Long Term Monitoring of Song Birds in Quetico Park

2014 & 2015 Data Summary

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INTRODUCTION

Monitoring the diversity and abundance of songbirds, and their related changes though time, is a component of assessing the ecological condition of an area. Within Quetico Provincial Park a long term monitoring program was established in 2014 to monitor songbirds in specific ecosites. The data resulting from these efforts will contribute to a broader programs that aims to assess the ecological integrity of Quetico Provincial Park and other park-land in the northwest zone of Ontario Parks.

A common method for assessing the diversity and abundance of songbirds is via the use of digital, audio recording equipment that records bird's songs at permanent sample plots; these audio recordings are utilized to identify species and track changes in presence and absence of passerine species. This method is especially useful in remote sites, allows for consistency in bird song identification, and allows for trend analysis overtime as this program is repeated.

Two ecosites, B055 and B128, were chosen to establish songbird monitoring sample plots as they are indicative of the forest conditions within Quetico Provincial Park. Ecosite B055 has the greatest coverage of upland area within Quetico Park, while ecosite B128 has the greatest coverage of wetland are in Quetico Park; this was determined with the use of Forest Resource Inventory (FRI) mapping. Together, ecosites B055 and B128 comprise close to 31% of the park's total area, as such monitoring songbirds within these ecosites is expected to result in an understanding of songbird composition for a significant portion of Quetico Park. This songbird monitoring is for the purpose of determining whether the richness and diversity of forest birds in ecosites B055 and B128 are what would be expected in Quetico Provincial Park due to natural fluctuations alone within a 5-year period.

Ecosite B055 is aspen-birch hardwood forest and constitutes 24% of the park. The over story consists of trembling aspen or white birch normally mixed with balsam fir, black spruce and white spruce (Figure 1). The substrate is sandy to course loamy, and understory vegetation consists of bush honeysuckle, mountain maple, blue-bead lily, wild lily-of-the-valley, wild sarsaparilla, dwarf raspberry, ground-pine and feathermoss (OMNR 2009).

Ecosite B128 is conifer swamp and composes 7% of the park. It consists of black spruce with a presence of tamarack and speckled alder and occasionally there is also balsam fir (Figure 2). The ground cover of these landscapes is mostly moss with woody debris and conifer litter. Understory vegetation includes twinflower, dwarf raspberry, sheathed sedge, blue-bead lily, wild

lily-of-the-valley, naked miterwort, palmate-leaf sweet-coltsfoot and Wulf's peat moss (OMNR 2009).

Logic constraints resulted in the placement of audio recording devices to follow a route in the northern, central portion of Quetico Park, as opposed to random placement of the sample plots. In 2014, fourteen SongMeters were placed at sample plot locations, eight within the B055 ecosite and six within the B128 ecosite. During 2015, eleven SongMeters were placed – eight from plots within ecosite B055 and three from plots within ecosite B128 – some in slightly different locations and plots 001, 009, and 012 were not included in monitoring for 2015 (see Figure 3). Sample plot locations were altered slightly as the monitors were not set up in the correct ecosite the first time.

METHODS

Wildlife Acoustics SM2/SM2+ Song Meters were placed on trees at least 100 metres away from the ecosite boundary in order to avoid edge effects and in an attempt to only record birds associated with the selected ecosite. See Figures 1 and 2 for examples of song meter placement in tree. The Song Meters recorded for two, five day periods, with the first period being between May 24th and June 17th and the second period being from June 13th to July 10th. Recordings were preprogramed to commence a half an hour before sunrise, with a total recording time of ten minutes.

Avian species were identified by song by a single observer from the audio recordings and data forms were filled out identifying species number and relative direction of individual birds for each individual recording. Species data was summarized by sampling event for each plot. Data from all events was pooled for each plot to determine species presence and combined by ecosite to look at habitat effects. Vegetation plot data was collection from all plots in August of 2014.

Figure 1. Typical ecosite B055 habitat (Plot 14).

Figure 2. Typical ecosite B128 habitat (Plot 6).

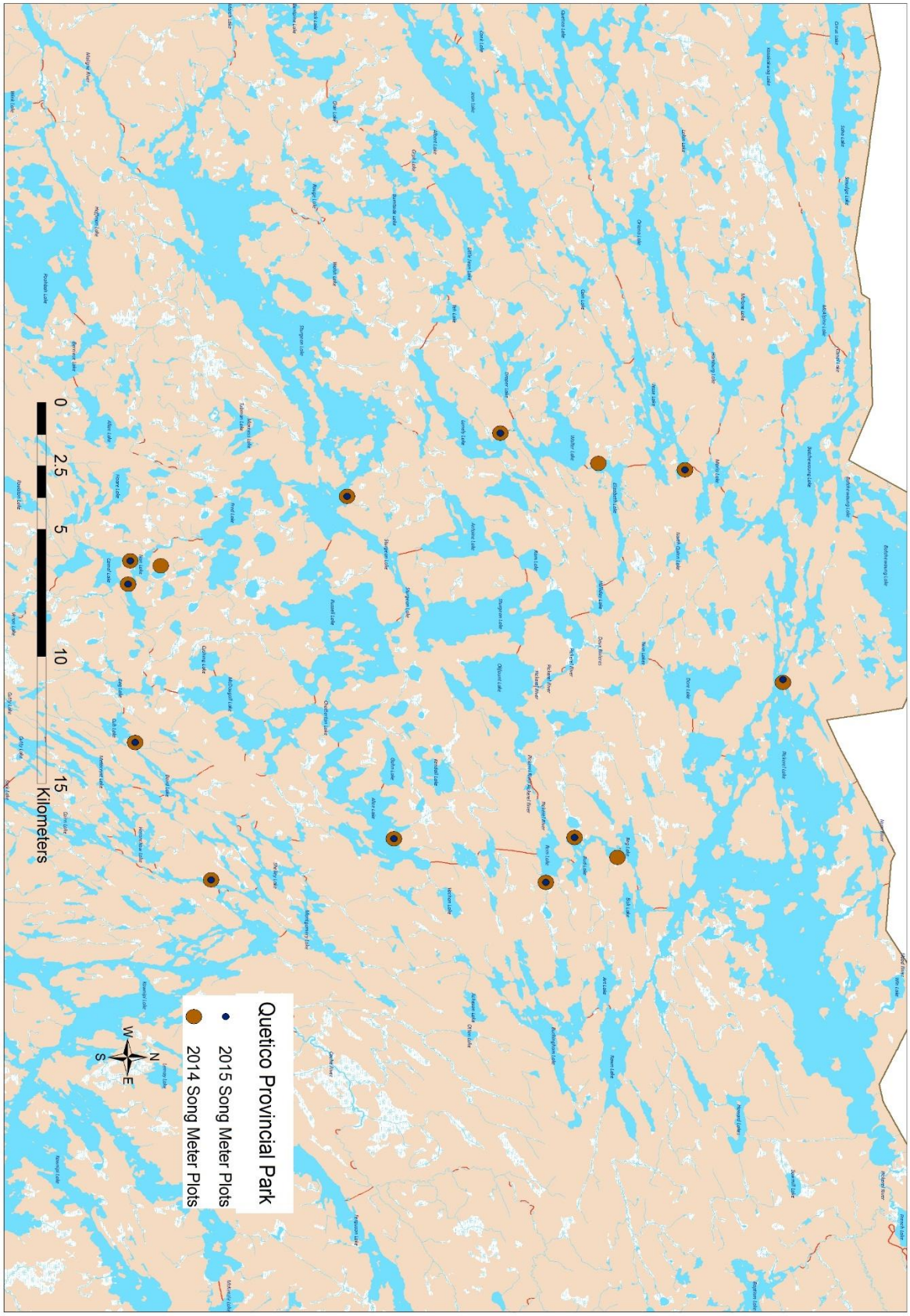

Figure 3. Locations of recording devices (Wildlife Acoustics SM2/SM2+ SongMeters) used in 2014 and 2015.

RESULTS

In 2014, a total of 61 species were identified; 48 species were found in ecosite B055 with 16 species being unique to that ecosite (Table 1), while 45 species were found in ecosite B128 with 13 of them being found only in that ecosite (Table 2). 32 species were common between the two ecosites in 2014 (Table 3). Whereas, in 2015, a total of 55 species were identified - 49 species in ecosite B055 and 33 species in ecosite B128. In ecosite B055, 22 species unique to this ecosite were identified (Table 1), while only 5 species were found to be unique to ecosite B128 (Table 2); 27 species were common between the two ecosites (Table 4). Included are some non-forest dependent species (e.g. the Common Loon), but were recorded and are a part of this report.

Table 1. Species recorded only from ecosite B055 during 2014 and 2015 SongMeter surveys of Quetico Provincial Park.

2014			**2015**		
Species (Common Name)	% of ES B055 Plots Recorded	% Composition (total birds) of ES B055	Species (Common Name)	% of ES B055 Plots Recorded	% Composition (total birds) of ES B055
Alder Flycatcher	13%	0%	Alder Flycatcher	25%	0%
American Redstart	38%	2%	American Crow	13%	0%
American Robin	50%	1%	American Redstart	25%	1%
Brown Creeper	25%	1%	Bald Eagle	13%	0%
Canada Warbler	50%	1%	Black-and-white Warbler	63%	2%
Common Raven	13%	0%	Black-capped Chickadee	13%	0%
Dark-eyed Junco	13%	0%	Belted Kingfisher	13%	0%
Eastern Phoebe	13%	0%	Blackburnian Warbler	63%	3%
Least Flycatcher	25%	0%	Brown Creeper	13%	1%
Mourning Warbler	25%	1%	Black-throated Green Warbler	13%	0%
Northern Waterthrush	25%	1%	Canada Goose	25%	0%
Unknown Warbler	13%	0%	Canada Warbler	38%	1%
Unknown Gull	13%	0%	Chestnut-sided Warbler	50%	3%
Wood Thrush	13%	0%	Hairy Woodpecker	13%	0%
Winter Wren	88%	0%	Mourning Warbler	25%	1%
			Philadelphia Vireo	13%	1%
			Rose-breasted Grosbeak	25%	1%
			Ring-billed Gull	13%	0%
			Red-breasted Nuthatch	63%	2%
			Ruffed Grouse	38%	1%
			Northern Spring Peeper	13%	0%
			Veery	50%	3%

Table 2. Species recorded only from ecosite B128 during 2014 and 2015 SongMeter surveys of Quetico Provincial Park.

2014			2015		
Species (Common Name)	% of ES B128 Plots Recorded	% Composition (total birds) of ES B128	Species (Common Name)	% of ES B128 Plots Recorded	% Composition (total birds) of ES B128
Bald Eagle	17%	0%	Lincoln's Sparrow	100%	4%
Belted Kingfisher	17%	0%	Pine Siskin	33%	1%
Black-throated Blue Warbler	17%	1%	Purple Finch	33%	1%
Boreal Chickadee	33%	1%	Spruce Grouse	33%	1%
Brown Creeper	17%	0%	Swamp Sparrow	33%	2%
Hermit Thrush	17%	1%			
Lincoln's Sparrow	33%	1%			
Olive-sided Flycatcher	33%	1%			
Tennessee Warbler	17%	1%			
Wilson's Storm-Petrel	17%	0%			
Yellow Warbler	17%	0%			

The ten most common species for each ecosite, in each year, are presented in Tables 5-8. Determination of the most common species is based on the number of plots each species song was recorded at, not based on the proportion that each species was recorded. Despite the differences in forest composition between ecosites B055, upland deciduous forests, and B128, lowland confer dominated wetlands, there are several species identified as common to both forest types; this implies that Boreal avian species tend toward generalist strategies. Of the ten most common species in ecosites B055 and B128 in 2014, eight species were common between the two ecosites (Magnolia Warbler, Nashville Warbler, Yellow-rumped Warbler, Golden-crowned Kinglet, Red-eyed Vireo, Winter Wren, Ovenbird, and White-throated Sparrow) (Table 5). In 2015, five of the ten most common species in ecosites B055 and B128 were common (Blue Jay, Nashville Warbler, Winter Wren, White-throated Sparrow, and Yellow-rumped Warbler) (Table 6).

Comparing 2014 to 2015, only 4 of the top ten species are common across the two years in ecosites B055 and B128. The common species are Nashville Warbler, Winter Wren, Yellow-rumped Warbler, and White-throated Sparrow. Also, of the ten most common species in B055 between 2014 and 2015, seven were found to be common between the two years (Magnolia Warbler, Nashville Warbler, Yellow-rumped Warbler, Red-eyed Vireo, Winter Wren, Swainson’s Thrush, White-throated Sparrow) (Table 7). Furthermore, the ten most common species identified in ecosite B128 in 2014 and 2015 had seven species that were found to be

common (Nashville Warbler, Winter Wren, Yellow-rumped Warbler, Chipping Sparrow, Golden-crowned Kinglet, Ruby-crowned Kinglet, White-throated Sparrow) (Table 8).

Table 3. Species recorded in both ecosite B128 and B055 during 2014 SongMeter survey of Quetico Provincial Park.

Species (Common Name)	% of ES B055 Plots Recorded	% Composition (total birds) of ES B055	% of ES B128 Plots Recorded	% Composition (total birds) of ES B128
American Crow	13%	0%	17%	0%
Black-and-white Warbler	100%	5%	50%	2%
Black-capped Chickadee	38%	1%	33%	0%
Blue-headed Vireo	13%	1%	33%	1%
Blackburnian Warbler	75%	3%	67%	3%
Blue Jay	75%	2%	67%	2%
Black-throated Green Warbler	13%	0%	17%	0%
Cedar Waxwing	13%	0%	67%	1%
Chipping Sparrow	38%	1%	83%	4%
Common Loon	38%	1%	50%	1%
Common Yellowthroat	25%	1%	67%	2%
Chestnut-sided Warbler	63%	6%	17%	0%
Golden-crowned Kinglet	88%	3%	83%	4%
Gray Jay	38%	1%	50%	1%
Magnolia Warbler	100%	7%	67%	2%
Nashville Warbler	100%	10%	100%	17%
Northern Flicker	13%	0%	33%	0%
Northern Parula	88%	5%	17%	0%
Ovenbird	75%	6%	83%	4%
Pileated Woodpecker	50%	1%	33%	1%
Red-breasted Nuthatch	25%	0%	50%	1%
Ruby-crowned Kinglet	38%	1%	83%	3%
Red-eyed Vireo	88%	6%	67%	4%
Ruffed Grouse	63%	1%	50%	1%
Song Sparrow	13%	0%	33%	1%
Swainson's Thrush	75%	3%	67%	3%
Unidentified Woodpecker	38%	0%	67%	1%
Veery	63%	2%	33%	1%
Winter Wren	88%	4%	100%	4%
White-throated Sparrow	75%	13%	83%	16%
Yellow-bellied Sapsucker	13%	0%	17%	0%
Yellow-rumped Warbler	100%	8%	100%	10%

Table 4. Species recorded in both ecosite B128 and B055 during 2015 SongMeter survey of Quetico Provincial Park.

Species (Common Name)	% of ES B055 Plots Recorded	% Composition (total birds) of ES B055	% of ES B128 Plots Recorded	% Composition (total birds) of ES B128
American Robin	50%	1%	67%	1%
Blue-headed Vireo	13%	0%	100%	3%
Blue Jay	100%	4%	67%	1%
Chipping Sparrow	13%	0%	100%	6%
Common Loon	75%	3%	33%	1%
Common Merganser	13%	0%	33%	1%
Common Raven	50%	1%	33%	1%
Common Yellowthroat	13%	0%	33%	1%
Golden-crowned Kinglet	50%	2%	67%	5%
Gray Jay	63%	2%	67%	2%
Hermit Thrush	38%	1%	100%	6%
Least Flycatcher	13%	3%	33%	2%
Magnolia Warbler	75%	4%	33%	2%
Nashville Warbler	100%	7%	100%	8%
Northern Flicker	38%	1%	33%	1%
Northern Parula	63%	3%	33%	1%
Olive-sided Flycatcher	13%	0%	67%	5%
Ovenbird	88%	6%	67%	3%
Pileated Woodpecker	38%	1%	67%	2%
Ruby-crowned Kinglet	38%	2%	100%	9%
Red-eyed Vireo	88%	8%	33%	2%
Swainson's Thrush	88%	3%	67%	5%
Winter Wren	100%	5%	67%	6%
White-throated Sparrow	88%	10%	100%	14%
Yellow-bellied Flycatcher	75%	2%	67%	3%
Yellow-bellied Sapsucker	75%	1%	67%	3%
Yellow-rumped Warbler	88%	5%	100%	6%

Table 5. Top 10 species (by % of plots recorded) recorded in ecosites B128 and B055 during 2014 SongMeter survey of Quetico Provincial Park.

Ecosite B055 (2014)			**Ecosite B128 (2014)**		
Species (Common Name)	% of Plots Recorded	% of Total Birds	Species (Common Name)	% of Plots Recorded	% of Total Birds
Black-and-white Warbler	100%	5%	Nashville Warbler	100%	17%
Magnolia Warbler	100%	7%	Winter Wren	100%	4%
Nashville Warber	100%	10%	Yellow-rumped Warbler	100%	10%
Yellow-rumped Warber	100%	8%	Chipping Sparrow	83%	4%
Golden-crowned Kinglet	88%	3%	Golden-crowned Kinglet	83%	4%
Northern Parula	88%	5%	Ovenbird	83%	4%
Red-eyed Vireo	88%	6%	Ruby-crowned Kinglet	83%	3%
Winter Wren	88%	4%	White-throated Sparrow	83%	16%
Ovenbird	75%	6%	Magnolia Warbler	67%	2%
White-throated Sparrow	75%	13%	Red-eyed Vireo	67%	4%

Table 6. Top 10 species (by % of plots recorded) recorded in ecosites B128 and B055 during 2015 SongMeter survey of Quetico Provincial Park.

Ecosite B055 (2015)			**Ecosite B128 (2015)**		
Species (Common Name)	% of ES B055 Plots Recorded	% Composition (total birds) of ES B055	Species (Common Name)	% of ES B128 Plots Recorded	% Composition (total birds) of ES B128
Blue Jay	100%	4%	Blue-headed Vireo	100%	3%
Nashville Warbler	100%	7%	Chipping Sparrow	100%	6%
Winter Wren	100%	5%	Hermit Thrush	100%	6%
Ovenbird	88%	6%	Lincoln's Sparrow	100%	4%
Red-eyed Vireo	88%	8%	Nashville Warbler	100%	8%
Swainson's Thrush	88%	3%	Ruby-crowned Kinglet	100%	9%
White-throated Sparrow	88%	10%	White-throated Sparrow	100%	14%
Yellow-rumped Warbler	88%	5%	Yellow-rumped Warbler	100%	6%
Common Loon	75%	3%	Blue Jay	67%	1%
Magnolia Warbler	75%	4%	Winter Wren	67%	6%

Table 7. Top 10 species (by % of plots recorded) recorded in ecosite B055 during 2014 and 2015 SongMeter surveys of Quetico Provincial Park.

Ecosite B055					
2014			**2015**		
Species (Common Name)	% of ES B055 Plots Recorded	% Composition (total birds) of ES B055	Species (Common Name)	% of ES B055 Plots Recorded	% Composition (total birds) of ES B055
Black-and-white Warbler	100%	5%	Blue Jay	100%	4%
Magnolia Warbler	100%	7%	Nashville Warbler	100%	7%
Nashville Warber	100%	10%	Winter Wren	100%	5%
Yellow-rumped Warber	100%	8%	Ovenbird	88%	6%
Golden-crowned Kinglet	88%	3%	Red-eyed Vireo	88%	8%
Northern Parula	88%	5%	Swainson's Thrush	88%	3%
Red-eyed Vireo	88%	6%	White-throated Sparrow	88%	10%
Winter Wren	88%	4%	Yellow-rumped Warbler	88%	5%
Swainson's Thrush	75%	3%	Common Loon	75%	3%
White-throated Sparrow	75%	13%	Magnolia Warbler	75%	4%

Table 8. Top 10 species (by % of plots recorded) recorded in ecosite B128 during 2014 and 2015 SongMeter surveys of Quetico Provincial Park.

Ecosite B128					
2014			**2015**		
Species (Common Name)	% of ES B128 Plots Recorded	% Composition (total birds) of ES B128	Species (Common Name)	% of ES B128 Plots Recorded	% Composition (total birds) of ES B128
Nashville Warbler	100%	17%	Blue-headed Vireo	100%	3%
Winter Wren	100%	4%	Chipping Sparrow	100%	6%
Yellow-rumped Warbler	100%	10%	Hermit Thrush	100%	6%
Chipping Sparrow	83%	4%	Lincoln's Sparrow	100%	4%
Golden-crowned Kinglet	83%	4%	Nashville Warbler	100%	8%
Ovenbird	83%	4%	Ruby-crowned Kinglet	100%	9%
Ruby-crowned Kinglet	83%	3%	White-throated Sparrow	100%	14%
White-throated Sparrow	83%	16%	Yellow-rumped Warbler	100%	6%
Blackburnian Warbler	67%	3%	Golden-crowned Kinglet	67%	5%
Cedar Waxwing	67%	1%	Winter Wren	67%	6%

When considering the design of Quetico Provincial Park's long term monitoring of forest bird species richness and diversity, the amount of coverage (i.e. the number of plots and recording devices) that is required within each ecosite should be considered. If the presence of bird species is consistent across each plot within a given ecosite then the number of plots required to provide reliable trend data would be relatively few. Although more years of monitoring are required to properly address this question, the information presented in Figures 4

and 5 indicate species are not consistent between plots. It was found that a relatively high proportion of species were identified at only one plot – 33.3% and 32.7% in ecosite B055 in 2014 and 2015 respectively, and 42.4% and 33.3% in ecosite B128 in 2015 and 2014 respectively. As well, a relatively low percentage of bird species were found at the full complement of plots for each ecosite - 8.3% and 6.1% in ecosite B055 in 2014 and 2015 respectively, and 24.2% and 6.7% in ecosite B128 in 2015 and 2014 respectively.

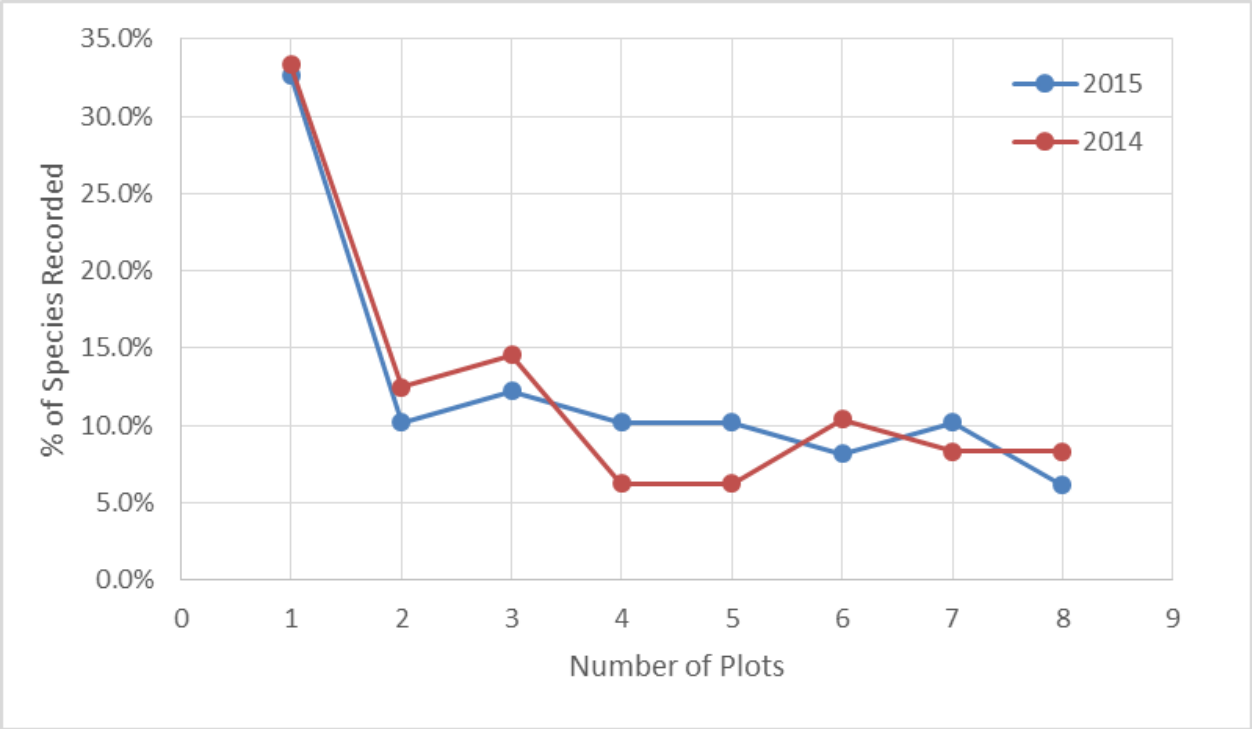

Figure 4. Proportion of bird species recorded by number of plots for ecosite B055 during 2014 and 2015 SongMeter surveys of Quetico Provincial Park.

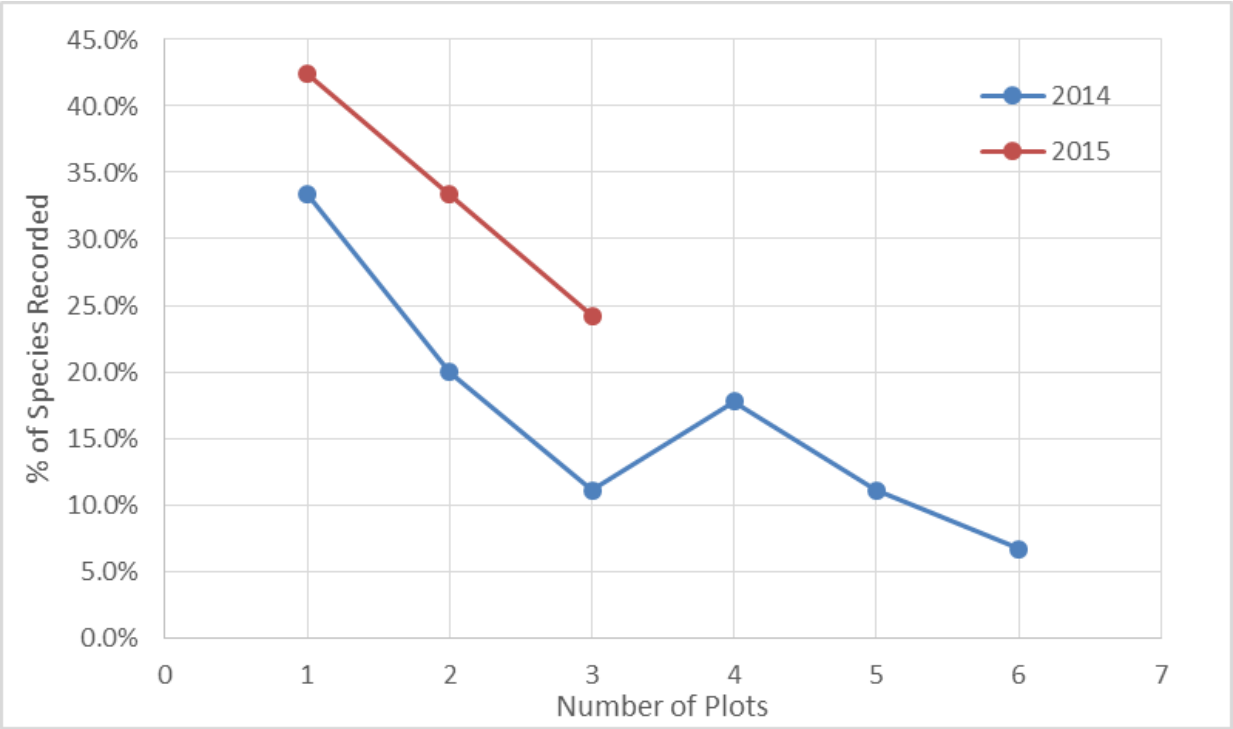

Figure 5. Proportion of bird species recorded by number of plots for ecosite B128 during 2014 and 2015 SongMeter surveys of Quetico Provincial Park.

In 2014, ten species were only recorded in the first sampling period (May 24th to June 17th), while 16 species were only recorded between those dates in 2015 (Table 9). Of these species, four (American Crow, Belted Kingfisher, Black-throated Green Warbler, Common Yellowthroat) were recorded only in the first sampling period in both 2014 and 2015. Fewer species were recorded in only the second sampling period (June 13th to July 10th), only eight species in 2014 and six species in 2015 (Table 9); just one of these species, the Cedar Waxwing, was recorded only in the second sampling period for both 2014 and 2015. Interestingly, the Song Sparrow was recorded only in the first sampling period in 2014, but in 2015 was only recorded in the second sampling period. Similarly, a Bald Eagle was only recorded in the second sampling period of 2014, but in 2015 was only recorded in the first sampling period.

Figure 5. Bird species identified in only one sampling period during 2014 and 2015 SongMeter surveys of Quetico Provincial Park.

Species Recorded Only in the First Sampling Period		**Species Recorded Only in the Second Sampling Period**	
2014	**2015**	**2014**	**2015**
American Crow	Acadian Flycatcher	Bald Eagle	Black-capped Chickadee
Belted Kingfisher	Alder Flycatcher	Brown Creeper	Blue-headed Vireo
Black-throated Green Warbler	American Crow	Cedar Waxwing	Cedar Waxwing
Common Raven	Bald Eagle	Dark-eyed Junco	Ring-billed Gull
Common Yellowthroat	Belted Kingfisher	Hermit Thrush	Song Sparrow
Eastern Phoebe	Black-throated Green Walrbler	*Unknown Warbler*	Swamp Sparrow
Song Sparrow	Canada Goose	*Unknown Gull*	
Tennessee Warbler	Common Yellowthroat	*Unknown Woodpecker*	
Wood Thrush	Hairy Woodpecker		
Yellow Warbler	Mourning Warbler		
	Philadelphia Vireo		
	Pine Siskin		
	Purple Finch		
	Ruffed Grouse		
	Spruce Grouse		
	Northern Spring Peeper		

ACKNOWLEDGEMENTS

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LITERATURE CITED

Ontario Ministry of Natural Resources (OMNR). 2009. Ecosites of Ontario. OMNR Ecological Land Classification Working Group. 355pp.

APPENDIX I – Photos of Plot Vegetation Conditions

SM Plot001

SM Plot002

SM Plot003

SM Plot004

SM Plot005

SM Plot006

SM Plot007

SM Plot010

SM Plot011

SM Plot012

SM Plot013

SM Plot014