



Long-term forest bird trends in Minnesota's National Forests

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Driven to Discover

FORESTS

Since 1968 breeding bird populations in forests have dropped 32% in the East and nearly 20% in the West.

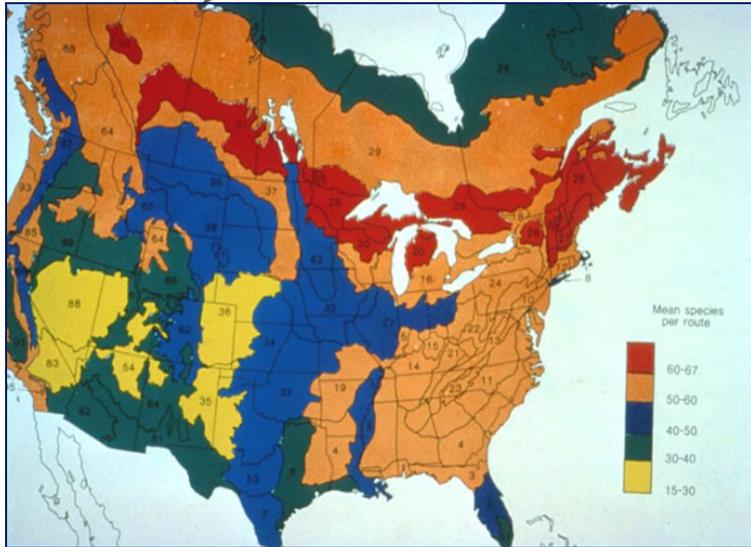
Habitat loss due to development is a major threat. But creating and restoring forests has proven to be a great help.

State of the Birds 2014 #SOTB14

Cerulean Warbler by Gerrit Vyn



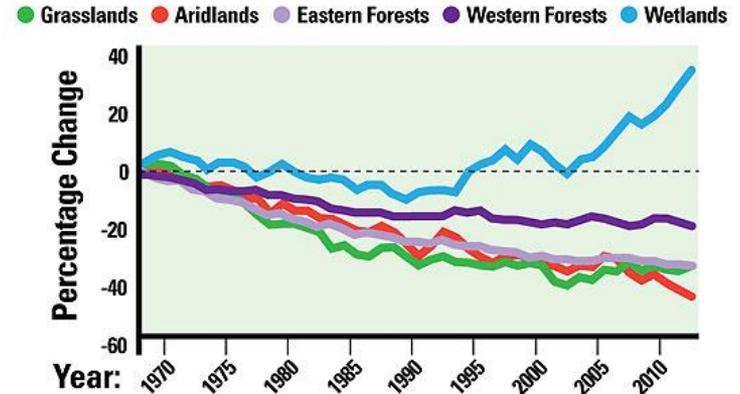
The breeding bird communities of Minnesota's forests are among the most diverse in North America.



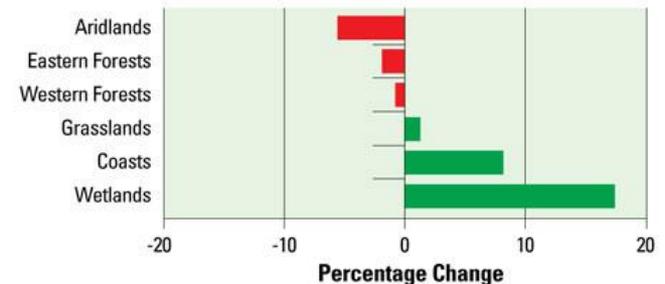
- Economic benefits
 - Bird watching, hunting
- Plant pollinators
- Pest controllers
- Seed distributors
- Nutrient redistributors
- Environmental indicators

North American Bird Conservation Initiative, U.S. Committee. 2014. The State of the Birds 2014 Report. U.S. Department of Interior, Washington, D.C.

BIRD POPULATION INDICATORS IN FIVE INLAND HABITATS



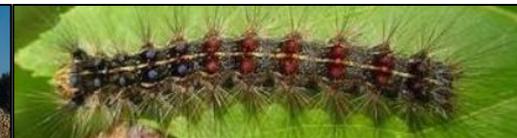
HABITAT INDICATOR CHANGE SINCE 2009 STATE OF THE BIRDS REPORT



Aridland birds continue to show the steepest declines, while coastal and wetland bird populations continue to increase.

Current issues in Minnesota forests

- In less than 200 years Minnesota's forests have decreased from 31 million acres to 16 million acres
- Harvest levels have declined in Minnesota's NFs since the 1990's
 - Changes in the balance between forest cover types, age classes, and patch sizes
 - Management strategies that deviate from the range of natural variation in MN forest ecosystems
- Continued threats:
 - Fragmentation, agriculture, urbanization, climate change, invasive species



Gypsy Moth



Emerald Ash Borer

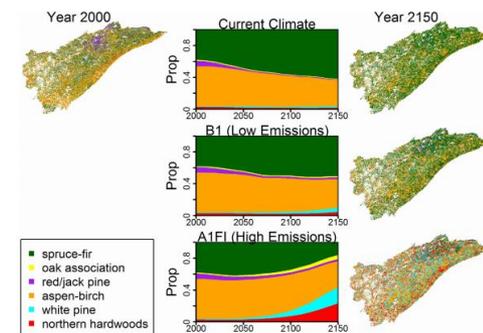
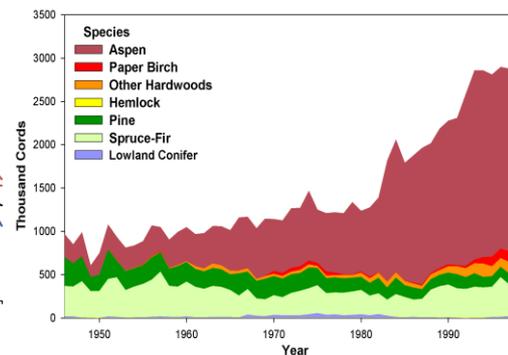
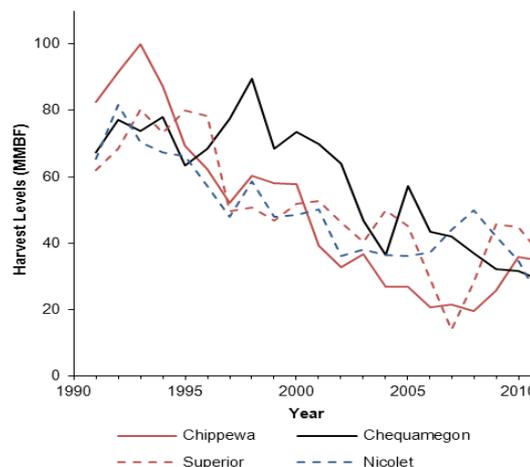


Fig. 9. Northeastern Minnesota map of classified forests type at simulation year 2000 (upper left), proportion of forest types changing through time for each climate future (middle), and associated forest type maps at simulation year 2150 (right). Figure colors consistent throughout.



Results for 20 years (1995-2014) in Chippewa and Superior National Forests

- **Chippewa NF** – 64 species tested; 17 (27 %) species significantly increased and 7 (11 %) had decreasing trends; – **89% of the species are either stable or increasing**
- **Superior NF** – 63 species tested; 18 (29 %) species increased and 12 (19 %) decreased; – **81 % of the species are either stable or increasing**
- **Both NFs** – 53 species tested; 17 (23 %) species have significant **increasing** and 8 species (15%) had significant **decreasing** trend in both National Forests; **collectively 85% of the species examined are either stable or increasing**

Species declining – 1995-2014

Typical Cover Type Associations

Deciduous (4)



Coniferous (6)



Early successional (2)



Fields and meadows (1)



Chippewa NF

Least Flycatcher

Scarlet Tanager

Yellow-throated Vireo**

Chipping Sparrow**

Connecticut Warbler**

Winter Wren**

Song Sparrow**

Superior NF

Red-eyed Vireo**

Chipping Sparrow

Connecticut Warbler**

Evening Grosbeak**

Swainson's Thrush**

Yellow-bellied Flycatcher**

Mourning Warbler

Olive-sided Flycatcher

American Crow**

Broad-winged Hawk

Common Loon**

Downy Woodpecker

Grain of salt



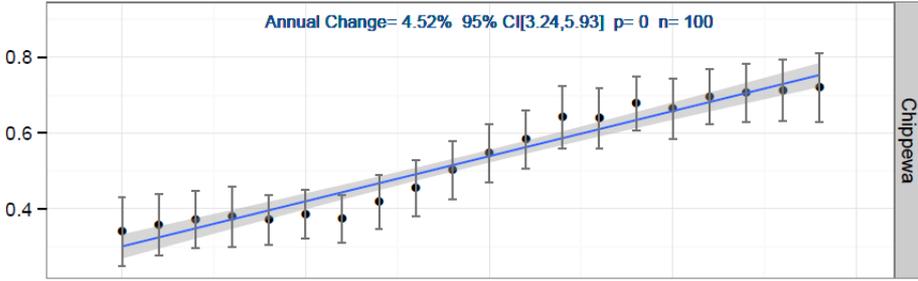


Increasing species:



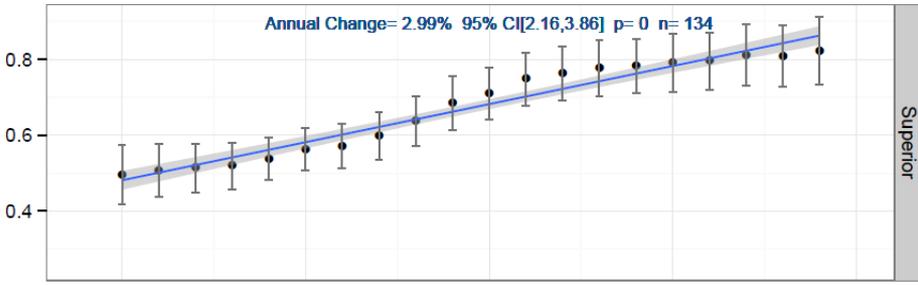
Black-and-white Warbler

Annual Change= 4.52% 95% CI[3.24,5.93] p= 0 n= 100



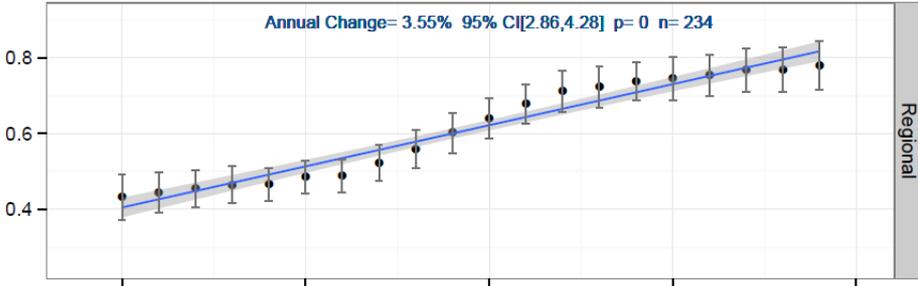
Chippewa

Annual Change= 2.99% 95% CI[2.16,3.86] p= 0 n= 134



Superior

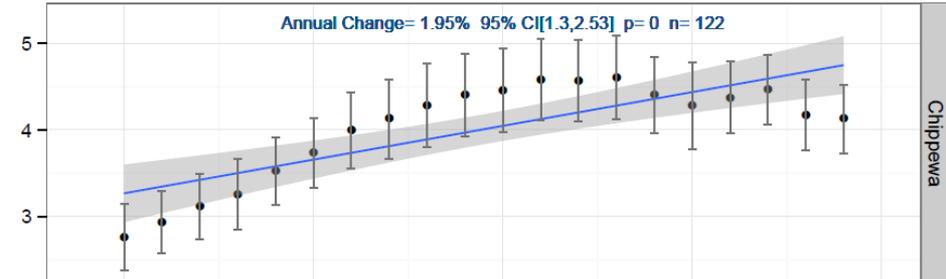
Annual Change= 3.55% 95% CI[2.86,4.28] p= 0 n= 234



Regional

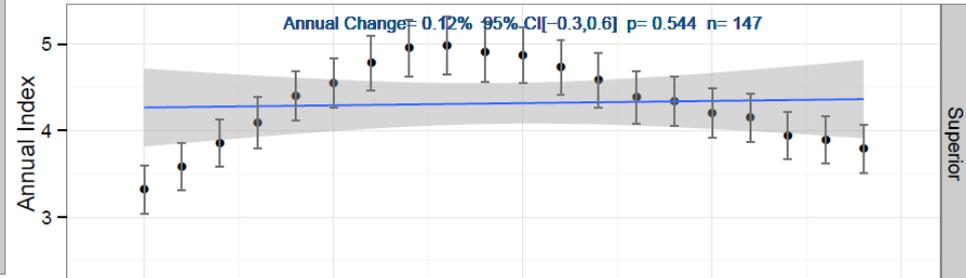
Ovenbird

Annual Change= 1.95% 95% CI[1.3,2.53] p= 0 n= 122



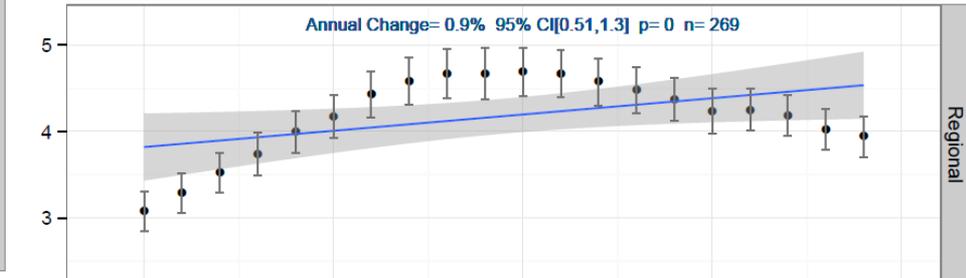
Chippewa

Annual Change= 0.12% 95% CI[-0.3,0.6] p= 0.544 n= 147



Superior

Annual Change= 0.9% 95% CI[0.51,1.3] p= 0 n= 269



Regional

Annual Index

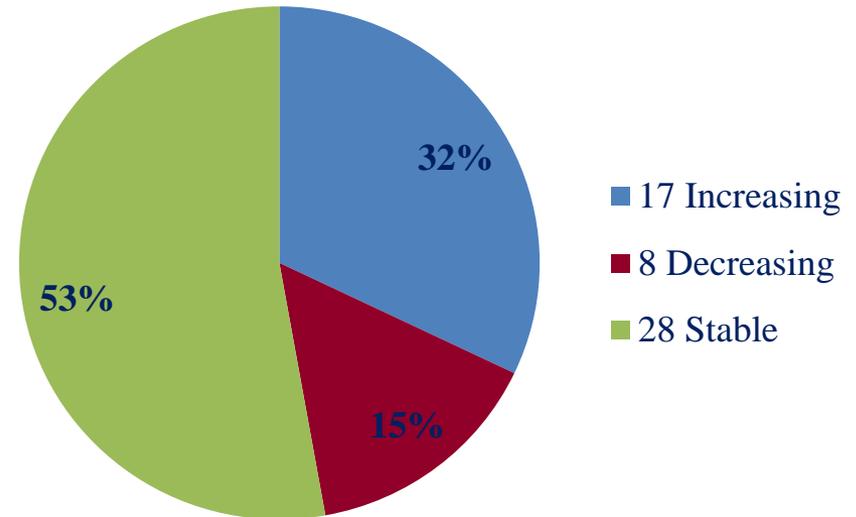
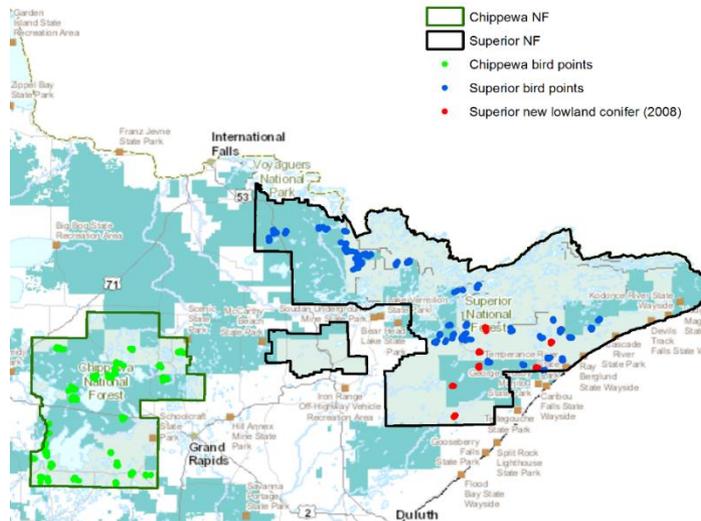
Annual Index

Year

Year

Scorecard for birds in Minnesota forests -1995-2014

53 species trends



Collectively 85 % of the species examined are either stable or increasing in our National Forests



Connecticut Warbler



Golden-winged Warbler

Reflection of NF management.

But results may only be applicable to NF lands, we need more information for state and county lands.

Connecticut Warbler

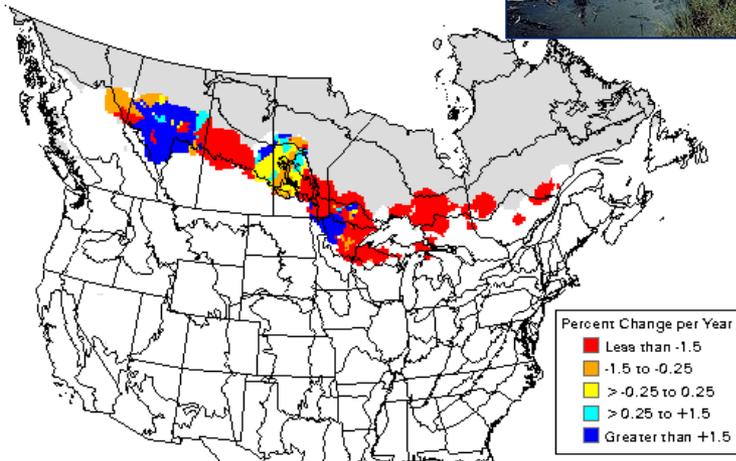
Connecticut Warbler
Oporornis agilis



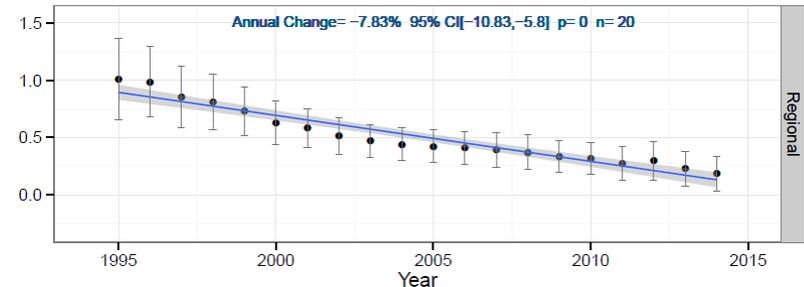
Map by Cornell Lab of Ornithology
Range data by NatureServe



- Large and widespread declines in Canada from the North American Breeding Bird Survey
- >80% population decline in 20 years in Minnesota National Forests
- Potential climate change impacts on lowland coniferous forests
- Migration
 - “Super collider” with towers - Arnold and Zink (2011), Longcore et al. (2013)
- Wintering areas?



Breeding Bird Survey, Sauer et al. (2014)



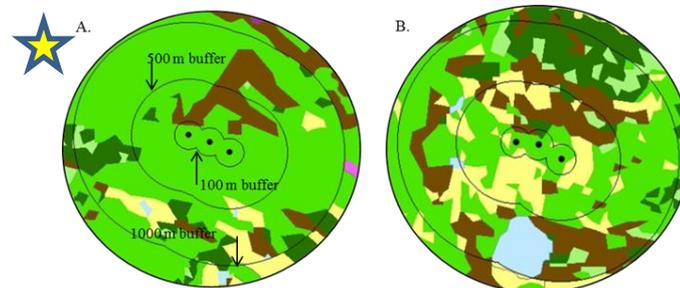
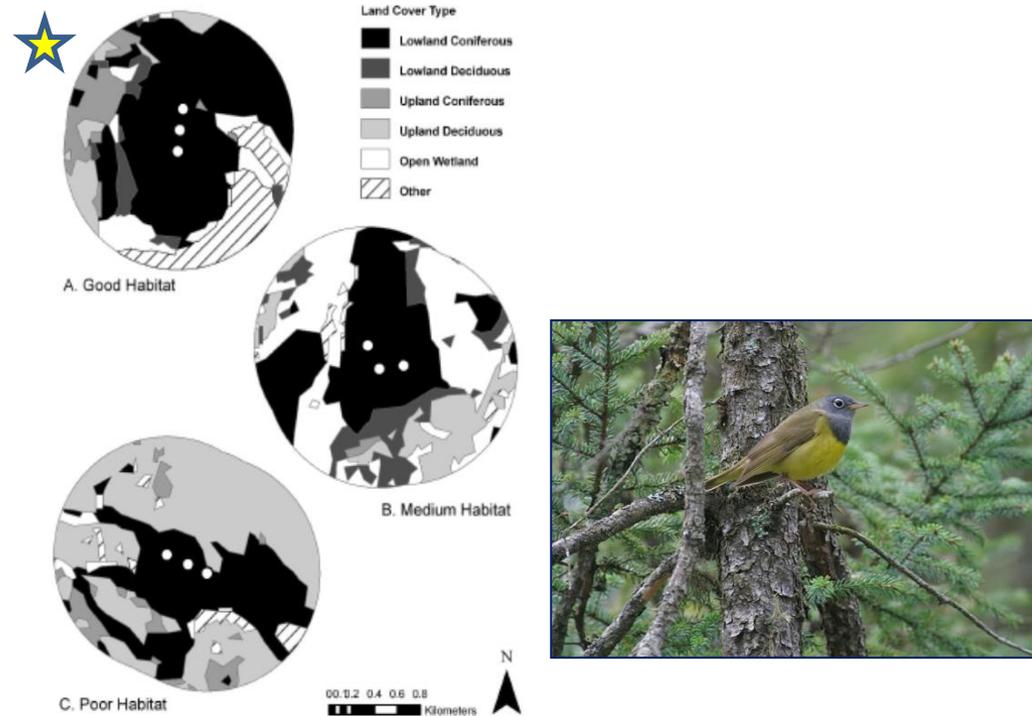
NRRI Forest Bird

Connecticut Warbler

- Our results show landscape effects are important for Connecticut Warblers.

- Positively associated with large patches of lowland forest- *Lapin et al. (2013) The Condor 115: 168-177*

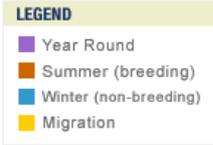
- Higher probability of local extinction in stands with more edge- *Grinde et al. in prep*



More edge → higher probability of local extinction

Golden-winged Warbler

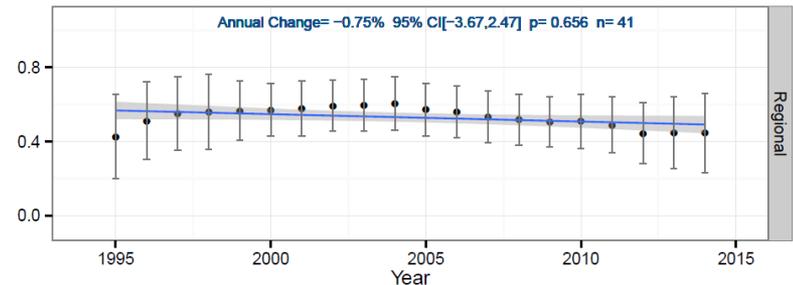
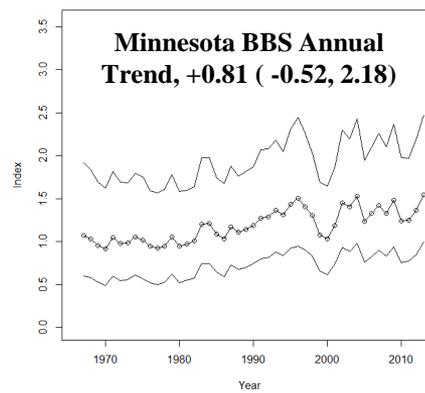
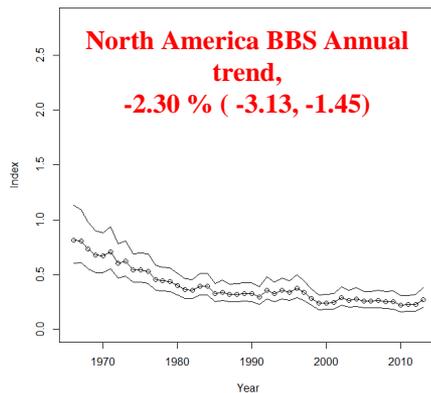
Golden-winged Warbler
Vermivora chrysoptera



Map by Cornell Lab of Ornithology
Range data by NatureServe



- Potentially the most important MN bird species
- 47 % of the global population is in MN
- Listed as threatened in Canada and being considered as endangered in US
- MN breeding habitat
 - Shrub wetlands (courtship and foraging)
 - Young forests (courtship and foraging)
 - Mature forests (foraging, nesting, & cover)

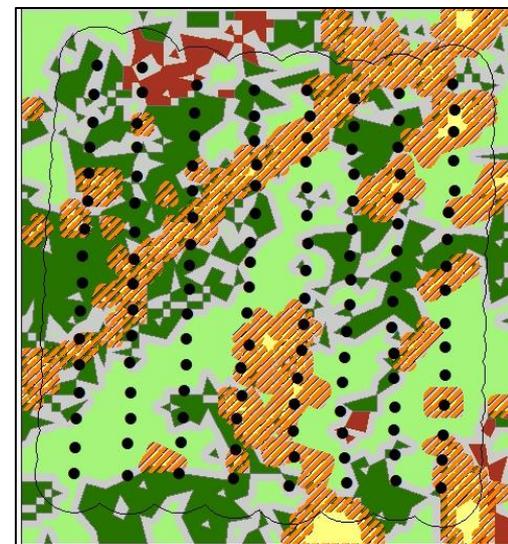
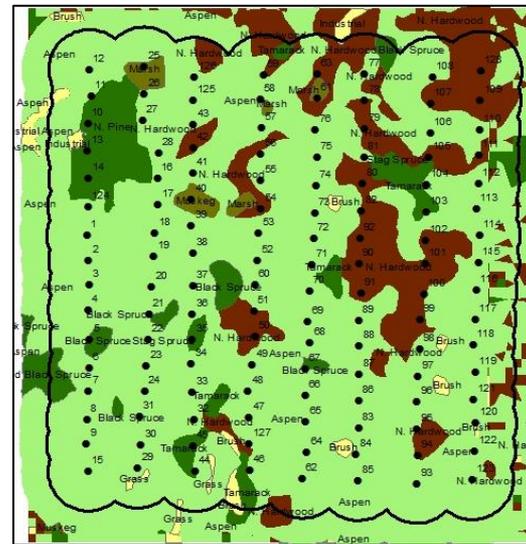


Breeding Bird Survey, Sauer et al. (2014)

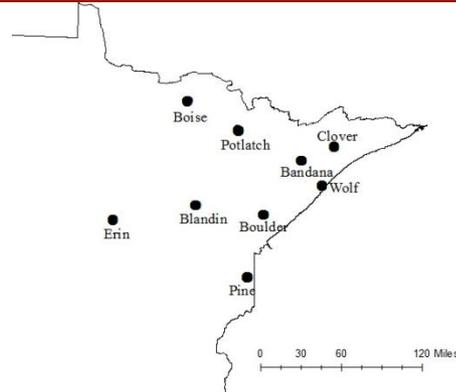
NRRI Forest Bird

Golden-winged Warbler

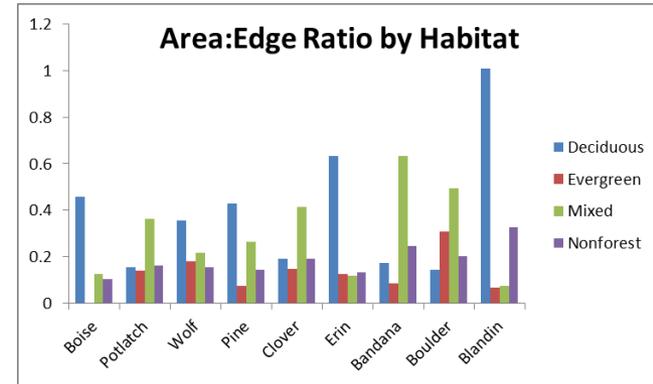
- Landscape effects are important for also important drivers of Golden-winged Warbler abundance
- Preliminary results of experimental “Large Plots” project show
 - Abundance is positively associated with large patches of early-successional and shrub swamp habitats
 - Spatial distribution data shows preference for “soft edge”



Large Plots Project



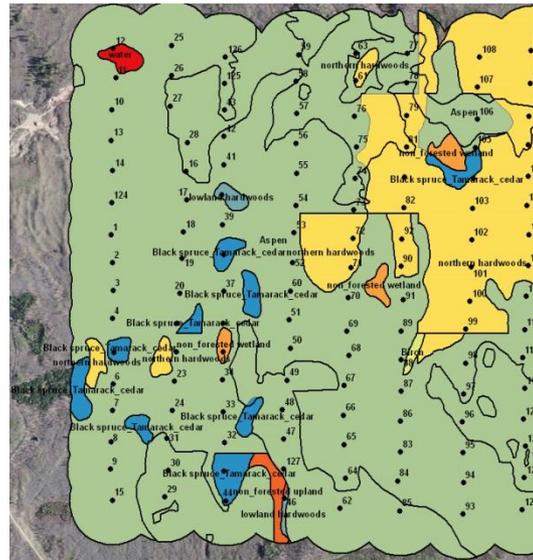
Objective: Determine the influence of patch size, associated landscape factors, and forest succession on species abundance and distribution in managed forests of Minnesota.



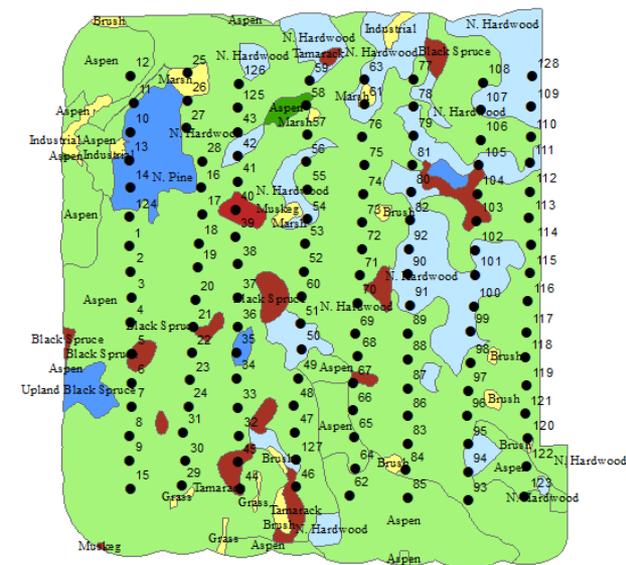
Large plots project (1993-1998; 2012- present)

- 9 sites 1 mile x 1 mile
- 8 transects 1400m long ~ 200m apart
- 128 point counts in each plot
- Plots vary in management history, habitat composition, and landscape features.

Blandin plot in 1993:
Average forest age ~75

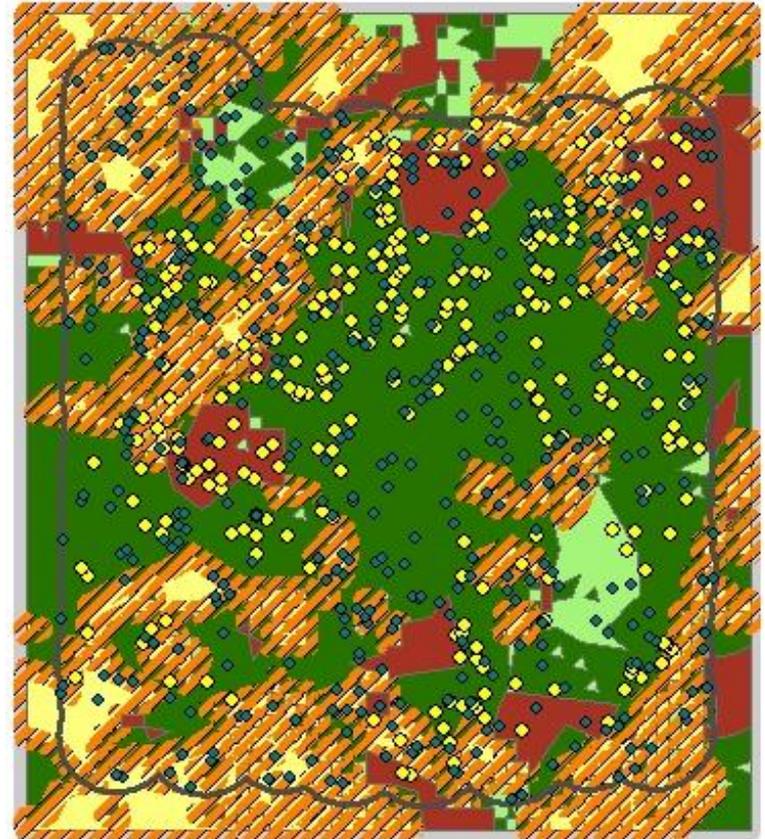
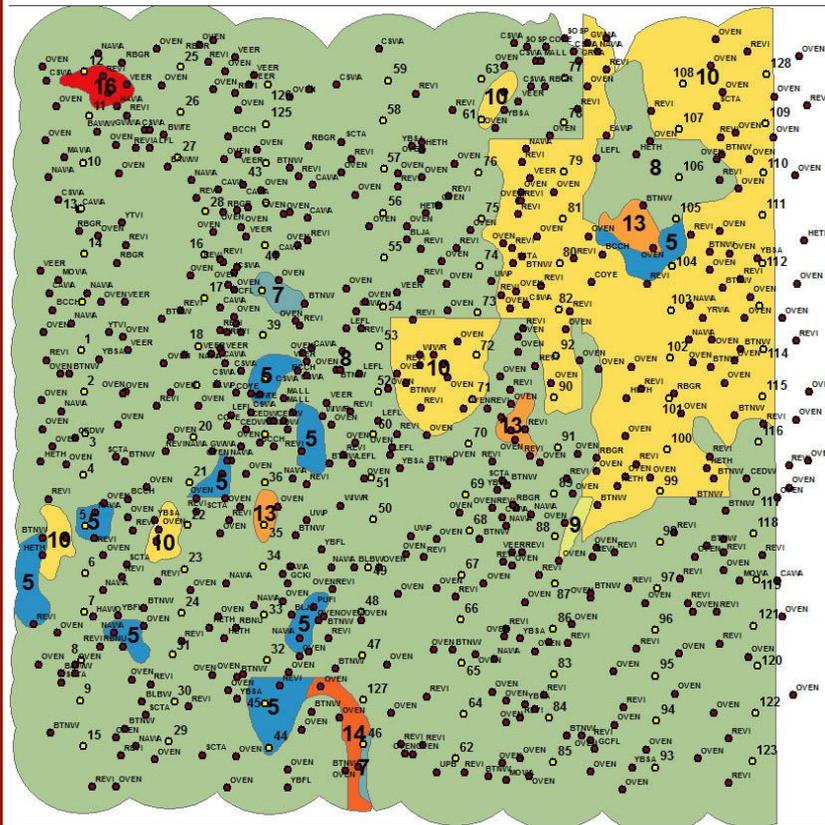


Blandin plot in 2012:
Average forest age ~30



Large Plots Project: Spatial distribution of birds across forested landscape

Ovenbird distribution vs. randomly distributed species



Habitat Selection:	Landscape Location:
Deciduous	Hard edge
Conifer	Soft edge
Mixed forest	Core habitat
Non-forest	

Ovenbirds select for deciduous core habitats and avoid hard edges ~40m buffer in from non-forest habitats: landing areas, ATV trails, power line easements, etc.

Blandin Large Plot: Breeding birds and forest succession

- In cooperation with UPM Blandin, NCASI, and Potlatch

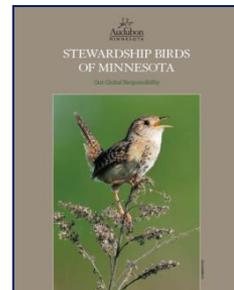
- What is the use of young, regenerating forests by forest birds during the breeding and post-breeding season?



- Examination of forest succession and bird communities across a large landscape

UPM Blandin Large Plot
- number of individuals observed

Species	1994	1995	1996	2013	2014
Total number of species	31	35	43	44	46
Total individuals	582	609	776	837	781
Bl.-throated Grn. Warbler	43	29	49	2	1
Chestnut-sided Warbler	20	0	25	111	99
Golden-winged Warbler	3	3	2	32	28
Ovenbird	220	225	203	97	105
Red-eyed Vireo	118	118	159	90	60
Scarlet Tanager	11	9	20	2	0
White-throated Sparrow	0	0	6	39	21
Veery	0	0	28	86	104





Forestry and Wildlife Summary

- Our Goal – understand the environmental concerns that inhibit the growth of the economy.
- Greater capacity to utilize the forests of MN, especially for value-added use of wood.
- Climate change, invasive species, agriculture growth, and exurban development need to be considered in concert through appropriate planning.
- Balance in maintaining existing forests and their appropriate cover types, age classes, and patch sizes will be beneficial to wildlife.

Forestry and Wildlife Summary

- USDA Forest Service – especially Chippewa, and Superior National Forests
- UPM Blandin, Potlatch, & National Council for Air and Stream Improvement
- US Environmental Protection Agency
- MN Dept. of Natural Resources
- MN Legislative Comm. for MN Resources
- US Fish and Wildlife Service
- Audubon Minnesota
- US Geological Survey
- National Science Foundation
- Minnesota Ornithologists' Union – website for many of the pictures



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