Frontenac Breeding Birds

Report on the 2011 Field Season

Prairie Warbler nest with eggs, Frontenac Prov. Park, June 2011 (D.Derbyshire)

FRONTENAC BIRD STUDIES

AVIAN MONITORING & RESEARCH IN THE FRONTENAC ARCH

MIGRATION RESEARCH FOUNDATION

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December 2011

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This report was prepared with element occurrence and observation data supplied by the Natural Heritage Information Centre, Ontario Ministry of Natural Resources.

Detailed locations of designated Species at Risk and other rare/sensitive species has been removed from the public version of the document.

Suggested Citation:

Derbyshire, D. 2011. *Frontenac Breeding Birds: Report on the 2011 Field Season.* Unpublished report by the Migration Research Foundation.

Photo Credits: Page 1 – Satellite view of Frontenac Arch (NASA), Page3 - Downy Woodpecker banded at BLAK (Seabrooke .Leckie), Page 17 - Nest building pair of Great Crested Flycatchers (Dan Derbyshire), Page 20 - Colour banding Prairie Warbler (Dan Derbyshire), Page 24 – Louisiana Watertrush at nest (Dan Derbyshire).

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Introduction

Background

Migration Research Foundation

The Migration Research Foundation (MRF) was established in 2002 to support conservation and wildlife management efforts through the study of animal distributions and movements, and the dissemination of this knowledge within the scientific community and to the public at large. All MRF programs are overseen by a four-person volunteer board of directors.

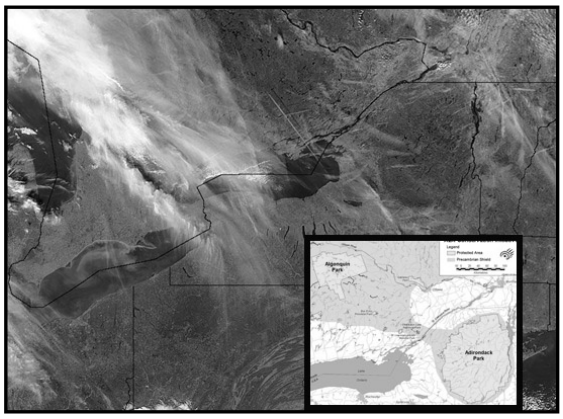
Frontenac Bird Studies

Frontenac Bird Studies (FBS) was created by the Migration Research Foundation (MRF) in 2009 with the aim to strengthen the capacity for protection of bird populations and habitats in the Frontenac region through monitoring and research.

FBS Objectives

Objectives of FBS are to: a) increase knowledge of avian populations and ecology in the Frontenac Arch; b) establish long-term monitoring programs to track changes in avian communities; c) raise awareness through public outreach and community support; and d) cooperate with analogous agencies to increase capacity for protection of biodiversity.

The Frontenac Arch



The Frontenac Arch is an ancient span of Precambrian bedrock that connects the Canadian Shield of central and northern Ontario to the Adirondack and Appalachian regions to the south. Over a billion years old, the Frontenac Arch is considered the “backbone” of Eastern North America and one of the most biologically diverse regions in Canada. As a unique zone of bio-geographic overlap with convergent ecoregions, the Frontenac Arch has a high number of federally and provincially listed species at risk. The landform is also an important corridor of habitats for the migration and dispersal of wildlife. The Frontenac Arch Biosphere Reserve was established in 2002, in recognition of the region’s significance to cultural and biological heritage.

Formerly a mountain range, the present-day Frontenac Arch was formed by glacial retreat and millennia of erosion, which has resulted in the distinctive shield topography of ridges and valleys with shallow soils. The rugged landscape of the region has hindered agricultural land use and commercial development. Roughly 40% of the Frontenac Arch consists of forest cover, 30% is wetland and 15% is agricultural, with the remainder being human settlements. Despite that the majority of the region is in a “natural” state, just 7% of the Biosphere Reserve is protected from development. This percentage consists primarily of provincial parks (Frontenac, Charleston Lake, Murphy's Point) a national park (St. Lawrence Islands), as well as some scattered nature reserves and conservation areas.

Birds on the Arch

The North American Bird Conservation Initiative (NABCI) indicates that relative to other areas of Southern Ontario, the Frontenac Arch has a “high proportion of forest, shrubland and low intensity agricultural habitats” and that diversity of breeding birds is “exceptionally high” (Ontario Partners in Flight 2006). The NABCI plan for region 13 (Lower Great Lakes/St. Lawrence Plain) lists 42 priority species, of which 35 occur on the Frontenac Arch. The plan for region 12 (Boreal Hardwood Transition) lists 51 priority species, of which 43 occur in this area.

A total of 17 bird species classified as Species At Risk (provincial and/or federal) occur or have occurred historically on the Frontenac Arch. Of these, Cerulean Warbler (COSEWIC-Endangered), Golden-winged Warbler (COSEWIC-Threatened), Whip-poor-will (COSEWIC-Threatened), and Louisiana Waterthrush (Special Concern) occur here in provincially and nationally significant densities. Though not considered “at risk”, Prairie Warbler and Red-shouldered Hawk are two of many rare/sensitive species with high concentrations in the region.

Frontenac Breeding Birds

Program Overview

Frontenac Breeding Birds, the flagship program of FBS, was designed as an integrated approach to monitoring - an approach that concurrently derives both annual primary demographic statistics and basic population parameters of breeding landbirds. In 2009, a point count regime was established throughout a defined study area to systematically assess relative abundance, species richness and distribution through the combined use of roadside and off-road point count surveys (Derbyshire 2009). We also began annual assessments of breeding bird demographics through the installation of two Monitoring Avian Productivity and Survivorship (MAPS) stations and a nest-monitoring scheme. The North American Bird Conservation Initiative has identified avian demographics as a primary monitoring objective for “species or study areas of high management concern/interest” in the Ontario region (Ontario Partners in Flight 2006). Data on vital rates such as productivity, survivorship, fidelity and recruitment are critical to the detection and reversal of causal factors in population trends. The FBS MAPS network now includes three stations with the addition of the Blue Lakes (BLAK) site in 2010.

The rich diversity of species on the Frontenac Arch, including fifteen avian Species At Risk, is cause for extensive monitoring and stewardship. As a third objective of the program, FBS staff and volunteers carefully document any rare species detected during all fieldwork operations within the breeding season and also perform additional inventory work in appropriate habitats for select species.

Study Area

A core study area of over 15,000 hectares, located between the towns of Sydenham and Westport, ON, was selected in 2009 as the best available context for the Frontenac Breeding Birds program (Appendix I). This area, in the northern section of the Frontenac Arch, is at the heart of the transition from the Mixedwood Plains and Boreal Shield. The study area includes Frontenac Provincial Park at its centre, a designated threshold-wilderness of over 5000 hectares. Frontenac Provincial Park is a model unit to measure breeding bird populations given its size, location, protected status and high diversity of habitats and species. The landscape surrounding Frontenac Provincial Park receives a higher degree of anthropogenic pressure, which will facilitate comparative analysis. The study area is mostly privately owned with the exception of the park, a few small crown land parcels and the Helen Quilliam Sanctuary, owned by the Kingston Field Naturalists. Opportunities for expansion of the MAPS program within the defined study area was found to be limited, which led us to establish a broader coverage area for this particular component of the project. This process is still underway and will be defined as appropriate sites are found and operated.

Historical surveys of Bird Populations in Frontenac Provincial Park

Dougan & Associates and Bill McLeish Consulting (2006)

An assessment of three bird Species at Risk in Frontenac Provincial Park was produced in 2006 by Dougan & Associates and Bill McLeish Consulting (Brinker and McLeish 2006). An inventory of several bird species was conducted, which focused on Cerulean Warbler, Red-shouldered Hawk and Louisiana Waterthrush. A total of 71 point count surveys were completed, primarily along trail systems.

Ecological Services (2004)

Ecological Services, a local environmental consulting firm, conducted a large-scale life science inventory of Frontenac Provincial Park in 2002 and 2003. Presence/absence information of all bird species found were included in the 2004 report along with more detailed documentation of Species at Risk encountered (Ecological Services 2004).

2011 Results

Monitoring Avian Productivity and Survivorship (MAPS)

Overview of MAPS Program

The Breeding Bird Survey (BBS) and Christmas Bird Count (CBC) are two primary sources of data used to derive population trends for North American birds. These long-standing programs can be used to determine rates of population change for many species but fail to identify causal factors effecting detected trends.

Modeled after the Constant Effort Ringing scheme in the United Kingdom, the Monitoring Avian Productivity and Survivorship (MAPS) program was initiated in 1989 to provide long-term demographic data for North American landbirds. After a four-year pilot study, the MAPS program was endorsed by Partners in Flight, U.S. Geological Survey and the U.S. Fish and Wildlife Service citing that MAPS was “the most important project in the nongame bird monitoring arena since the creation of the Breeding Bird Survey”. Over 1000 MAPS stations have been activated since 1989, contributing heavily to research, land management and conservation strategies at local, regional and continental scales. Unfortunately, only a handful of widely dispersed stations are currently operating in Ontario. The network of three stations (MABO, RRID, BLAK) run by FBS is the largest regional effort underway in the province.

MAPS Objectives (Desante et.al. 2009)

MAPS **Monitoring** Objectives are to provide:

- annual indices of adult population size and post-fledging productivity;
- annual estimates of adult survival rate, adult population size, proportion of residents in the adult population, and recruitment into the adult population.

MAPS **Research** Objectives are to identify and describe:

- temporal and spatial patterns in the demographic indices and estimates provided by MAPS
- relationships between these temporal and spatial patterns and (1) ecological characteristics of the target species (e.g., migration strategy, nest location), (2) population trends of the target species (e.g., areas or locations with increasing or decreasing trends), (3) station specific and landscape-level habitat characteristics (e.g., total forest cover, mean forest patch size), and (4) spatially-explicit weather data (e.g., mean, min, and max temperature or precipitation, extreme events).

MAPS **Management** Objectives are to:

- determine the proximate demographic cause(s) of population decline, that is, whether the decline is caused by low productivity or low survivorship.

- to identify and formulate landscape-level management actions and conservation strategies to reverse population declines and maintain stable or increasing populations.

- evaluate, through the adaptive management process, the effectiveness of those management actions and conservation strategies that are actually implemented. In all cases, these management objectives are to be achieved for multiple target species at the appropriate spatial scale.

Methods

Each MAPS station is roughly square or circular in shape and encompasses an area of 20 hectares. Standardized mistnetting is conducted within an interior "core" area of roughly eight hectares. The MAPS program divides the breeding season into ten distinct ten-day periods: (1) May 1-10; (2) May 11-20; (3) May 21-30; (4) May 31-June 9; (5) June 10-19; (6) June 20-29; (7) June 30-July 9; (8) July 10-19; (9) July 20-29; and (10) July 30-August 8. As part of the Northeast region with a later start to the breeding season, MAPS stations in Ontario commence operations during period four and complete during period ten for a total of seven visits between May 31-August 8. An individual MAPS visit involves six hours of effort, which amounts to 42 effort hours per station per season.

For each visit, mistnets are erected precisely at local sunrise time, checked at regular intervals of 20 minutes and are closed after six hours of operation. Each net location is coded and reused in all subsequent MAPS seasons to ensure methodological consistency. Birds are safely captured, measured and released during each six-hour visit to the MAPS site. As a mark-recapture study, the MAPS program utilizes mistnetting to acquire detailed demographic information on species, capture location (net #), sex, age, molt and feather condition, fat, and breeding condition scores of all individuals captured and recaptured. These data are recorded on standardized field data sheets and then entered into MAPSPROG, a specially designed program for MAPS data. Effort data (start/finish times, capture data, net operation etc.) are also tabulated at the end of each field day and entered into MAPSPROG.

A breeding status list is updated throughout each MAPS season to provide an assessment of the summer residency status of all species present at each station for each season. Presence of singing males, active nesting behaviour, territoriality and many other indicators of presence for each species are recorded during each visit to facilitate identification of active breeders, transients and non-breeders within the study site.

A Habitat Structure Assessment (HSA) is conducted during the first year of each MAPS station to provide a simple classification for each station, permit detection of gross changes in habitat structure at the station that may explain changes in population demographics, and provide station-specific habitat data to complement remotely-sensed landscape data at a fine resolution.

MAPS Station Information

Three MAPS stations were installed on protected lands within the study area FBS in May 2009. All three stations were registered with the Institute for Bird Populations (IBP), the administrative organization of the MAPS program. Sites selected for the stations included Hemlock Lake (HELA), located on crown land east of Canoe Lake Road, Rock Ridge (RRID) on Big Clear Lake within Frontenac Provincial Park, and Maplewood Bog (MABO) on crown land north of Devil Lake Road. The HELA station was closed after only two visits due to a combination of low capture volume and the inhibiting terrain. A new station with the name Blue Lakes (BLAK), located near Sharbot Lake, was operated in 2010 and 2011. Below is a more detailed summary of each station operated to date.

Hemlock Lake - (Location: AXIS, Station: HELA): Retired in June 2009

The HELA station was installed on crown land astride the northern section of Canoe Lake Road. The site contains a large beaver pond bordered by mixed forest dominated by Eastern Hemlock. The mature hemlocks around the pond appeared to have sustained considerable damage from insect infestation, possibly Hemlock Borer or Hemlock Looper. The habitat was regenerating from this damage, creating an unusual amount of dense undergrowth for the area. This made the site particularly attractive for MAPS as both adults and young tend to concentrate in dense second-growth habitats during the latter half of the breeding season. Yellow-bellied Sapsucker, Brown Creeper, Chestnut-sided Warbler, Black-and-white Warbler and Ovenbird was common breeders at the site while male Blackburnian and Magnolia Warbler held territories just outside the station boundaries. Unfortunately, after two visits it was decided that the uneven terrain, dense blowdown and thorny scrub made the site unfeasible as a long-term MAPS station. Our two visits indicated a fairly small population of adults, although the site had great potential for attracting large numbers of post-breeding dispersers later on in the summer.

Rock Ridge - (Location: AXIS, Station: RRID): Active 2009-2011

Located in the northeast corner of Frontenac Provincial Park, the RRID station was chosen primarily for its appropriate geographical situation, a long scrubby ridge bound by water on three sides – ideal for channeling late summer post-breeding dispersal. The site also had a diverse breeding bird community with large numbers of White-throated Sparrow, Field Sparrow, Eastern Towhee, Black-and-white Warbler and Nashville Warbler, among others. This site was burned over around 1930 and is very slowly regenerating due to the shallow till and expanses of exposed bedrock. Vegetation cover ranges from open mixed woodland to successional deciduous forest to rock scrub barrens.

Maplewood Bog - (Location: AXIS, Station: MABO): Active 2009-2011

The MABO station was installed on crown land on the north side of Devil Lake Road, north of Frontenac Provincial Park. Like HELA, this crown land parcel is relatively small and surrounded by largely undisturbed private lands. The name Maplewood Bog was chosen for the site because of the predominance of mid-succession *Acer saccharum* forest and the presence of multiple bogs/poor fens. MABO also features smaller components of rock scrub barren habitat and mixed open woodlands. This site was particularly attractive for its lower lying Sugar Maple-Oak forest and preponderance of small/shrubby wetlands. Of all the stations, MABO has the densest and most varied population of breeding avifauna. Dominant species included Veery, Ovenbird, Northern Waterthrush and American Redstart.

Blue Lakes - (Location: AXIS, Station: BLAK): Active 2010-2011

The BLAK station is located on crown lands near the small town of Sharbot Lake, ON. The site is sandwiched between two small dystrophic wetlands and features many open ridges and shaded valleys. The station is composed of three main habitat types; a section of mixed forest with a dense understorey of Balsam Fir and poplar, Red Oak-Red Maple deciduous forest and many small, sparsely treed rock barrens. In terms of bird species, BLAK differs from MABO and RRID in having Yellow-throated Vireo, Chestnut-sided Warbler and Black-throated Blue Warbler as three of its common breeding species.

Banding and Recapture Results

Capture Totals for all Stations

A total of 256 birds were captured in 2011 for all stations combined, substantially fewer than the 364 captured in 2010. Despite only two stations (MABO and RRID) operating in 2009, the total that year was almost 70 more than across all three stations in 2011. Lastly, the overall rate of capture (birds captured/net hour) was .22/hour, down from .30 in 2010 and .38 in 2009. Refer to Table 1 for a summary of visit and season totals by station.

Table 1. Summary of MAPS Effort/Banding Totals by Visit, Station and Year

Station	Date	Period	Nets Used	Net Hours	Banded	Unb	Recap	2011 Total	2010 Total	2009 Total
	6/5/2011	4	10	60	6		4	10	10	25
	6/17/2011	5	10	45	5		2	7	23	10
	6/30/2011	6	10	60	15		2	17	25	28
RRID	7/9/2011	7	10	60	12		1	13	20	10
	7/19/2011	8	10	55	24		4	28	15	15
	7/28/2011	9	10	50	4		2	6	8	14
	8/5/2011	10	10	50	5			5	21	26
subtotal				**380**	**71**	**0**	**15**	**86**	**122**	**128**
	6/4/2011	4	10	60	6		4	10	24	
	6/15/2011	5	10	60	11		4	15	19	
	6/27/2011	6	10	60	20		5	25	24	
BLAK	7/7/2011	7	10	60	13	1		14	20	
	7/16/2011	8	10	60	3		1	4	7	
	7/27/2011	9	10	40	3		1	4	8	
	8/4/2011	10	10	50	6		2	8	8	
subtotal				**390**	**62**	**1**	**17**	**80**	**110**	**0**
	6/10/2011	4	10	56	5		6	11	21	26
	6/16/2011	5	10	60	12		11	23	29	22
	6/29/2011	6	10	60	9		8	17	27	45
MABO	7/8/2011	7	10	60	18		4	22	23	30
	7/20/2011	8	10	55	5	1	5	11	23	31
	7/30/2011	9	10	50	4			4	4	24
	8/6/2011	10	10	45	1		1	2	5	19
subtotal				**386**	**54**	**1**	**35**	**90**	**132**	**197**

*Unb refers to birds captured and released unbanded

Annual totals of birds banded by species is provided below in Table 2. American Robin remains the most abundantly banded species for the AXIS stations, although they do seem to be dropping in numbers. Also of interest is the high proportion of Black-and-white Warbler, Veery and American Redstart - all falling within the top ten for three years of sampling. Totals of Ovenbird, Eastern Towhee and Field Sparrow are also significant given that these three species are of conservation concern due to habitat loss and/or fragmentation

Table 2. Yearly Banding Totals by Species for all Stations Combined (birds banded & recaptured). Species in bold indicate record high totals were set in 2011.

Species	2011	2010	2009	Total	Species	2011	2010	2009	Total
Sharp-shinned Hawk	**1**			**1**	Magnolia Warbler			1	1
Broad-winged Hawk			1	1	Black-throated Blue Warbler	2	3		5
Yellow-billed Cuckoo		2	2	4	Myrtle Warbler	4	2	10	16
Black-billed Cuckoo		2	2	4	Black-throated Green Warbler		1		1
Yellow-bellied Sapsucker	6	7	4	17	Pine Warbler		1		1
Downy Woodpecker	1	5	1	7	Black-and-white Warbler	7	10	16	33
Hairy Woodpecker	5	7	5	17	American Redstart	6	10	8	24
Yellow-shafted Flicker		1	2	3	Ovenbird	7	9	5	21
Pileated Woodpecker	1	1		2	Northern Waterthrush		8	8	16
Eastern Phoebe	**6**	**4**	**1**	**11**	Common Yellowthroat	6	10	12	28
Great Crested Flycatcher	1	1	1	3	Scarlet Tanager	6	7	3	15
Eastern Kingbird		1	1	2	Eastern Towhee	4	7	9	20
Yellow-throated Vireo	2	3		5	Chipping Sparrow	2	3	6	11
Warbling Vireo		1		1	Field Sparrow	6	8	7	20
Red-eyed Vireo	17	24	23	64	Song Sparrow	7	12	15	34
Blue Jay	7	7	3	15	Swamp Sparrow		3	2	5
Black-capped Chickadee	15	21	23	59	White-throated Sparrow		3	4	7
Red-breasted Nuthatch		1	2	3	Rose-breasted Grosbeak	14	16	7	36
White-breasted Nuthatch		1	5	6	Indigo Bunting			1	1
Veery	9	10	14	33	Red-winged Blackbird	3	2		5
Hermit Thrush	2	5	5	12	Common Grackle	9	14	2	25
Wood Thrush	4	5	5	14	Brown-headed Cowbird			1	1
American Robin	15	36	29	80	Baltimore Oriole			3	3
Gray Catbird	2	6	9	17	**Purple Finch**	**1**			**1**
Cedar Waxwing	2		2	4	American Goldfinch			1	1
Golden-winged Warbler	**1**			**1**					
Nashville Warbler	1	1	5	7					
Chestnut-sided Warbler	5	5	3	13	Grand Total	187	286	269	736

Rock Ridge

At Rock Ridge, 71 new birds were banded this year, down from 101 in 2010 and 115 in 2009. The makeup of species sampled was similar to previous seasons, although abundance varied considerably. A few species posted record high totals this year including; Blue Jay, Eastern Phoebe, Ovenbird and Scarlet Tanager. However, this list pales in comparison to that for species with record low totals; American Robin, Black-and-white Warbler, Black-billed Cuckoo, Chipping Sparrow, Eastern Towhee, Red-eyed Vireo and White-throated Sparrow. The White-throated Sparrow in particular, a staple species at RRID in our first two years, was very scarce in 2011. Our only record this season was of a single male that held territory on the opposite cliff of the gorge for a few visits in June. We estimated that a minimum of six territories were occupied at RRID in 2009. Diversity of species captured was also considerably lower this year; nineteen species were captured in 2011, down from 26 and 31 in 2010 and 2009 respectively.

Table 3. Yearly capture totals at Rock Ridge

Species	2011 New	2011 Rec	2010 New	2010 Rec	2009 New	2009 Rec
Broad-winged Hawk					1	
Yellow-billed Cuckoo			2		2	
Black-billed Cuckoo			2		2	
Ruby-thr. Hummingbird						
Downy Woodpecker			1			
Hairy Woodpecker	3	3	2		3	
Yellow-shafted Flicker			1		2	
Eastern Phoebe	6		4		1	
Great Crested Flycatcher					1	
Eastern Kingbird			1		1	
Red-eyed Vireo	4		11	5	7	2
Blue Jay	6		1		2	
Black-capped Chickadee	5	2	12	6	6	1
Red-breasted Nuthatch			1		1	
Veery					1	
Hermit Thrush			3		4	
American Robin	7		15	3	19	1
Gray Catbird	1					
Cedar Waxwing					2	
Nashville Warbler	1				3	
Myrtle Warbler	3		2		7	
Black-thr. Green Warbler			1			
Pine Warbler			1			
Black-and-white Warbler	6	5	9	3	12	1
American Redstart					2	
Ovenbird	2					
Northern Waterthrush			1			
Common Yellowthroat			2	1	1	
Scarlet Tanager	4	1			1	
Chipping Sparrow	2		3	2	5	1
Eastern Towhee	3	1	4	1	7	2
Field Sparrow	5	3	7		5	
Song Sparrow	1		3		5	1
White-throated Sparrow			3		4	2
Rose-breasted Grosbeak	2		2		3	
Red-winged Blackbird	2					
Common Grackle	8		7		2	
Brown-headed Cowbird					1	
Baltimore Oriole					2	
Grand Total	71	15	101	21	115	11

Maplewood Bog

At MABO the pattern of declining forest bird abundance seems to be even more precipitous. Just 54 birds were banded in 2011, down from 95 in 2010, and from 154 in 2009. Only two species were banded in record high numbers, both of which were rare species captured for the first time – Sharp-shinned Hawk and Golden-winged Warbler (1 banded of each). Results for the remaining species are either record low or generally consistent. Species exhibiting the most marked decrease in abundance since 2009 are: Gray Catbird (90%), American Robin (80%), Ovenbird (80%), Song Sparrow (80%), Black-capped Chickadee (77%), Red-eyed Vireo (56%), and Veery (54%). Despite appropriate water levels, Northern Waterthrush was neither captured nor even observed in 2011, astonishing given that this was one of the most abundant species at MABO in previous years, 2009 especially. It should be noted that a slight measure of decrease in newly banded birds could be expected from year-to-year as a greater portion of adults are banded and thus become recaptures in following seasons. However, decreases of this magnitude are exceptional and likely indicate poor productivity, survivorship and/or recruitment. Twenty-one species were captured this year – also a record low result.

Table 4. Yearly capture totals at Maplewood Bog

Species	2011 New	2011 Rec	2010 New	2010 Rec	2009 New	2009 Rec
Sharp-shinned Hawk	1					
Yellow-bellied Sapsucker	1		4		4	
Hairy Woodpecker	1	1	5		2	
Great Crested Flycatcher			1			
Red-eyed Vireo	7	9	8	8	16	2
Blue Jay	1		4	1	1	
Black-capped Chickadee	4		7	2	17	2
Red-breasted Nuthatch					1	
White-breasted Nuthatch					5	1
Veery	6	12	2	5	13	7
Hermit Thrush			1		1	
Wood Thrush	4	3	4	5	5	1
American Robin	2	3	11	2	10	4
Gray Catbird	1	2	5	3	9	3
Golden-winged Warbler	1					
Nashville Warbler			1		2	
Chestnut-sided Warbler	1		2		3	1
Magnolia Warbler					1	
Black-thr. Blue Warbler			1			
Myrtle Warbler					3	
Black-and-white Warbler	1		1		4	2
American Redstart	6		8		6	2
Ovenbird	1		4		5	3
Northern Waterthrush			2	3	8	6
Common Yellowthroat	6		7	3	11	4
Scarlet Tanager	2	2	5		2	
Downy Woodpecker			1		1	
Eastern Towhee	1		3		2	
Chipping Sparrow					1	
Field Sparrow	1				2	
Song Sparrow	2	1	4	2	10	2
Swamp Sparrow			2		2	
Rose-breasted Grosbeak	4	2	2	1	4	
Indigo Bunting					1	
Baltimore Oriole					1	
American Goldfinch					1	
Grand Total	54	35	95	35	154	40

Blue Lakes

A total of 62 birds were banded at BLAK in 2011, which is down from the 90 banded last year. In terms of overall abundance, BLAK has been very similar to MABO in the last two years (within eight individuals in each season). Compared to last year the most marked decrease in abundance is evident for American Robin and Veery while Black-capped Chickadees increased sharply. Twenty-one species were captured this year, down six from 2010. The composition of species differs at BLAK from the other stations by having significantly higher numbers of Yellow-throated Vireo, Hermit Thrush, Chestnut-sided Warbler, Black-throated Blue Warbler and Rose-breasted Grosbeak.

Table 5. Yearly Capture Totals at Blue Lakes

Species	2011 New	2011 Rec	2010 New	2010 Rec
Yellow-bellied Sapsucker	5	2	3	2
Downy Woodpecker	1		3	1
Hairy Woodpecker	1			
Pileated Woodpecker	1		1	
Great Crested Flycatcher	1			
Yellow-throated Vireo	2		3	1
Warbling Vireo			1	
Red-eyed Vireo	6	1	5	
Blue Jay			2	
Black-capped Chickadee	6	1	2	
White-breasted Nuthatch			1	
Veery	3	4	8	5
Hermit Thrush	2	1	1	
Wood Thrush			1	
American Robin	6		10	1
Gray Catbird			1	
Cedar Waxwing	2			
Chestnut-sided Warbler	4	5	3	1
Black-throated Blue Warbler	2		2	3
Myrtle Warbler	1			
American Redstart			2	
Ovenbird	4		5	1
Northern Waterthrush			5	
Common Yellowthroat			1	
Scarlet Tanager			2	
Field Sparrow			1	
Song Sparrow	4		5	4
Swamp Sparrow			1	
Rose-breasted Grosbeak	8	3	12	
Red-winged Blackbird	1		2	
Common Grackle	1		7	
Purple Finch	1			
Grand Total	62	17	90	19

Analysis of Vital Rates

At least five years of MAPS data are needed to produce valid estimates of vital rates, the precision of which improves with each additional year of data collection. Analysis of vital rates in this report is therefore limited as the amount of data available doesn't yet warrant a complete investigation.

Productivity

Mark-recapture techniques, such as those employed in the MAPS program, are powerful tools for measuring population demography. Each bird captured during MAPS sessions is aged, sexed, and carefully measured for breeding evidence and other biometrics. A complete summary of productivity statistics per species is presented below in Tables 6-8. Age ratios are one of a few tools available in the measurement of avian productivity for a site, region or continent. After the primary nesting cycle, the proportion of young birds in the population reaches an annual high. Simply put, the degree to which this proportion varies is considered an index of productivity.

There is considerable variation in total sample of young birds detected at the stations. The BLAK site had the lowest score with hatch-years making up 13% of new captures, down from 16% a year ago. As usual, RRID had the highest score with just over 35%, a bit lower than last year (45%) but equal to the 2009 result. Young birds

represented a little over 18% of new birds banded at MABO in 2011, substantially lower than in previous seasons when a little over 30% were young birds in 2009 and 2010. This is the third year in a row that RRID has produced the highest output of hatch-year birds amongst the stations. Compared to RRID, the low sample of hatch-years during late sampling periods at MABO and BLAK are likely related to varying site-specific performance in attracting and congregating post-bred dispersing individuals. The effect of a sharply reduced adult population is also worth considering when evaluating apparent low productivity rates at MAPS stations.

Productivity at Rock Ridge

Scientists at the Institute for Bird Populations consider that each station samples productivity for bird populations within a 4km radius of the station centre (Desante et.al. 2009). This means that while some of the young birds included in Table 6 will be from the actual 20-hectare MAPS station proper, a potentially higher portion may come from areas further away. Rock Ridge has several qualities that probably contribute to better sampling of dispersing birds in late summer. The site is elevated atop a long ridge bound by water, which has a natural funnel effect for birds on the move. This year, 25 of 71 newly banded individuals were young birds (35%). Looking at each species, high proportions are evident for American Robin, Eastern Phoebe and Scarlet Tanager. Hatch-year individuals of twelve species were banded this year, down from 17 in 2010 and 19 in 2009 – certainly a function of a diminished overall sample. Unlike previous seasons at Rock Ridge, very few birds were captured during visits 6-7 at the end of the season, which may have influenced lower productivity indices in 2011.

Table 6. Productivity at Rock Ridge (RRID). Figures are percentage of newly banded birds that were aged hatch-year.

Species	2011 HY%	2010 HY%	2009 HY%
Broad-winged Hawk	0	0	0
Yellow-billed Cuckoo	0	0	0
Black-billed Cuckoo	0	0	0
Ruby-thr. Hummingbird	0	0	100
Downy Woodpecker	0	100	0
Hairy Woodpecker	33.3	0	0
Yellow-shafted Flicker	0	100	0
Eastern Phoebe	83.3	100	100
Great Crested Flycatcher	0	0	0
Eastern Kingbird	0	100	0
Red-eyed Vireo	0	9.1	0
Blue Jay	33.3	0	50
Black-capped Chickadee	40	91.7	16.7
Red-breasted Nuthatch	0	100	100
Veery	0	0	100
Hermit Thrush	0	33.3	75
American Robin	57.1	53.3	73.7
Cedar Waxwing	0	0	0
Nashville Warbler	100	0	33.3
Yellow-rumped Warbler	0	0	28.6
Black-thr. Green Warbler	0	0	0
Pine Warbler	0	100	0
Black-and-white Warbler	16.7	66.7	33.3
American Redstart	0	0	100
Northern Waterthrush	0	100	0
Common Yellowthroat	0	0	100
Scarlet Tanager	50	0	100
Chipping Sparrow	50	33.3	40
Eastern Towhee	0	50	28.6
Field Sparrow	20	42.9	20
Song Sparrow	0	66.7	33.3
White-throated Sparrow	0	0	25
Rose-breasted Grosbeak	50	50	0
Common Grackle	50	0	0
Brown-headed Cowbird	0	0	0
Baltimore Oriole	0	0	0
Total	35.2 (n=25)	45.5 (n=46)	35.9 (n=42)

Productivity at Maplewood Bog

Overall proportion of hatch-years among new captures at MABO was considerably lower this year, down to just 19% from >30% in both prior years. It's difficult to make any comparative statements about productivity at MABO with a sample size of just ten hatch-year individuals this season. Needless to say, results are poor and certainly reflective of a markedly diminished pool of nesting adults for many species. Refer to Table 7 for a complete breakdown of productivity results at MABO.

Table 7. Productivity at Maplewood Bog (MABO) (figures are percentage of newly banded birds that were aged hatch-year).

Species	2011 HY%	2010 HY%	2009 HY%
Ruby-thr. Hummingbird	0	0	50
Yellow-bellied Sapsucker	100	75	25
Hairy Woodpecker	100	60	50
Great Crested Flycatcher	0	0	0
Red-eyed Vireo	0	12.5	18.8
Blue Jay	0	0	0
Black-capped Chickadee	50	85.7	64.7
Red-breasted Nuthatch	0	0	100
White-breasted Nuthatch	0	0	60
Veery	16.7	0	7.7
Hermit Thrush	0	100	100
Wood Thrush	0	25	20
American Robin	0	45.5	30
Gray Catbird	0	0	22.2
Nashville Warbler	0	0	0
Chestnut-sided Warbler	0	50	66.7
Magnolia Warbler	0	0	0
Black-throated Blue Warbler	0	0	0
Yellow-rumped Warbler	0	0	33.3
Black-and-white Warbler	0	0	25
American Redstart	33.3	12.5	16.7
Ovenbird	0	0	20
Northern Waterthrush	0	0	0
Common Yellowthroat	33.3	28.6	54.6
Scarlet Tanager	50	20	50
Downy Woodpecker	0	100	100
Eastern Towhee	0	0	50
Chipping Sparrow	0	0	0
Field Sparrow	0	0	50
Song Sparrow	50	75	40
Swamp Sparrow	0	0	50
Rose-breasted Grosbeak	0	0	0
Indigo Bunting	0	0	0
Baltimore Oriole	0	0	100
American Goldfinch	0	0	0
Total	18.5% (n=10)	30.53 (n=29)	32.48 (n=51)

Productivity at Blue Lakes

A summary of productivity by species for BLAK is presented below in Table 8. A meager eight hatch-year individuals were banded this season – a substantial decrease from the fifteen banded in 2010. Blue Lakes and Maplewood have similar landscape characteristics in that both are situated at edges of small water bodies (fens, ponds or small lakes) within heavily forested landscapes. Given that the region is dominated by forest cover broken up by thousands of wetlands and lakes – it is likely that these two stations fail to attract large numbers of dispersing birds due to their uniformity with the broader landscape.

It is plausible that BLAK will be much more effective as a site for measuring adult survivorship than for productivity. We will make a decision before spring 2012 as to whether operations should continue here or if a search for a more balanced site is warranted.

Table 8. Productivity at Blue Lakes (BLAK). Figures are percentage of newly banded birds that were aged hatch-year.

Species	2011 HY%	2010 HY%
Yellow-bellied Sapsucker	0	33.3
Downy Woodpecker	0	66.7
Hairy Woodpecker	100	0
Pileated Woodpecker	0	100
Yellow-throated Vireo	0	0
Warbling Vireo	0	0
Red-eyed Vireo	0	0
Blue Jay	0	0
Black-capped Chickadee	66.7	100
White-breasted Nuthatch	0	100
Veery	0	0
Hermit Thrush	0	0
Wood Thrush	0	100
American Robin	0	10
Chestnut-sided Warbler	0	0
Black-throated Blue Warbler	0	0
American Redstart	16.7	0
Ovenbird	0	0
Northern Waterthrush	0	100
Common Yellowthroat	0	0
Scarlet Tanager	0	0
Gray Catbird	0	0
Field Sparrow	0	0
Song Sparrow	25	20
Swamp Sparrow	0	0
Rose-breasted Grosbeak	12.5	0
Red-winged Blackbird	0	0
Common Grackle	0	0
Total	12.9 (n=8)	16.67 (n=15)

Survivorship

Low rates of productivity at MAPS stations tend to indicate limitations of the landscape and/or adverse effects of weather. The aforementioned station-specific context is important, as a poor sample may simply be reflective of the inability of a site to attract dispersing young. Rates of adult survivorship differ in that this parameter measures the mortality rate of adults, thereby primarily evaluating conditions in migratory and/or wintering areas. Assessing each species in terms of both parameters is vital to understanding population trends of breeding birds in the landscape.

Survivorship at Rock Ridge

Recaptures have always been mysteriously scarce at RRID, both between years and even within season. Rate of return for birds banded in 2009 that returned in either 2010 or 2011 is 6%. The rate was even lower for birds banded in 2010, only 3% of these were recaptured in 2011. At the species level, the return rate is highest for Black-and-white Warbler (19%), Eastern Towhee (18%) and Hairy Woodpecker (20%). Of concern is that no returns have ever been recorded for the following core species: Hermit Thrush, Myrtle Warbler, White-throated Sparrow, Song Sparrow and Red-eyed Vireo. In terms of within season recaptures, MABO has had 110 total in

three years while only a meager 47 have occurred at RRID over the same term. The habitats differ greatly between the two sites as Rock Ridge has relatively younger forest interspersed with many small granitic rock barrens. The lower recapture rates could be functions of lower population density due to sparser vegetation and more barren rock (within season recapture) and/or weaker site fidelity amongst species that are more generalist in their preferences for successional habitats (between season recaptures). A higher capture rate of post-breeding dispersing individuals at RRID may also be contributing to lower rates of return.

Table 9. Survivorship (rate of return) at Rock Ridge in 2011

Species	2009 Sample	Return 2010	Return 2011	Return in 2010 & 2011	2010 Sample	Return 2011
Broad-winged Hawk	1					
Yellow-billed Cuckoo	2				2	
Black-billed Cuckoo	2				2	
Downy Woodpecker					1	
Hairy Woodpecker	3		1		2	
Yellow-shafted Flicker	2				1	
Eastern Phoebe	1				4	
Great Crested Flycatcher	1					
Eastern Kingbird	1				1	
Red-eyed Vireo	7				11	
Blue Jay	2				1	
Black-capped Chickadee	6	3			12	
Red-breasted Nuthatch	1				1	
Veery	1					
Hermit Thrush	4				3	
American Robin	19	1			15	
Gray Catbird						
Cedar Waxwing	2					
Nashville Warbler	3					
Myrtle Warbler	7				2	
Black-throated Green Warbler					1	
Pine Warbler					1	
Black-and-white Warbler	12	2	1	1	9	2
American Redstart	2					
Northern Waterthrush					1	
Common Yellowthroat	1				2	
Scarlet Tanager	1					
Chipping Sparrow	5	1			3	
Eastern Towhee	7	1	1		4	
Field Sparrow	5		1		7	1
Song Sparrow	5				3	
White-throated Sparrow	4				3	
Rose-breasted Grosbeak	3				2	
Common Grackle	2				7	
Brown-headed Cowbird	1					
Baltimore Oriole	2					
Grand Total	115	8	4	1	101	3

Survivorship at Maplewood Bog

At MABO the overall rate of return for birds banded in 2009 that returned in either 2010 or 2011 is 11.6%. For birds banded in 2009, 12.3% returned in 2010 and only 6% returned in 2011. For birds banded in 2010, only 8.4% returned in 2011. A total of six individuals that were banded in 2009 returned in both proceeding years (three individuals of each Red-eyed Vireo and Veery).

At the species level, highest return rates are evident for Veery (46%), Scarlet Tanager (28%) and Wood Thrush (33%). Contrastingly low return rates are evident for the following core species at MABO: American Redstart (0%), Ovenbird (0%), American Robin (14%), Black-capped Chickadee (8%), Gray Catbird (7%) and Common Yellowthroat (5%).

Table 10. Survivorship (rate of return) at MABO in 2011

Species	2009 Sample	Return 2010	Return 2011	Return in 2010 & 2011	2010 Sample	Return 2011
Yellow-bellied Sapsucker	4				4	
Hairy Woodpecker	2				5	1
Great Crested Flycatcher					1	
Red-eyed Vireo	16	4	3	3	8	
Blue Jay	1	1			4	
Black-capped Chickadee	17	2			7	
Red-breasted Nuthatch	1					
White-breasted Nuthatch	5					
Veery	13	4	5	3	2	1
Hermit Thrush	1				1	
Wood Thrush	5	2			4	1
American Robin	10	1	1		11	1
Gray Catbird	9		1		5	
Nashville Warbler	2				1	
Chestnut-sided Warbler	3				2	
Magnolia Warbler	1					
Black-throated Blue Warbler					1	
Myrtle Warbler	3					
Black-and-white Warbler	4				1	
American Redstart	6				8	
Ovenbird	5				4	
Northern Waterthrush	8	2			2	
Common Yellowthroat	11	1			7	
Scarlet Tanager	2				5	2
Downy Woodpecker	1				1	
Eastern Towhee	2				3	
Chipping Sparrow	1					
Field Sparrow	2					
Song Sparrow	10	2			4	1
Swamp Sparrow	2				2	
Rose-breasted Grosbeak	4				2	1
Indigo Bunting	1					
Baltimore Oriole	1					
American Goldfinch	1					
Grand Total	154	19	10	6	95	8

Remarkable Returns

A summary of notable return records for Rock Ridge and Maplewood Bog is presented below in Table 11. So far all of our recapture records are of birds originally banded at the same station (no foreign recoveries). It is fascinating to be able to study encounter information for individuals captured in three consecutive years! Returns of Veery at MABO are particularly interesting. Included here are three individuals with five or six capture records each. One of these (2431-64433) was originally banded as a recently fledged hatch-year on August 3, 2009 and was recaptured twice in 2010 as an apparent non-breeder and twice again in 2011 in breeding condition. This bird, if still alive, is wintering somewhere in South American rainforests as this report is being written.

Table 11. Selected return records at MABO and RRID (Code - N=New Capture, R=Recapture, 1=after-hatch year, 2=hatch-year, 5=second-year, 6=after-second year, M=Male, U=Unknown)

Species	Record Type	BAND	DATE	Station	AGE	SEX	Wing Length	Net
REVI	N	235140706	6/5/2009	MABO	1	M	81	09
REVI	R		6/23/2009	MABO	1	M	81	10
REVI	R		6/18/2010	MABO	6	M	81	09
REVI	R		7/8/2011	MABO	6	M	81	09
GRCA	N	241109420	8/3/2009	MABO	2	U	90	01
GRCA	R		6/10/2011	MABO	6	U	92	06
GRCA	R		7/8/2011	MABO	6	U	91	06
EATO	N	241109904	6/16/2009	RRID	1	M	87	06
EATO	R		6/5/2011	RRID	6	M	87	04
BAWW	N	260060519	7/20/2009	RRID	1	M	69	08
BAWW	R		6/20/2010	RRID	6	M	70	08
BAWW	R		6/17/2011	RRID	6	M	70	12
FISP	N	260060507	6/16/2009	RRID	5	M	60	05
FISP	R		7/28/2011	RRID	6	M	63	04
VEER	N	243164433	8/3/2009	MABO	2	M	92	09
VEER	R		6/29/2010	MABO	5	M	91	08
VEER	R		6/29/2010	MABO	5	M	91	08
VEER	R		6/16/2011	MABO	6	M	94	08
VEER	R		6/29/2011	MABO	6	M	94	07
VEER	N	243164408	6/14/2009	MABO	6	M	101	03
VEER	R		6/23/2009	MABO	6	M	100	04
VEER	R		7/6/2009	MABO	6	M	101	07
VEER	R		7/17/2009	MABO	6	M	102	08
VEER	R		6/10/2010	MABO	6	M	101	07
VEER	R		6/10/2011	MABO	6	M	101	10
VEER	N	243164406	6/14/2009	MABO	1	M	101	10
VEER	R		6/14/2009	MABO	1	M	-	10
VEER	R		6/10/2011	MABO	6	M	101	10
VEER	R		6/16/2011	MABO	6	M	100	07
VEER	R		6/16/2011	MABO	6	M	-	01
VEER	R		6/29/2011	MABO	6	M	100	03

Discussion

The first season of operations at our MAPS stations in 2009 remains an important benchmark for our MAPS network as neither 2010 or 2011 have produced the same level of sampled abundance and diversity. In fact, the data indicate a sharp and progressive decline at MABO and RRID since 2009 and at BLAK since 2010. It is possible that this trend represents a return to normal abundance levels following an exceptional high in 2009. However, numbers of breeding birds at the sites in 2011 seemed abnormally low, which suggests that the 2009 results are closer to normal. Although three years of data is insufficient for assessing causation, the 55% drop in total captures at MABO from 2009-2011 suggests a clear reduction in forest bird populations at the station – a trend that is also evident, though less severe, at RRID and BLAK.

Weather patterns in spring/summer of 2009 and 2010 were atypical, variably featuring periods of excessive rain or drought and unusually cool temperatures. We've given a lot of consideration to the possibility that climate anomalies in recent years have negatively affected fecundity of forest songbirds in the region (Derbyshire 2010). Unlike the previous two breeding seasons, the temperatures in 2011 were comparatively normal by late May. However, precipitation was irregular - extraordinarily wet in early spring, followed by a prolonged period of drought spanning late-May through August. The high rainfall in the early spring was probably beneficial as it

replenished low water levels from the dry winter and propagated a wealth of insects *(Diptera sp.)* for the months of May and June. The productivity rates at our MAPS stations in July and early August of 2011 would suggest, once again, a lackluster breeding season. At this point we can only speculate on the degree to which recent irregularities in climate have affected the apparent regression of bird populations at our MAPS stations. Recent analysis of MAPS data by scientists at IBP indicates that rates of survivorship may be more causal than productivity for many forest species in decline – particularly neotropical migrants. It is reasonable then to consider that factors unrelated to local breeding conditons may be driving population trends at our stations. Ultimately, the magnitude of environmental pressures being exerted at specific life cycle stages can differ considerably between species and region. Continued data collection for at least two but preferably up to seven more years is needed to evaluate populations at the stations and to facilitate more in-depth analysis.

Nest Monitoring

Nest searching and monitoring can be labour intensive, however a well-designed and executed study produces significant benefits, including an ability to discern patterns of nest success, predation, parasitism and relationships of these patterns to specific habitat variables. Since our project began it has been our goal, as an adjunct to our MAPS studies, to execute an effective nest search/monitoring component. Unfortunately, time constraints have limited our ability to put a concerted effort into this area. However, the nest information that we do have is still of significance both to our studies and the broader efforts of Project Nestwatch and the Ontario Nest Records Scheme.

A total of 18 nests were recorded in 2011, twelve of which were monitored (visited more than once). Notable records include four nest accounts of Prairie Warbler as well as records of Cerulean Warbler and Red-headed Woodpecker.

Table 12. 2011 Nest Records (Nest outcome codes – OU=Unknown, F=Failed, S=Successful)

Species	Date Found	Nest Checks	Outcome	Species	Date Found	Nest Checks	Outcome
Mallard	26-May	1	OU	Prairie Warbler	21-Jun	Multiple	S
Great Blue Heron	30-May	Multiple	OU	Prairie Warbler	26-Jun	Multiple	F
Osprey	30-May	Multiple	OU	Prairie Warbler	22-Jun	Multiple	OU
Red-headed Woodpecker	30-May	Multiple	OU	Prairie Warbler	1-Jul	1	S
Hairy Woodpecker	25-May	Multiple	OU	Cerulean Warbler	22-May	Multiple	OU
Northern Flicker	14-Jun	1	OU	American Redstart	22-May	Multiple	OU
Least Flycatcher	26-May	Multiple	F	Common Grackle	30-May	1	OU
Great Crested Flycatcher	30-May	Multiple	OU	Baltimore Oriole	14-Jun	1	OU
Common Raven	10-May	Multiple	S				
Wood Thrush	22-Jun	1	OU				

Breeding Bird Status Report

Frontenac Provincial Park 2011

The vast majority of our fieldwork is concentrated in Frontenac Provincial Park and along road systems immediately surrounding the park. Our coverage of this area provides a unique opportunity to document and track annual breeding status of the park's avifauna. Because of the sheer size of the area and also that much of it is fairly remote, it is certain that not all areas/habitat can be consistently accessed on a yearly basis. The point count system, now in place, will function as the standardized and systematic method for evaluating breeding bird species over the long-term. The purpose of this exercise is to assemble breeding status results derived from both dedicated surveys and casual observations into a single source. This information will be of use to our own studies, other researchers and as an annually running archive of breeding bird activity in Frontenac Provincial Park.

All of the information presented here pertains to an area defined by current Frontenac Provincial Park boundaries and does NOT include observations derived from roadsides outside of the park boundaries. The Park checklist pinpoints 119 bird species that have bred within the park, although criteria used and details on most species are unclear (The Friends of Frontenac Provincial Park 2005).

In 2011, a total of 109 species were detected during the course of all fieldwork from early May-early August. This result was thirteen species higher than the max result of any previous season. Of the species encountered this year, 34 met criteria as Confirmed Breeders (using system developed by the Ontario Breeding Bird Atlas). Another 38 species were classed as Probable Breeders, 26 as Possible Breeders and 11 as Migrant/Transient species.

A complete list of breeding status by species is provided in Appendix II. Note that location information is available for all records but has been omitted from the chart. The following is a selection of 2011 accounts for unusual species.

Canada Goose: (2010 & 2011 - Confirmed)

Canada Goose is not listed as a breeding species in the checklist but for a second consecutive year adults were observed with young. While not a common species in the park, they do occur where appropriate habitat is found. Canada Goose is certainly an annually breeding bird species at FPP.

Sandhill Crane: (2011 – Possible)

A surprising encounter with a low flying individual on June 11, 2011 was a rare summer record for the park. The bird circled low and called above the observers for a few seconds and then carried on. The species was not encountered again in the area despite regular visits to the rock barrens thereafter. Sandhill Crane is a rare but annually breeding species in the region with a reliable pair nesting in the Westport area (Weir 2008). No nest records of this species exist for the park.

Herring Gull and Ring-billed Gull: (2010 & 2011 - Confirmed)

Neither gull species is currently listed as having bred in FPP according to the checklist. A colony containing 10-12 active Ring-billed Gull nests and one active Herring Gull nest was discovered in 2010 on a small island on Big Clear Lake. Both species nested on the same island in 2011 but unfortunately the colony was raided by an unidentified ground-based predator in June, which led to desertion of the island by the adults. Also of note in 2011 was a massive wind storm that toppled one of the old pines on the island that supported an active Great Blue Heron nest. Several nestlings perished either during the fall or after from starvation.

Red-headed Woodpecker: (2011 - Confirmed)

In 2010, a pair was detected during our mid-July biothon fundraiser in excellent habitat, which suggested that breeding may have occurred last year. We returned to this location in 2011 on several visits starting in late May, which resulted in the discovery of a highly territorial pair nest building near the top of a standing snag. A return visit on June 14 revealed that the original nest had been abandoned but a second nest was being excavated. No further evidence was obtained.

Red-bellied Woodpecker: (2011 - Possible)

An individual was observed near Devil Lake on June 7, 2010, which was the first record of this species for Frontenac Provincial Park. No further breeding evidence was obtained. Another individual was detected in the same area on May 25, 2011. The bird could not be relocated thereafter and no further evidence of nesting was obtained apart from the observation of a single adult individual.

Yellow-bellied Flycatcher: (2011 - Probable)

The Yellow-bellied Flycatcher is largely restricted to the boreal forest region of northern Canada where they favour moist coniferous forest and peatlands. They do occur in small numbers south of this region where suitable habitat exists. Approximately eight pairs (±5) are estimated to breed in the Kingston area annually (Weir 2008). A male was encountered singing from a small spruce/tamarack bog in rock barren habitat on June 11, 2011. The bird was present and singing on at least three other dates thereafter with the last record occurring on July 1. The bog itself was inaccessible without either waders or a canoe and so further evidence was not obtained. The habitat was appropriate and large enough to hold a territory. This site should be checked annually for this and other spruce specialists in the future. There are no nesting records for this species in the park.

Blue-headed Vireo: (2011 - Possible)

Blue-headed Vireos have been encountered in forests dominated by *Pinus sp*. between Slide and Big Salmon Lakes since field studies began in 2009. They are likely an uncommon inhabitant of the park but expected to be an annual breeder. This species is notoriously difficult to confirm and a concerted effort will have to be made to accomplish this in the future.

Barn Swallow: (2011 – Probable)

Swallows are a group of aerial insectivores that are declining rapidly in Ontario and elsewhere. There was an unusual concentration of four Barn Swallows on June 26th within the rock barren zone of the park. The birds were locating around a large, open expanse of shallow water and mud, which was lined by steep rock faces. Eight individuals were found there on July 1. Although active nests were suspected in this area, confirmation was not obtained.

Tennessee Warbler: (2011 – Transient)

Frontenac Provincial Park is just south of the core breeding range of Tennessee Warbler. A single male was heard singing at the Rock Ridge MAPS station on June 30. They prefer mixed-coniferous forest containing spruce and fir species, of which there is very little in the park. They are known to be one of the earliest southbound migrants in the fall and this individual may well have been dispersing or migrating from further north.

Louisiana Waterthrush: (2010 - Confirmed)

Louisiana Waterthrush was not listed as a breeding species in the checklist but the OBBA indicates that adults with fledged young were observed during the atlas period near Arab Lake (2001-2005). The park is also listed as a breeding location for this species in the Birds of the Kingston Region 2nd Edition (Weir 2008). A nest with four eggs was discovered by FBS staff in 2010 and adults were observed feeding young in 2011 at the same location.

Bobolink: (2011 – Possible)

There were two observations (June 11, July 1) of Bobolink in the rock barrens this season, both of which involved single low flying, singing males. Very little suitable habitat exists within the park but appropriate meadows are found directly south of the rock barrens on private property. These records may therefore be wandering or dispersing males from locales outside of park boundaries.

Table 13. Summary of Frontenac Breeding Bird Status 2009-2011

FPP Status	2011	2010	2009
Confirmed	34	38	43
Probable	38	29	29
Possible	26	24	24
Migrant/Transient	11	5	
Total	109	96	96

Rare Species Monitoring and Research

Prairie Warbler
Dendroica discolor
(Not at Risk)

Background

The second edition of the Ontario Breeding Bird Atlas provides an excellent summary of the current provincial status of the Prairie Warbler (PRAW). The authors of the account note that the distribution has remained largely unchanged since the first atlas conducted in the early 1980s, although many long-standing colonies had been deserted due to habitat succession. Several colonies in the Frontenac region have disappeared including a large colony of 20 pairs that inhabited the west side of Canoe Lake, which was active from 1961-1987. Another historical colony resided at Devil Lake for more than 40 years from 1948-1988 (Weir 2008). The largest population remaining in Ontario occurs in the Georgian Bay region where 270 pairs were found in the 1990s (Cadman 2007). Outside of Georgian Bay, colonies of Prairie Warblers seem to be small and isolated, possibly due to habitat shortage, which could make them more susceptible to extirpation. Data from the second atlas suggest that away from the Georgian Bay area fewer than 50 pairs occur and the total provincial population is unlikely to exceed 320 breeding pairs (Cadman 2007).

Historical Records at Frontenac

A total of four territorial Prairie Warblers were randomly encountered during our fieldwork in 2009, which included a small colony along the sloped shoreline of Slide Lake at Frontenac Provincial Park's east-central boundary. The colony contained three singing males on June 24 but no other breeding evidence or observation of females was obtained at that time. Approximately two kilometers to the west, another territorial male was found earlier on June 20 in rock scrub barren habitat during a round of point count surveys. The previous study by Brinker and McLeish (2006) reported five Prairie Warblers within Frontenac Provincial Park in 2005, just two years after Ecological Services reported six individuals in the same general area. All of these involved males detected in rock scrub barren habitat along the park's southeastern boundary. These findings, combined with our own observations of the species in 2009 suggested that Prairie Warbler may be a regular but uncommon summer resident in the park and that a more thorough inventory was warranted.

FBS Inventory in 2010

In 2010 a search of appropriate habitat for Prairie Warbler began on June 14 and concluded on June 23. A total of 19 territorial males were found and georeferenced. Four of these males were paired with females for a total of 23 individuals. A pair was observed feeding recently fledged young, which confirmed successful breeding for the first time. The Prairie Warblers that were found occurred along a northeast trending line spanning approximately 4.5 kilometres, which correlates to the youngest successional rock barren habitat in the park and surrounding area (see Appendix IV). There was a strong association of occupied territories to areas containing expanses of exposed rock, pockets of dense, low shrubs and sharply sloped shorelines of small lakes and beaver ponds. While a few territories occur in relative isolation, most were clustered together where habitat was extensive

enough to allow aggregations. The largest cluster occurs around two long, narrow wetlands where as many as eight or more males were recorded (eight males within 580m). In total, twenty singing males were located by FBS between 2009 and 2010. Of the 23 Prairie Warbler records in 2010, thirteen occurred within Frontenac Provincial Park boundaries while an additional ten individuals were georeferenced as just outside the park perimeter (three pairs and four singing males).

FBS Inventory in 2011

The Prairie Warbler population in Frontenac Provincial Park was selected as a focus for more expansive inventory and study in 2011. We began the year with the goal of searching previously unexplored but potentially viable habitat and also to revisit active breeding sites surveyed in 2010. This exercise enabled us to improve the precision of our population measurement and to establish an index of appropriate habitat for future monitoring. A second goal was to colour-band as many of the males as possible and to determine each male's breeding status (e.g. territoriality, pair bond and active nests). The incorporation of colour-banding was critical to avoid double-counting for closely clustered territories, thereby providing an absolute abundance estimate for the colony in 2011. The ability to uniquely mark each male also permitted us to associate territories, paired females, active nests and fledged young to specific individuals and to assess adult survivorship and fidelity with subsequent monitoring. An effort was put forth to assess breeding status of each male and to find and monitor any active nests.

Results

Preface

The cool and wet early spring led to an extended field season for Louisiana Waterthrushes in 2011. As a result, work started on Prairie Warblers a week later than anticipated. The project began in earnest on June 7 and ended on July 1, 2011. Spatial coverage was significantly expanded this year to encompass over 300 hectares of rock/scrub barrens in Frontenac Provincial Park. Routes for the exhaustive area searches were chosen by pinpointing the most suitable habitat using recent aerial photography in combination with first-hand field experience from 2010.

It quickly became apparent that, unlike in 2010, male Prairie Warblers were curtailing song vocalization quite early - around mid-morning (~9-10am), which greatly reduced the total area that could be covered in a single day. This may have been due to either or both high temperatures and a more accelerated nesting phenology in 2011. The short daily survey window meant that many areas needed to be visited twice, once for initial survey and a second time for colour-banding and nest searching if any males were found. It should be mentioned here that the prime habitat and thus the Prairie Warblers are difficult to access and distributed over a rather broad area. The resultant effects of these various circumstances made for a very challenging and strenuous three weeks. It also meant that we needed to scale back on the scope of our investigation in 2011. However, we were able to complete a thorough search of the highest priority rock barren habitats in the park and succeeded in colour-banding all territorial males encountered.

Abundance and Distribution

A total of fourteen males were encountered in 2011, which is down from 19 males in 2010. Only one male Prairie Warbler was recorded in the vicinity of Slide Lake in 2011, down from four there in 2010. It is also worth noting that three males were casually detected here in 2009. The habitat in this area is in a more advanced stage of succession and so it is conceivable that Prairie Warblers around Slide Lake will soon abandon this area entirely. Similarly, the barrens on private lands southwest of the park boundary, roughly 1.5km east of Doe Lake, was found to be deserted in 2011. Three males were recorded here in 2010. There are clearly two major breeding clusters or colonies in Frontenac Provincial Park, a smaller one along the Caldwell Creek gorge (5 known territories) and the largest one that centers around two north-south trending wetlands just north of the park boundary (ten known territories). Abundance of males in these clusters have remained more or less stable between 2010 and 2011. Despite a considerable effort, the search of hitherto unexplored areas containing similar habitat revealed no distinctly new territories or clusters of Prairie Warblers in the park. However, the process identified key areas where Prairie Warblers may have either nested in the past or could nest in the future. It is clear that ample habitat exists for growth and expansion of the Prairie Warbler population in

Frontenac Provincial Park, especially immediately north, southwest and northeast of the largest current cluster of breeding pairs. Refer to Appendix VI for eight photographs of exemplary Prairie Warbler habitat in the park.

Breeding Status

Non-breeders

All of the males that were documented this year were given codenames and are referred to below in brackets (see Table 14). This year, just 3 of 14 males were classified as non-breeders (21%). Two males found along Caldwell Creek (Juniper, Houdini) were encountered on single dates and exhibited passive response to playback on capture attempts. It is therefore presumed that these males were non-breeding. The other individual (Rocky) was encountered north of the core breeding area for Prairie Warblers at our Rock Ridge MAPS station on June 17 and June 30. We attempted to capture the bird on June 30, which was unsuccessful. This individual appeared to be unpaired and only loosely territorial.

Possible Breeders

Some of the males that we found can only be classified as possible breeders because time did not permit repeat visits to confirm breeding status through direct observation and nest searching. This category applies to the lone bird at Slide Lake (Slide) as well as several individuals in the core clusters (Priv, Halloween, Flat and Caldwell South). All of these individuals exhibited very strong territorial response to playback and all but two were recorded singing from their territories on multiple dates.

Breeders

Finally after all ground searches for males were completed, it became urgent to confirm breeding status before adults reared their young and began to disperse. Fortunately, our efforts were successful for many of the territorial males in the largest cluster centering on the unnamed wetlands. Despite less than ideal effort, pair bond and active nesting was confirmed for six of the fourteen males in 2011 (43%). The observation of adults feeding fledged young was used in four cases (Cornermale, Red, Green Bay, Whitey) to confirm successful breeding. A total of four nests were discovered, only one of which failed (Slope singer). The female was observed reshaping the failed nest on July 1, which suggests that a second attempt was underway. Two nests with young at 4-7 days old were found, both of which may have successfully fledged but only one was confirmed based on observation of the attending male feeding young out of the nest (Whitey). The fourth nest was found after young had already fledged from it. Parents were observed feeding dependent young in the immediate vicinity (Green Bay). All four nests were well concealed within dense patches of low shrubs and positioned near the top of individual shrubs at heights ranging from 0.7–1.3m. Three of four nests were located in *Viburnum rafinesquianum* (Downy Arrowwood) and one in a *Lonicera sp*.

Table 14. Male Prairie Warblers detected in 2011 (UTM locations available but undisclosed in this report).

No.	Codename	Days Observed	1st Date	Last Date	UTM	Time	Paired?	Nest?	Fledged Young?
1	Slide	1	7-Jun			900	?	?	
2	Red	4	11-Jun	1-Jul		940	Y	N	Y
3	Green Bay	3	11-Jun	1-Jul		1100	Y	Y	Y
4	Flat	2	20-Jun	21-Jun		730	?	?	
5	Cornermale	4	20-Jun	1-Jul		830	Y	N	Y
6	Slope singer	4	20-Jun	1-Jul		1130	Y	Y	
7	Priv	1	21-Jun			740	?	?	
8	Halloween	2	21-Jun	1-Jul		930	?	?	
9	Whitey	2	21-Jun	26-Jun		1300	Y	Y	Y
10	Caldwell North	2	22-Jun	1-Jul		850	Y	Y	?
11	Caldwell South	2	22-Jun	1-Jul		1200	?	?	
12	Juniper	1	22-Jun	1-Jul		1050	N	N	
13	Rocky	2	17-Jun	30-Jun		640	N	N	
14	Houdini	1	26-Jun			920	N	N	

Table 15. 2011 Prairie Warbler Nest Records

Record	Dates	Host Plant	Nest Height	Eggs	Nestlings	Age of Nestlings
Whitey	21-Jun	Downy Arrowwood	.8m		5	5-6d
Whitey	26-Jun	"			0	
Slope Singer	26-Jun	Downy Arrowwood	.7m	4		
Slope Singer	1-Jul	"		0		
Caldwell North	22-Jun	Honeysuckle	1m	1	4	6-7d
Caldwell North	26-Jun	"			0	
Green Bay	1-Jul	Downy Arrowwood	1.3m	0	0	

Banding and Biometrics

Fifteen Prairie Warblers were captured and uniquely marked with both a numbered USFWS aluminum band and a three-colour combination of darvic plastic leg bands. It was quickly realized that the smallest available size darvic bands (xfd) were too large for the species, which prompted some modification to the bands. Male Prairie Warblers were captured by employing an audio lure broadcasting type 1 song and alarm calls from beneath an erected mistnet (2.5m ht, 12m length, 30mm mesh). A decoy was placed within .5m of the nets' centre as a flight target for responding males. Most birds were safely captured within a few seconds to minutes after playback started, although a few took up to 30 minutes, mostly because of location specific issues (e.g. lack of vegetative cover). Captured birds were quickly banded, measured and released at the site.

Eleven of fifteen Prairie Warblers banded were adult males, with the remaining four being unsexed nestlings belonging to male "Caldwell North". June and July are difficult periods of the calendar for accurately aging warblers due to pronounced wear occurring in both second-year and after-second-year age classes at that time. Because of this only two of the adults could be confidently aged after-second-year and only two aged second-year. Of interest here is that one of the second-year birds was mated and successfully fledged young (Green Bay). Weights were remarkably consistent, ranging from 7.7g to 8.3g for eleven adult males. Wing lengths averaged 56.7mm with a min of 55mm and max of 58mm. Cloacal protuberance (CP), feather wear and feather molt were also scored.

Table 16. Prairie Warbler Banding Records in 2011 (Fat, Cloacal Protuberance and Feather Wear scored according to MAPS guidelines on a 7, 3 and 5 point scale respectively)

Species	Band	Fat	Wing	Cloacal Protuberance	Feather Wear	Age	Sex	Weight	Date	Time	Capture Method
PRAW	2570-08801	0	55mm	1	3	5	Male	7.8g	06/07/2011	9:00	Mist net
PRAW	2570-08802	0	56mm	3	2	1	Male	8.1g	06/11/2011	9:40	Mist net
PRAW	2570-08803	1	57mm	3	3	5	Male	8.1g	06/11/2011	11:00	Mist net
PRAW	2570-08804	0		3	2	1	Male	7.7g	06/20/2011	7:30	Mist net
PRAW	2570-08805	1		2	1	6	Male	7.8g	06/20/2011	8:30	Mist net
PRAW	2570-08806	0		3	2	1	Male	8g	06/20/2011	11:30	Mist net
PRAW	2570-08807	0	57mm	3	3	1	Male	8.3g	06/21/2011	7:40	Mist net
PRAW	2570-08808	0	58mm	3		1	Male	8g	06/21/2011	9:30	Mist net
PRAW	2570-08809	2	58mm	2	1	6	Male	8.3g	06/21/2011	13:00	Mist net
PRAW	2570-08810	0	56mm	3	3	1	Male	7.7g	06/22/2011	8:50	Mist net
PRAW	2570-08811				0	4	NA		06/22/2011	9:00	Hand
PRAW	2570-08812				0	4	NA		06/22/2011	9:00	Hand
PRAW	2570-08813				0	4	NA		06/22/2011	9:00	Hand
PRAW	2570-08814				0	4	NA		06/22/2011	9:00	Hand
PRAW	2570-08815	1	57mm	2	1	1	Male	8.1g	06/22/2011	12:00	Mist net

Discussion

Given that we only have two adequate years of sampling it is impossible to establish any population trends but we do now have a baseline to work with and at the very least a starting point for evaluating and tracking demographics. Fieldwork in 2011 highlighted some very important practical considerations for future monitoring and research efforts, in particular the need to commence surveys no later than late May/early June. Also important is to carefully consider limitations of access and to tailor project design accordingly.

The possible and confirmed breeders, both of which exhibited at least some form of strong territoriality, encompass a maximum of 11 of the 14 records of males encountered in 2011 (78%). This number can be no less than 43% based on the evidence collected this year (6 of 14 confirmed). Despite that the breeding population in Frontenac Provincial Park is small and isolated, it can be posited that, based on demographics measured in 2011, pair bonding and productivity are at acceptable levels. However, here in Frontenac, and in the Georgian Bay region, population isolation, stagnant population growth and most importantly, unchecked habitat succession places Prairie Warbler as a species in jeopardy in Canada.

The population in Frontenac Provincial Park, while comparatively small to that in Georgian Bay, remains one of the largest remaining active colonies in Canada and is uniquely accessible for annual monitoring and detailed study. Continued monitoring and study of the species in the park is warranted, both to further the understanding and protection of Prairie Warblers and their dwindling rock barren ecosystems.

Louisiana Waterthrush

Parkesia moticilla

(COSEWIC-Special Concern, SARO-Special Concern)

Background

In Canada, the Louisiana Waterthrush (LOWA) has a small range limited to southern Ontario and Quebec. The population is small, estimated at <200 pairs, and restricted to mature forested ravines with clear, gravel-bottomed streams and woodland swamps. This species is considered “area sensitive” according to a Maryland study where a minimum of 100 contiguous hectares of mature habitat is reportedly needed for successful breeding (Robbins 1979). In Ontario, the Louisiana Waterthrush is a rare but regular breeder in the southwestern portion of the province. Smaller numbers also occur in deeply incised valleys and woodland swamps of the Frontenac Arch where mature forest is present.

The Frontenac Arch sits at the northern limit of the continental breeding range for Louisiana Waterthrush. Here, annual occupancy and productivity of breeding sites are probably influenced by weather cycles and periodic expansion/contraction of the source population further south, possibly upstate New York. It has been suggested that north-wandering immigrants cause a “rescue effect” for the Canadian population. There is also evidence of the species expanding its range northward, likely in response to maturing second growth forest cover.

Historical Records at Frontenac Provincial Park

An early spring migrant, Louisiana Waterthrushes return to Ontario in April and become nearly silent by mid-June, making them a difficult species to detect during summer point counts. The first record available for the park is of a singing male on June 9, 1989 (Natural Heritage Information Centre). Another record was submitted to the NHIC of a male singing in the Moulton Gorge on May 4, 1996. Ecological Services reported two males in 2003, one at Crab Lake Gorge on two separate occasions and a single encounter of a male near Dipper Bay, Birch Lake (Ecological Services 2004). Both of these sightings were of suspected unpaired males from mid-late May. In 2005, Brinker and McLeish (2006) reported another presumed unpaired male in non-stream habitat closer to the Gibson Lake area. The authors noted that most flowing watercourses were dry in 2005, including Crab Lake Gorge. However, breeding was confirmed, perhaps for the first time, by atlassers in the Arab Lake area, presumably the Arab Gorge, with the report of adults with fledged young (Cadman 2007).

During our 2009 field season, we happened upon two males, one at a well-known site on Canoe Lake Road and another at Crab Lake Gorge in Frontenac Provincial Park. No evidence of breeding beyond the presence of a male on territory was obtained. The migration timing, behaviour and habitat requirements of this species required that a species-specific inventory project would have to be designed to properly evaluate annual abundance and productivity of Louisiana Waterthrushes in the study area.

Inventory in 2010

Surveys of potential breeding sites began in late April 2010, primarily in Frontenac Provincial Park. Sites were identified using available mapping/aerial photography as well as guidance from park staff. Conditions in late April were slightly drier than normal due to an arid winter and early spring. Water depth and flow returned to acceptable levels for May and June. A total of seventeen sites were visited at least once in 2010. An effort was made to quickly describe relevant terrestrial and aquatic characteristics of each site. Water flow and floor substrates were scored along with forest age, slope and canopy cover. The song of the Louisiana Waterthrush was broadcast at most sites to confirm presence/absence of adult males. Sites that were deemed unsuitable were not revisited later in the season.

Of seventeen sites surveyed, five produced LOWA on at least one visit. The occupied sites included Arab Gorge, Moulton Lake South and Crab Lake Gorge in Frontenac Provincial Park and Canoe Lake Road and Devil Lake Road located north of the park (south of Westport Road). Three of these were known breeding sites for LOWA but two were newly documented sites based on all information available to the author (Moulton Lake South, Devil Lake Road). At three active sites in 2010, males were present only for a brief period (Arab Gorge, Crab Lake Gorge and Devil Lake Road), which suggested a potential shortage of females and a resultant effect on males to abandon territories and disperse. Atypically dry conditions in early spring may have influenced the low pair formation in 2010 but it is expected that annual abundance and fecundity are more heavily influenced by expansion and contraction of the core population further south. The highlight of the season was the discovery of a new breeding location in Frontenac Provincial Park – Moulton Lake South. A bonded pair was found on May 10, 2010 and later a nest with eggs was located on May 26 on the upper bank over a small waterfall.

Inventory in 2011

Coverage

In 2011 coverage of potential breeding sites was expanded considerably. A total of 27 sites were surveyed between April 18 and June 12. Seventeen sites were inspected in Frontenac Provincial Park, which included eleven sites that were visited for the first time this spring. FBS staff have now searched out and described 25 sites within the park between 2010 and 2011. We also expanded our coverage of suitable habitat beyond park boundaries in 2011. While just two roadside sites were visited last year, six new roadside sites were surveyed in 2011. Three of these sites are located along James Wilson Road and have hosted Louisiana Waterthrushes in previous years. A complete summary of sites is presented below in Table 17 and a map is provided in Appendix III. Refer to Appendix V for a selection of site photographs.

Table 17. Louisiana Waterthrush Sites Surveyed in 2011 (monitoring priority estimated based on site attributes and historical presence/absence data)

Location	Visits	First Date	Last Date	Playback Used?	Monitoring Priority
Arab Gorge	3	18-Apr	20-May	yes	High
Canoe Lake Road	4	19-Apr	25-May	yes	High
Crab Lake Gorge	2	6-May	25-May	yes	High
Devil Lake Creek	2	6-May	22-May	yes	Moderate
Devil Lake Road	5	6-May	25-May	yes	High
Devil Lake Road 2	1	20-May		yes	Low
Devil Lake Road 3	3	6-May	20-May	yes	High
Dipper Bay	2	10-May	22-May	yes	High
Draper Lake Lane	1	17-May		yes	Low
Gibson Lake	1	25-May		yes	High
James Wilson 1	3	6-May	26-May	yes	High
James Wilson 2	3	6-May	20-May	yes	High
James Wilson 3	3	6-May	20-May	yes	High
Little Clear	1	12-May		yes	Low
Little Salmon	1	12-May		yes	High
Little Salmon 4	1			yes	Low
Moulton Lake North	1	6-May		yes	Moderate
Moulton Lake South	5	7-May	12-Jun	yes	High
Rathkopf	1	30-May		yes	Moderate
Moulton Gorge 1	2	10-May	22-May	yes	High
Moulton Gorge 2	3	10-May	12-Jun	yes	Moderate
Moulton Gorge 3	2	10-May	22-May	yes	Moderate
Moulton Gorge 4	1	10-May		yes	Low
Moulton Gorge 5	1	10-May		yes	Low
Moulton Gorge	1	10-May		yes	High
Dipper Bay 2	2	10-May	22-May	yes	Moderate
Hardwood Bay	1	30-May		yes	Moderate

2011 Results

Louisiana Waterthrush records in 2011

A dry winter was more than made up for by a remarkably wet early spring, which improved water depth and flow at all of the sites in 2011. Despite this, Louisiana Waterthrushes were exceptionally hard to find this season. It should also be noted that normal spring temperatures were late to arrive this year, with cool conditions persisting into mid-late May. Only three of the 27 sites produced birds: Canoe Lake Road, Moulton Lake South and James Wilson Road 1. Canoe Lake Road and Moulton Lake South appear to be the most reliable sites in the area as birds have been reliably encountered there in two consecutive years. Males responded to playback on three of four and four of five visits to Canoe Lake Road and Moulton Lake South, respectively. In addition, males were determined to be paired at both sites and for a second consecutive year, breeding was confirmed at Moulton Lake South when adults were observed feeding fledged young on June 12, 2011. Unlike 2010 when males were present for a brief window, Louisianas were not found at all at the Devil Lake Road, Crab Lake Gorge and Arab Gorge sites in 2011 – despite multiple return visits to each.

Arab Gorge

The Arab Gorge site is located near the park office, southwest of Arab Lake. This steep sided gorge is nearly two kilometers in length and should be appropriate for up to two pairs in exceptionally good years. Adults with fledged young were found here during the Ontario Breeding Bird Atlas (2001-2005). A male briefly held territory

on May 16-17, 2010. Three visits to the site in 2011 failed to produce records of LOWA. Sometime from May 12-20, a surge of water passed through the beaver dam at the south end of Arab Lake, which resulted in some damage and erosion along the length of the stream. This damage will not adversely affect the site for future years with respect to Louisiana Waterthrushes.

Canoe Lake Road

The site on Canoe Lake Road has been active for many years and seems to be reliably occupied on an annual basis. The creek crosses beneath Canoe Lake Road and can be viewed on either side of the road but visibility is quite limited (site is on private property). A singing male was recorded here on two occasions in both 2009 and 2010 but no further evidence of breeding was acquired. A singing male was first encountered on April 19, 2011 and a pair was detected later on May 6. Given the fidelity of LOWA to this site it is likely that fecundity is high. The site is heavily shaded by a dense stand of hemlock and has exhibited consistent water depths and flow since our surveys began here in 2009.

Crab Lake Gorge

The Crab Lake Gorge site near Devil Lake at the north end of the park has held territorial/singing males in 2003 (Ecological Services 2004), 2009 and 2010 (Derbyshire 2010). Each of these cases involved the detection of a singing male with no further evidence of breeding or presence on subsequent visits. During our 2010 inventory a male responded aggressively to playback on May 11 but did not respond on June 7 or 19. Ground searches for LOWA in June at this site yielded no activity. There appears to be some fidelity to the site and so it's possible that breeding has occurred here intermittently in the past. However, it seems more likely that these males are roaming the area looking for females or that an unknown breeding territory is close by. Surveys in 2011 failed to reveal any evidence of occupancy.

Devil Lake Road

This potentially viable stream was discovered along Devil Lake Road during roadside point counts in 2009. The site is similar to the Canoe Lake Road site in terms of stream characteristics and habitat type (site is also on private property). A singing male was discovered here on May 26, 2010. Five stops here between May 6 and May 25 failed to produce records of LOWA here in 2011. A close inspection of aerial photography suggests that the stream corridor is quite long and therefore it is conceivable that birds could be present but out of range for playback response.

Dipper Bay

There has only been one confirmed record at Dipper Bay on Birch Lake, which was reported as an unpaired adult there on May 30, 2003 (Ecological Services 2004). McLeish returned to this area in 2005 and found no evidence of the species but did note that streams in the vicinity were dry. FBS staff visited the steep gorge within mature deciduous forest that empties into Dipper Bay on May 10 and May 22, 2011. The site seems highly suitable but probably quite dry in most years. Even after the wet spring, water depth and flow was very minimal in 2011. No Louisiana Waterthrushes were detected this year, although this would be a site worth monitoring in the future.

Gibson Lake

In 2005 a singing male approximately 315m southwest of Gibson Lake was found (Brinker and McLeish 2006). It was determined that the bird was most likely a non-territorial male as no suitable habitat was found in the vicinity. We returned to this location on May 25, 2011 and found potentially suitable habitat. A meandering stream with weak to moderate flow was found but no waterthrushes were present. It's conceivable that the individual found here in 2005 had a territory. The terrain along the stream course is variable with flat and steep-sided sections but there are a number of potential nesting sites in crevices along the steeper banks. The main drawback of this site is the forest age, which is younger than ideal and with a partially open canopy.

James Wilson Road Sites

Louisiana Waterthrushes have been nesting with some regularity at three sites along James Wilson Road, roughly three kilometers west from the northwestern park boundary. This area of steep hills and plunging valleys is heavily wooded with mature oak and maple. These locations seem to have been monitored in most years by Kingston Field Naturalists and other members of the birding community. James Wilson Road 1 is of interest as it is the only occupied woodland swamp site in the area that we are aware of. A male responded aggressively to playback on May 20 and May 26, 2011. No further evidence of breeding was obtained as the site is on private property and permission was not obtained to explore the area. There is at least one record of a nest with young at this site from May 30, 2003 (NHIC).

James Wilson Road 2 is a short section of stream on private property. No waterthrushes were observed here on three visits between May 6 and May 20. There is at least one record of a nest with young at this location from May 27-30, 2003 (NHIC). Our own assessment of the location was that this site had relatively poor characteristics, the most important of which is the short length of the stream run, potential for high disturbance and lack of appropriate nest crevices but the data indicates otherwise.

James Wilson Road 3 is located near the dam adjoining Desert Lake and Canoe Lake. Directly below the dam is a very short section of highly turbulent flowing water that runs parallel to James Wilson Road. Just north of the dam on the west side of the southernmost cove of Canoe Lake is a waterfall that spills over steep rocks from private land. Playback was attempted at both sites, although this was fruitless given the ambient noise and distance to the waterfall from the eastern shore. The waterfall site north of the dam may be the actual breeding location but the area was marked private and no attempt to secure permission was made. This site was the location of the first confirmed nest in the Kingston region, which dates back to June 3, 1981 (NHIC).

Moulton Lake North

An adult bird was flushed from a woodland swamp approximately 380m west of the Moulton Lake North site on May 6, 2011. The bird called but did not sing and showed no interest in playback. This was almost certainly another non-territorial bird, probably on the move and in search of a mate. Therefore, it has been decided to mark this bird as transient and leave Moulton Lake North as a historically unoccupied site.

Moulton Gorge Complex

The Moulton Gorge Complex refers to a group of seven interconnected stream sites that share affiliation with the Moulton Gorge in the park's northwest. The group includes Moulton Lake South, Moulton Gorge and Moulton Gorge sites 1-5.

Moulton Lake South

This site is heavily shaded and contains mid-late successional deciduous forest with moderate-sharp slope and a shaded gravel-bottomed stream with moderate flow. On May 26, 2010 a Louisiana Waterthrush nest with four eggs was discovered here, however a follow-up visit on June 7 revealed that the eggs had been predated. On that date the male was still singing while the female remained in the area suggesting that a second nesting was underway. No further visits to the site were made in 2010.

Surveys of the site in 2011 revealed that adults were present between 7 May and 12 June. Alarm calls on May 22 and 31 suggested a nest was present but the author elected to avoid causing disturbance by nest searching. Of particular interest on May 31 was the observation of adults fending off a rival male on five occasions, which suggests that at least one unpaired male was in the area. Fortunately, adults were found feeding fledged young on June 12, which provided us with our first confirmation of successful breeding since our studies began. Interspecific territorial aggression between the male Louisiana and a female Cerulean Warbler led to the discovery of a Cerulean Warbler nest directly above the stream – also a first for FBS!

Moulton Gorge 1-5

South of the Moulton Lake South site are six sites that were surveyed in 2011, two of which have held Louisiana Waterthrushes in the past. The most notable and potentially productive site is Moulton Gorge 1, which features

a 20ft high plunging waterfall and steep banks with plentiful opportunities for nest sites. The site is very well shaded with hemlock, pine and hardwoods. The stream itself is gravel-bottomed and clear. A negative of the site is the short length of the stream run, which is roughly 50-70m in total length. There is one record here of a singing male on May 4, 1996 (NHIC). It should be noted that Moulton Gorge 1 is no less than 350m from the Moulton Lake South site and so there could be overlap between the sites in some years. No birds were detected here in 2011 and there is no evidence that a pair has nested here before, however this will be a high priority monitoring site going forward.

Moulton Gorge sites 2, 4 and 5 were surveyed in 2011 but no waterthrushes were observed. Furthermore, these sites should be categorized as low priority due to a host of unsuitable characteristics. Moulton Gorge 3 is a more favourable site but is so close to Moulton Lake South and Moulton Gorge 1 that it may not represent an independently viable breeding location.

Moulton Gorge

The site named Moulton Gorge was first visited in 2010, where it was deemed to be only marginally suitable because suitable stream habitat occurred in intermittent and very short stretches. We have since discovered a record of a singing male on June 9, 1989 (NHIC) from within a woodland swamp a little over 100m to the east. We returned to this area on May 10, 2011 but could not locate the target species. This should be a high priority site for monitoring in the future given the prior record and the presence of both stream and woodland swamp habitat.

Table 18. Summary of Louisiana Waterthrush records in 2011.

Location	Historical LOWA Records?	Data Source	Status in 2011
Arab Gorge	Y	FBS, NHIC	
Canoe Lake Road	Y	FBS, NHIC	Pair
Crab Lake Gorge	Y	FBS, NHIC	
Devil Lake Creek			
Devil Lake Road	Y	FBS	
Devil Lake Road 2			
Devil Lake Road 3			
Dipper Bay	Y	NHIC	
Draper Lake Lane			
Gibson Lake	Y	NHIC	
James Wilson 1	Y	NHIC	Singing Male
James Wilson 2	Y	NHIC	
James Wilson 3	Y	NHIC	
Little Clear			
Little Salmon			
Little Salmon 4			
Moulton Lake North			Non-territorial Adult
Moulton Lake South	Y	FBS	Pair and 1 rival male
Rathkopf			
Moulton Gorge	Y	NHIC	
Moulton Gorge 1	Y	NHIC	
Moulton Gorge 2			
Moulton Gorge 3			
Moulton Gorge 4			
Moulton Gorge 5			
Dipper Bay 2			
Hardwood Bay			

Discussion

For a second consecutive year we found that an overwhelming number of historically occupied sites were either vacant or occupied only for a brief period by seemingly unpaired males. Contrastingly, there are two reliable sites where Louisiana Waterthrushes have been present in both years for an extended period and where either pair bond or nest evidence have been obtained (Canoe Lake Road and Moulton Lake South). Additionally, three sites where singing males were recorded in 2010 were vacant in 2011 (Crab Lake Gorge, Arab Gorge and Devil Lake Road).

Only three (25%) of 12 historically occupied sites were active in 2011. Our assessment of previous data suggests that Louisiana Waterthrush populations were probably comparatively high during the atlas period (2001-2005) when at least eight of nine known sites were occupied in one or more years (not including new sites found by FBS). While the results sound overly negative, they are not unexpected for a species at the uppermost limit of their range and where annual fluctuations will be marked. As mentioned in previous reports, it is likely that periodic shifts in the source population further south will directly impact the abundance, demography and productivity of the Ontario population. Therefore, the present population in the study area is quite possibly contracted and subject to low recruitment. A colour-banding study that marked all adults and juveniles would shed considerable light on the population dynamics of Louisiana Waterthrushes in the Frontenac Arch.

In 2011 we continued with our goal to build a database of potential breeding sites, their annual characteristics and rates of occupancy. Where possible, we've investigated breeding status/success for each Louisiana Waterthrush encountered. Next year we will complete our search for suitable sites within the defined study area and use this roster of locations for more detailed annual monitoring and potential research in the future.

Other Records of Rare Species

A table of records for other rare species detected in 2011 is included below (Table 19). There are a handful of records of Prairie Warbler here, which were derived from a single location along Canoe Lake Road in May – all males determined to be transient. Thirteen encounters with Cerulean Warbler are included along with a total of 81 West Virginia White butterlies on seven dates between May 6 and May 12, 2011. Records of Golden-winged Warbler, Red-headed Woodpecker, Sedge Wren, Common Nighthawk and Five-lined Skink were noteworthy. The four records of Common Nighthawk involved four individuals encountered during our surveys in the rock barrens between June 20 and June 22. Two of these were roosting adults that were flushed from the ground during a rainfall while the other two were flyovers near Flagpole Hill. Dawn and dusk surveys of the rock barrens would be instructive toward measuring population density of nighthawks in the park.

Table 19. Other records of rare species and Species at Risk (UTM locations for Species at Risk not included)

Date	Species	Number	UTM/Locatiion	Breeding Evidence
7-May-11	West Virginia White	18		
7-May-11	West Virginia White	3		
10-May-11	West Virginia White	17		
10-May-11	West Virginia White	8		
12-May-11	West Virginia White	5		
12-May-11	West Virginia White	14	Arab Gorge	
30-May-11	Hummingbird Clearwing	1	Near Mccomish homestead	Feeding
30-May-11	Ribbon Snake	1		Basking
12-Jun-11	Blanding's Turtle	1		
15-Jun-11	Five-lined Skink	1		juvenile
27-Jun-11	Five-lined Skink	1		adult
16-Jul-11	Five-lined Skink	1		juvenile
20-Jun-11	Common Nighthawk	1		Flyover
21-Jun-11	Common Nighthawk	1		flyover
22-Jun-11	Common Nighthawk	1		Roosting
22-Jun-11	Common Nighthawk	1		Roosting
30-May-11	Red-headed Woodpecker	2		Nesting Pair
22-May-11	Sedge Wren	2		Singing
18-Jun-11	Blue-headed Vireo	1		Singing
12-May-11	Golden-winged Warbler	1		Singing
6-Aug-11	Golden-winged Warbler	1		Captured at MAPS Station
12-May-11	Prairie Warbler	1		Singing
20-May-11	Prairie Warbler	1		Singing

Date	Species	Number	UTM/Locatiion	Breeding Evidence
20-May-11	Prairie Warbler	1		Singing
7-May-11	Cerulean Warbler	1		Singing
12-May-11	Cerulean Warbler	1		Singing
22-May-11	Cerulean Warbler	1		Singing
22-May-11	Cerulean Warbler	2		Nesting
25-May-11	Cerulean Warbler	1		Singing
25-May-11	Cerulean Warbler	1		Singing
25-May-11	Cerulean Warbler	1		Singing
25-May-11	Cerulean Warbler	1		Singing
25-May-11	Cerulean Warbler	1		Singing
25-May-11	Cerulean Warbler	1		Singing
25-May-11	Cerulean Warbler	1		Singing
25-May-11	Cerulean Warbler	1		Singing
14-Jun-11	Cerulean Warbler	1		Singing
7-May-11	Evening Grosbeak	1		Calling
7-May-11	Pine Siskin	1		flyover

Acknowledgements

The successful delivery of Frontenac Breeding Birds in 2011 was the result of support and dedication provided by a collective of individuals and organizations with an interest and commitment to science and conservation in the region.

A warm and spirited thanks are due to the following for their collaborative support in the development and execution of the program in 2011!

Corina Brdar	Ontario Parks
Monique Charette	Ontario Ministry of Natural Resources
Peter Dawson	Ontario Parks
Christopher Dunn	Biothon Participant
Steve Gillis	Biothon Participant
Audrey Heagy	Bird Studies Canada
Don Johnston	FBS Volunteer
Bert Korporaal	Ontario Parks
Seabrooke Leckie	FBS Assistant (staff)
Chris Robinson	Ontario Parks
Don Sutherland	Natural Heritage Information Centre
Ken & Vera Shepherd	

Frontenac Bird Studies would not have been possible without the support of our generous funders and sponsors:

John Hackney Foundation for the Noosphere

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McLean Foundation

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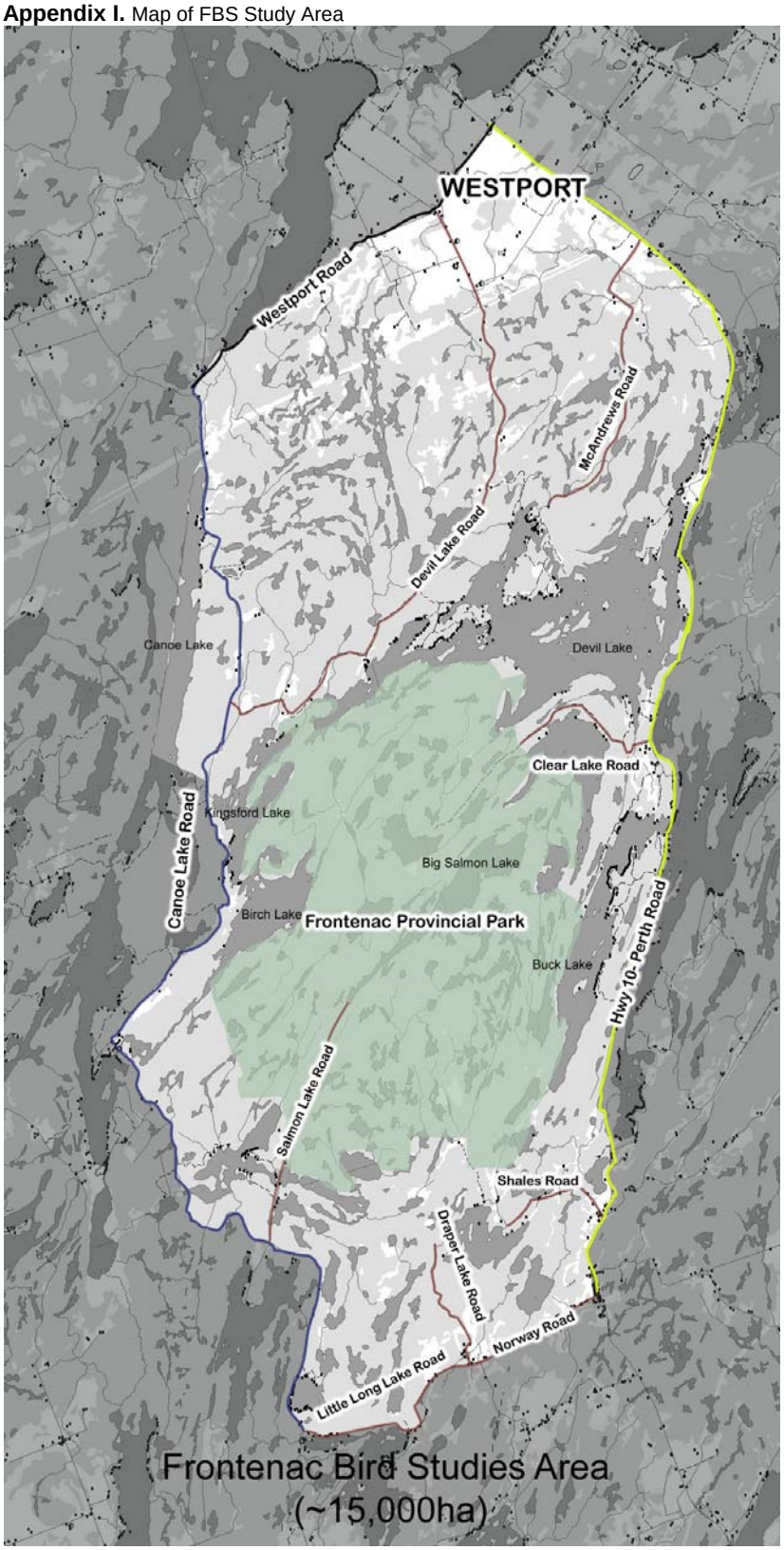
Appendices

Appendix I. Map of FBS Study Area



Appendix II. 2009-2011 Breeding Bird Status - Frontenac Provincial Park. Highlighted species have not yet been recorded by FBS in Frontenac Provincial Park but are listed as having bred in previous years (The Friends of Frontenac Provincial Park 2005).

FPP Checklist Species	Date	2011 Code	2011	2010	2009
Alder Flycatcher	18-Jun	S	Poss		Poss
American Bittern					
American Black Duck					
American Crow	7-May	H	Poss	Poss	P
American Goldfinch	26-Jun	P	P	P	P
American Kestrel					
American Redstart	31-May	NE	C	C	C
American Robin	18-Jun	NE	C	C	C
American Woodcock	20-Jun	H	Poss	Poss	P
Bald Eagle					
Baltimore Oriole	14-Jun	AE	C	P	C
Bank Swallow					Poss
Barn Swallow	1-Jul	A	P	Poss	Poss
Barred Owl	7-May	P	P	C	Poss
Belted Kingfisher	10-May	H	Poss	C	C
Black-and-white Warbler	30-Jun	GF	C	P	C
Black-billed Cuckoo	30-Jun	T	P	P	P
Blackburnian Warbler	22-May	T	P		
Black-capped Chickadee	9-Jul	FY	C	C	C
Blackpoll Warbler	20-May	X	X	X	
Black-throated Blue Warbler	7-May	X	X	X	
Black-throated Green Warbler	22-May	T	P	P	C
Blue Jay	30-Jun	FY	C	C	C
Blue-gray Gnatcatcher					
Blue-headed Vireo	18-Jun	S	Poss	Poss	P
Blue-winged Teal					
Bobolink	1-Jul	S	Poss	Poss	Poss
Broad-winged Hawk	6-May	V	P	C	Poss
Brown Creeper					
Brown Thrasher	1-Jul	NU	C	P	P
Brown-headed Cowbird					P
Canada Goose	25-May	FY	C	C	Poss
Canada Warbler	22-May	X	X		
Cedar Waxwing	26-Jun	P	P	Poss	P
Cerulean Warbler	12-Jun	FY	C	P	P
Chestnut-sided Warbler	26-Jun	T	P	P	Poss
Chimney Swift					
Chipping Sparrow	7-May	P	P	C	C
Cliff Swallow					
Common Grackle	30-May	CF	C	C	C
Common Loon	22-May	S	Poss	P	P
Common Moorhen					
Common Nighthawk	5-Jun	S	Poss	P	C
Common Raven	10-May	NY	C	C	P
Common Yellowthroat	22-May	DD	C	C	P
Cooper's Hawk				Poss	
Downy Woodpecker	10-May	H	Poss	Poss	Poss
Eastern Bluebird					
Eastern Kingbird	30-May	P, A	P	P	C
Eastern Meadowlark					
Eastern Phoebe	10-May	NE	C	C	C
Eastern Screech Owl					
Eastern Towhee	20-Jun	FY	C	P	C
Eastern Wood Pewee	22-May	S	Poss	P	C
European Starling	1-Jul	H	Poss		Poss
Evening Grosbeak	7-May	H	Poss	Poss	
Field Sparrow	26-Jun	FY	C	C	C
Golden-crowned Kinglet					
Golden-winged Warbler					
Gray Catbird	11-Jun	S	Poss	Poss	C
Great Blue Heron	25-May	AE	C	C	C
Great Crested Flycatcher	14-Jun	AE	C	P	C
Great Horned Owl	22-Jun	FY	C	Poss	C
Green Heron					
Green-winged Teal					
Hairy Woodpecker	25-May	NY	C	C	C
Hermit Thrush	26-Jun	T	P	P	C
Herring Gull	8-Jun	NE	C	C	
Hooded Merganser	14-Jun	FY	C	Poss	C
Horned Lark					Poss
House Finch					
House Wren					
Indigo Bunting	22-May	A	P	Poss	P
Killdeer	22-Jun	A	P	Poss	Poss
Least Flycatcher	12-Jun	T	P	Poss	P
Louisiana Waterthrush	12-Jun	FY	C	C	Poss
Magnolia Warbler	25-May	X	X		
Mallard	6-May	P	P	P	Poss
Mourning Dove	17-Jun	P	P	P	C
Nashville Warbler	30-Jun	T	P	C	C
Northern Flicker	14-Jun	AE	C	C	C
Northern Goshawk				Poss	
Northern Pintail					
Northern R-wing. Swallow	10-May	H	Poss	P	C
Northern Saw-whet Owl					
Northern Waterthrush	22-May	T	P	P	P
Olive-sided Flycatcher	30-May	X	X		
Osprey	30-May	AE	C	C	C
Ovenbird	22-May	A	P	C	C
Pied-billed Grebe	17-Jun	S	Poss		P
Pileated Woodpecker	22-May	T	P	P	P
Pine Siskin	7-May	H	Poss		Poss
Pine Warbler	7-May	N	P	C	C
Prairie Warbler	11-Jun	CF	C	C	P
Purple Finch	1-Jul	T	P	C	P
Purple Martin				Poss	P
Red-bellied Woodpecker	25-May	H	Poss	Poss	
Red-breasted Nuthatch	18-Jun	H	Poss	C	P

FPP Checklist Species	Date	2011 Code	2011	2010	2009
Red-eyed Vireo	14-Jun	NE	C	P	C
Red-headed Woodpecker	30-May	AE	C	P	
Red-shouldered Hawk	12-May	T	P	C	P
Red-tailed Hawk	25-May	H	Poss		Poss
Red-winged Blackbird	12-Jun	FY	C	C	Poss
Ring-billed Gull	8-Jun	NE	C	C	Poss
Rose-breasted Grosbeak	10-May	P	P	P	C
Ruby-crowned Kinglet	10-May	X	X	X	
Ruby-throated Hummingbird	26-May	H	Poss	Poss	Poss
Ruffed Grouse	21-Jun	FY	C	C	C
Rusty Blackbird	7-May	X	X		
Sandhill Crane	11-Jun	H	Poss		
Savannah Sparrow	22-Jun	S	Poss		
Scarlet Tanager	22-Jun	T	P	P	C
Sedge Wren	22-May	X	X		
Solitary Sandpiper				X	
Song Sparrow	14-Jun	FY	C	C	C
Sora					
Spotted Sandpiper	1-Jul	P	P		Poss
Swainson's Thrush	20-May	X	X		
Swamp Sparrow	22-May	P	P	P	C
Tennessee Warbler	30-Jun	S	Poss	X	
Tree Swallow	10-May	N	P	Poss	Poss
Turkey Vulture	6-May	H	Poss	P	P
Veery	22-Jun	S	Poss	Poss	C
Vesper Sparrow					Poss
Virginia Rail					Poss
Warbling Vireo	10-May	S	Poss	Poss	P
Whippoorwill	11-Jun	S	Poss	Poss	C
White-breasted Nuthatch	14-Jun	CF	C	Poss	P
White-crowned Sparrow	12-May	X	X		
White-throated Sparrow	30-Jun	T	P	C	C
Willow Flycatcher					
Wilson's Snipe	1-Jul	P	P	P	P
Winter Wren	12-May	T	P	P	C
Wood Duck	6-May	P	P	C	C
Wood Thrush	22-Jun	AE	C	C	C
Yellow Warbler	26-Jun	CF	C	C	P
Yellow-bellied Flycatcher	11-Jun	S	P		
Yellow-bellied Sapsucker	10-May	N	P	P	Poss
Yellow-billed Cuckoo	7-Jul	T	P	C	P
Yellow-rumped Warbler	26-Jun	T	P	C	C
Yellow-throated Vireo	10-May	T	P	C	P

Observed
X Species observed in its breeding season (no evidence of breeding).
Possible
H Species observed in its breeding season in suitable nesting habitat.
S Singing male present, or breeding calls heard, in its breeding season in suitable nesting habitat
Probable
P Pair observed in their breeding season in suitable nesting habitat.
T Permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place
D Courtship or display between a male and a female or 2 males, including courtship, feeding or copulation
V Visiting probable nest site.
A Agitated behaviour or anxiety calls of an adult.
B Brood patch on adult female or cloacal protuberance on adult male.
N Nest-building or excavation of nest hole.
Confirmed
DD Distraction display or injury feigning.
NU Used nest or egg shell found (occupied or laid within the period of the study).
FY Recently fledged young or downy young, including young incapable of sustained flight
AE Adults leaving or entering nest site in circumstances indicating occupied nest.
FS Adult carrying fecal sac.
CF Adult carrying food for young.
NE Nest containing eggs.
NY Nest with young seen or heard.

Year Status Codes: C=Confirmed, P=Probable, Poss=Possible, X= Transient/Migrant