



BIRD STUDIES
ÉTUDES D'OISEAUX **CANADA**

Forest Birds at Risk in the Carolinian Forest of Southwestern Ontario

2017 Summary Report



Photo: MDF

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This report summarizes results of the 7th year of the Southern Ontario Forest Birds at Risk monitoring and stewardship program.

ACKNOWLEDGEMENTS

Thank you to the many landowners who make this project possible, and especially to those taking action to support SAR and SAR habitat on their properties.

Thank you to BSC field staff who collected the data for this report, as well as helped prepare summary reports and materials for landowners. Special thanks to volunteer Don Wills who monitored Prothonotary Warbler breeding success at several sites. Thank you to Catherine Jardine, who manages the Forest Birds at Risk database and produced various data summaries, and to the many other BSC staff who provided input and commentary.

Finally, this endeavour would not be possible without the continued financial support of:



PROJECT GOALS AND OBJECTIVES

Our goal is to improve the conservation status of four high priority forest birds at risk in southwestern Ontario's forests: Acadian Flycatcher (ACFL; Endangered), Louisiana Waterthrush (LOWA; Threatened), Cerulean Warbler (CERW; Endangered), and Prothonotary Warbler (PROW; Endangered). Project results are intended to direct conservation and stewardship efforts over the short and long-term.

Primary project objectives are to:

- Determine and monitor site occupancy of the four target SAR in the Norfolk Sand Plain and elsewhere throughout southwestern Ontario (e.g., federally-identified Critical Habitat);
- Identify and mitigate threats to the target SAR in the Norfolk Sand Plain and elsewhere throughout southwestern Ontario;
- Increase key audiences' awareness and understanding of the target SAR and conservation needs, and to engage land owners and managers in stewardship for SAR.

In 2017, we also had the following secondary objectives to:

- Increase our understanding of CERW habitat preferences in southwestern Ontario.
- Continue to monitor site fidelity for LOWA as part of a study initiated in 2011.

METHODS

Site Occupancy Surveys

Target SAR were searched for in forest tracts with known and potential breeding habitat for one or more of the four target SAR: ACFL, CERW, LOWA, and PROW. Sites were chosen for occupancy surveys based on whether they were known sites (occupied by target species within the last 5 years), historic sites (occupied by target species over 5 years ago, but not since), or new sites (sites with potential habitat that have not been previously surveyed, or have never had target SAR detected). All sites were surveyed at least once during the breeding season and many were surveyed multiple times throughout the season to account for differences in timing of breeding amongst target species (e.g., LOWA breeding season: May to June, ACFL breeding season: June to August). BSC staff surveyed each site with area searches, recording target species locations and breeding evidence and assessing habitat quality. Threats to SAR or SAR habitat were identified and reported to landowners. Nests were searched for when time permitted, however it was not a priority. See Appendix A for a copy of the data form used in the field. Further details of survey methodology, including levels of breeding evidence, can be obtained by contacting speciesatrisk@birdscanada.org.

Identifying Cerulean Warbler habitat

In 2017, additional habitat surveys were done to increase our understanding of CERW breeding habitat preferences/use in southwestern Ontario. At all sites surveyed for SAR occupancy, habitat surveys were

completed where CERW was first seen or heard. If no CERW was detected (control sites), surveys were completed at least 100 metres from the edge(s) of the site (i.e., in interior forest), from wherever the site was first entered. Habitat data collected included basal area and foliage density at four canopy heights (<6m, 6-12m, 12-18m, and >18m high). As well, habitat suitability was scored on a scale of 1 to 5.

Norfolk Sand Plain Forest Bird Monitoring – Pilot Project

The Norfolk Sand Plain Forest Bird Monitoring Project (NSP-FBMP) was a 2-year project initiated in 2016, to test a sampling scheme designed to broadly monitor forest bird populations found in southwestern Ontario, including several widespread species at risk (e.g. Wood Thrush). As part of the pilot project, several new landowners (i.e., landowners not previously contacted through the forest bird monitoring program) were contacted for permission to enter their properties. While the pilot project was separate from the Forest Birds at Risk Program, as a result of the pilot project's random sampling scheme, there was some overlap in survey sites between the two studies. Any sites sampled through the pilot project, where target SAR were newly found, were also included as "new" sites (as described above) for the Forest Birds at Risk Program.

Site fidelity study – LOWA

In 2011, a colour banding program was initiated for LOWA in Southwestern Ontario. Adults and nestlings were banded from 2011 to 2015 in an effort to determine site fidelity and return rates. Although no new birds were banded, all resightings were recorded.

Landowner Engagement and Stewardship

All landowners were contacted prior to conducting surveys on their property to gain permission to access their land. If threats to target SAR or their habitat were observed during surveys, the appropriate landowner was informed and mitigation options were discussed. At the end of the season, all landowners were provided with thank-you letters and survey results for their properties. Landowner engagement efforts, e.g., discussions and threat mitigation efforts, were tracked to help maintain strong relationships between BSC and landowners and consistent communications between years.

RESULTS AND DISCUSSION

Survey effort totaled 197 survey hours (319 person-hours), spread over 163 site visits, at 87 sites (Table 1). Thirty-three of the sites surveyed are designated as Critical Habitat for ACFL (30 sites) and PROW (3 sites) and 15 sites were surveyed for the first time in 2017. Target SAR were detected in 43 sites (Figure 1): ACFL at 22 sites; CERW at 14 sites; LOWA at 14 sites; and PROW at 7 sites. Of the 43 occupied sites, 9 sites supported more than one of the target SAR. Table 2 details the number of individuals and breeding evidence recorded for each target species at each site.

Table 1. Summary of 2017 survey effort by site. Bolded sites are those first surveyed in 2017.

Site ID	Landowner	Visits	Time (hours)	Effort (person-hours)
BR02z	Private ²	2	2	2
BR80z	LPRCA	1	1	1
BR81z	LPRCA	1	2.25	2.25
EL14z	Private ¹⁹⁸	2	1	1.5
^A EL15z	CCCA	1	2.75	5.5
^A EL20z	TTLT	1	3.5	7
^A EL27z	Private ¹⁰⁸	2	2.75	5.5
^A EL29b	Private ¹¹⁶	1	1.5	3
EL43b	CCCA	1	0.75	1.5
EL44z	Private ¹⁴⁶	2	1	1.5
EL45a	Private ¹⁴⁰	3	7.25	14.5
EL45z	Private ⁸⁹	3	3.25	6.5
EL46b	Private ¹⁰⁵	1	2	4
^A EL49z	Private ⁶³	2	0.75	1
EL51a	Private²	1	0.25	0.5
EL51z	LPRCA	1	0.25	0.5
EL53b	Private ¹⁰⁰	1	1.25	2.5
EL54b	Private ¹²⁷	1	1.25	2.5
EL57z	Private ¹⁴¹	2	0.5	0.75
EL60a	Private²	1	0.75	1.5
EL60b	Private²	1	0.5	1
EL60z	Private¹⁰⁵	1	1	2
ES2z	Parks Canada	1	1.5	1.5
ES5z	Parks Canada	1	1	1
^P ES20z	ERCA	1	1	1
^{AP} HN1b	NCC	5	11	15.5
^A HN1c	NCC	6	11	17
HN3c	LPRCA	3	1.5	1.75
^A HN4d	LPRCA	4	6.75	9.75
^A HN5a	NCC	2	1.25	2.75
HN5c	NCC	2	2	4
HN5z	NCC	2	0.75	1.5

^A HN7b	LPRCA	1	1.25	1.25
HN7z	LPRCA	1	0.75	0.75
HN12d	MNR	1	0.25	0.5
^A HN12f	MNR	1	0.25	0.25
^A HN12g	MNR	4	5.75	7.25
HN13z	LPRCA	1	0.75	1.5
^A HN14z	HNC	2	3	6
^A HN16b	MNR	3	3.5	7
HN16e	MNR	1	0.75	0.75
^A HN17a	LPRCA	1	1	2
^A HN17b	LPRCA	1	0.75	1.5
HN18a	LPRCA	1	1	1
HN18b	LPRCA	1	0.75	0.75
HN18c	LPRCA	1	0.75	0.75
HN18i	Private¹⁹⁰	1	0.75	0.75
HN18j	Private¹⁹¹	1	1	1
^A HN21a	LPRCA	4	3.25	3.25
^A HN21b	LPRCA	3	6	6
HN21c	LPRCA	2	0.5	0.5
HN21e	Private¹⁹⁴	1	0.75	0.75
HN22a	LPRCA	1	2	2
HN26c	LPRCA	1	1.25	2.5
^A HN27a	LPRCA	2	3.5	11.75
^A HN27c	LPRCA	12	15.5	34.75
^A HN27d	LPRCA	11	11.5	20.25
HN27g	NFN	2	2.25	3.25
HN27I	LPRCA	2	0.5	0.5
HN30z	Private ¹⁰³	3	4	7.25
HN34a	LPRCA	1	1.25	2.5
^A HN37a	LPRCA	1	1	1
HN37z	LPRCA	1	2	2
HN39b	LPRCA	1	1.5	3
HN41a	Private¹⁹³	1	0.25	0.25
HN41z	Private ²	1	0.75	0.75
^A HN52a	Norfolk County	4	4.25	7
HN62z	LPRCA	1	1.25	1.25
HN81z	LPBLT	4	8.75	12.75
^A HN90z	LPRCA	1	0.75	1.5

HN99z	Private ¹⁴²	2	1	2
HN101b	NCC	1	0.75	1.5
HN102b	Private[?]	1	1.25	1.25
HN111b	LPRCA	1	1.25	1.25
HN111h	Private[?]	1	0.25	0.25
HN160a	Private¹⁸⁸	1	1	2
HN160z	Private ¹³⁸	2	0.5	1
HN161z	Private ¹⁴³	2	1.5	3
^P KE2z	Ontario Parks	1	2.5	2.5
LA2z	ABCA	3	10.75	10.75
^A MI3e	LTCA	1	1.75	3.5
MI3h	LTCA	1	0.5	1
^A MI3i	LTCA	1	1	2
^A MI3j	LTCA	1	0.5	1
^A MI3k	LTCA	1	1.25	2.5
^A MI3n	LTCA	1	0.25	0.5
^A MI6z	Middlesex County	1	0.75	1.5
TOTALS	87	163	197	319

Private[?]=Unknown private landowner; LPRCA=Long Point Region Conservation Authority; Private^{number}=Private landowner with unique number generated in FBAR Database; CCCA=Catfish Creek Conservation Authority; TTLT=Thames Talbot Land Trust; ERCA=Essex Region Conservation Authority; NCC=Nature Conservancy of Canada; MNR=Ministry of Natural Resources; HNC=Hamilton Naturalists Club; LPEA=Long Point Eco Adventures; NFN=Norfolk Field Naturalists; LPBLT=Long Point Basin Land Trust; ABCA= Ausable Bayfield Conservation Authority; LTCA=Lower Thames Conservation Authority.

^ASite ID: Represents sites listed as critical habitat for ACFL.

^PSite ID: Represents sites listed as critical habitat for PROW.

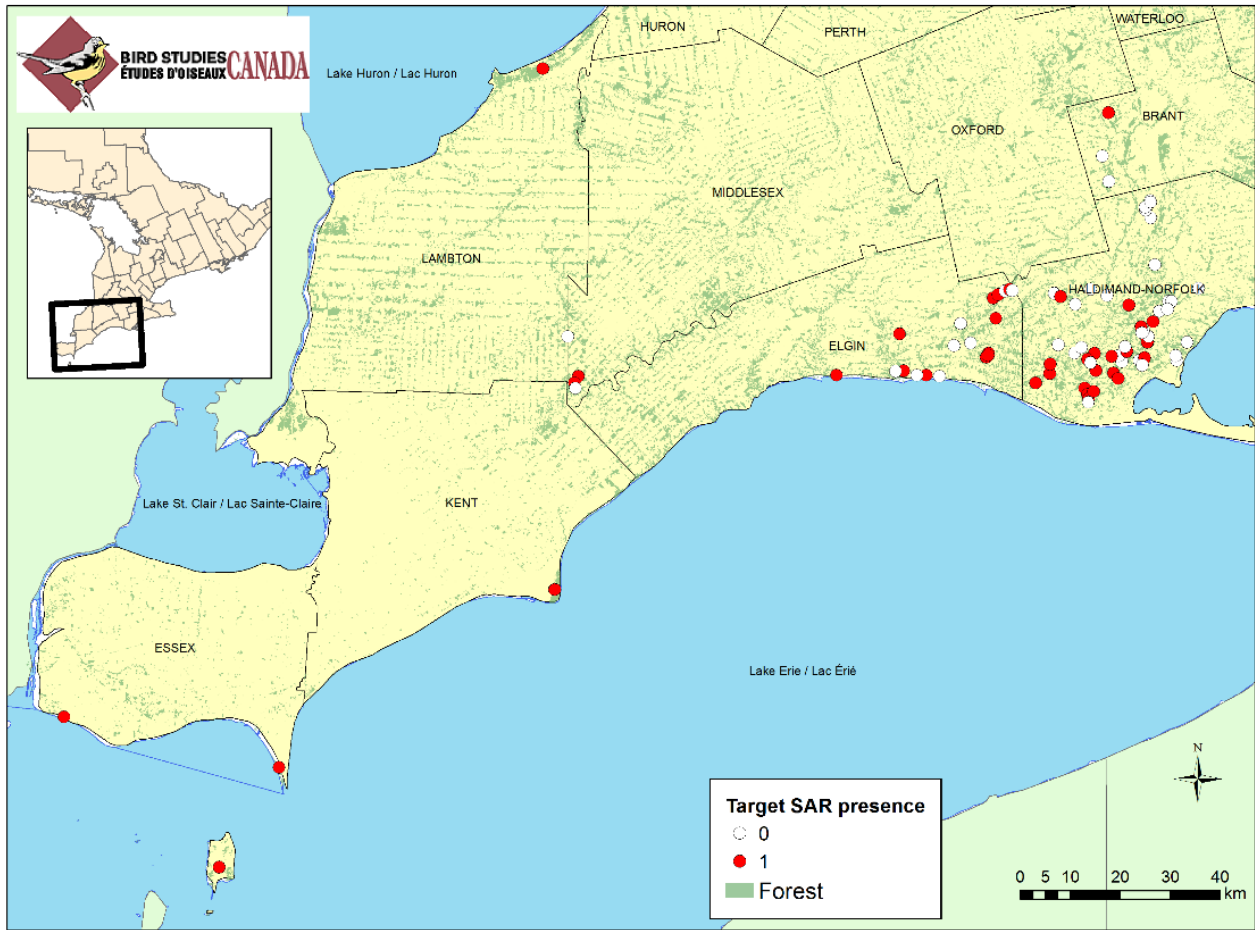


Figure 1. Surveyed sites in southwestern Ontario in 2017. Red circles indicate sites occupied by target SAR.

Table 2. Forest birds at risk found in 2017 in southwestern Ontario by site. Sites are **bolded** if 2017 is the first year one or more target SAR were observed. ‘S’ signifies a singing male, ‘P’ signifies a pair was observed, and ‘N’ signifies a nest was located at the site.

Site ID	ACFL			CERW			LOWA			PROW		
	S	P	N	S	P	N	S	P	N	S	P	N
BR02z											1	1
BR80z												
BR81z												
EL14z							1					
^EL15z								1				
^EL20z		5	3									
^EL27z	3											

^A EL29b												
EL43b												
EL44z												
EL45a	2	4	4				2	2	1			
EL45z	1						2	1				
EL46b												
^A EL49z												
EL51a				2								
EL51z												
EL53b												
EL54b							1					
EL57z				1								
EL60a	1	2	3									
EL60b		1	1									
EL60z	1	1	1									
ES2z										2	2	
ES5z									1			
^P ES20z									1			
^{AP} HN1b	2			2			1	1			6	6
^A HN1c	3			1			2	1	1	1		
HN3c												
^A HN4d	1	1	1				1					
^A HN5a							1					
HN5c												
HN5z												
^A HN7b												
HN7z												
HN12d												
^A HN12f												
^A HN12g				1								
HN13z												
HN14z												
^A HN16b	1											
HN16e												
^A HN17a												
^A HN17b				1								
HN18a												
HN18b												
HN18c												

HN18i												
HN18j												
^A HN21a												
^A HN21b				3								
HN21c												
HN21e				1								
HN22a												
HN26c				1								
^A HN27a								1	1			
^A HN27c	3	3	5				2	1				
^A HN27d	1	2	5				2					
HN27g	1											
HN27l												
HN30z		1	2				1	1	1			
HN34a												
^A HN37a												
HN37z				1								
HN39b												
HN41a												
HN41z												
^A HN52a		1	2									
HN62z												
HN81z	1	2	1									
^A HN90z												
HN99z												
HN101b	1											
HN102b	1											
HN111b				1								
HN111h				1								
HN160a				4								
HN160z												
HN161z												
^P KE2z										2	2	
^A LA2z	5	3	6	2			1					
^A MI3e		3										
MI3h	1											
^A MI3i												
^A MI3j												

^A MI3k	1											
^A MI3n												
^A MI6z												
TOTALS	30	29	34	22	0	0	17	9	4	3	11	11

^ASite ID: Represents sites listed as critical habitat for ACFL.

^BSite ID: Represents sites listed as critical habitat for PROW.

Site conservation ranking

To determine the conservation significance of each site, in multiple years between 2011 and 2017 (87 sites total), were scored by summing the proportion of years occupied by target SAR (Table 3). For example, a site surveyed in two different years that was occupied by ACFL in both years and LOWA in one was ranked 1.5 (1.0 for ACFL and 0.5 for LOWA). The highest possible ranking is 4.0 indicating that all target SAR present in all years surveyed.

Half of the sites surveyed in multiple years had a conservation score of at least 0.5; 15 (34%) of those are privately owned, 16 (36%) are owned by conservation authorities, 6 (14%) by land trusts or other ENGOS and the remaining 7 (16%) by local, provincial, or federal governments. Thirty-four sites were occupied by 2 or more target species in multiple years.

Table 3. Conservation ranking of surveyed sites in southwestern Ontario between 2011 and 2017. Sites surveyed more than once were assigned a conservation ranking, with the proportion of years each target species was detected out of the number of years surveyed.

Site ID	Ownership	Years Surveyed	Proportion of years detected				Score (sum)
			ACFL	CERW	LOWA	PROW	
BR02-z	Private ²	2	0	0	0	1	1
BR80-z	LPRCA	2	0	0	0	0	0
BR81-z	LPRCA	2	0	0	0	0	0
EL3-z	Private ⁷⁷	2	0.5	0	0	0	0.5
EL14-z	Private ¹⁹⁸	4	0.3	0	0.8	0	1.1
^A EL15z	CCCA	3	0	0	0.33	0	0.33
^A EL20-z	TTLT	6	0.7	0	0	0	0.7
^A EL27-z	Private ¹⁰⁸	6	1	0	0.5	0	1.5
^A EL28-z	Private ⁸⁶	4	0	0	0	0	0
^A EL29-z	Private ¹¹⁶	5	0	0.2	0	0	0.2
EL43-a	CCCA	4	0.25	0	0	0	0.25
EL44-z	Private ¹⁴⁶	2	0	0	0	0	0
EL45-a	Private¹⁴⁰	2	1	0	1	0	2
EL45-z	Private⁸⁹	6	1	0	0.83	0	1.83

EL46-b	Private ¹⁰⁵	6	0.33	0	0.83	0	1.17
EL46-c	Private ¹⁰⁵	3	0.67	0	0	0	0.67
^A EL49-z	Private ⁶³	6	0.17	0	0	0	0.17
EL50-a	Private ⁶⁴	2	0	0	0	0	0
EL51-z	LPRCA	5	0	0	0.4	0	0.4
EL52-z	Private ⁹⁷	2	0	0	0	0	0
EL53-b	Private ¹⁰⁰	2	0	0	0	0	0
EL54-b	Private ¹²⁷	2	0	0	1	0	1
EL57-z	Private ¹⁴¹	2	0	1	0	0	1
ES2-z	Parks Canada	4	0.25	0	0	0.5	0.75
ES5-z	Parks Canada	2	0	0	0	1	1
ES10-z	ERCA	2	0	0	0	0.5	0.5
^P ES20-z	ERCA	2	0	0	0	1	1
^{AP} HN1-b	NCC	7	0.43	1	1	1	3.43
^A HN1-c	NCC	7	1	0.43	1	0.29	2.71
HN3-c	LPRCA	5	0	0	0.4	0	0.4
HN4-a	LPRCA	4	0	0	0	0	0
^A HN4-d	LPRCA	7	0.71	0.14	0.14	0	1
^A HN5-a	LPRCA	7	0.29	0	0.71	0	1
HN5-b	NCC	4	0	0	0.25	0	0.25
HN5-c	NCC	4	0	0	0.25	0	0.25
HN5-z	NCC	4	0.25	0	0.25	0	0.5
HN7-z	NCC	3	0	0	0	0	0
HN8-a	LPRCA	2	0	0	0	0	0
HN12-d	MNRF	6	0.33	0	0	0	0.33
HN12-e	MNRF	3	0.33	0	0	0	0.33
HN12-f	MNRF	3	0.33	0	0	0	0.33
HN12-g	MNRF	7	0.57	0.86	0.14	0	1.57
^A HN14-z	HNC	7	0.29	0	0.14	0	0.43
^A HN16-b	MNRF	7	0.14	0	0.86	0	1
HN16-e	MNRF	2	0.5	0	0	0	0.5
HN16-m	LPEA	3	0.33	0	0	0	0.33
^A HN17-a	LPCRA	3	0	0	0	0	0
^A HN17-b	LPCRA	4	0	0.25	0	0	0.25
HN19-b	LPRCA	6	0	0.17	0.17	0	0.33
HN21-a	LPRCA	7	0	0.71	0	0	0.71
HN21-b	LPRCA	6	0	0.83	0	0	0.83
HN21-c	LPRCA	5	0	0.4	0	0	0.4

^A HN27-a	LPRCA	7	0	0	1	0	1
^A HN27-c	LPRCA	7	1	0.14	1	0	2.14
^A HN27-d	LPRCA	7	1	0.14	0.43	0	1.57
HN27-g	NFN	7	1	0	0	0	1
HN27-j	LPRCA	2	0	0	0	0	0
HN27-l	LPRCA	2	0	0.5	0	0	0.5
HN30-a	Private ⁶⁵	3	0	0	0.33	0	0.33
HN30-z	Private ¹⁰³	5	0.2	0	1	0	1.2
HN31-a	LPRCA	3	0.67	0	0.33	0	1
HN31-z	LPRCA	3	0	0	0	0	0
HN37-a	LPRCA	6	0	0.33	0	0	0.33
HN37-b	LPBLT	2	0	0	0	0	0
HN37-z	LPRCA	4	0	0.25	0	0	0.25
HN41-z	Private ⁷	2	0	0	0	0	0
HN52-a	Norfolk Cty.	7	0.43	0	0.43	0	0.86
HN59-z	Private ⁷	2	0	0	0	0	0
HN69-z	Private ⁹⁶	3	0.67	0.67	0	0	1.33
HN81-z	LPBLT	7	1	0	0	0.14	1.14
HN90-z	LPRCA	2	0	0	0	0	0
HN96-a	NCC	2	0	0	0	0	0
HN99-z	Private ¹⁴²	2	0	0.5	0	0	0.5
HN101-b	NCC	2	0.5	0	0	0	0.5
HN112-b	Private ⁸²	5	0	0	0.4	0	0.4
HN112-c	Private ⁸²	3	0	0	1	0	1
HN113-a	NCC	2	0	0	0	0	0
HN114-z	LPBLT	4	0	0	0	0	0
HN160-z	Private ¹³⁸	2	0	0.5	0	0	0.5
HN161-z	Private ¹⁴³	2	0.5	0	0	0	0.5
^{AP} KE2-z	Ontario Parks	4	0.75	0	0	0.75	1.5
^A LA2-z	ABCA	4	1	0.25	0.5	0	1.75
^A MI3e	LTCA	3	1	0.33	0	0	1.33
MI3h	LTCA	2	0.5	0	0	0	0.5
^A MI3i	LTCA	2	0	0	0	0	0
^A MI3j	LTCA	2	0	0.5	0	0	0.5
^A MI3n	LTCA	3	0.33	0	0	0	0.33
^A MI6-z	Middlesex Cty.	4	0.5	0	0	0	0.5

Private[?]=Unknown private landowner; LPRCA=Long Point Region Conservation Authority;
Private^{number}=Private landowner with unique number generated in FBAR Database;

CCCA=Catfish Creek Conservation Authority; TTLT=Thames Talbot Land Trust; ERCA=Essex Region Conservation Authority; NCC=Nature Conservancy of Canada; MNR=Ministry of Natural Resources and Forestry; HNC=Hamilton Naturalists Club; LPEA=Long Point Eco Adventures; NFN=Norfolk Field Naturalists; LPBLT=Long Point Basin Land Trust; ABCA=Ausable Bayfield Conservation Authority; LTCA=Lower Thames Conservation Authority.

^ASite ID: Represents sites listed as critical habitat for ACFL.

^BSite ID: Represents sites listed as critical habitat for PROW.

Occupancy Surveys

ACADIAN FLYCATCHER

Overall, 29 pairs and 30 single male ACFLs (88 individuals) were detected at 23 sites, including 15 known, 2 historic, 6 new (Figure 2; Table 2). Of the 23 sites where ACFL was detected, 12 are listed as Critical Habitat. Seven of the remaining sites have been occupied by ACFL in multiple years and meet the requirements for Critical Habitat designation; this information has been forwarded to Environment and Climate Change Canada for consideration.

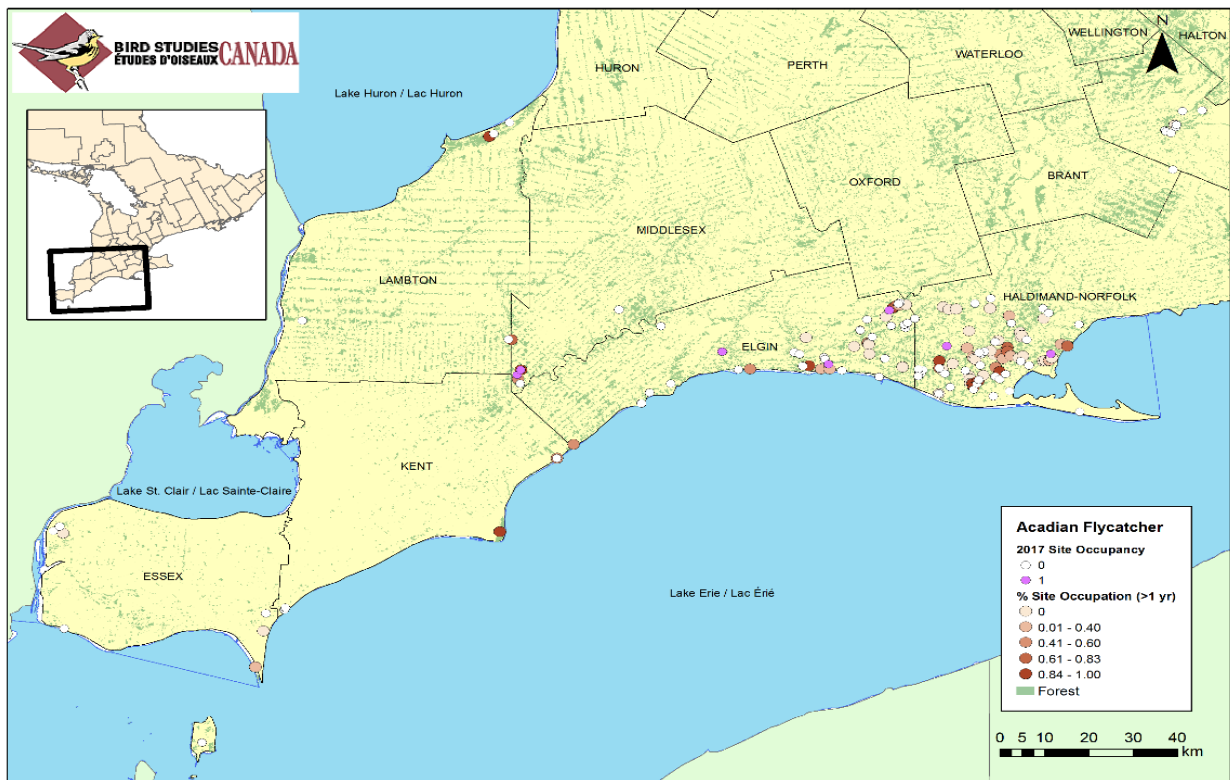


Figure 2. Acadian Flycatcher site occupancy in southwestern Ontario between 2011 and 2017. Darker circles indicate sites occupied by flycatchers in multiple years.

In total 34 nests were found. Nests were not monitored to determine productivity or nesting success. No nests were parasitized by Brown-headed Cowbirds (BHCO) (Tables 2 and 5).

LOUISIANA WATERTHRUSH

LOWA were found at 14 sites, including 12 known sites, 1 historic site, and 1 new site (Figure 3; Table 2). In total 35 individuals, 17 single males and 9 pairs, were detected. Four LOWA nests were found but were not monitored. None were parasitized by BHCO.

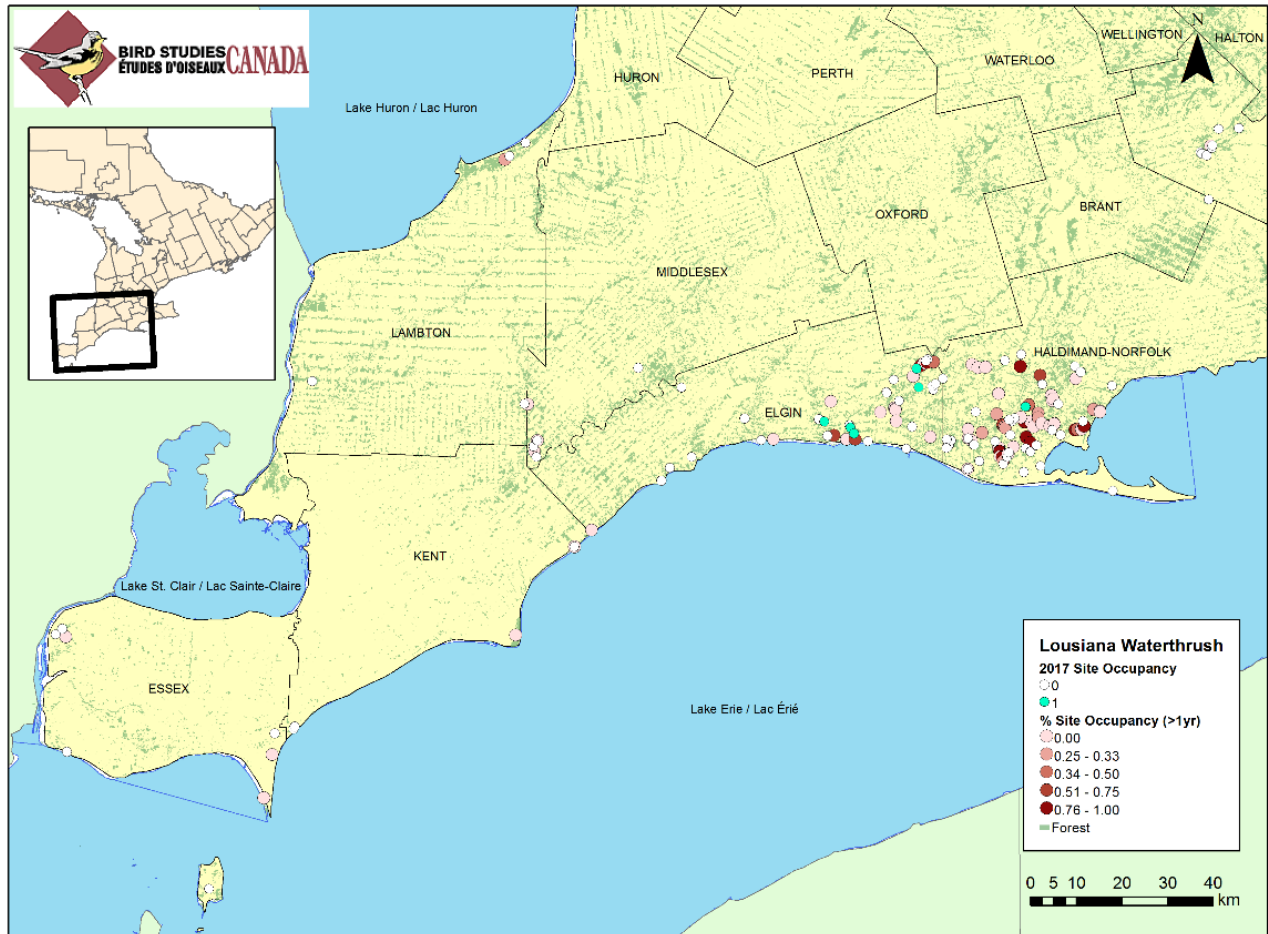


Figure 3. Louisiana Waterthrush site occupancy in southwestern Ontario between 2011 and 2017. Darker circles indicate sites occupied by flycatchers in multiple years.

Site Fidelity

Only one colour banded LOWA was re-sighted in 2017; a male at Coppens Tract, where it was originally banded in 2015 as an adult (Table 4).

Between 2011 and 2015, 116 LOWAs were colour banded, including 16 adult males, 16 adult females, and 84 chicks. Of the 32 adults colour banded, 14 (44%; 5 males and 9 females) have been re-sighted in subsequent years. All adult birds were re-sighted in the same forest where they were initially caught. In comparison, of the 84 chicks colour banded, only seven (8%; 6 males and 1 female) have been re-sighted in subsequent years. Of the re-sighted chicks, 43% returned to breed in the same forest where they hatched, the remaining 57% after hatch year chicks were detected at different locations from where they were initially banded. These results may indicate site fidelity may be inherent among adults while the majority of young in southwest Ontario disperse to other breeding locations.

Table 4. Re-sighted LOWA from 2011 to 2017, including location and year of initial capture and re-sight(s). Each individual LOWA has a unique band number consisting of a metal band with a number identification as well as a colour band combination to determine individual birds.

Band Number	Age/Sex	Year Banded	Year(s) Re-sighted	Site Banded	Site Re-sighted
2401-80801	Adult/Female	2011	2012	Turkey Point	Turkey Point
2401-80802	Adult/Male	2011	2012, 2013, 2014	Turkey Point	Turkey Point
2401-80805	Adult/Female	2011	2012, 2013, 2014	Coppens Tract	Coppens Tract
2401-80812	Adult/Female	2011	2012	Backus North	Backus North
2401-80816	Chick/Male	2011	2012	Coppens Tract	Backus North
2401-80820	Adult/Female	2012	2013, 2014	Wilson Tract	Wilson Tract
2401-80825 ¹	Chick/Male	2012	2015	Turkey Point	Turkey Point
2401-80826	Adult/Male	2012	2014, 2015	South Coast Gardens	South Coast Gardens
2401-80840	Adult/Male	2012	2013, 2014, 2015	Backus South	Backus South
2401-80847	Chick/Male	2013	2015	Backus North	Backus North
2401-80865	Adult/Female	2013	2015	Shoppe's Creek	Shoppe's Creek
2401-80867	Adult/Male	2013	2014, 2016	Backus North	Backus North
2401-80871	Adult/Female	2013	2014	Backus South	Backus South
2401-80874/75 ²	Chick/Male	2013	2015	Turkey Point	Backus South
2401-80876	Adult/Female	2013	2014, 2015	Turkey Point	Turkey Point
2401-80884	Chick/Male	2014	2015	Coppens Tract	Shoppe's Creek
2401-80890	Chick/Male	2014	2015	Wilson Tract	Shoppe's Creek
2401-80896	Chick/Female	2014	2016	Backus North	Backus North
2401-80900	Adult/Female	2014	2015	Backus North	Backus North
2521-79111	Adult/Male	2015	2016, 2017	Coppens Tract	Coppens Tract
2521-79114	Adult/Female	2015	2016	Shoppe's Creek	Shoppe's Creek

¹This bird was observed in Turkey Point in 2015 with the band combination: Left Leg=Silver/White, Right Leg=Black/White. This combination was given to a male LOWA from South Coast Gardens in 2012, however this bird was also seen in South Coast Gardens in 2015. After careful examination of the banding data it was assumed that the bird seen in Turkey Point was actually banded in 2012 as a nestling with the band number 2401-80825. This was unverified however, as this bird was not caught in 2015.

²The full band combination of this bird was not seen, however the three bands seen allowed us to determine that this bird had one of two band numbers: 2401-80874 or 2401-80875; however, both of these birds were banded as chicks in Turkey Point in 2013.

CERULEAN WARBLER

During the 2017 breeding season 22 male CERW were recorded at 14 sites, including 7 known sites and 7 new sites (Tables 2 and 5, Figure 4a). It should be noted, however, that the newly surveyed sites were deliberately chosen for their high potential to support CERW as opposed to the other target SAR. Despite being recorded in high numbers in comparison with previous years, CERW were conspicuously absent from several known and recently occupied sites.

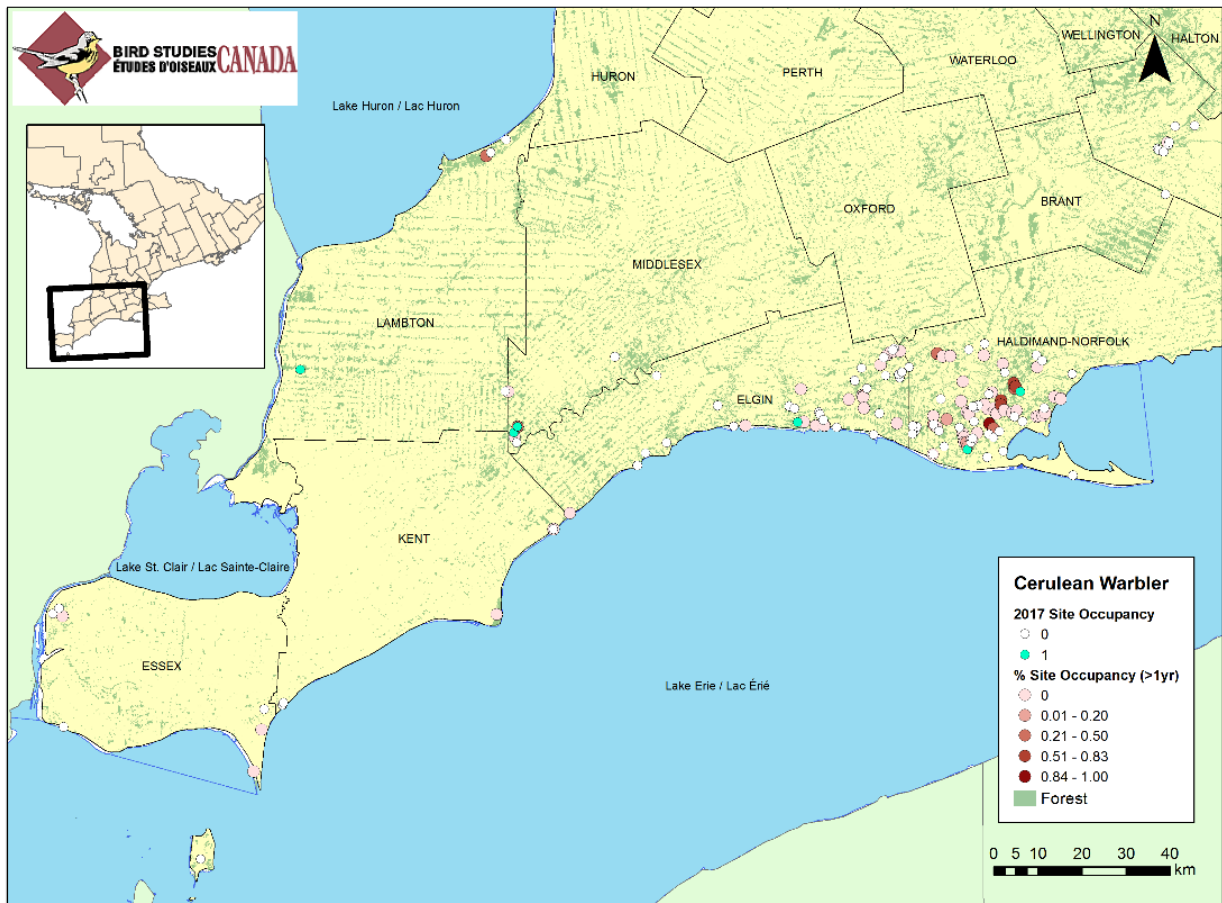


Figure 4. *Cerulean Warbler* site occupancy in southwestern Ontario between 2011 and 2017. Darker circles indicate sites occupied by *Cerulean Warblers* in multiple years.

Habitat

Habitat data was recorded at a total of 80 sites, including the 14 where CERW were present (Figure 4b). We constructed a global model explaining variation in CERW occupied sites which included the following explanatory variables: foliage density at 4 vertical strata (VS;>6m, 6-12m, 12-18m, and >18m) and basal area estimates of the following taxa groups; Hard Maples (HM), Soft Maples (SM), White Oak group (Ow), Red Oak group, Hickories (Hic sp.). All other deciduous (Dec) and conifer (Con) trees were grouped together (Table 5).

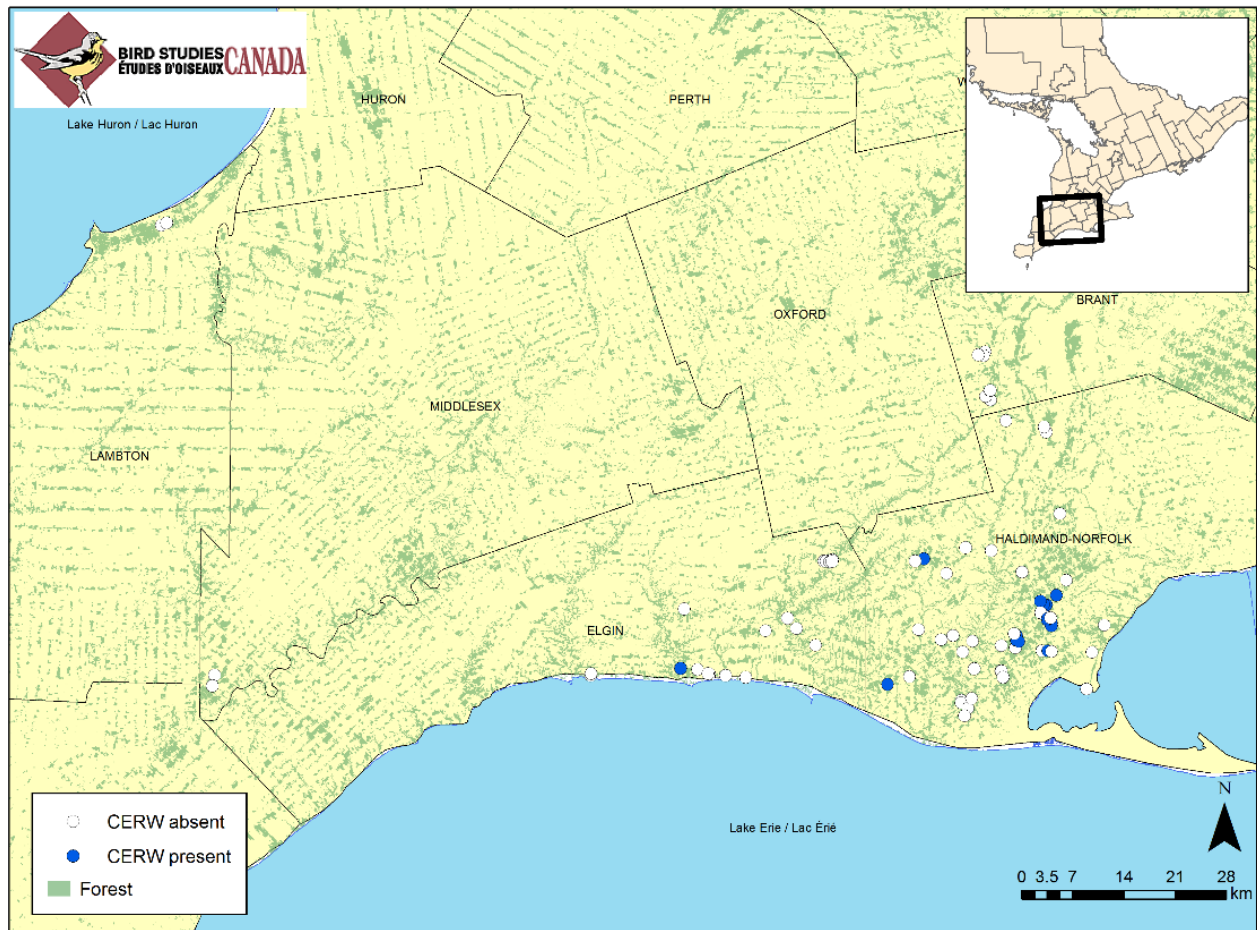


Figure 5. Locations where habitat data was collected. Blue dots indicate CERW occupied sites in 2017.

We modelled CERW presence versus availability using logistic regression and used backward step-wise for model selection. After we determined what taxa groups were in the best model we added a variable to the analysis; the total basal area excluding those species already in the best model. We examined model fit using a GOF likelihood ratio test and examined pseudo-R² statistics, ROC (receiver operating characteristic) curve and area under the curve (AUC) to examine model performance.

The global model adequately fit the observed data (Likelihood Ratio test $P = 0.006$). The AUC for the best model was 0.84, indicating relatively good performance and McFadden's pseudo-R² was 0.32. CERW were positively associated with sites with high understory density at less than 6 m and low midstory density between 6 – 12m, as well as with oak, possibly hickory and soft maple (Table 6). In other areas, such as the Frontenac Arch, CERW presence is more closely linked with the presence of a supercanopy, however, this was not the case in southwestern Ontario. White oak as CERW's best predictor has also been recorded in other regions and appears to be consistent with our findings for southwestern Ontario. CERW's association with Hickory has been previously reported in the Frontenac Arch as well as in the

United States. The addition of soft maples as a predictor for CERW habitat is somewhat atypical relative to other areas in Ontario however, soft maple are often associated with bottomland or swampy forests, which are typical of the project's study area.

Table 5. Results of model comparison. The best model (lowest AICc value) describes CERW habitat preferences in the Carolinian region of southwestern Ontario. Vertical Strata (VS) represents the foliage density within the attributed heights; Total deciduous (Dec) is the basal area of all deciduous with the exception of hard (HM) and soft (SM) maples, red and white (Ow) oak, and Hickory spp (Hic sp.). All conifer (Con) trees were combined.

Models	K	AICc	Δ AICc	Model Likelihood	AICc Wt	LL	Cum. Wt.
β + VS <6m + VS 6-12m + Dec + SM + Hic sp. + Ow	7	66.18	0	1	0.683	-25.312	0.683
β + VS <6m + VS 6-12m + Dec + SM + Hic sp. + Ow + Con	8	68.167	1.987	0.37	0.253	-25.069	0.935
β + VS <6m + Dec + HM + SM + Hic sp. + Ow	7	72.385	6.206	0.045	0.031	-28.415	0.966
β + VS <6m + VS 6-12m + VS >18m + Dec + HM + SM + Hic sp. + Ow + Con	10	72.969	6.79	0.034	0.023	-24.89	0.989
Global Model	11	75.456	9.277	0.01	0.007	-24.787	0.996
β	1	76.248	10.068	0.007	0.004	-37.098	1

Table 6. Coefficients describing the top model for CERW habitat preferences in southwestern Ontario. Positive association for VS <6m, white oak, and soft maple proved to be the best habitat predictors for CERW in the Carolinian region. High foliage density at VS 6-12m was shown to have a significant negative association for CERW habitat preferences.

Variable	Estimate	S.E.	Z-value	P-value
(Intercept)	-0.505	1.524	-0.331	0.741
VS <6m	0.483	0.210	2.298	0.022
VS 6-12m	-0.966	0.378	-2.558	0.011
Deciduous	-0.090	0.055	-1.648	0.099
Soft Maple	0.144	0.075	1.930	0.054
Hickory sp.	0.505	0.330	1.529	0.126
White Oak	0.406	0.143	2.844	0.004

PROTHONOTARY WARBLER

PROWs were detected at a total of 7 known sites, 3 of which are listed as Critical Habitat (Figure 5; Tables 2 and 5). Eleven nests (of 11 pairs) were found at 4 sites. Nine pairs used nest boxes and two pairs nested in natural tree cavities (at Point Pelee National Park and Rondeau Provincial Parks). House Wrens (a nest site competitor) were documented at two sites (Point Pelee National Park and Rondeau Provincial Parks). An additional 3 territorial males were observed at 3 sites.

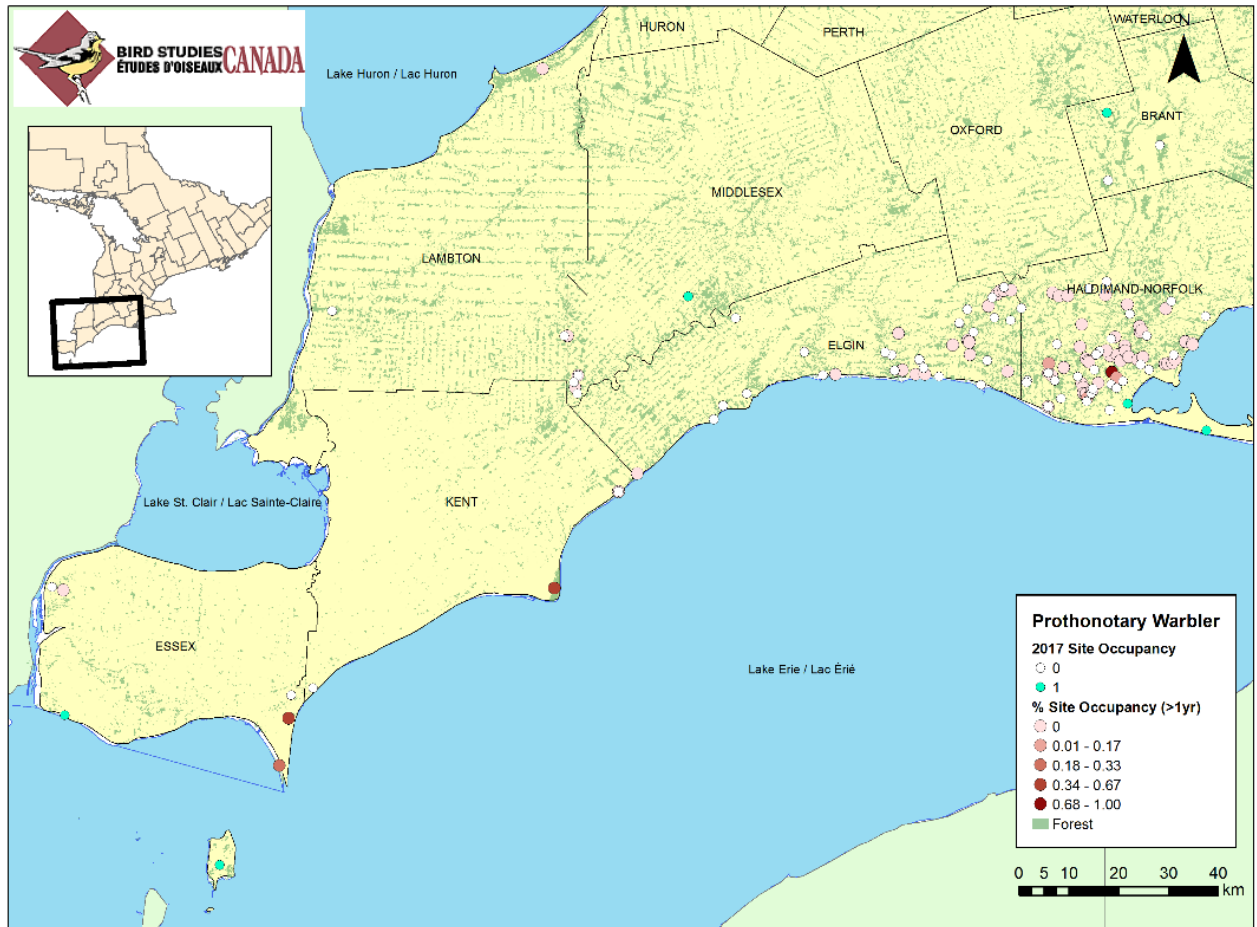


Figure 6. Prothonotary Warbler site occupancy in southwestern Ontario between 2011 and 2017. Darker circles indicate sites occupied by flycatchers in multiple years.

Table 7. Summary of forest birds at risk productivity in southwestern Ontario between 2011 and 2017. Note that less effort was placed on productivity monitoring in 2016 and 2017.

Species	Year	# Sites	Sites Occupied	Pairs	Males	Females	Nests	Young Fledged	Young Fledged/Nest	Parasitism Rate	BHCO Young Fledged
ACFL	2011	12	32%	11	18	12	18	15	0.83	0	0
	2012	17	28%	13	20	13	16	15	0.94	0.06	0
	2013	12	22%	10	17	10	16	23	1.44	0	0
	2014	18	31%	26	37	26	33	28+	0.85	0	0
	2015	17	27%	19	31	19	23	25+	1.09	0	0
	2016	13	22%	9	11	11	10	4	0.4	0	0
	2017	22	25%	29	30	29	34	U	U	0	0
CERW	2011	6	16%	1	16	1	0	-	-	-	-
	2012	5	8%	2	13	2	0	-	-	-	-
	2013	5	9%	1	15	1	1	2	2	0	0
	2014	8	14%	1	20	1	0	-	-	-	-
	2015	6	10%	2	15	2	0	-	-	-	-
	2016	10	17%	0	11	0	0	-	-	-	-
	2017	14	17%	0	22	0	0	-	-	-	-
LOWA	2011	11	30%	7	13	7	7	16	2.29	0.14	1
	2012	17	28%	17	24	17	8	31	3.88	0	0
	2013	13	24%	11	17	12	10	26+	2.6	0.3	3+
	2014	11	19%	13	15	12	11	25	2.27	0.42	2
	2015	15	23%	9	22	10	10	14	1.4	0.3	4
	2016	12	21%	8	7	8	5	1	0.2	0	0
	2017	14	17%	9	17	9	4	U	U	0	0
PROW	2011	1	3%	1	2	1	1	5	5	0	0
	2012	1	2%	4	3	4	5	25	5	0	0
	2013	1	2%	4	4	4	4	20	5	0	0
	2014	3	5%	6	6	6	7	31	4.43	0	0
	2015	2	3%	8	6	8	9	33	4.13	0	0
	2016	9	16%	10	5	10	9	U	U	0	0
	2017	7	8%	11	3	11	11	U	U	0	0

U = unknown; productivity was not monitored in 2017.

Landowner Stewardship and Threat Mitigation

In 2017, 49 publically-owned sites were surveyed. Public landowners include 5 conservation authorities, who manage the majority of sites (40), as well as 2 counties, and provincial and federal governments. Surveys were done on 38 privately-owned sites¹, 28 of which are owned by 20 individual woodlot owners and 10 sites are owned by land trusts (NCC, LPBLT, TTLT) as well as 2 naturalist groups. The level of engagement in the program, as well as, management goals and stewardship activities vary greatly between landowners, both public and private.

Public landowners

Public landowners manage for species at risk to some extent although mandates and priorities vary greatly between public landowners. Federal and provincial government land currently being monitored by the FBAR program includes 8 sites that are considered protected areas, such as national and provincial parks, and have conservation-based mandates and management plans to protect SAR. However, activities and management plans for the remaining properties are varied; several are actively harvested, while others are protected as SAR habitat. Of the actively harvested sites, forest management plans include considerations for SAR and SAR habitat, although many plans require updating and on-the-ground staff knowledge and understanding of SAR and SAR habitat requirements varies. To our knowledge, there is no harvesting planned for identified SAR habitat in the near future.

The recent SARA-listings of Louisiana Waterthrush as Threatened and Cerulean Warbler as Endangered (both previously assessed as of Special Concern) should bring the importance of these species to the forefront and Critical Habitat is likely to be identified on several public properties in the area. Continued targeted efforts are needed to ensure that SAR habitat continues to be a priority in public land management plans, particularly in cases where active harvesting is part of the regular management regime, and that managers and on-the-ground staff are made aware of target SAR and how integral these public properties, which represent the bulk of the species' strongholds, are to SAR recovery.

Private landowners

Species at risk management also varies among private woodlot owners, at least nine (including the land trusts and naturalist groups) incorporate target SAR into their management plans and/or specifically manage for SAR and SAR habitat. Thus 14 properties, including some with high conservation significance (e.g., multiple SAR in multiple years), are managed for SAR. An additional nine private landowners, with 9 properties, have expressed great interest in learning about SAR and SAR habitat and have requested project results each year, although they do not necessarily use this information to manage for target SAR. The remaining landowners allow BSC to survey their properties, but have not expressed interest in learning about, or managing for, target SAR. In the future, it would be worth determining the potential

¹ An additional 7 sites, where ownership was not determined, were surveyed; this happened as a result of a miscommunication between staff and these sites will no longer be surveyed until ownership and permission is sought.

threats on properties that are not managed for target SAR, e.g., determine the potential for habitat degradation or destruction.

Threats

Threats were observed at 23 sites, 17 of which were occupied by target SAR. However, of those threats, only one – the loss of a PROW nesting tree—was deemed an immediate threat to SAR. In this case, nest boxes were erected to help mitigate the loss and PROW continued to nest successfully at the site. Dried out sloughs is another immediate, but less easily mitigated threat, and was observed at seven sites previously occupied by Louisiana Waterthrush and/or Acadian Flycatcher. This particular threat is somewhat qualitative in that it is dependent on the observer recognizing where a slough has once been, and may not have been consistently recorded years previous. However, the ephemeral nature of these species' habitats makes long-term tracking of this type of habitat change that much more important and additional efforts are needed to ensure that this threat is being adequately captured in the data. Overall, it appears forests are drier and sloughs are fewer and/or smaller as a result of drying. This is most likely related to changing water and temperature regimes in the region which may be due to a number of factors including climate change.

The majority of threats recorded were known or ongoing threats, such as invasive pests or diseases (e.g., Emerald Ash Borer). No signs of woolly adelgid or oak wilt were observed. While landowners are regularly informed of these invasive diseases and pests, thus far, removal or mitigation efforts have primarily been left to land managers. Given the prevalence of invasive pests in the area, and the high threat that woolly adelgid and oak wilt have to target SAR habitat, more efforts need to be made by staff to determine what, if any, steps can be taken to mitigate these threats to provide better advice to landowners and managers.

Other ongoing threats include garbage dumping, ATV use, and other recreational activities. ATV use through Louisiana Waterthrush and Acadian Flycatcher habitat is of particular concern because recreationists increase the potential of damaging or destroying the nests due to each species nest placement (i.e. in a streambank or low hanging branch). This particular issue has been discussed with public landowners/manager (e.g., St. Williams Conservation Reserve staff and L.P.R.C.A.) however, it remains unresolved for the time being. The newly recorded occupancy of Cerulean Warbler directly adjacent Gopher Dunes (motocross track) may provide an opportunity for increased engagement of the recreational vehicle-using groups/community.

In 2017, BSC produced the first edition of: [BENEFICIAL MANAGEMENT PRACTICES FOR SOUTHWESTERN ONTARIO FOREST BIRDS AT RISK: A Guide for Woodlot Owners and Forest Practitioners](#), which includes recommended beneficial management practices (BMPs) for all of the target SAR, as well as, discusses how to prioritize when multiple SAR are present. This guide will be incorporated into field staff training in the future to provide field staff with a reference for target SAR BMPs and to ensure a consistent approach to management advice.

Additional outreach to public and private landowners

The above-mentioned guide was provided to the OMNRF's Managed Forest Tax Incentive Program (MFTIP) coordinator and sent to Managed Forest Plan Approvers. In addition, the guide is available through the Ontario Woodlot Association (OWA) [website](#) and an article introducing the guide was published in the OWA's S&W Report (*New Resource is for the Birds*, Fall/Winter 2017, Vol 89, p. 17), a newsletter for OWA members. Following the publication, Becky Stewart, Ontario Program Manager, was an invited speaker at the Oxford and Brantford chapter's AGMs and delivered a talk entitled "Forest Management and Birds", and will be speaking at the Elgin Chapter's AGM in April. Over 75 private woodlot owner's attended these presentations and 22 BMP guides were given directly to interested landowners. Two new potential sites for target SAR have been subsequently identified by landowners and will be surveyed by BSC staff in 2018.

Table 8. Threats recorded by site in 2017. Indicators of a potential threat to SAR were natural (e.g. invasive species) or human-related (e.g. recreational use).

Site ID	Site Name	Landowner	2017 SAR Occupancy	Threat(s) or potential threats	Notes and/or actions taken	Threat(s) Mitigated
BR80z	Brant Tract	LPRCA	No SAR	ATV Use, Deer Stands, Emerald Ash Borer	Ongoing	N
^A EL15z	Springwater Forest	CCCA	LOWA	Walking Trails close to LOWA territory, Beech Bark Disease	Ongoing	N
^A EL20z	Hawk Cliff	TTLT	ACFL	Garlic Mustard, Multifloral Rose, Beech Bark Disease	Ongoing	N
^A EL27z	Rush Creek	Private ¹⁰⁸	ACFL	Pollution in main stream	Ongoing, does not appear to impact SAR	N
EL43b	Calton Swamp	CCCA	No SAR	Emerald Ash Borer	Ongoing	N
EL45a	Painted Ravine	Private ¹⁴⁰	ACFL, LOWA	Beech Bark Disease, Pollution in main stream	Ongoing	N
EL60a	Pizza Place	Private [?]	ACFL	ATV trail close to ACFL nests	Follow-up with landowner still needed	N
ES2z	Point Pelee National Park	Parks Canada	PROW	PROW nest tree rotten	Nest boxes installed at 4 sites; nest box occupied by PROW; staff given guidance on monitoring sites	Y
^{AP} HN1b	Backus Woods North Property	NCC	ACFL, LOWA, CERW, PROW	Beech bark disease, dry sloughs	Ongoing	N

^A HN1c	Backus Woods South Property	NCC	ACFL, LOWA, PROW	Pollution near gate (furniture)	Garbage removed by landowner	Y
HN5z	Deer Creek Valley	NCC	No SAR	Beech bark disease	Ongoing	N
HN7b	Landon South	LPRCA	No SAR	Pollution throughout site, dry sloughs, atv use	Ongoing	N
^A HN12g	St. Williams Northeast	MNR	CERW	ATV Use, extinguished campfire, dry sloughs	Ongoing; discussed with staff, additional follow-up discussion still needed	N
^A HN16b	Turkey Point Bluffs and Ravines	MNR	ACFL	Biking trails and Bridges, emerald ash borer	Ongoing	N
HN21a	Swick-King Tract	LPRCA	None	Dry Sloughs	Ongoing	N
HN26c	Roney Tract	LPRCA	CERW	Dry Sloughs	Ongoing	N
^A HN27c	Coppen's Tract	LPRCA	ACFL, LOWA	ATV Use, Garlic Mustard, Newly built deer stand with camera set up beside it; camera removed on next visit..., Beech Bark Disease	Ongoing	N
^A HN27d	Armstrong Tract	LPRCA	ACFL, LOWA	ATV Use; garlic mustard	Ongoing	N
HN27g	Rowanwood Tract	NFN	ACFL	Emerald Ash Borer	Ongoing	N
HN37z	Middleton Wetlands	LPRCA	CERW	Dry Sloughs	Ongoing	N
HN62z	Carr Tract	LPRCA	No SAR	ATV Use; Dry Sloughs	Ongoing	N
^A HN90z	Buchner Mason Tract	LPRCA	No SAR	Emerald Ash Borer	Ongoing	N
^P KE2z	Rondeau Provincial Park	Ontario Parks	PROW	House Wrens (PROW nest box competitor); Emerald Ash Borer	Ongoing	N
^A LA2z	Lambton County Forest	ABCA	ACFL, LOWA, CERW	Trails near ACFLs	Ongoing	N

Appendix:

Southern ON Species at Risk Program-Data Form

SOUTHERN ON SPECIES AT RISK PROGRAM – DATA FORM

Observer 1	
Observer 2	
Site Name	
Site ID	

Date (dd-mm-yyyy)	
Visit no.	
Start time (24 hr)	
Stop time (24 hr)	

Habitat No. ¹		
Zone	Easting	Northing

Basal Area Factor 2	
Species	No.
Hard Maple	
Soft Maple	
Bitternut Hickory	
Shagbark Hickory	
Red Oak	
White Oak	
W. Birch	
Y. Birch	
Am. Beech	
Ash spp.	
Basswood	
Bl. Cherry	
Bl. Walnut	
Elm spp.	
Ironwood	
Poplar spp.	
Sassafras	
Tulip	
W. Pine	
E. Hemlock	
Dead trees	

Occupancy								
Species	No.	BE	UTM Coordinates			Previously observed (w/in year)? (✓)	NR (✓)	Hab No. CERW only
			Zone	Easting	Northing			

Threats				
Type ¹	Description	UTM Coordinates		
		Zone	Easting	Northing

¹Types of threats: Harvesting (H), Garbage Dumping (G), Road/Trail (R), Invasive Pest (IP), Invasive Disease(ID), Other (O)

Foliage Density (0 to 10)	
> 18 m	
12 - 18 m	
6 - 12 m	
< 6 m	

Habitat Suitability (1 to 5)

¹ In the case of CERW; if done at site without CERW (i.e., control point) leave blank