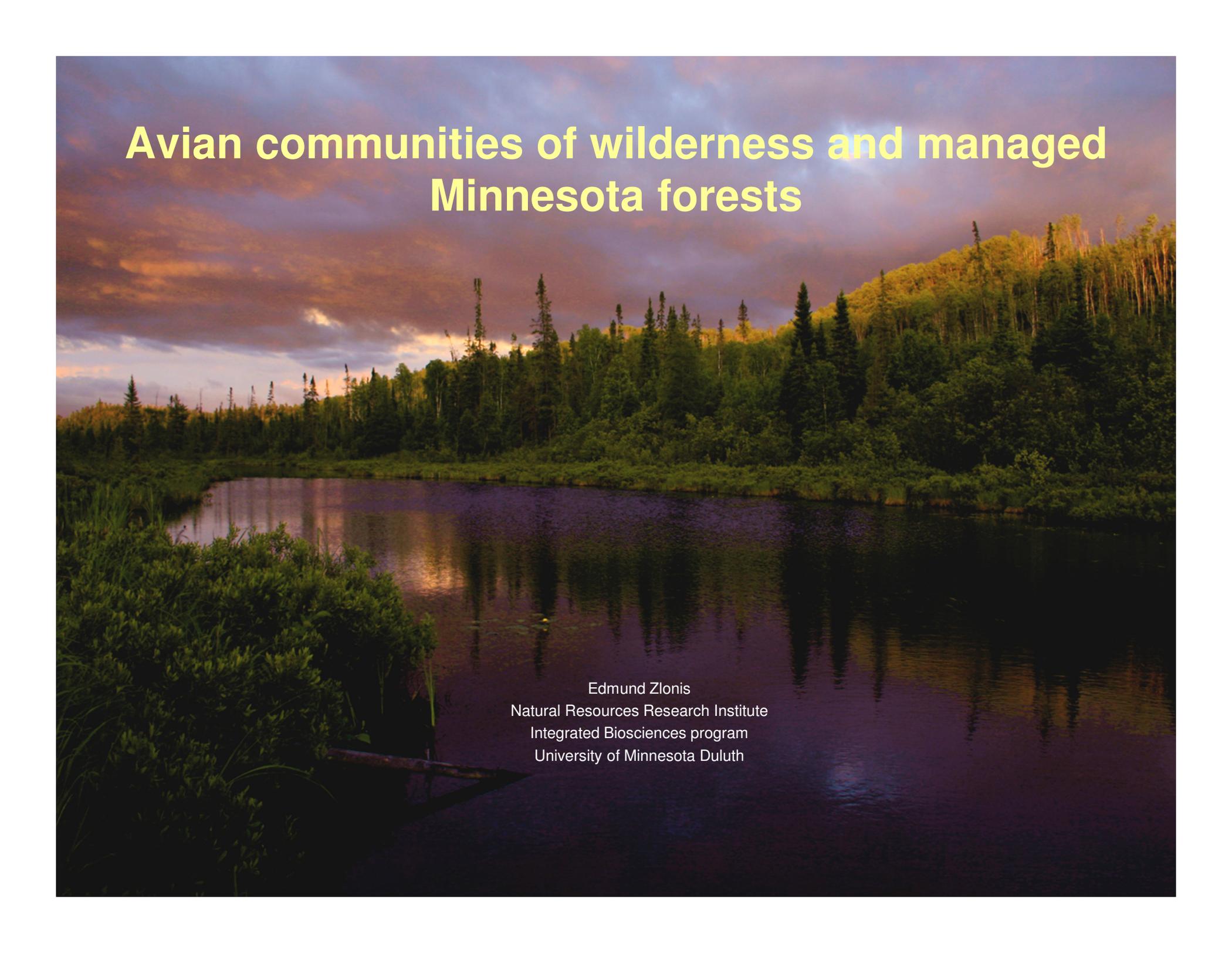


Avian communities of wilderness and managed Minnesota forests



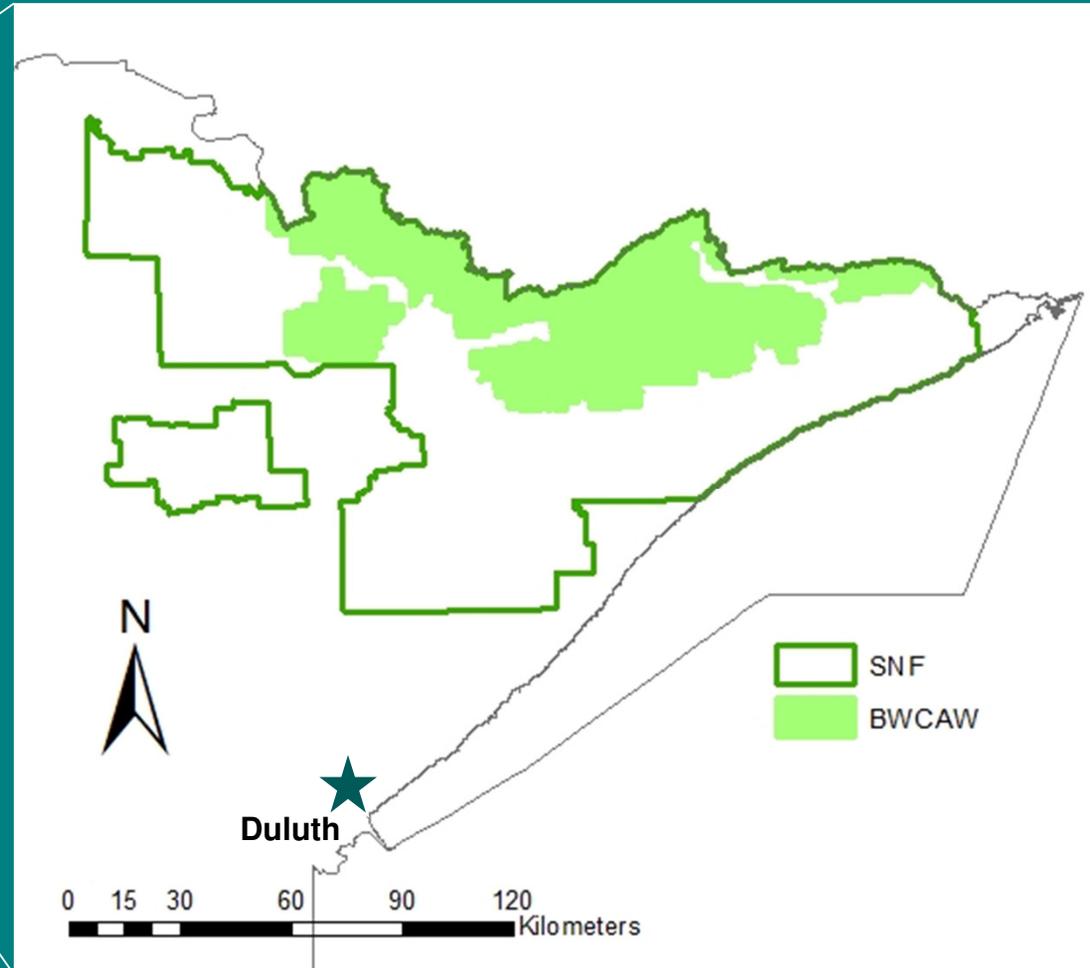
Edmund Zlonis
Natural Resources Research Institute
Integrated Biosciences program
University of Minnesota Duluth

Outline

- **Study Area and Design**
- **Results**
 - **Habitat**
 - **Birds**
- **Conclusions**

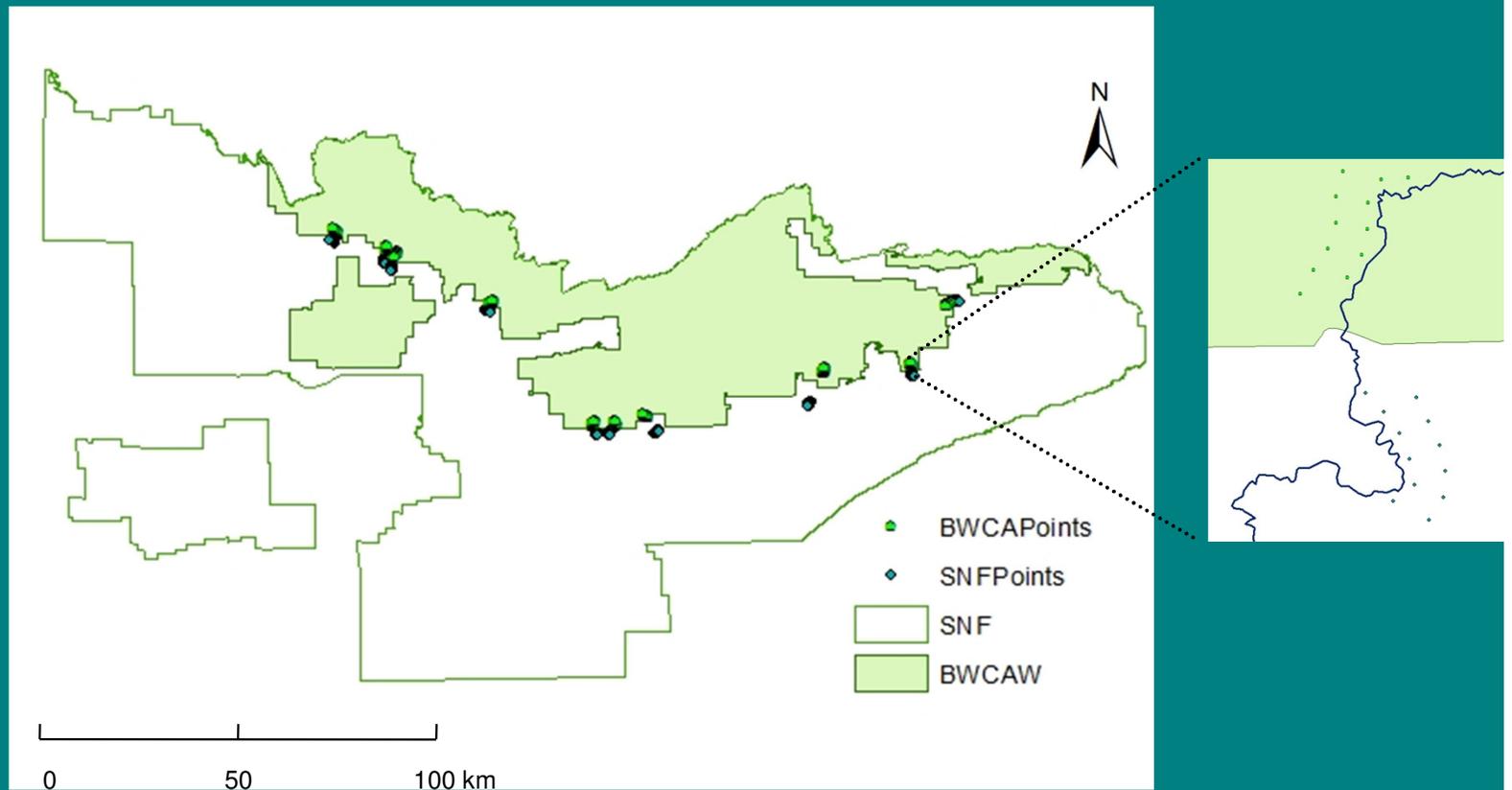


Study Area; BWCAW border



- Actively managed and wilderness (passively managed) forest areas
- How might these differences affect breeding birds?

Study Area; BWCAW border



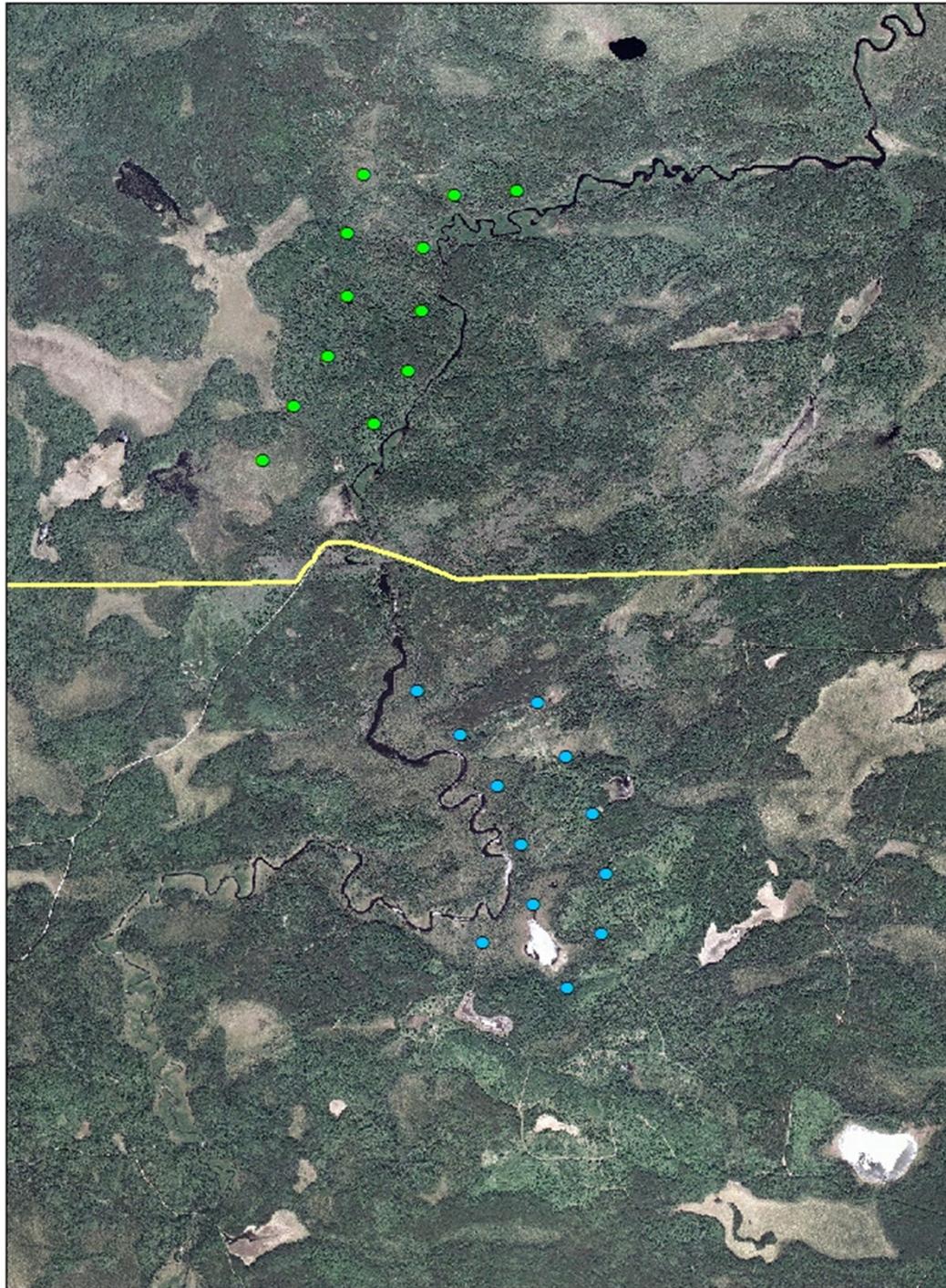
- 10 paired transects near river systems (BWCAW and SNF side)
 - 12 points per river-management type combination (6 at 100 m and 6 at 400 m from river)
- 240 total point count locations (120 per management type)

Transect count

BWCAW

500m Buffer

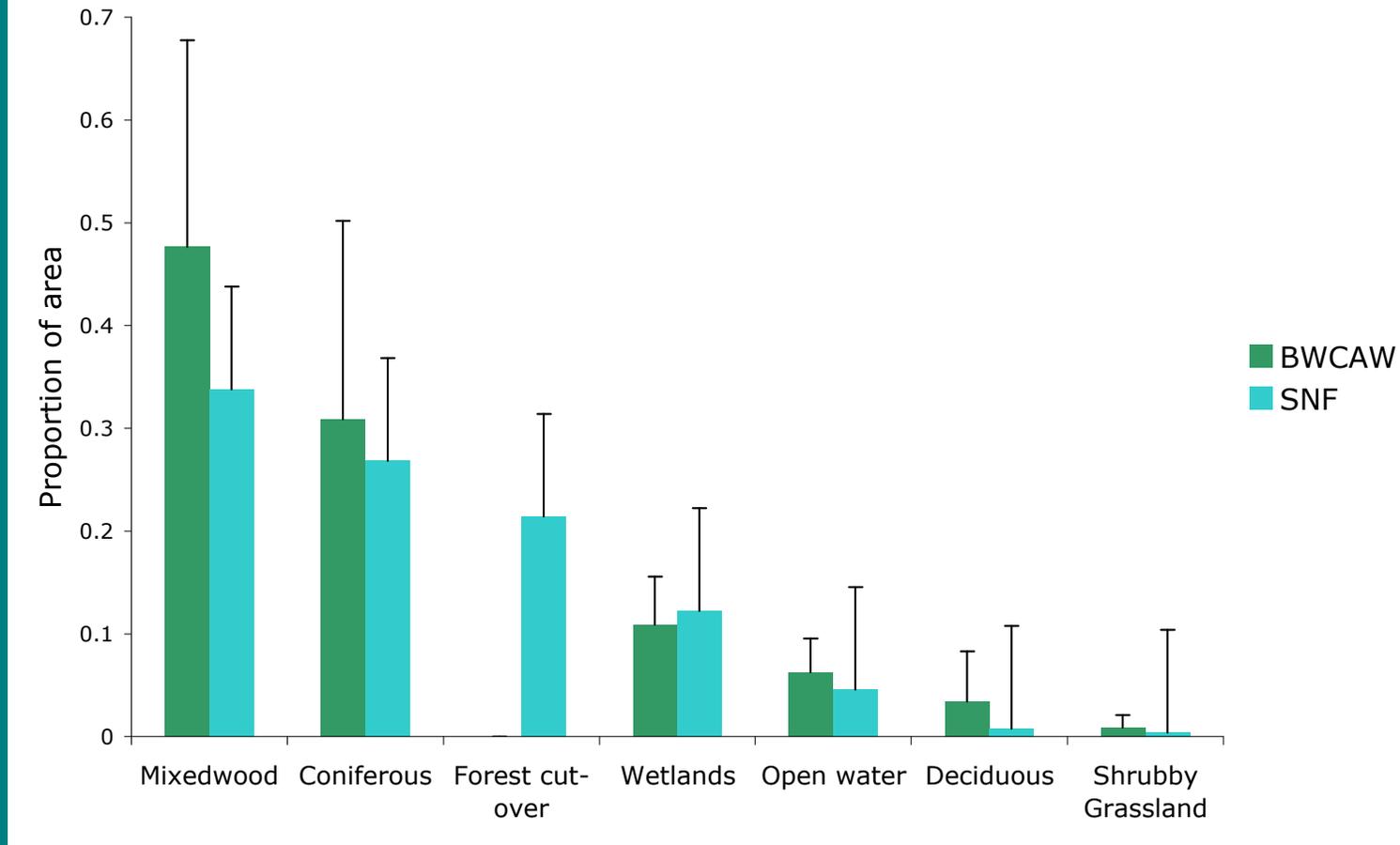
SNF



m

○ Point count every 250m along transect

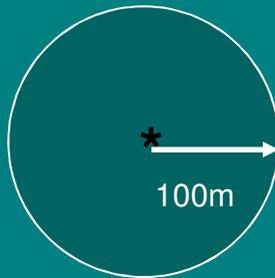
Broad habitat types



- Proportion of broad habitat-types in 1000 m radius surrounding transect center
 - ~ 20% of area near SNF transects regenerating from logging (mainly 1980-1995)
 - Fire was last major disturbance in 9 / 10 of BWCaw transects

Data Collection

- Three surveys for each of the transects
 - Mid-May through early-July 2010 and 2011
 - 10 minute avian-counts at each point

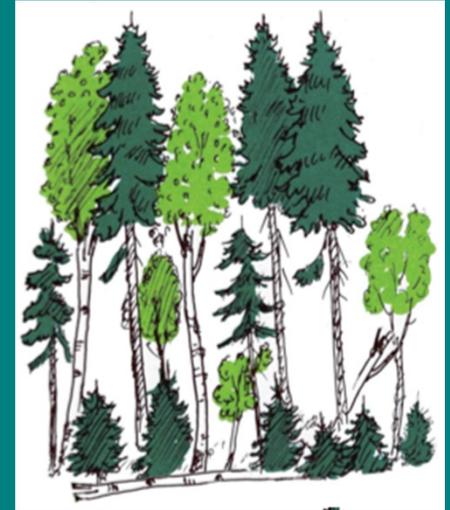


- Habitat assessment at each point count location



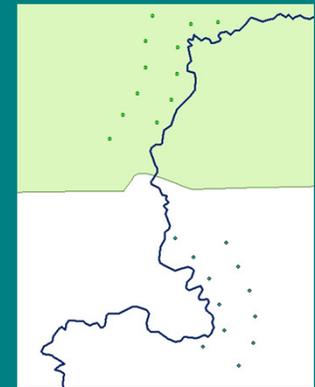
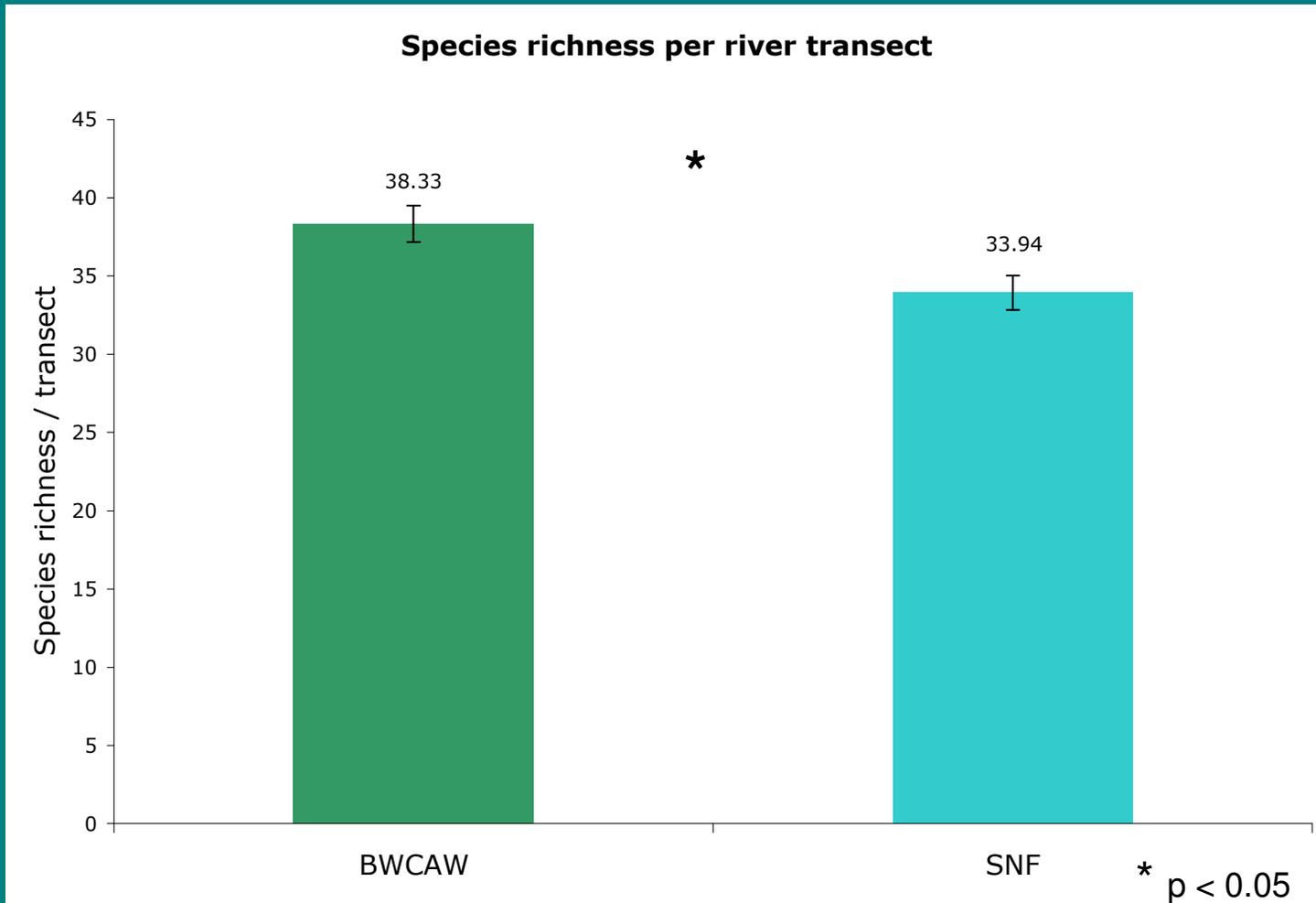
Vegetation characteristics

- Habitat assessment at each point (120 in BWCAW, 120 in SNF)
 - Used 10 BAF prism to estimate basal area, tree species composition at point count locations (trees > 10cm dbh)
 - Estimated canopy height and Canopy, subcanopy, understory, and ground coverages



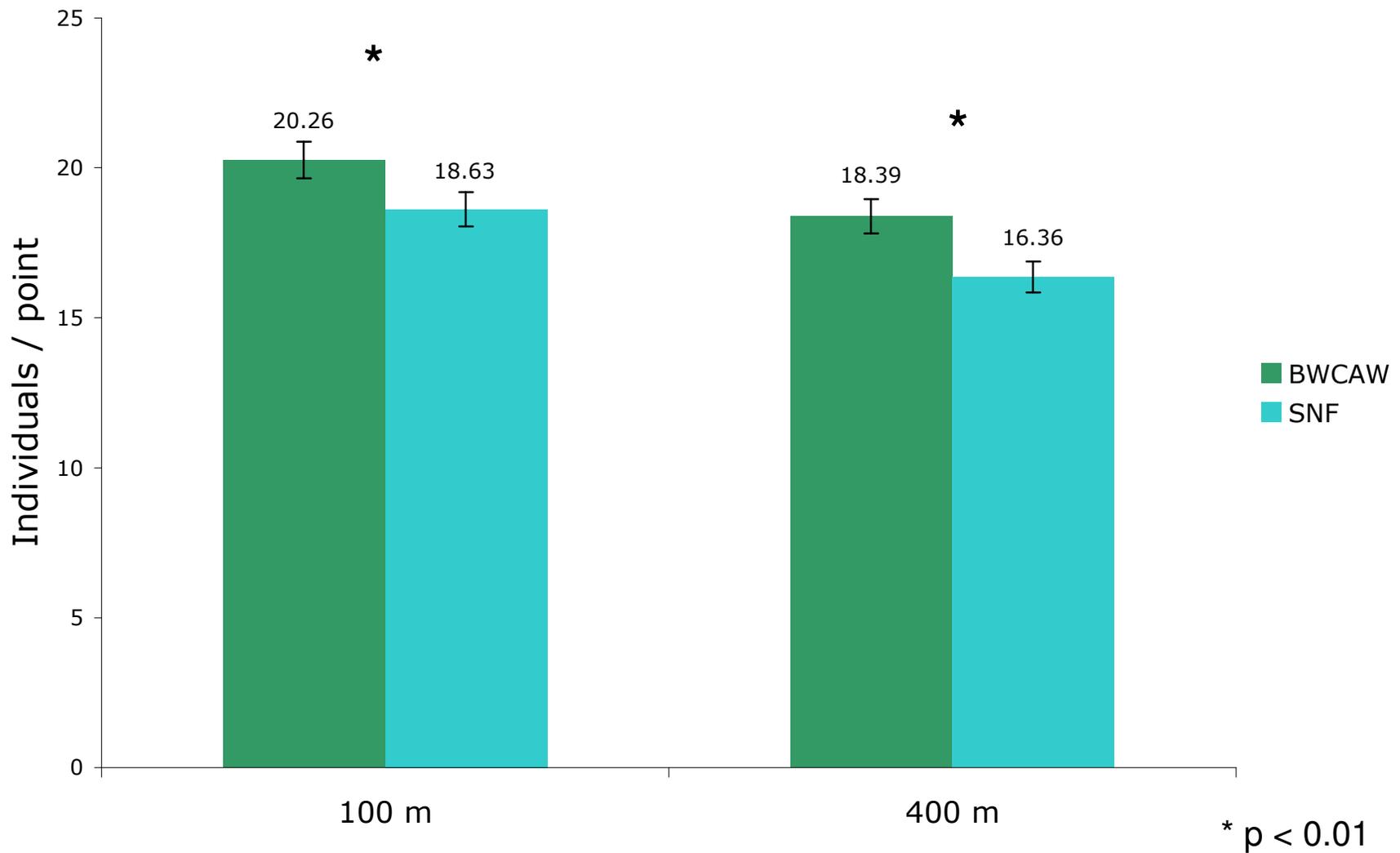
Variable	BWCAW	se	SNF	se	p-value
Canopy height (m)	15.97	0.72	13.34	0.62	0.02
Tree richness (species/prism plot)	2.36	0.17	1.68	0.14	<0.01
BA (m ² /ha)	14.79	1.34	11.84	1.09	0.09
Tree density (trees/ha)	564.68	54.64	561.11	54.30	0.96
Snag density (trees/ha)	68.15	18.81	37.81	10.44	0.17
Canopy coverage	48%	4%	48%	4%	0.90
Canopy deciduous	46%	5%	44%	5%	0.78
Sub-canopy coverage	40%	3%	34%	3%	0.14
Sub-canopy deciduous	44%	5%	38%	4%	0.13
Understory coverage	47%	4%	42%	3%	0.19
Understory deciduous	58%	6%	57%	6%	0.84
Ground coverage	81%	4%	80%	4%	0.85
Shrub density	3.08	0.17	3.18	0.18	0.67

Bird community results



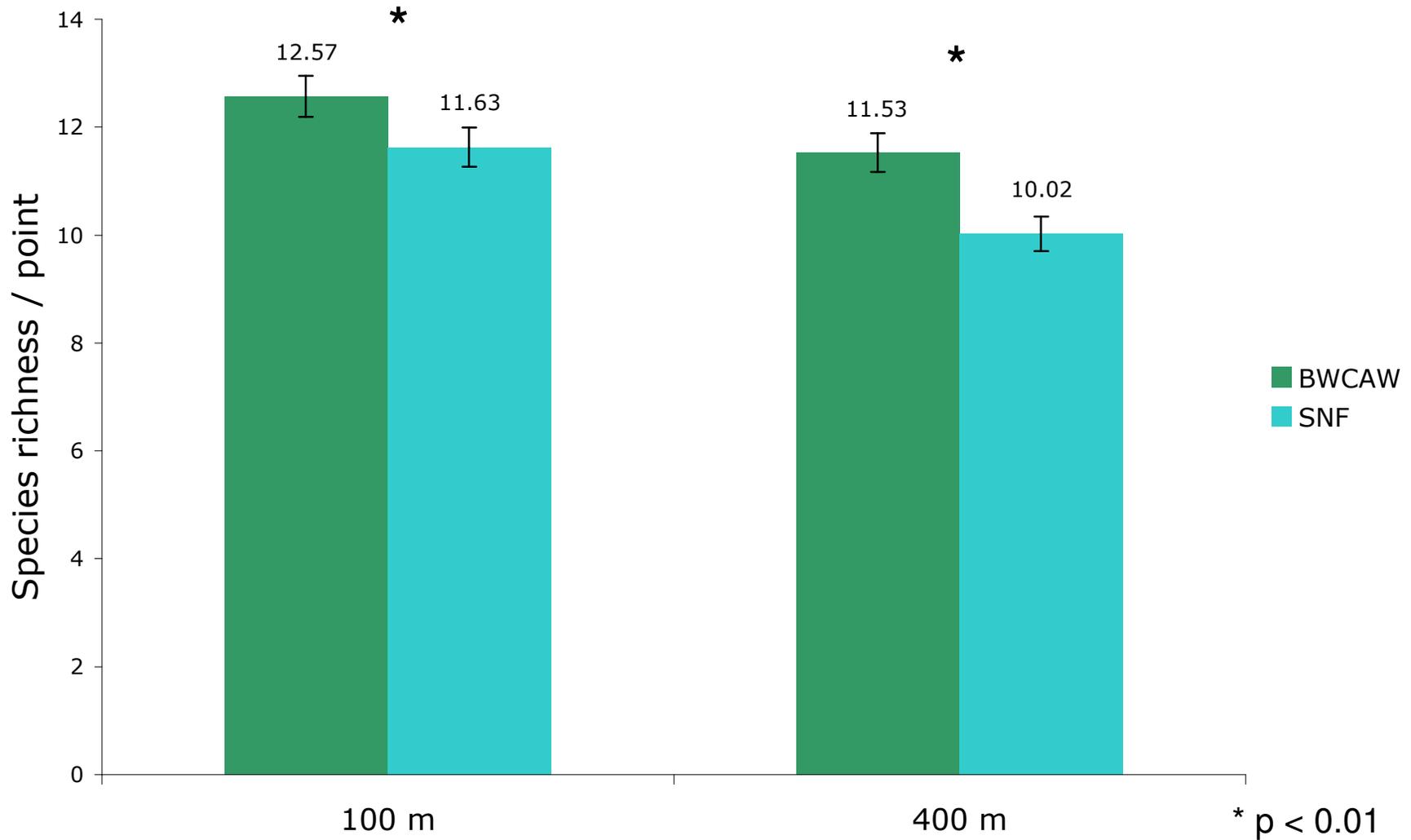
- 13,332 total individuals detected (without flyovers), 94 species
- 87 species in BWCAW, 84 species in SNF

Total individuals unlimited distance



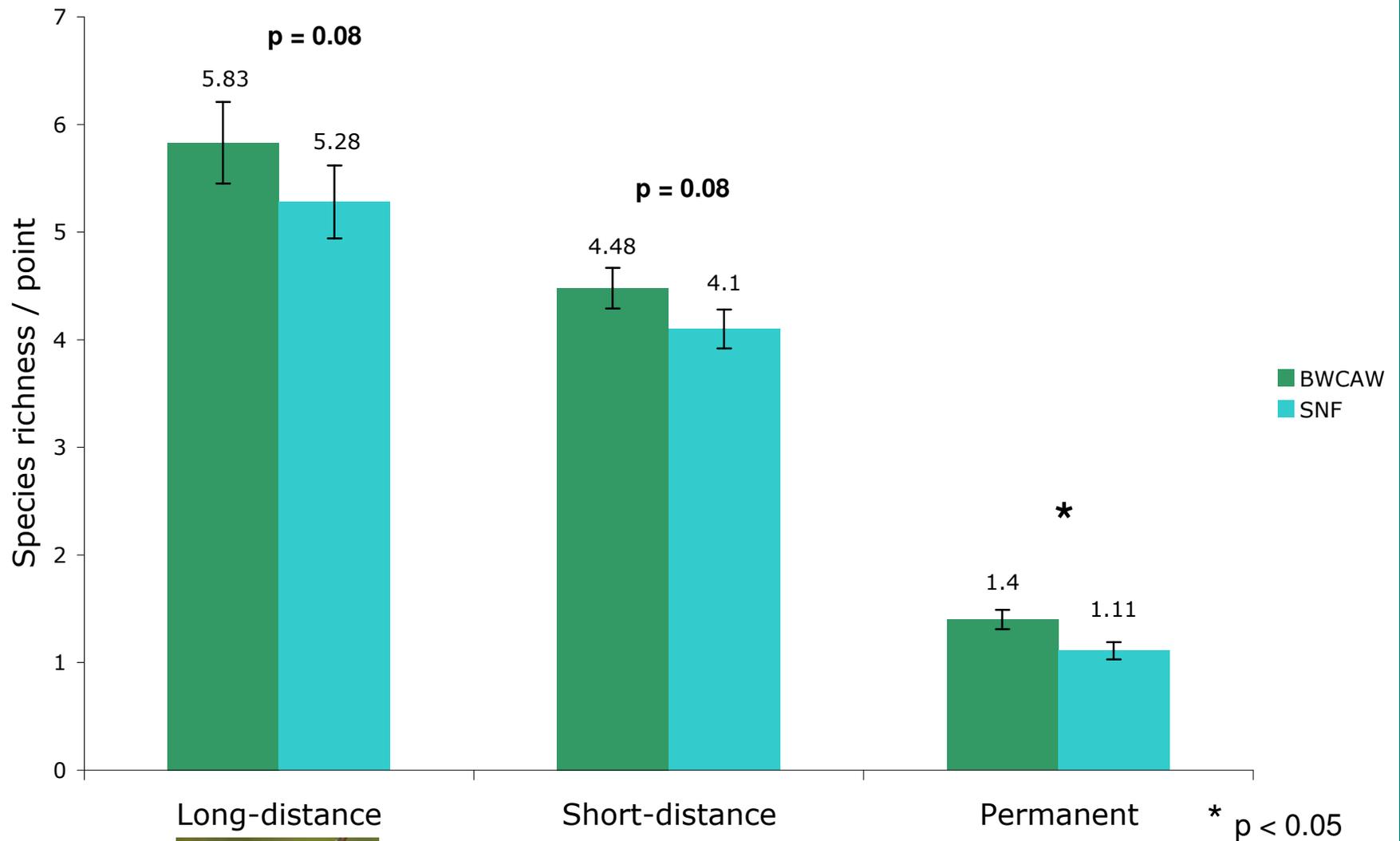
- BWCAW; 19.33 individuals / point, SNF; 17.5 individuals / point
- Similar results between unlimited distance and fixed radius (100m) counts

Species richness unlimited distance

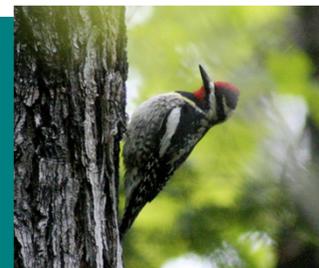
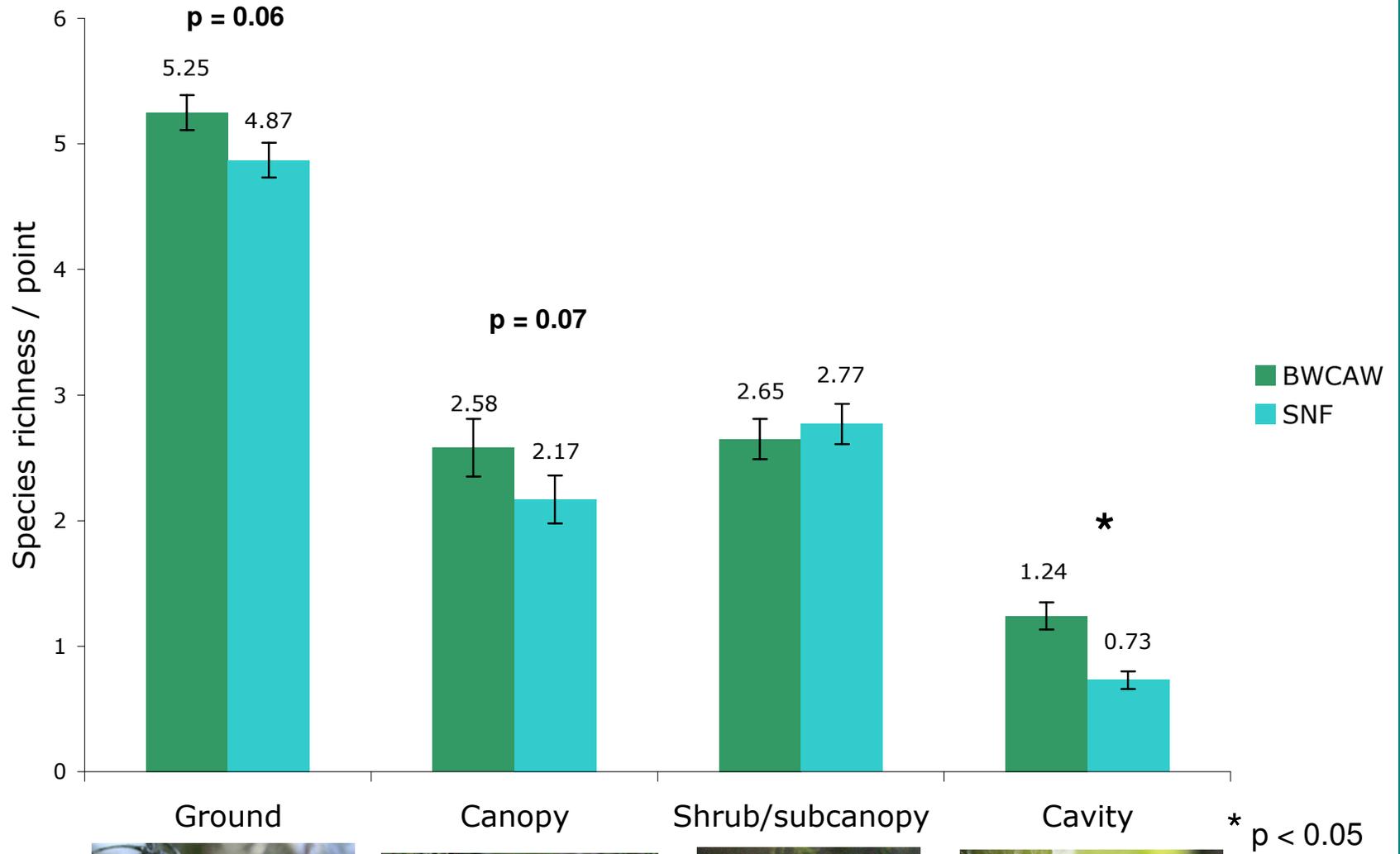


- BWCAW; 12.05 species / point , SNF; 10.83 species / point
- Similar results for unlimited distance and fixed radius (100m) counts

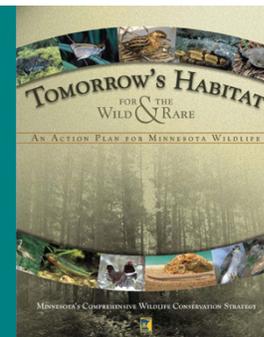
Species richness of migration guilds



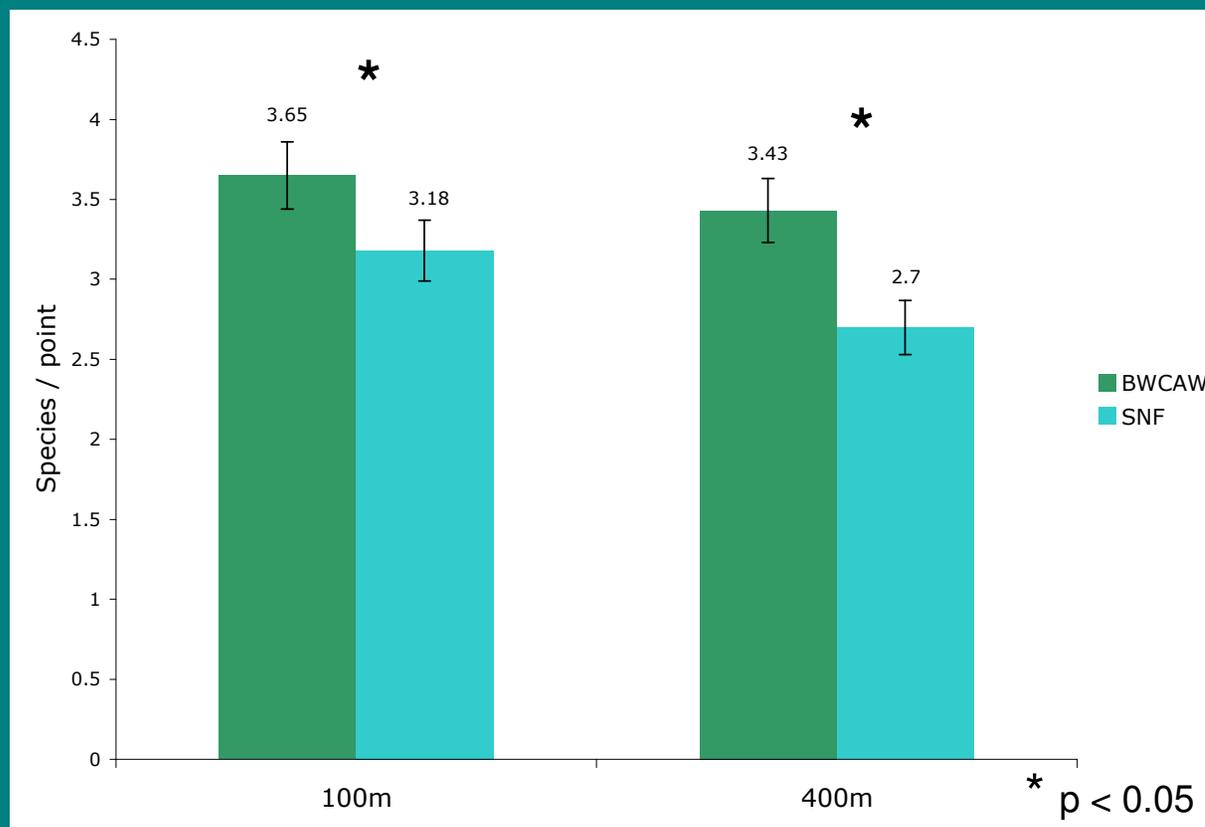
Species richness of nesting guilds



Species of conservation concern



Common name
American Bittern
Bald Eagle
Bay-breasted Warbler
Black-backed Woodpecker
Black-billed Cuckoo
Black-throated Blue Warbler
Boreal Chickadee
Canada Warbler
Cape May Warbler
Common Loon
Common Nighthawk
Connecticut Warbler
Eastern Wood-pewee
Le Conte's Sparrow
Least Flycatcher
Olive-sided Flycatcher
Ovenbird
Rose-breasted Grosbeak
Sedge Wren
Spruce Grouse
Swamp Sparrow
Veery
White-throated Sparrow
Winter Wren
Yellow-bellied Sapsucker



- BWCW; 3.51 species / point, SNF; 2.84 species / point
- 100m; 3.40 species / point, 400m; 2.93 species / point



Individual species: Management type effect



Winter Wren



Black-capped Chickadee



Brown Creeper



Red-breasted Nuthatch

BWCAW



Golden-crowned Kinglet



Least Flycatcher



Canada Warbler



Yellow-bellied Flycatcher

SNF

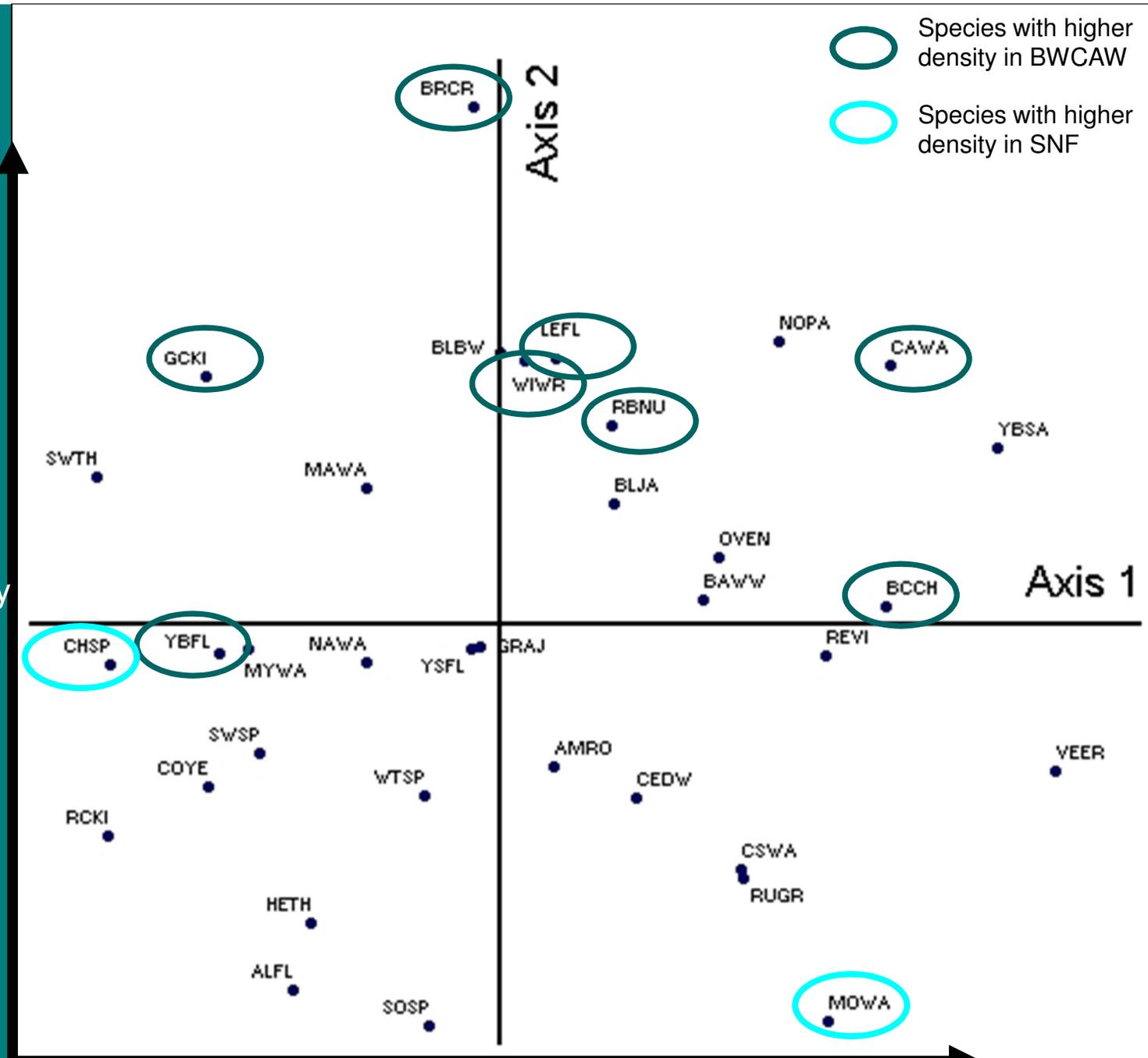


Mourning Warbler



Chipping Sparrow

Increasingly mature,
mixed, and structurally
complex forests



Increasing deciduous cover

Conclusions



- Increased species richness and abundance in BWCAW forest stands
 - Especially resident and cavity nesting species
 - Eight out of ten species that varied had higher density in BWCAW
- Important habitat variables are increased in BWCAW forest stands
 - Especially for canopy / cavity nesting species
 - BWCAW still providing habitat for MOST early-successional species
- Higher species richness and abundance in relation to riparian corridors



Implications for conservation and management

- Wilderness management might help support cavity-nesting species, mature-forest species, and species of concern
 - Riparian areas, as well
- Retaining higher proportion of older, mixed stands in landscape might increase species richness and abundance
 - Many species are associated with mature and mixed forests
- Increase stand 'turnover' time during management?
 - *More diligent retention of trees, snags, patches*
 - *Avoid riparian systems*
 - *Further protection of Roadless Areas?*



Acknowledgements



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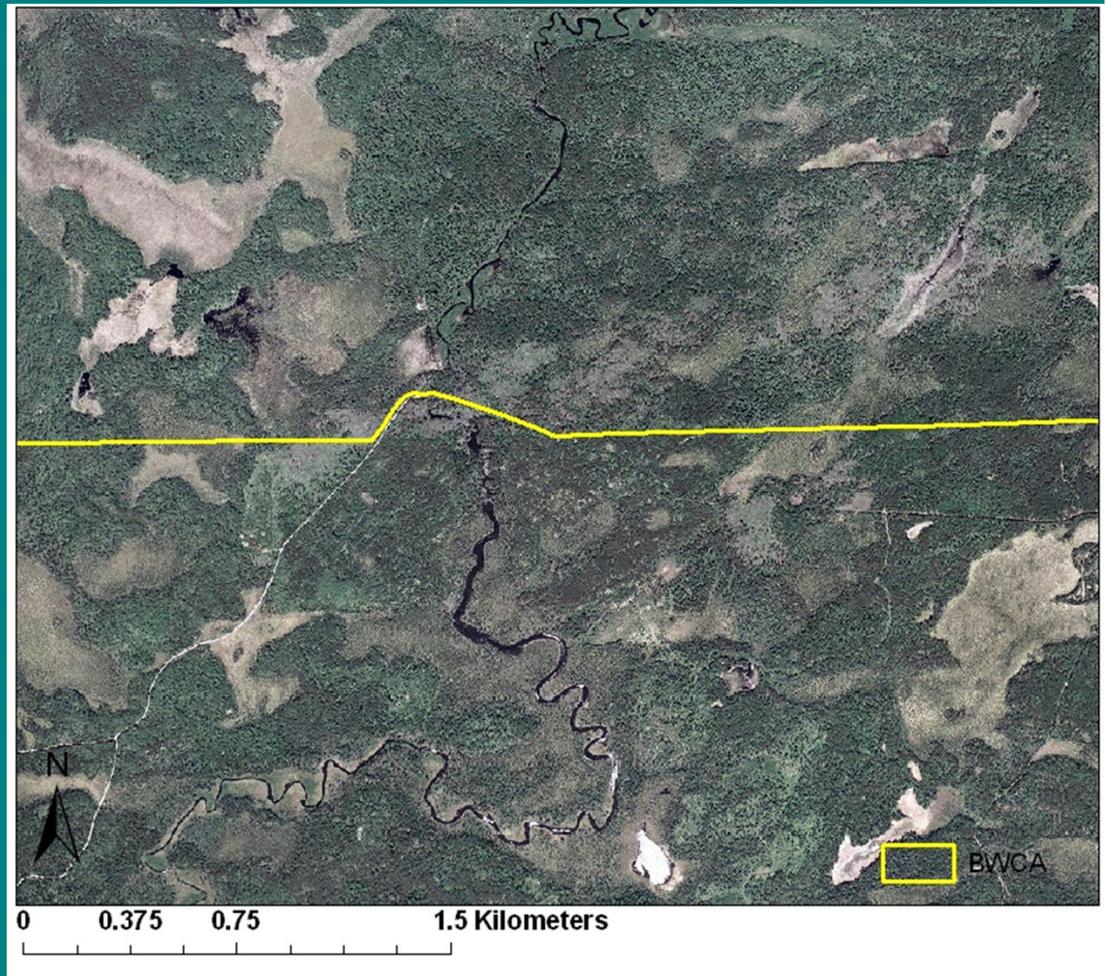


Thousands of birds

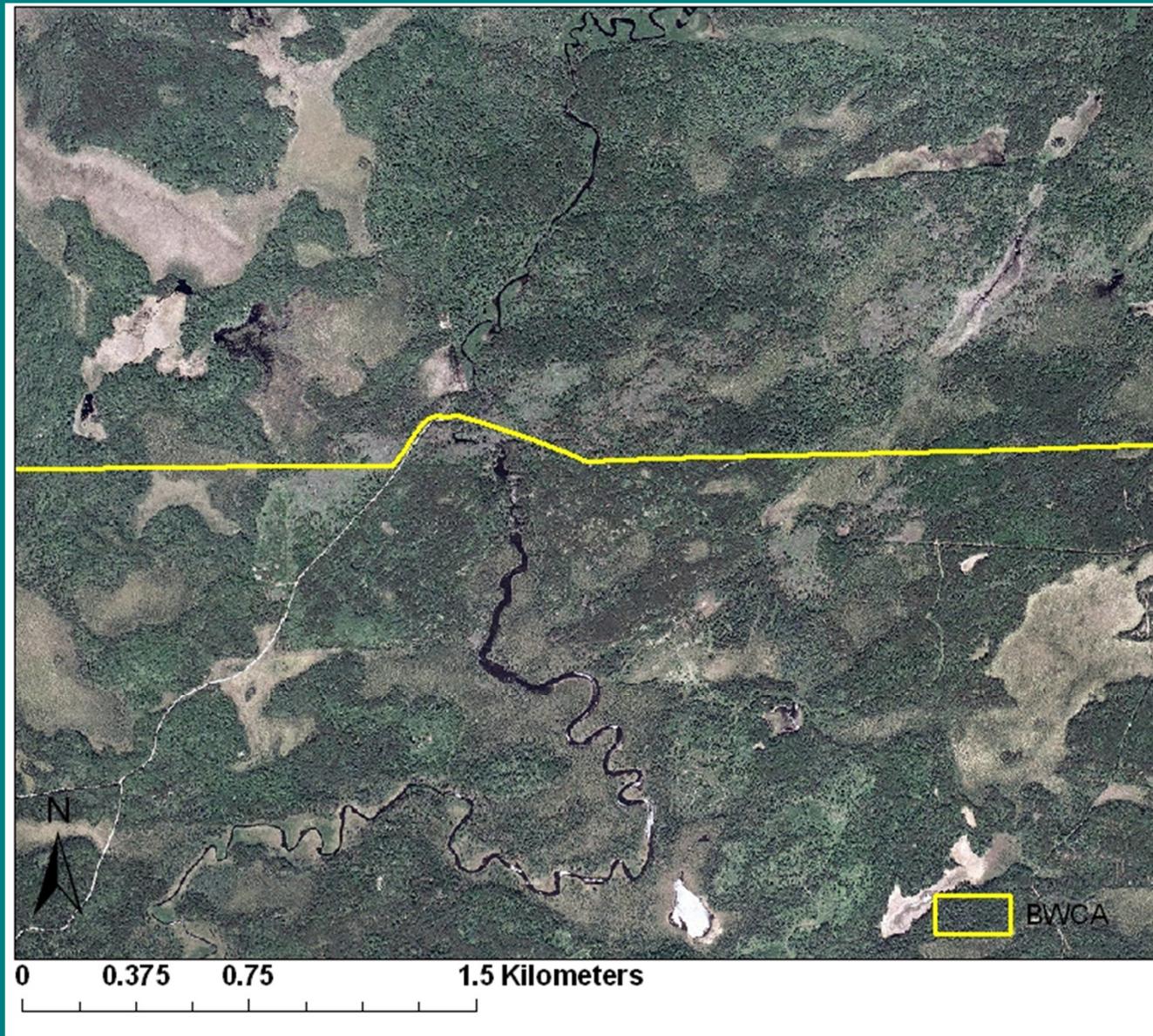


Study Site Selection

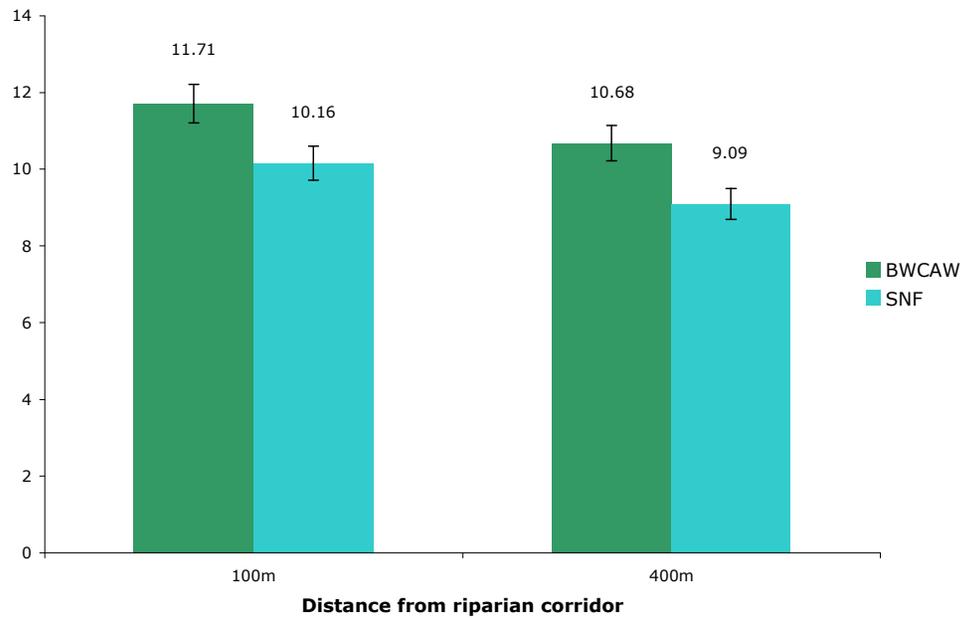
- 1) At least 1.5 km riparian habitat on both sides of border - near river systems
- 2) $> 45^\circ$ angle from BWCA border
- 3) Logging on SNF side (since inception of BWCAW)
- 4) Primarily upland forest within 400 m of riparian area



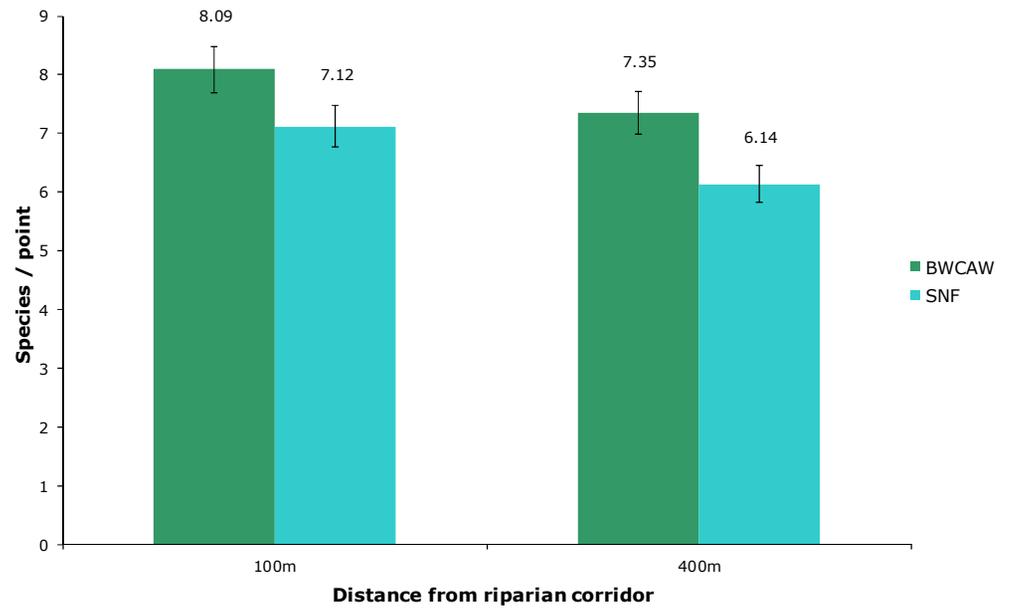
Example transect; Little Isabella River



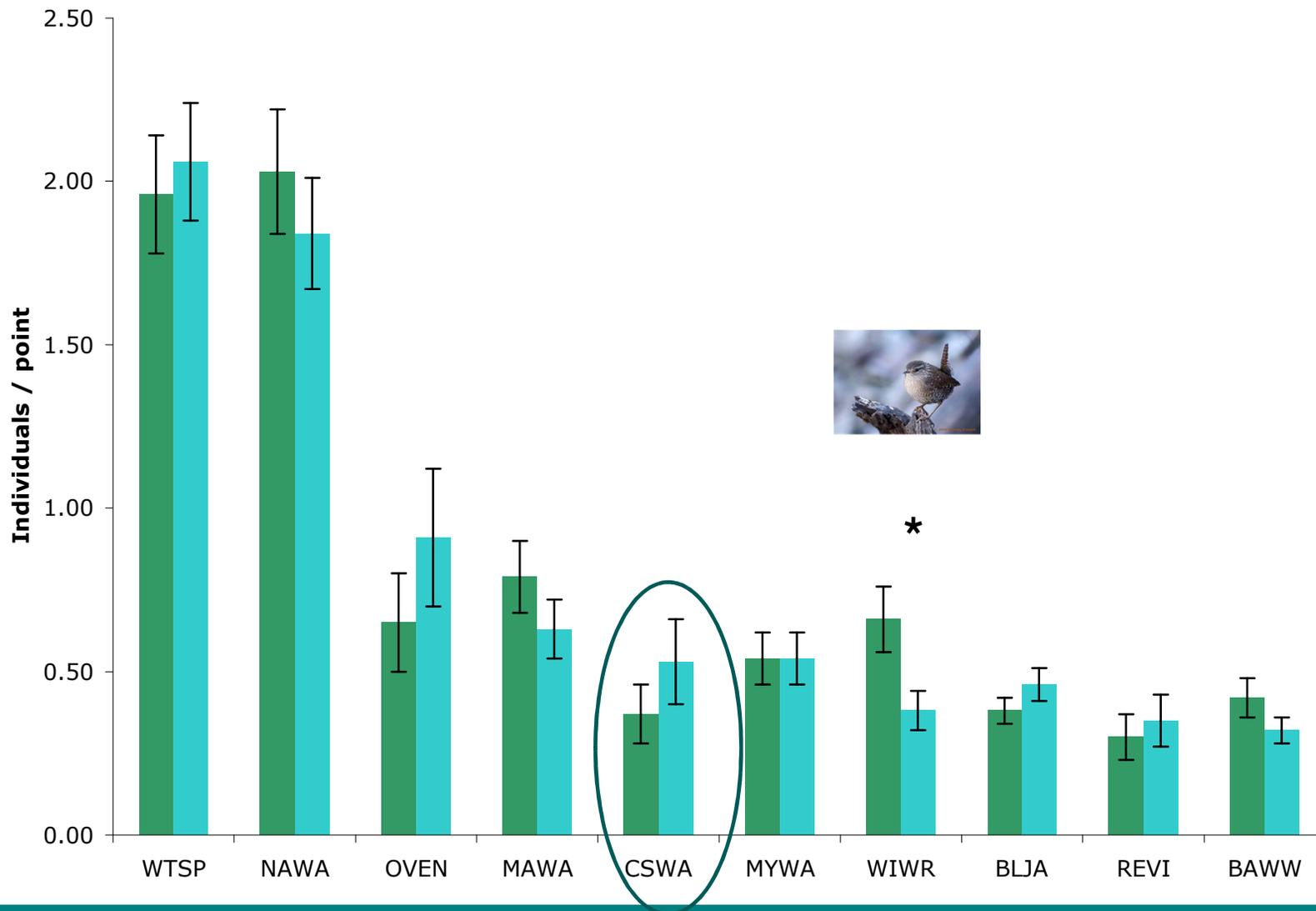
Total Individuals Within 100m



Species Richness Within 100m



Ten most common species



* $p < 0.05$

- Only species with observations at $>10\%$ of point counts were analyzed; 35 / 94 species

Individual species: Riparian corridor effect



Alder Flycatcher



Song Sparrow



Swamp Sparrow

100 m



Winter Wren



White-throated Sparrow



Common Yellowthroat

400 m



Ovenbird