Boreal Bird Surveys in Pine Island State Forest
2005-2006

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Background

Bird surveys were conducted in Pine Island State Forest (SF) near Big Falls, Minnesota during the breeding season in 2005 and 2006. Pine Island SF is composed of extensive areas of lowland boreal conifer forests, which have not had much harvest pressure compared to other forests in northern Minnesota. The boreal forest and the unique bird species associated with it are at the southern edge of their range in northern Minnesota. Therefore, Pine Island SF is thought to be a unique area because many boreal bird species that are uncommon in Minnesota are likely located in Pine Island SF making it an important scientific and birding resource. It has been suggested that Pine Island SF be nominated as an Important Bird Area.

Human disturbance in boreal forests is starting to become more intense. The main threats to boreal forests are logging, global warming, peat mining, and intensive management of insect infestations. These natural insect outbreaks (i.e., spruce budworm) are an important food source for some boreal bird specialists such as Cape May Warblers, Tennessee Warblers, and Bay-breasted Warblers. Much more information is needed to assess how forest management is affecting boreal forests and their associated bird species.

There is a lack of data on boreal forests in general and on Pine Island SF specifically. The main goal of this project is to gather information on the bird species in Pine Island SF. The project objectives were to 1) create a species list of all birds detected in Pine Island SF, 2) gather preliminary data on the distribution of boreal birds in lowland conifer stands in different age classes, and 3) assess the need for future data collection in this area.

Methods

We established 14 plots (each with 2 bird survey points) in Pine Island SF in lowland conifer forest of different age classes (Fig. 1). The MN DNR FIM data were used to identify easily accessible lowland black spruce stands in three age classes: 70-90 years old, 91-110 years old, and >110 years old. When possible, stands were selected so that stands within a particular age class were distributed across the study area rather than clumped. Stands were field verified, and two bird survey points were established within each stand at least 150m from each other and 50m from the edge of the stand when possible. In addition to the 14 plots, 14 listening areas were set

up along the roads in areas surrounded by lowland habitat as secondary priority areas to be surveyed if time permitted.

The breeding bird surveys in the 14 plots were conducted between June 1 – July 4 using a passive listening period followed by broadcasts to elicit the response of five boreal bird specialists (see Appendix 1 for methodology). At each survey point, the surveyor waited for 2 minutes for birds to adjust to the observer's presence. Then, all birds seen and heard were recorded during a 2-minute period on a check list (presence/absence data). An attempt was made to differentiate birds heard within 100m from those heard outside of 100m. Then the surveyor broadcast the songs of five focal boreal bird species (Tennessee Warbler, Connecticut Warbler, Bay-breasted Warbler, Cape May Warbler, and Olive-sided Flycatcher) using a CD and a small boom box at a volume of 2/3 the maximum volume. This volume was chosen because it was the highest volume that did not distort the bird songs. A species' song was played for 20 seconds in one direction followed by a 30-second listening period, and this sequence was then repeated in the opposite direction. This was done for each of the five focal species and the number of individuals detected was recorded. Any additional species detected during this time period were also recorded.

Results

In 2005, 6 surveyors conducted bird surveys (4 contractors and 2 nongame personnel). Due to time constraints, not all of the plots were surveyed by each surveyor. Each plot was surveyed between 3-5 times, each time by a different surveyor. All surveyors were trained in the survey protocol. For the 14 listening areas, one surveyor (nongame personel) surveyed 11 of the listening areas once in June of 2005 using a passive 10-minute listening period.

In 2006, one surveyor conducted bird surveys (nongame personnel). Eight of the 14 plots were surveyed one time only in June. No listening areas were surveyed.

During the breeding season in 2005 and 2006, a total of 78 species were detected in Pine Island SF (Appendix 2). 57 species were detected during breeding bird surveys at the survey points, 19 additional species were detected while traveling between survey points or at the listening areas, and 2 additional species were detected during frog surveys in the area. The most common species in the survey plots were Nashville Warblers and Golden-crowned Kinglets (both of which were found in all 14 plots) followed by Hermit Thrushes, Ruby-crowned Kinglets, and Gray Jays. Other species that were common in the plots were Yellow-bellied Flycatchers, Yellow-rumped Warblers, and White-throated Sparrows followed by Winter Wrens, Boreal Chickadees, Brown Creepers, Connecticut Warblers, and Dark-eyed Juncos. There were also multiple observations of the following unique boreal species in or near the plots: Palm Warblers, Great Gray Owls, Spruce Grouse, Lincoln's Sparrows, White-winged Crossbills, and one Red Crossbill.

Of the five focal boreal bird species, Connecticut Warblers were the most prevalent species and were detected at 8 plots (Table 1). They were quite responsive to the broadcasts, both responding vocally and/or by approaching the observer. Connecticut Warblers were found at 80% of the >110 year old plots, 60% of the 91-110 year old plots, and 25% of the 70-90 year old plots. Olive-sided Flycatchers were detected at 2 plots (one 91-110 and >110 year old stand).

However, several Olive-sided Flycatchers were seen along the roads outside of the plots. One observer thought she heard a Tennessee Warbler both in and outside of one plot, but this was not visually confirmed. Two observers thought they heard Cape May Warblers at 3 different plots, but none of these were not visually confirmed and Cape May Warblers can sound almost identical to Golden-crowned Kinglets, which are extremely common in the plots. No Bay-breasted Warblers were detected.

In addition to the 78 species detected during the breeding season, 12 additional species were detected in Pine Island SF during the non-breeding season (Appendix 3). In May 2005 while survey points were being established there was a positive identification of a Tennessee Warbler. This observation occurred before the breeding season began, and it was likely that migrants were still in the area. In May 2006 during a frog and toad survey in the area a Barred Owl was observed. An active Northern Hawk Owl nest was found off of Toumey Williams Rd in spring 2006. In August 2006 many flocks of Red Crossbills were observed. In September 2006, many migrating unidentified warblers were seen. Additional wildlife of interest observed in the area was a timber wolf seen in June 2006 and a female moose seen in August 2006, both off Toumey Williams Rd. Appendix 4 includes observations of Rare Natural Features in Pine Island SF from the Natural Heritage Database.

Also noteworthy was a large windstorm that knocked down many large trees on June 24, 2005 in the Big Falls area. A few of our plots were affected, and Plot 1 was heavily affected. About 40% of the 2005 surveys occurred after this windstorm, and this sudden habitat change may have affected the survey results in some plots. In the winter of 2005/2006, a massive area encompassing Plot 1 was clear-cut.

Conclusions

Several of the surveyors made the observation that there appeared to be a lower abundance and diversity of birds in these lowland conifer stands compared to other habitat types that the observers had surveyed in northern Minnesota. It was quite striking how few species and individuals were detected at each plot, and the morning chorus was surprisingly restrained. However, the types of bird species present in these lowland conifer stands made the stands quite unique. There were several boreal forest bird species that were relatively common in our plots that are relatively uncommon in Minnesota during the breeding season: Yellow-bellied Flycatchers, Boreal Chickadees, Connecticut Warblers, and Dark-eyed Juncos. There were also observations of several other uncommon boreal forest species in or near the plots: Olive-sided Flycatchers, Palm Warblers, Great Gray Owls, Spruce Grouse, Lincoln's Sparrows, White-winged Crossbills, and Red Crossbills. We will add to the Pine Island SF species list as more species are detected in the SF.

Connecticut Warblers were the most common of the five boreal bird specialists we were specifically surveying for. Based on these preliminary surveys, they appear to be more common in the older lowland conifer stands (91-110 and >110 years old age classes) compared to the younger lowland conifer stand (70-90 years old age class). We plan to conduct vegetation surveys in the plots to see if there is a correlation between the presence of Connecticut Warblers and the structural features and age of the stand. We also hope to conduct more bird surveys in

the area to further refine our understanding of the distribution of boreal bird species in lowland conifer stands.

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Table 1. The location of the bird survey points, age class, and the presence of the five focal boreal bird species (x = present at point, ? = unconfirmed observation).

Plot	Point	X UTM	Y UTM	Age Class	OSFL	CONW	TEWA	CMWA	BBWA
1	1	440886	5345485	70-90				?	
1	2	440946	5345594	70-90					
2	1	441263	5348477	70-90		x	?	?	
2	2	441369	5348642	70-90					
3	1	411350	5363096	70-90					
3	2	411353	5362939	70-90					
4	1	431920	5339197	70-90				?	
4	2	431994	5339066	70-90					
5	1	427076	5344672	91-110	x	x			
5	2	427192	5344530	91-110		x			
6	1	424302	5347428	91-110		x			
6	2	424216	5347316	91-110					
7	1	410329	5354765	91-110					
7	2	410172	5354771	91-110		x			
8	1	426559	5345905	91-110					
8	2	426280	5346571	91-110					
9	1	440910	5347674	91-110					
10	1	425912	5346757	>110					
10	2	425868	5346610	>110					
11	1	427857	5341676	>110	x	x			
11	2	427879	5341835	>110	x	x			
12	1	426813	5344539	>110		x			
12	2	426746	5344687	>110		x			
13	1	441122	5353034	>110					
13	2	441140	5353193	>110		x			
14	1	441409	5348058	>110		x			
14	2	441412	5347912	>110		x			

OSFL = Olive-sided Flycatcher, CONW = Connecticut Warbler, TEWA = Tennessee Warbler, CMWA = Cape May Warbler, and BBWA = Bay-breasted Warbler

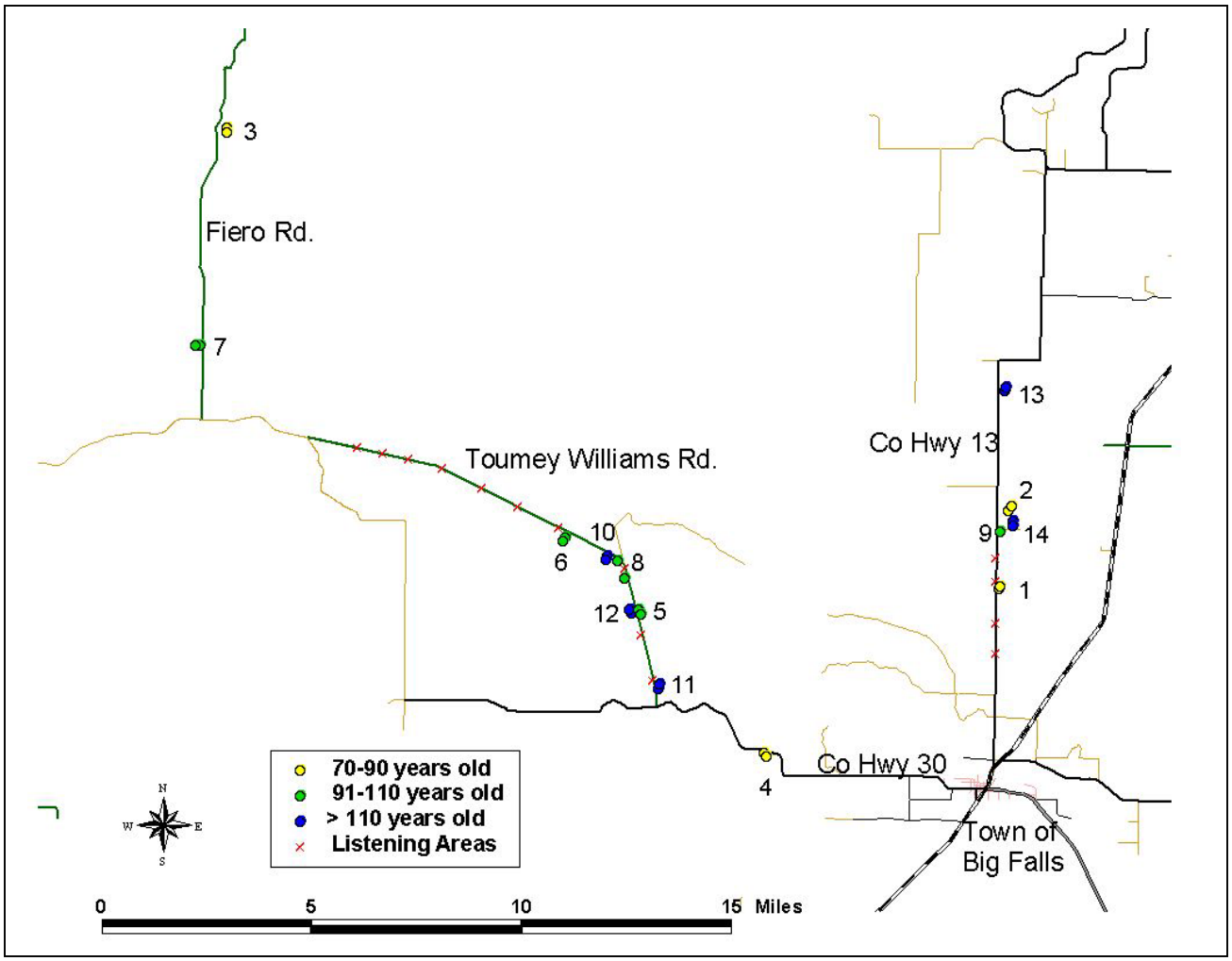

Figure 1. The location of the 14 plots in lowland conifer forest stands in 3 age classes (70-90 years old, 91-110 years old, and > 110 years old) in Pine Island SF. Each plot has 2 bird survey points (with the exception of Plot 9 which only has 1). The location of listening areas, which are located on the roads, are also shown.

Appendix 1. The methodology used to survey boreal birds in Pine Island State Forest.

Surveys will be conducted between June 1 and July 4. Surveys will be conducted between sunrise and 9:30 am. Try to conduct surveys only on days with no or little precipitation and winds less than 15 mph. Bird surveys consist of 1) noting the presence and number of five boreal bird species after eliciting a response by broadcasting the species' song, and 2) noting the presence of all other species heard on a checklist. Wait 2 minutes for birds to adjust to your presence before beginning the survey.

1- Fill out data sheet: name, date, and time.
2- Enter waypoint in GPS unit when you arrive at survey point and write down coordinates on data sheet.
3- Listen for 2 minutes; check off each species you detect on the data sheet.

4- Broadcast 1st song (Tennessee Warbler song for 20s, listen for 30s; Tennessee Warbler song for 20s, listen for 30s). Record number of individuals observed.
5- Broadcast 2nd song (Connecticut Warbler song for 20s, listen for 30s; Connecticut Warbler song for 20s, listen for 30s). Record number of individuals observed.
6- Broadcast 3rd song (Bay-breasted Warbler song for 20s, listen for 30s; Bay-breasted Warbler song for 20s, listen for 30s). Record number of individuals observed.
7- Broadcast 4th song (Cape May Warbler song for 20s, listen for 30s; Cape May Warbler song for 20s, listen for 30s). Record number of individuals observed.
8- Broadcast 5th song (Olive-sided Flycatcher song for 20s, listen for 30s; Olive-sided Flycatcher song for 20s, listen for 30s). Record number of individuals observed.
9- Report the weather condition of the surveys that day and any additional species you saw or heard along with the Plot and Point it was observed at.
10- Record any additional species seen or heard while traveling between survey points.

Appendix 2. The 78 species detected in Pine Island SF during the breeding season in 2005 and 2006.

Turkey Vulture	Blue-headed Vireo	Blackburnian Warbler
Sharp-shinned Hawk	Red-eyed Vireo	Black-throated Green Warbler
Broad-winged Hawk	Philadelphia Vireo	Pine Warbler
Red-tailed Hawk	Blue Jay	Palm Warbler
Ruffed Grouse	Gray Jay	Yellow Warbler
Spruce Grouse	American Crow	Mourning Warbler
Sandhill Crane	Common Raven	Connecticut Warbler
Common Snipe	Tree Swallow	Ovenbird
Black-billed Cuckoo	Black-capped Chickadee	Common Yellowthroat
Great Gray Owl	Boreal Chickadee	American Redstart
Northern Saw-whet Owl	Brown Creeper	Scarlet Tanager
Whip-poor-will	Red-breasted Nuthatch	Chipping Sparrow
Ruby-throated Hummingbird	Winter Wren	Lincoln's Sparrow
Belted Kingfisher	Sedge Wren	Song Sparrow
Northern Flicker	Golden-crowned Kinglet	Swamp Sparrow
Yellow-bellied Sapsucker	Ruby-crowned Kinglet	White-throated Sparrow
Downy Woodpecker	Veery	Dark-eyed Junco
Hairy Woodpecker	Hermit Thrush	Rose-breasted Grosbeak
Pileated Woodpecker	American Robin	Red-winged Blackbird
Olive-sided Flycatcher	Cedar Waxwing	Purple Finch
Eastern Wood-Pewee	Nashville Warbler	Red Crossbill
Yellow-bellied Flycatcher	Northern Parula	White-winged Crossbill
Alder Flycatcher	Chestnut-sided Warbler	Pine Grosbeak
Least Flycatcher	Magnolia Warbler	Pine Siskin
Great Crested Flycatcher	Yellow-rumped Warbler	American Goldfinch
Yellow-throated Vireo	Black-and-white Warbler	Evening Grosbeak

Appendix 3. Additional species detected in Pine Island SF in 2005 and 2006.

May 2005	Great Blue Heron
	Canada Goose
	Tennessee Warbler
May 2006	Barred Owl
	Northern Hawk Owl
August 2006	Northern Harrier
	American Kestrel
	Three-toed Woodpecker
	Eastern Kingbird
	Common Grackle
September 2006	Northern Waterthrush
	White-crowned Sparrow

Appendix 4. Rare Natural Features identified within Pine Island SF in the Natural Heritage Database.

Birds	American Bittern
	Bald Eagle
	Sandhill Crane
Mammals	Northern Bog Lemming
Fish	Lake Sturgeon
	Northern Brook Lamprey
Invertebrates	Black Sandshell (Ligumia recta)
	Caddisfly (Oxyethira itascae)
	Creek Heelsplitter (Lasmigona compressa)
Plants	Beaked Spike-rush (Eleocharis rostellata)
	Bog Rush (Juncus stygius var. americanus)
	Coastal Sedge (Carex exilis)
	Dragon's-mouth (Arethusa bulbosa)
	English Sundew (Drosera anglica)
	Hair-like Beak-rush (Rhynchospora capillacea)
	Hair-like Sedge (Carex capillaris var. major)
	Linear-leaved Sundew (Drosera linearis)
	Marsh Arrow-grass (Triglochin palustris)
	Montane Yellow-eyed Grass (Xyris montana)
	Moss (Tomenthypnum falcifolium)
	Sooty-colored Beak-rush (Rhynchospora fusca)
	Sterile Sedge (Carex sterilis)
	Twig-rush (Cladium mariscoides)

Other	Colonial Waterbird Nesting Site (3 sites; GBHE)
	Black Spruce Bog Type
	White Pine-Red Pine Forest Type
	Lake and Wetland Composite