

Frontenac Breeding Birds

Report on the 2010 Field Season



Prairie Warbler near Slide Lake, Frontenac Provincial Park – June 2010 (D.Derbyshire)



Dan Derbyshire
Coordinator, Frontenac Bird Studies
fbs@migrationresearch.org

December 2010

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Suggested Citation:

Derbyshire, D. 2010. *Frontenac Breeding Birds: Report on the 2010 Field Season*. Unpublished report by the Migration Research Foundation.

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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.

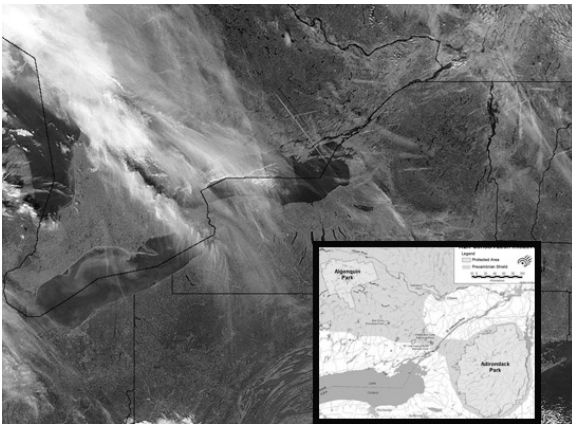
Frontenac Bird Studies

Frontenac Bird Studies (FBS) was created by the Migration Research Foundation (MRF) in 2009 with the understanding that proactive science and educational programming will be vital to the protection of the extraordinary socio-cultural and natural heritage of the Frontenac Arch. The primary goal of the FBS project is to strengthen the capacity for protection of bird populations and habitats in the region.

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 millenia 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% 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 15 bird species classified as Species At Risk (provincial and/or federal) occur or have occurred historically on the Frontenac Arch. Of these, Cerulean Warbler (Endangered), Golden-winged Warbler (Threatened), Common Nighthawk (Threatened), Whip-poor-will (Threatened), and Louisiana Waterthrush (Special Concern) occur here in nationally significant densities. Though not considered “at risk”, Prairie Warbler and Red-shouldered Hawk are two of many examples of 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 Species At Risk, is cause for extensive monitoring and stewardship. As a third objective of the program, we carefully documented any rare species detected during all fieldwork operations within the breeding season and also perform additional inventory work in appropriate habitats for select species. Location information for rare/sensitive species is excluded from this version of the report, which has been edited for general circulation.

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 A). 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 and Contemporary Studies of Birds in the Frontenac Arch

Breeding Bird Survey (BBS)

The Breeding Bird Survey (BBS) is the continental standard for assessing temporal and spatial shifts in populations of breeding birds. Our study area contains part of one BBS route (312-Glendower), which follows the western boundary (Bedford Rd-Canoe Lake Road). This stretch of secondary road has been covered annually since 2004 by members of the Kingston Field Naturalists. The route carries on from the north end of Canoe Lake southwest to Highway 38 via Westport Road. A total of fifty roadside point counts (3 minute

duration) are evenly distributed along the length of the route, of which fewer than half are located within the FBS study area.

Queen's University Biological Station

The Queen's University Biological Station (QUBS) has been actively studying Cerulean and Golden-winged Warblers, along with many other species in the Frontenac Arch, specifically in an area near Opinicon Lake (approx. 15 km east of study area). A previous inventory of Cerulean Warbler populations extended beyond the QUBS property to include a larger portion of the Frontenac Arch.

Kingston Field Naturalists

The Kingston Field Naturalists (KFN) is an active group with a deep background of natural history inventory in the Kingston area. The club conducts a host of bird monitoring projects for the region as a whole, including the Forest Bird Monitoring Program (FBMP), Red-shouldered Hawk and Spring Woodpecker Survey and the Great Lakes Marsh Monitoring Program. The KFN has participated in both editions of the Ontario Breeding Bird Atlas and has conducted inventory and documentation of Species at Risk within the region.

Ontario Breeding Bird Atlas

Published in 1987, the first edition of the Ontario Breeding Bird Atlas (OBBA) was based on five years of extensive field inventory of breeding birds across Ontario from 1981-1985. Published in 2007, the second edition of the OBBA facilitated a landmark comparative analysis of trends and shifts in distribution of Ontario's breeding bird populations. These province-wide five-year assessments are repeated every two decades and are, in combination with BBS results, the important groundwork for monitoring, conservation and research.

Other Studies

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, S. and B. 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. This study will be referenced as Brinker and McLeish (2006) throughout this report.

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. This document will be referenced as Ecological Services (2004) throughout this report.

2010 Results

Monitoring Avian Productivity and Survivorship (MAPS)

Background

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 a core area of about 8 hectares. The MAPS program divides the breeding season into ten 10-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 from May 31-August 8. An individual MAPS visit involves six hours of effort, which amounts to 42 effort hours during the entire 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, moult and feather condition, fat, and breeding condition scores of all individuals captured and recaptured. This data is 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.) is also tabulated at the end of each field day and entered into MAPSPROG.

A Breeding Status List is carefully maintained throughout the MAPS season to provide a complete assessment of the summer residency status of all species present at each station each season. Nesting behaviour, song 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 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) near 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 inhibiting terrain for fieldwork. A new station with the name Blue Lakes (BLAK), located near Sharbot Lake, was installed and operated in 2010. 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. Black-and-white Warbler, Brown Creeper, Yellow-bellied Sapsucker, Chestnut-sided Warbler and Ovenbird were 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-present

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-present

The MABO station was installed on crown land on the north side of Devil Lake Road, north of Frontenac Provincial Park. Like HELA, the 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 Sugar Maple forest and the presence of multiple bogs. 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-present

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 Chestnut-sided Warbler and Black-throated Blue Warbler as two of its common breeding species.

Banding Results

Weather conditions in June 2009 were unusually cool, windy and wet, which we suggested may have negatively influenced breeding productivity (Derbyshire 2009). The month of June in 2010 was also atypically wet, making the first three rounds of visits a challenge to schedule. However, all seven visits to each of three stations were completed on time and July and early August were closer to average in terms of both temperature and precipitation. This report presents the first opportunity to compare and contrast results over two consecutive seasons at both MABO and RRID while BLAK, the new station, is summarized here for the first time.

A total of 364 birds were captured in 2010 for all stations combined. This result is just 39 captures more than the sum total of only two stations in 2009 (MABO, RRID). Furthermore, the 2010 rate of 13.6 captures/visit is significantly lower than last year when a rate of 19 was calculated. Lastly the overall rate of capture (birds captured/net hour) was .30/hour, down from .38 in 2009. These figures may suggest reduced population density in the region this summer but there are important differences between stations to note. Capture totals at RRID were relatively consistent between years while MABO exhibited a sharp 39% decrease in newly banded birds in 2010 over last year (-33% in total captures when recaptures are included). Refer to Table 1 for a summary of visit totals by station.

Table 1. Summary of MAPS effort/banding totals by visit and station

Station	Date	Visit No.	Nets	Net Hours	New	Recap	Unb*	2010 Tot	2009 Tot
RRID	6/11/2010	1	10	60	10			10	25
RRID	6/20/2010	2	10	60	20	3		23	10
RRID	7/2/2010	3	10	60	17	8		25	28
RRID	7/8/2010	4	10	45	17	3		20	10
RRID	7/18/2010	5	10	50	12	3		15	15
RRID	7/26/2010	6	10	60	7	1		8	14
RRID	8/2/2010	7	10	60	18	3		21	26
subtotal					101	21	0	122	128
BLAK	6/8/2010	1	10	60	24			24	
BLAK	6/15/2010	2	10	60	15	4		19	
BLAK	6/25/2010	3	10	60	18	6		24	
BLAK	7/4/2010	4	10	60	16	4		20	
BLAK	7/14/2010	5	10	60	5	2		7	
BLAK	7/22/2010	6	10	60	6	1	1	8	
BLAK	8/1/2010	7	10	60	6	2		8	
subtotal					90	19	1	110	
MABO	6/10/2010	1	10	59	13	8		21	26
MABO	6/18/2010	2	10	60	17	11	1	29	22
MABO	6/29/2010	3	10	60	19	8		27	45
MABO	7/6/2010	4	10	50	20	3		23	30
MABO	7/17/2010	5	10	60	18	4	1	23	31
MABO	7/27/2010	6	10	60	4			4	24
MABO	8/5/2010	7	10	45	4	1		5	19
subtotal					95	35	2	132	197

*Unb refers to birds captured and released unbanded

Rock Ridge

At Rock Ridge, 101 birds were banded in 2010, down from 115 in 2009. As expected, more recaptures were recorded this year. The makeup of species sampled was similar in both years, although abundance varied considerably for some. Nashville Warbler, Eastern Towhee and Yellow-rumped Warbler were noticeably less abundant in 2010 while Black-capped Chickadee, Common Grackle and Eastern Phoebe were captured more frequently. A total of 26 species were captured, down from 31 in 2009.

New species captured at RRID in 2010 included Black-throated Green Warbler, Downy Woodpecker, Northern Waterthrush and Pine Warbler.

Table 2. Rock Ridge (RRID) Banding Results

Species	2009	2010	2009	2010	Species	2009	2010	2009	2009
	new	new	rec	rec		new	new	rec	rec
American Redstart	2				Field Sparrow	5	7		
American Robin	19	15	1	3	Great Crest. Flycatcher	1			
Baltimore Oriole	2				Hairy Woodpecker	3	2		
Black-and-white Warbler	12	9	1	3	Hermit Thrush	4	3		
Black-billed Cuckoo	4	2			Nashville Warbler	3			
Black-cap. Chickadee	6	12	1	6	Northern Waterthrush		1		
Black-thr. Green Warbler		1			Pine Warbler		1		
Blue Jay	2	1			Red-breasted Nuthatch	1	1		
Broad-winged Hawk	1				Red-eyed Vireo	7	11	2	5
Brown-headed Cowbird	1				Rose-breast. Grosbeak	3	2		
Cedar Waxwing	2				Ruby-thr. Hummingbird				
Chipping Sparrow	5	3	1	2	Scarlet Tanager	1			
Common Grackle	2	7			Song Sparrow	5	3	1	
Common Yellowthroat	1	2		1	Veery	1			
Downy Woodpecker		1			White-throated Sparrow	4	3	2	
Eastern Kingbird	1	1			Yellow-billed Cuckoo	2	2		
Eastern Phoebe	1	4			Yellow-rumped Warbler	7	2		

Eastern Towhee	7	4	2	1	Yellow-shafted Flicker	2	1		
					Totals	117	101	11	21

Maplewood Bog

Results were markedly more down than up at MABO this year. A total of 95 birds were banded in 2010, down from 154 a year ago. Banding totals for Veery, Northern Waterthrush, Black-capped Chickadee and Song Sparrow dropped sharply while totals for Scarlet Tanager and Blue Jay were higher. While a few species show a large disparity between years, the results are generally lower across the board in 2010. Results for Veery are particularly mysterious as only seven were captured in 2010 versus twenty in 2009 and only a single hatch-year individual has been recorded in two consecutive breeding seasons. Species diversity was also down this year (32 in 2009, 25 in 2010). Populations undergo natural fluctuations and it seems that the inception of our MAPS stations is probably coinciding with a downturn. Survivorship and productivity data for both years are provided later in this report.

Table 3. Maplewood Bog (MABO) Banding Results

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

Blue Lakes

The Blue Lakes (BLAK) station was set up near Sharbot Lake, ON in May 2010 after a lengthy yet fruitless search for a second site in Frontenac Provincial Park. It became clear that more suitable opportunities lay further north. Broadening the spatial distribution of the MAPS network also offered the potential of increased species and habitat coverage. The first season at BLAK was generally positive, particularly through early July. The final three visits were extremely quiet – a result very similar to the last two visits to MABO in 2010.

A total of 90 birds were banded at BLAK and 19 recaptures were recorded. In terms of capture totals this makes BLAK in 2010 the least “active” season for any station we’ve had to date. Dominant species here are Rose-breasted Grosbeak, American Robin, Veery and Common Grackle. Black-throated Blue Warbler, Chestnut-sided Warbler and Yellow-throated Vireo occur here in sufficient numbers to suggest that long-term monitoring may be possible. These three species are unlikely to be sampled adequately at either RRID or MABO. While BLAK may be less busy than the other stations, it would be an asset to the network because of the unique species assemblage and landscape characteristics found there. We also have to consider that populations may very well be at low ebb and that the 2010 results probably reflect this. A total of 27 species were captured this summer, which is remarkably consistent with MABO (25) and RRID (26) in 2010.

Table 4. Blue Lakes (BLAK) Banding Results

Species	2010 new	2010 recap	Species	2010 new	2010 recap
American Redstart	2		Pileated Woodpecker	1	
American Robin	10	1	Rose-breasted Grosbeak	12	
Black-capped Chickadee	2		Red-eyed Vireo	5	
Blue Jay	2		Red-winged Blackbird	2	
Black-throated Blue Warbler	2	3	Scarlet Tanager	2	
Common Grackle	7		Song Sparrow	5	4
Common Yellowthroat	1		Swamp Sparrow	1	
Chestnut-sided Warbler	3	1	Veery	8	5
Downy Woodpecker	3	1	Warbling Vireo	1	
Field Sparrow	1		White-breasted Nuthatch	1	
Gray Catbird	1		Wood Thrush	1	
Hermit Thrush	1		Yellow-bellied Sapsucker	3	2
Northern Waterthrush	5		Yellow-throated Vireo	3	1
Ovenbird	5	1	Totals	90	19

Productivity

Mark-recapture techniques, such as those employed in the MAPS program, are essential to calculating avian demography. Each bird captured during MAPS sessions were aged, sexed, and carefully measured for breeding evidence and other biometrics. A complete summary of productivity statistics per species is presented below in Tables 5-7. Age ratios are one of a few tools available in the measurement of avian productivity for a site, region or continent. After a summer with high nest success, 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 17% of new captures. Conversely, RRID had the highest score with just over 45% while MABO recorded just over 30%. This is the second year in a row that RRID has produced the highest output of hatch-year birds amongst the stations (35.9% in 2009, 32.5% at MABO in 2009). The lower productivity at MABO in both years is attributable to poor results during the final two visits in late July and early August – a pattern mirrored at BLAK this year. 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. Despite lower performance, the sample of hatch-year individuals at MABO in both years should be sufficient for the monitoring of productivity rates going forward at this site.

Rock Ridge

In 2010, Rock Ridge experienced a substantial increase in productivity. Scientists at the Institute for Bird Populations consider that each station samples productivity for bird populations within a 4km radius of the station centre. This means that while some of the young birds included in Table 5 will be from the actual 20-hectare MAPS station, a potentially higher portion may come from local areas. 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. A total of 45% of newly banded birds at RRID in 2010 were hatch-year individuals, which is up from 35% in 2009.

At the species level, Black-and-white Warbler, Black-capped Chickadee, Eastern Towhee and Field Sparrow exhibited significantly higher productivity this year. For a second season in a row productivity was nil or very low for several species where at least two adults were banded. These include Black-billed Cuckoo, Yellow-billed Cuckoo and Red-eyed Vireo. Again, it is important to note that our data pool is still too shallow to make any conclusive statements but it is worth exploring and monitoring these patterns as they continue to emerge.

Table 5. Productivity at Rock Ridge (RRID)

SPEC	2010 HY%	2009 HY%	2010 Total Adults	2010 Total HY	2010 Total	2009 Total Adults	2009 Total HY	2009 Total
American Redstart		100.00				0	2	2
American Robin	53.33	73.68	7	8	15	5	14	19
Baltimore Oriole		0.00				2		2
Black-and-white Warbler	66.67	33.33	3	6	9	8	4	12
Black-billed Cuckoo	0.00	0.00	2		2	2		2
Black-capped Chickadee	91.67	16.67	1	11	12	5	1	6
Black-thr. Green Warbler	0.00		1		1			
Blue Jay	0.00	50.00	1		1	1	1	2
Broad-winged Hawk		0.00				1		1
Brown-headed Cowbird		0.00				1		1
Cedar Waxwing		0.00				2		2
Chipping Sparrow	33.33	40.00	2	1	3	3	2	5
Common Grackle	0.00	0.00	7		7	2		2
Common Yellowthroat	0.00	100.00	2		2	0	1	1
Downy Woodpecker	100.00		0	1	1			
Eastern Kingbird	100.00	0.00	0	1	1	1		1
Eastern Phoebe	100.00	100.00	0	4	4	0	1	1
Eastern Towhee	50.00	28.57	2	2	4	5	2	7
Field Sparrow	42.86	20.00	4	3	7	4	1	5
Great Crested Flycatcher		0.00				1		1
Hairy Woodpecker	0.00	0.00	2		2	3		3
Hermit Thrush	33.33	75.00	2	1	3	1	3	4
Nashville Warbler		33.33				2	1	3
Northern Waterthrush	100.00		0	1	1			
Pine Warbler	100.00		0	1	1			
Red-breasted Nuthatch	100.00	100.00	0	1	1	0	1	1
Red-eyed Vireo	9.09	0.00	10	1	11	7		7
Rose-breasted Grosbeak	50.00	0.00	1	1	2	3		3
Ruby-thr. Hummingbird		100.00				0	1	1
Scarlet Tanager		100.00				0	1	1
Song Sparrow	66.67	33.33	1	2	3	4	2	6
Veery		100.00				0	1	1
White-throated Sparrow	0.00	25.00	3		3	3	1	4
Yellow-billed Cuckoo	0.00	0.00	2		2	2		2
Yellow-rumped Warbler	0.00	28.57	2		2	5	2	7
Yellow-shafted Flicker	100.00	0.00	0	1	1	2		2
Total	45.54	35.90	55	46	101	75	42	117

Maplewood Bog

Overall proportion of hatch-years amongst new captures at MABO was fairly consistent for both years (30.5% in 2010, 32.4% in 2009). Despite this, abundance of hatch-year Scarlet Tanager, Ovenbird, Gray Catbird and White-breasted Nuthatch decreased sharply while Yellow-bellied Sapsucker stands out as the only species showing a marked increase over last year. Veery, Ovenbird and Northern Waterthrush are three of the most abundant breeding bird species at MABO and for a second consecutive year very few young birds have been recorded. For these three species combined, 32 adults and only two hatch-years (1 VEER and 1 OVEN) have been banded from 2009-2010. Refer to Table 6 for a complete breakdown of productivity results at MABO.

Table 6. Productivity at Maplewood Bog (MABO)

Species	2010 %HY	2009 %HY	2010 Total Adults	2010 Total HY	2010 Total	2009 Total Adults	2009 Total HY	2009 Total
American Goldfinch		0.00				1		1
American Redstart	12.50	16.67	7	1	8	5	1	6
American Robin	45.45	30.00	6	5	11	7	3	10
Baltimore Oriole		100.00				0	1	1
Black-and-white Warbler	0.00	25.00	1	0	1	3	1	4
Black-capped Chickadee	85.71	64.71	1	6	7	6	11	17
Black-throated Blue Warbler	0.00		1	0	1			
Blue Jay	0.00	0.00	4	0	4	1		1
Chestnut-sided Warbler	50.00	66.67	1	1	2	1	2	3
Chipping Sparrow		0.00				1		1
Common Yellowthroat	28.57	54.55	5	2	7	5	6	11
Downy Woodpecker	100.00	100.00	0	1	1	0	1	1
Eastern Towhee	0.00	50.00	3	0	3	1	1	2
Field Sparrow		50.00				1	1	2
Gray Catbird	0.00	22.22	5	0	5	7	2	9
Great Crested Flycatcher	0.00		0	0	1			
Hairy Woodpecker	60.00	50.00	2	3	5	1	1	2
Hermit Thrush	100.00	100.00	0	1	1	0	1	1
Indigo Bunting		0.00				1		1
Magnolia Warbler		0.00				1		1
Nashville Warbler	0.00	0.00	1	0	1	2		2
Northern Waterthrush	0.00	0.00	2	0	2	8		8
Ovenbird	0.00	20.00	4	0	4	4	1	5
Red-breasted Nuthatch		100.00				0	1	1
Red-eyed Vireo	12.50	18.75	7	1	8	13	3	16
Rose-breasted Grosbeak	0.00	0.00	2	0	2	5		5
Ruby-thr. Hummingbird		50.00				1	1	2
Scarlet Tanager	20.00	50.00	4	1	5	1	1	2
Song Sparrow	75.00	40.00	1	3	4	6	4	10
Swamp Sparrow	0.00	50.00	2	0	2	1	1	2
Veery	0.00	7.69	2	0	2	12	1	13
White-breasted Nuthatch		60.00				2	3	5
Wood Thrush	25.00	20.00	3	1	4	4	1	5
Yellow-bellied Sapsucker	75.00	25.00	1	3	4	3	1	4
Yellow-rumped Warbler		33.33				2	1	3
Total	30.53	32.48	65	29	95	106	51	157

Blue Lakes

A summary of productivity by species for BLAK is presented below in Table 7. As stated earlier, the impact of extremely few captures during visits 5-7 is highly influential on productivity indices here. An average of 18.5 new birds were banded during visits 1-4, which was followed by an average of 5.6 for the final 3 visits. This pattern is contrary to the norm as captures per visit should trend upward as more and more young birds are fledged and begin to disperse with adults. It is plausible that BLAK will be more effective going forward as a site for measuring adult survivorship than for productivity. However, we only have one season to work with thus far and still have time to try and improve the sample (e.g. shifting arrangement/locations of net lanes). The lack of dense shrub habitat with edge characteristics on public lands in the Frontenac Arch has made site selection for post-breeding dispersal exceedingly difficult since FBS began in 2009.

Table 7. Productivity at Blue Lakes (BLAK)

Species	Total Adults	Total HY	Percent HY	Grand Total
American Redstart	2	0	0.00	2
American Robin	9	1	10.00	10
Black-capped Chickadee	0	2	100.00	2
Blue Jay	2	0	0.00	2
Black-throated Blue Warbler	2	0	0.00	2
Common Grackle	7	0	0.00	7
Common Yellowthroat	1	0	0.00	1
Chestnut-sided Warbler	3	0	0.00	3
Downy Woodpecker	1	2	66.67	3
Field Sparrow	1	0	0.00	1
Gray Catbird	1	0	0.00	1
Hermit Thrush	1	0	0.00	1
Northern Waterthrush	0	5	100.00	5
Ovenbird	5	0	0.00	5
Pileated Woodpecker	0	1	100.00	1
Rose-breasted Grosbeak	12	0	0.00	12
Red-eyed Vireo	5	0	0.00	5
Red-winged Blackbird	2	0	0.00	2
Scarlet Tanager	2	0	0.00	2
Song Sparrow	4	1	20.00	5
Swamp Sparrow	1	0	0.00	1
Veery	8	0	0.00	8
Warbling Vireo	1	0	0.00	1
White-breasted Nuthatch	0	1	100.00	1
Wood Thrush	0	1	100.00	1
Yellow-bellied Sapsucker	2	1	33.33	3
Yellow-throated Vireo	3	0	0.00	3
Total	75	15	16.67	90

Temporal Productivity Results

A temporal analysis of hatch-year birds banded per visit reveals that RRID bears an upward trending pattern over the course of the seven visit breeding period (early June – early August). This pattern occurs in both years at RRID while MABO peaks during visit 4 or 5 and then drops sharply during the final two visits. BLAK also peaked during visit 4 in 2010 and then fell off during the final three outings. These patterns reaffirm our suspicion that RRID is a superior site for measuring rates of nest success (productivity), although species assemblage and divergent landscape characteristics may also play a role.

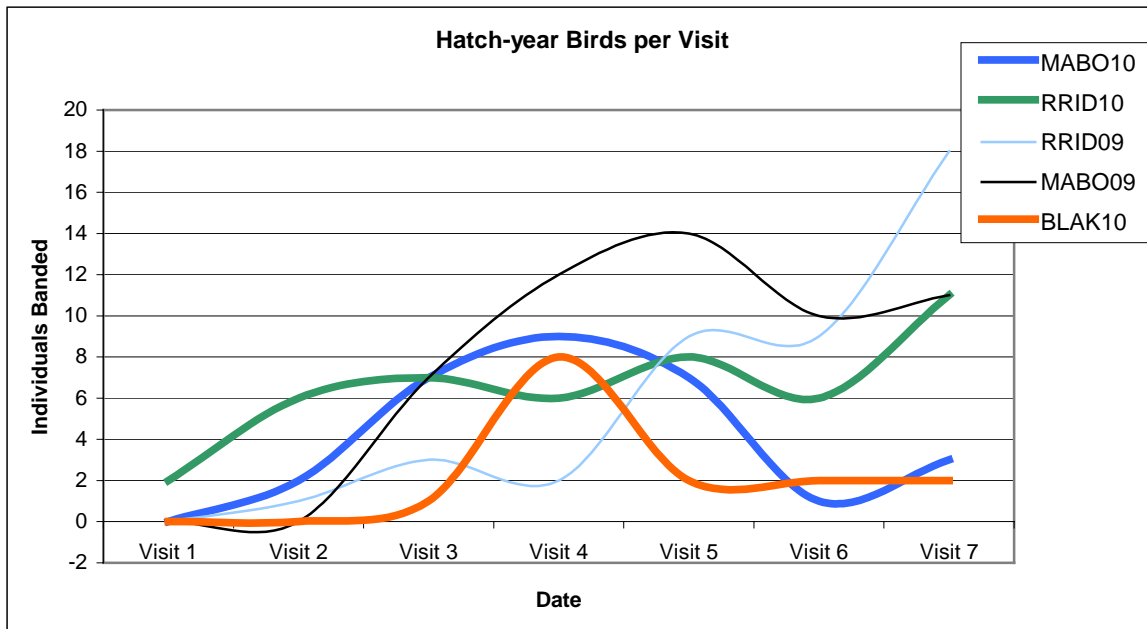


Figure 1. Hatch-year individuals banded by visit for MAPS stations in 2009 and 2010
Survivorship

Two years of MAPS data are insufficient to derive accurate estimates of vital rates. At least five years of MAPS data are needed to produce valid estimates, 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.

Rock Ridge

Rate of return at RRID was lower as just 6.84% of the 154 birds banded in 2009 were recaptured in 2010 (8 birds in total). The returns include two Black-and-white Warblers and three Black-capped Chickadees that make up over half of the total. Single returns of American Robin, Chipping Sparrow and Eastern Towhee were also recorded. Seven of the eight returns were adults banded in 2009. One of the chickadees was banded as a hatch-year on August 7, 2009, and was recaptured on June 20, 2010 as an adult breeding female. Like the Veery, the Black-and-white Warbler is a neo-tropical migrant that winters from southern Florida south to Columbia. The two returns, both males, were recaptured either in the same net or within 40m of where they were originally captured in 2009.

Table 8. Survivorship (rate of return) of Rock Ridge in 2010

RRID	2009 Sample	Return	%Return
American Redstart	2		0
American Robin	19	1	5.26
Baltimore Oriole	2		0
Black-and-white Warbler	12	2	16.67
Black-billed Cuckoo	4		0
Black-cap. Chickadee	6	3	50
Blue Jay	2		0
Broad-winged Hawk	1		0
Brown-headed Cowbird	1		0
Cedar Waxwing	2		0
Chipping Sparrow	5	1	20
Common Grackle	2		0
Common Yellowthroat	1		0
Eastern Kingbird	1		0
Eastern Phoebe	1		0
Eastern Towhee	7	1	14.29
Field Sparrow	5		0
Great Crest. Flycatcher	1		0
Hairy Woodpecker	3		0
Hermit Thrush	4		0
Nashville Warbler	3		0
Red-breasted Nuthatch	1		0
Red-eyed Vireo	7		0
Rose-breast. Grosbeak	3		0
Scarlet Tanager	1		0
Song Sparrow	5		0
Veery	1		0
White-throated Sparrow	4		0
Yellow-billed Cuckoo	2		0
Yellow-rumped Warbler	7		0
Yellow-shafted Flicker	2		0
Totals	117	8	6.84

Maplewood Bog

A total of 19 birds of the 177 originally banded in 2009 were recaptured at MABO in 2010. Therefore, the overall return rate was 12.34%. The highest return rates are evident for Blue Jay (100%), Wood Thrush (40%), Veery

(30.7%), Red-eyed Vireo and Northern Waterthrush (25%). All returning birds were adults in 2009 with the exception of a Veery banded as a hatch-year in early August of that year. This Veery was recaptured on June 29, 2010 as a second-year individual and was caught in the exact same net as the previous year! It was previously thought that the Veery wintered in northern South America but a more recent study indicates a more restricted wintering range of central and southern Brazil. This would mean that “our” Veery traveled an estimated 14,000 kilometres between August 2009 and June 2010 only to have landed in the same 12m long mistnet at MABO – phenomenal.

Table 9. Survivorship (rate of return) at MABO in 2010

Species	2009 Sample	Returns	%Return
American Goldfinch	1		0.00
American Redstart	6		0.00
American Robin	10	1	10.00
Baltimore Oriole	1		0.00
Black-and-white Warbler	4		0.00
Black-capped Chickadee	17	2	11.76
Blue Jay	1	1	100.00
Chestnut-sided Warbler	3		0.00
Chipping Sparrow	1		0.00
Common Yellowthroat	11	1	9.09
Downy Woodpecker	1		0.00
Eastern Towhee	2		0.00
Field Sparrow	2		0.00
Gray Catbird	9		0.00
Hairy Woodpecker	2		0.00
Hermit Thrush	1		0.00
Indigo Bunting	1		0.00
Magnolia Warbler	1		0.00
Nashville Warbler	2		0.00
Northern Waterthrush	8	2	25.00
Ovenbird	5		0.00
Red-breasted Nuthatch	1		0.00
Red-eyed Vireo	16	4	25.00
Rose-breasted Grosbeak	4		0.00
Scarlet Tanager	2		0.00
Song Sparrow	10	2	20.00
Swamp Sparrow	2		0.00
Veery	13	4	30.77
White-breasted Nuthatch	5		0.00
Wood Thrush	5	2	40.00
Yellow-bellied Sapsucker	4		0.00
Yellow-rumped Warbler	3		0.00
Totals	154	19	12.34

A summary of notable return records for both stations is presented in Tables 10 and 11.

Table 10. Selected return records at MABO (Code - N=New Capture, R=Recapture, CP=Cloacal Protuberance, BP=Brood Patch)

Band Size	Code	BAND	Species	AGE*	SEX	CP	BP	WEIGHT	DATE	TIME	STATION	NET
1	N	235140702	NOWA	1	M	3	0	15.9	6/5/2009	070	MABO	06
R	R	235140702	NOWA	1	M	3	0	16.8	6/5/2009	113	MABO	09
R	R	235140702	NOWA	1	M	3	0	16.1	6/14/2009	072	MABO	09
R	R	235140702	NOWA	1	M	3		N/A	6/14/2009	110	MABO	07
R	R	235140702	NOWA	6	M	2	0	17.0	6/18/2010	075	MABO	09
R	R	235140702	NOWA	6	M	1	0	17.0	6/29/2010	112	MABO	06
1A	N	241109401	WOTH	5	F	0	3	47.7	6/5/2009	070	MABO	08
R	R	241109401	WOTH	5	F	0	3	48.0	7/6/2009	064	MABO	09
R	R	241109401	WOTH	6	F	0	3	49.4	6/10/2010	063	MABO	08
R	R	241109401	WOTH	6	F	0	3	50.2	6/29/2010	085	MABO	08
R	R	241109401	WOTH	6	F	0	3	47.7	7/6/2010	064	MABO	08
1B	N	243164408	VEER	6	M	2	0	30.8	6/14/2009	110	MABO	03

R	R	243164408	VEER	6	M	2	0	30.2	6/23/2009	073	MABO	04
R	R	243164408	VEER	6	M	0	0	31.3	7/6/2009	093	MABO	07
R	R	243164408	VEER	6	M	2	0	30.6	7/17/2009	083	MABO	08
R	R	243164408	VEER	6	M	2	0	31.9	6/10/2010	105	MABO	07

Table 11. Selected return records at RRID (Code - N=New Capture, R=Recapture, CP=Cloacal Protuberance, BP=Brood Patch)

Band Size	Code	BAND	Species	AGE	SEX	CP	BP	WEIGHT	DATE	TIME	STATION	NET
2	N	134200624	EATO	1	F	0	4	40.5	8/7/2009	070	RRID	08
R	R	134200624	EATO	6	F	0	3	44.4	7/2/2010	113	RRID	13
0	N	260060514	BAWW	6	M	3	0	9.7	6/27/2009	075	RRID	04
R	R	260060514	BAWW	6	M	0	0	10.2	7/26/2010	080	RRID	05
0	N	260060519	BAWW	1	M	0	0	12.2	7/20/2009	080	RRID	08
R	R	260060519	BAWW	6	M	2	0	10.5	6/20/2010	093	RRID	08
0	N	260060523	CHSP	1	M	0	0	12.2	7/28/2009	073	RRID	04
R	R	260060523	CHSP	1	M	0	0	12.4	8/7/2009	101	RRID	10
R	R	260060523	CHSP	6	M	3	0	11.8	7/2/2010	100	RRID	01

Breeding Status

In any defined study area, there is both an active breeding bird population and a non-breeding population. These non-breeding birds are transients, consisting of migrants, failed breeders, and post-breeding dispersers. For the MAPS program, it is necessary to separate breeders from non-breeders. During each visit to the three stations, birds were observed to determine breeding status of each species encountered in the study area.

Rock Ridge

Various criteria are used as evidence of breeding activity (e.g. distraction display, nest discovered). At RRID, 71 species were recorded in 2010. Of these, 33 were confirmed as Breeders, eight as Likely Breeders and 30 as Transients. Ruffed Grouse, not found in 2009 was classified as a breeder in 2010 and Yellow-billed Cuckoo was upgraded from likely in 2009 to confirmed in 2010.

Table 12. MAPS Year status by species at RRID

SPEC	2009 YS	2010 YS	SPEC	2009 YS	2010 YS	SPEC	2009 YS	2010 YS
COLO	T	T	PIWO	T	-	YWAR	B	B
PBGR	T	-	EAWP	B	T	CSWA	T	T
GBHE		T	LEFL	T	T	MYWA	B	B
TUVU	T	T	EAPH	B	B	BTNW		T
CANG	T	T	GCFL	B	B	PIWA	B	L
WODU	B	L	EAKI	B	B	BAWW	B	B
MALL	T	L	YTVI		T	AMRE	T	-
HOME		T	WAVI	B	T	NOWA	T	T
OSPR	B	T	REVI	B	B	COYE	B	B
COHA		T	BLJA	B	B	SCTA	B	B
NOGO		T	AMCR	T	L	EATO	B	B
RSHA	T	T	CORA	L	T	CHSP	B	B
BWHA	L	T	HOLA	T	-	FISP	B	B
RUGR		B	PUMA	T	T	VESP	T	-
WISN		T	TRES	T	T	SOSP	B	B
RBGU	T	T	NRWS	B	-	SWSP	B	B
HERG		T	BANS	T	-	WTSP	B	B
MODO	B	B	BARS	T	T	RBGR	B	B
BBCU	B	B	BCCH	B	B	INBU	T	T
YBCU	L	B	RBNU	B	B	BOBO		T
CONI	B	L	WBNU	L	L	RWBL	B	B
WPWI	B	-	VEER	T	-	COGR	B	B
RTHU	L	-	HETH	B	B	BHCO	B	-
BEKI		T	AMRO	B	B	BAOR	B	B
YBSA	L	T	BRTH	B	T	PUFI	B	B
DOWO	L	L	CEDW	B	L	AMGO	B	B
HAWO	B	B	NAWA	B	B	EVGR		T

YSFL	B	B	NOPA	M	-
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*Year Status Codes: B=Breeder, L=Likely Breeder, T=Transient, M=Migrant

Maplewood Bog

At MABO, 70 bird species were detected in 2010, three more than in 2009. New species found this year include Wood Duck, Hooded Merganser, Great Blue Heron, Cooper's Hawk, Solitary Sandpiper, Barred Owl, Pileated Woodpecker, Eastern Kingbird, Black-throated Blue Warbler, American Redstart and Ovenbird. Thirty-one species were confirmed as Breeders, 11 as Likely Breeders, 26 as Transient and one as a Migrant (Solitary Sandpiper). Black-throated Blue Warbler was not recorded at all in 2009 but was classified as a breeder this year with the detection of a singing male on multiple visits and the observation of fledged young within station boundaries.

Table 13. MAPS Year Status by species at MABO

SPEC	2010 YS	2009 YS	SPEC	2010 YS	2009 YS	SPEC	2010 YS	2009 YS
WODU	T		NOFL	B	B	CSWA	B	L
MALL	T	T	PIWO	L		MAWA	-	T
HOME	T		LEFL	-	T	BTBW	B	
RUGR	L	B	EAPH	T	B	MYWA	B	B
COLO	T	T	GCFL	L	B	BTNW	T	T
GBHE	T		EAKI	T		CERW	T	T
TUVU	T	T	YTVI	L	B	BAWW	B	B
BADO	T		WAVI	-	T	AMRE	B	B
COHA	T		REVI	B	B	OVEN	B	B
EAWP	B	B	BLJA	B	B	COYE	B	B
NOWA	B	B	AMCR	T	T	SCTA	B	B
RTHU	L	B	CORA	T	T	EATO	B	B
YBCU	B	B	PUMA	T	T	CHSP	B	B
RSHA	T	T	TRES	T	L	FISP	B	B
BWHA	-	T	BARS	T	T	SOSP	B	B
SOSA	M		BCCH	B	B	SWSP	B	B
WISN	T	B	RBNU	L	B	RBGR	B	B
RBGU	-	T	WBNU	B	B	INBU	T	T
MODO	T	B	VEER	B	B	RWBL	T	L
BBCU	L	B	HETH	T	T	COGR	B	B
CONI	-	T	WOTH	B	B	BHCO	L	L
WPWI	T	L	AMRO	B	B	BAOR	B	B
BEKI	T	T	GRCA	B	B	PUFI	T	B
YBSA	B	B	CEDW	L	L	AMGO	B	B
DOWO	L	L	NAWA	L	L			
HAWO	B	B	YWAR	B	B			

Blue Lakes

Lastly, a total of 66 species were recorded at BLAK during the 2010 field season. Of these, 36 met criteria for confirmed Breeder, ten for Likely Breeder status and another 20 as Transient. Notable amongst the known breeders are Great Blue Heron, Wood Duck, Wilson's Snipe, Pileated Woodpecker, Least Flycatcher, Yellow-throated Vireo and Black-throated Blue Warbler.

Table 14. MAPS Year Status by species at BLAK

Species	2010 YS	Species	2010 YS	Species	2010 YS	Species	2010 YS	Species	2010 YS
COLO	T	YBCU	T	WAVI	B	CEDW	L	CHSP	B
GBHE	B	BEKI	L	REVI	B	YWAR	L	FISP	B
TUVU	T	YBSA	B	BLJA	B	CSWA	B	SOSP	B
CANG	L	DOWO	B	CORA	T	MAWA	T	SWSP	T
WODU	B	HAWO	B	TRES	L	BTBW	B	RBGR	B
MALL	T	YSFL	B	BARS	T	MYWA	B	RWBL	L
HOME	T	PIWO	B	BCCH	B	BTNW	T	COGR	B
OSPR	T	EAWP	B	RBNU	T	BLBW	T	BAOR	B
BWHA	T	LEFL	B	WBNU	B	AMRE	B	PUFI	L

RTHA	T	EAPH	L	VEER	B	OVEN	B	AMGO	B
RUGR	B	GCFL	B	HETH	B	NOWA	B		
SPSA	T	EAKI	L	WOTH	T	COYE	L		
WISN	B	YTVI	B	AMRO	B	SCTA	B		
BBCU	T	BHVI	T	GRCA	T	EATO	B		

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 the Frontenac Breeding Birds project began it has been our goal to, as an adjunct to our MAPS studies, execute an effective nest search/monitoring component. Unfortunately, time constraints have limited our ability to put forth a concerted effort into this area. Consequently, our sample size in both years has been insufficient to support comparative analysis with demographic data collected via the MAPS stations. 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. We are presently considering a greater emphasis on nest searching/monitoring for 2011.

A total of 27 nests were recorded in 2010, of which seventeen were monitored (more than one visit). Of the monitored nests, six failed, four succeeded and the remaining seven had unknown outcomes. Notable records include nest accounts of Louisiana Waterthrush in Frontenac Provincial Park, Yellow-billed Cuckoo and Yellow-throated Vireo at BLAK and a gull colony on Big Clear Lake. The gull colony contained one active nest of Herring Gull and 10-12 nests of Ring-billed Gull. For a second consecutive year no instances of brood parasitism by Brown-headed Cowbirds were noted.

Table 15. 2010 Nest Records (Nest outcome codes – OU=Unknown, F=Failed, S=Successful)

Nest Card #	Species	First Date	Visits	Outcome	Observer
209201	Red-shouldered Hawk	20-Apr	6	OU	DGD
209202	Eastern Phoebe	6-May	1	OU	DGD
209207	Red-winged Blackbird	17-May	1	OU	DGD
209205	Wood Thrush	17-May	2	OU	DGD
209208	Northern Flicker	20-May	2	OU	DGD
209206	Wood Thrush	20-May	3	F	DGD
209209	Hairy Woodpecker	20-May	2	S	DGD
209220	Osprey	16-May	4	S	DGD
209210	Louisiana Waterthrush	20-May	3	F	DGD
209211	Yellow-billed Cuckoo	25-May	3	S	DGD
209212	Veery	25-May	2	OU	DGD
209214	Chestnut-sided Warbler	30-May	5	F	DGD
209216	Ring-billed Gull	11-Jun	3	OU	DGD
209274	Chestnut-sided Warbler	7-Jun	1	OU	DGD
209224	Yellow-throated Vireo	25-Jun	2	OU	DGD
209223	Song Sparrow	23-Jun	1	OU	DGD
209222	Eastern Phoebe	20-Jun	1	OU	DGD
209221	American Robin	18-Jun	2	OU	DGD
209219	Veery	15-Jun	2	F	DGD
209218	Great Blue Heron	8-Jun	5	S	DGD
209217	Eastern Phoebe	14-Jun	1	OU	DGD
209215	Herring Gull	11-Jun	3	F	DGD
209213	Ovenbird	30-May	4	F	DGD
209204	Northern Waterthrush	10-May	1	OU	DGD
209203	Great Blue Heron	11-May	1	OU	DGD
209272	Osprey	17-Jun	1	OU	DJ
209273	American Robin	15-Jun	1	OU	DJ

Breeding Bird Status Report Frontenac Provincial Park 2010

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 FBS, other researchers, to Ontario Parks/OMNR 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). We are presently working on compiling historical records with the goal of storing this information in an electronic database.

In 2010, a total of 91 species were detected during the course of all fieldwork from late May-early August. This result was five species fewer than in 2009, which is not surprising given that last year was a "point count year" when overall area coverage was greater. Of the 92 species encountered this summer, 38 species were Confirmed as breeders (using system developed by Ontario Breeding Bird Atlas). Twenty-nine species were classed as Probable breeders, twenty-one as Observed (i.e. Possible breeders) and three as Migrant/Transient species. The Migrant/Transient species were Bobolink, Evening Grosbeak and Killdeer. Suitable habitat occurs locally for these species but the circumstances of the observations suggested that these were dispersing or migrating individuals.

A complete list of breeding status by species is provided in Appendix B. Note that location information is available for all records but has been omitted from the chart. The following is a selection of accounts for unusual records in the park in 2010.

Canada Goose: (2010 - Confirmed)

Canada Goose is not listed as a breeding species in the checklist but this is quite possibly an omission. While not a common species in the park, they do occur where appropriate habitat is found. Adults with fledged young were observed in a remote section of rock barren habitat in 2010. Canada Goose is almost certainly an annually breeding bird species at FPP.

Cooper's Hawk: (2010 - Possible)

A single Cooper's Hawk was observed flying over Big Clear Lake on June 2, 2010. No other breeding evidence was obtained on the species. This was our first record of Cooper's Hawk during the breeding season at FPP. Neither Cooper's Hawk nor Sharp-shinned Hawk have been confirmed as breeding species in the park based on all available information sources.

Herring Gull and Ring-billed Gull: (2010 - 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 on a small island on Big Clear Lake. Only one ground check of the site was conducted due to concerns that unoccupied Ring-billed Gull nests would be subject to predation by Herring Gulls. It appears that the colony failed in June for unknown reasons.

The island is a destination amongst park users and locals and so human disturbance may have been a factor in the outcome. Nest failure may also be affiliated with the windy and wet weather that occurred during the month.

Red-bellied Woodpecker: (2010 - Possible)

According to the checklist, our sighting of an adult near Devil Lake on June 7, 2010 is a new record for FPP. No further breeding evidence was obtained. The species is expanding northward and the author personally captured and banded an individual near the western shore of Kingsford Lake in February, 2009. This will be an interesting species to monitor going forward.

Red-headed Woodpecker: (2010 - Probable)

The historical status of Red-headed Woodpecker at FPP is quite vague but the species has undergone a dramatic decline and contraction in the Kingston region and in the province as a whole. Ecological Services (2004) makes reference to a nesting site near Gibson Lake but no specific details on the date, source and status of this record were provided. A pair was detected during our biothon fundraiser on July 11 in excellent habitat, which suggested that breeding may have occurred in 2010. We will return to the area in 2011 to confirm status of this species in FPP.

Blue-headed Vireo: (2009 – Probable, 2010 - Possible)

This species was encountered for a second year in a row within thick stands of pine between Slide Lake and Big Salmon Lake. There is no evidence that this species has bred at FPP historically but the detection of singing males in 2009 and 2010 suggests that this may actually be an annual breeder. A dedicated assessment is warranted to confirm breeding status in 2011. If confirmed, Blue-headed Vireo would join Red-eyed, Warbling and Yellow-throated as nesting vireo species in the park.

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.

Pine Siskin: (2009 – Possible)

Pine Siskin is not listed as a breeding species in FPP but an encounter on June 11, 2009 suggested that breeding might occur during years of irruption. The winter of 2008/2009 was an irruption year when large numbers of northern finches moved south in search of food. During the following summer, several nest records were documented in southern Ontario, well south of their typical boreal breeding range. This will be a species to watch for in conifer stands throughout FPP during irruption years. No Pine Siskins were detected in 2010.

Table 16. Summary of Frontenac Breeding Bird Status in 2009 and 2010

FPP Status	2010	2009
Confirmed	38	43
Probable	29	29
Observed	21	24
Migrant/Transient	3	
Total	91	96

A total of twenty-five species that are listed as breeding species in the checklist have not been recorded during our fieldwork thus far. Eight of these species are wetland birds, several of which probably occur in low densities and would require special survey methods to find (e.g. American Bittern, Sora, Common Moorhen). Another

eight were likely once more common but are probably quite scarce now due to habitat succession (e.g. American Kestrel, Eastern Bluebird, Savannah Sparrow and Eastern Meadowlark). Remnants of these habitats may still occur in small pockets and thus these species may still be present in very small numbers. Again, ground searching of target areas would be instructive. The remaining nine species probably still occur but in very low density and can therefore be easily missed (e.g. Eastern Screech-Owl, Northern Saw-whet Owl, Blue-gray Gnatcatcher, Golden-crowned Kinglet and Blackburnian Warbler). Continued coverage and exploration of new areas and habitats will improve our understanding of the contemporary status of these species in FPP.

Rare Species Inventory

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 population of perhaps 20 pairs that inhabited the west side of Canoe Lake, which hosted birds 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 encountered during our fieldwork in 2009, which included a small colony along the sloped shoreline of Slide Lake on Frontenac Provincial Park's east side. 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 kilometres 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. An additional four paired females were detected, which included an observation of a pair feeding recently fledged young. The Prairie Warblers occur 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 D). There was a strong association of occupied territories to areas containing expanses of exposed rock, a dense, low shrub layer 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 a thin, narrow wetland where as many as eight or more males were recorded (eight males within 580m). A singing male that was encountered on a point count route in 2009 was included in the accompanying table and map, however this area was not revisited in 2010. With this territory included, a total of twenty singing males have been documented by FBS thus far. On June 14 and again on June 23 there were single instances of three males engaged in a territorial dispute, which suggested that more males probably occurred but in both cases it was impossible to eliminate overlap with neighbouring territories.

Of the 2010 Prairie Warbler records, thirteen occur within Frontenac Provincial Park boundaries while an additional ten individuals were georeferenced as just outside the park perimeter (three pairs and four singing

males). It should be noted that these records were generated from the confines of the park trails and boundaries (no private lands were trespassed). Refer to Appendix D for a map of Prairie Warbler records in 2010.

We cannot establish the age of this colony prior to 2003 when Ecological Services conducted fieldwork in Frontenac Provincial Park but it is likely that the colony has grown substantially since that time. At present, the surveyed area consists of at least twenty males and a minimum of four of these males are paired with females. No attempt was made to ascertain the breeding status of each male, however some effort was put forth to find active nests, fledged young and adult females in areas where Prairie Warblers were highly concentrated. Considering the distribution of the species along a stretch of nearly five kilometers and the amount of potentially suitable habitat – it would be reasonable to estimate that the population would range from between 10-30 pairs in any given year. This estimate would make this one of, if not the, largest colony outside of the Georgian Bay core population.

Table 17. Summary of PRAW records in 2010

No.	Sex	Zone	Easting	Northing	Date	Notes
1	M				23-Jun-10	singing male
1	M				23-Jun-10	singing male
1	M				23-Jun-10	singing male
1	M				23-Jun-10	singing male
1	M				14-Jun-10	singing male
1	M				21-Jun-10	singing male
1	M				23-Jun-10	singing male
1	M				23-Jun-10	singing male
1	M				23-Jun-10	singing male
1	M				23-Jun-10	singing male
1	M				23-Jun-10	singing male
1	M				23-Jun-10	singing male
1	M				14-Jun-10	singing male
1	M				14-Jun-10	singing male
1	M				14-Jun-10	singing male
1	M				14-Jun-10	singing male
1	M				14-Jun-10	singing male
1	M				14-Jun-10	singing male
1	M				14-Jun-10	singing male
1	M				23-Jun-10	female
1	M				20-Jun-09	2009 PC
3	M				14-Jun-10	3 males chasing at this spot
3	M				23-Jun-10	3 males chasing at this spot
1	F				23-Jun-10	female
1	F				23-Jun-10	observed feeding fledged young
1	F				14-Jun-10	female

Discussion

The 2010 inventory of Prairie Warblers in Frontenac Provincial Park revealed an important concentration of one of Canada's rarest breeding warbler species, perhaps the largest outside of the Georgian Bay region. Our efforts have merely established a baseline from which future research and monitoring can be established. At a minimum, any unexplored habitat of suitable characteristics should be searched and a more exhaustive assessment of breeding status should be undertaken.

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/or woodland swamps. Louisianas are considered "area sensitive". According to a Maryland study a minimum of 100 contiguous hectares of mature habitat is needed for successful breeding (McCracken 2006). 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 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 is 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

An early spring migrant, Louisianas return to Ontario in April and become almost silent by June, making them a difficult species to detect during summer point counts. Ecological Services (2004) 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. 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 note 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 with the report of adults with fledged young (Cadman 2007).

In 2009, we found 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 FPP.

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 exceptionally dry due to an arid winter and early spring period. 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. A complete summary of sites is presented below in Table 18 and a map is provided in Appendix C.

Table 18. LOWA sites surveyed in 2010

First Date	Location	Flow	Water level	Stream floor	Forest Age	Slope	Canopy	Playback ?
10-May	Moulton Lake South	moderate	low-moderate	sand/gravel/rock	mid-late deciduous	moderate-sharp	mostly closed	yes
10-May	Moulton Gorge	strong	moderate	sand/gravel	variable	variable	variable	yes
10-May	Z Pond	nil	low	mud	mid-late deciduous	sharp	partly open	yes
10-May	Devil Lake Road	strong	moderate	sand/gravel	mid deciduous	variable	variable	yes
30-Apr	Canoe Lake Road	moderate	moderate	sand/gravel	Mature mixed	low-moderate	closed	yes
7-May	Devil Lake Creek	strong	deep	gravel/rock	Mature mixed	moderate	partly closed	yes
20-Apr	Arab Gorge	weak	low	sand/gravel	late deciduous	moderate-sharp	variable	yes
11-May	Gibson Lake Swamp	nil	deep	N/A	Variable	sharp	open	yes
11-May	Gibson Devil Creek	moderate	low	sand/mud	mature deciduous	moderate	partly closed	yes
11-May	Gibson creek	weak	low	sand/mud	mature deciduous	sharp	partly closed	yes
11-May	Crab Lake Gorge	weak	low	sand/gravel	mid-late deciduous	sharp	closed	yes
11-May	Moulton Lake North	moderate	low-moderate	sand/gravel	mid-late deciduous	moderate-sharp	mostly closed	yes
6-May	Black Lake	weak	low-none	mud	young	moderate	mostly open	no
17-May	Labelle South	moderate	moderate-deep	sand/mud/gravel	mid mixed	sharp	open	yes
17-May	Little Salmon	strong	moderate-deep	sand/gravel/rock	young-mid deciduous	sharp	mostly closed	yes
21-Jun	Slide Lake	strong	moderate-deep	gravel/rock	mid mixed	sharp	closed	no

23-Apr	McComish	weak	low	mud	mid-late deciduous	sharp	closed	yes
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Results

Of seventeen sites surveyed, five produced LOWA on at least one visit. The occupied sites include 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 are historical breeding sites for LOWA but two are newly documented sites based on all information available to the author. The following are accounts of each occupied location.

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 would have excellent conditions for Louisiana Waterthrush in years with average to heavy winter and spring precipitation. Adults with fledged young were found here during the Ontario Breeding Bird Atlas (2001-2005). The first visit on April 20, 2010 revealed that water levels were extremely low and barely moving, which may have influenced occupancy of the site in 2010. An adult male was finally located on May 16 after two earlier visits yielded no activity. The male responded to playback again on May 17 but was not relocated thereafter on three additional visits. Despite apparent desertion in 2010, the Arab Gorge site remains one of the best potential breeding sites in the region for LOWA.

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) and 2009 (Derbyshire 2009). 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. Over the years there have been as many as five Louisiana Waterthrush sightings at the gorge or within 1.45 km of the site. Repeated visits to this site/area in future years are needed to substantiate Crab Lake Gorge as a viable breeding location.

Moulton Lake South

This is a new breeding location for LOWA in Frontenac Provincial Park. A bonded pair was found on May 10, 2010. A nest with eggs was located on May 26 on the upper bank over a small waterfall. The site contains mid-late successional deciduous forest with moderate-sharp slope and a shaded gravel bottomed stream with moderate flow. Nest searching and monitoring was conducted with great care so as not to cause excessive disturbance or expose the nest to predation. Unfortunately, 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 were made to the site.

Canoe Lake Road

The site on Canoe Lake Road has been active for many years and is 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. Given the fidelity of LOWA to this site it is likely that fecundity is high.

Devil Lake Road

A stream was located along Devil Lake Road during roadside point counts in 2009. The site is remarkably similar to the Canoe Lake Road site in terms of stream characteristics and habitat type. Playback was attempted here on April 30 and May 10, eliciting no response. Another visit on May 26 revealed a singing male along the creek on the east side of the road (no playback was used). This observation indicates that this may be a breeding site for LOWA but no evidence was obtained beyond the presence of a singing male on the above date (site is on private property).

Table 19. Summary of LOWA records in 2010.

Location	Visits	UTM	LOWA Detected	Notes
Arab Gorge	6		Singing Male	Very low water level on April 20 through mid June. 1 singing male on May 16-17. No records after this 2-day period.
Black Lake	1		0	Habitat unsuitable
Canoe Lake Road	3		Singing Male	Male detected on Apr 30 and May 15. Breeding status uncertain. Stream located on private property.
Crab Lake Gorge	3		Singing Male	Male responded to playback on May 11 but was not relocated on 2 return visits in June.
Devil Lake Creek	2		0	Habitat may be suitable but no LOWA detected in 2010.
Devil Lake Road	3		Singing Male	No LOWA on Apr 30 or May 10 but a singing male was heard on May 26. Breeding status uncertain.
Gibson creek	1		0	Habitat unsuitable
Gibson Devil Creek	1		0	Habitat unsuitable
Gibson Lake Swamp	1		0	No LOWA detected
Labelle South	1		0	Habitat unsuitable
Little Salmon	1		0	Habitat might be suitable but area size may be an issue
McComish	1		0	No LOWA detected
Moulton Gorge	1		0	No LOWA detected
Moulton Lake North	1		0	No LOWA detected
Moulton Lake South	4		pair	Pair discovered on May 10. Nest with four eggs located on May 26.
Slide Lake	1		0	Habitat unsuitable
Z Pond	1		0	No LOWA detected.

Discussion

Our inventory of potential breeding sites in Frontenac Provincial Park produced three sites occupied by male Louisiana Waterthrushes. At two historically occupied sites, males were present only for a brief period (Arab Gorge and Crab Lake Gorge). This was also the case at the Devil Lake Road site in late May. These records point to a possible shortage of females and a resultant effect on males to abandon territories and disperse to new territories. Atypically dry conditions due to low winter/early spring precipitation may have factored into productivity 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. Also, most of the sites surveyed in 2010 are heavily influenced by beavers, whose varying habits and population cycles would directly impact LOWA in this region. At the extreme northern limit of their range, Louisiana Waterthrushes in the Frontenac Arch are an intriguing candidate for long-term study and monitoring, particularly in light of continued population expansion, climate change and forest succession.

Results here represent a formative baseline for further study. The project has produced the most comprehensive assessment of the species in Frontenac Provincial Park to date. It would be prudent to repeat this process in 2011, particularly for known sites and sites with high potential. It would also be beneficial to conduct further exploration of suitable habitats within and beyond Frontenac Provincial Park – particularly swamp-woodland sites. These efforts would improve overall coverage and help detect shifts in annual abundance and productivity and the relation of these factors to a variety of phenomena. Adding a colour-banding component to derive a demographic index would also be highly instructive.

Acknowledgements

The successful delivery of Frontenac Breeding Birds was the result of a generous effort put forth by a collective of individuals and organizations with an interest and commitment to science and conservation in the region.

A sincere thanks are due to the following for their collaborative support in the development and execution of the program in 2010.

Corina Brdar	Ontario Parks
Monique Charette	Ontario Ministry of Natural Resources
Peter Dawson	Ontario Parks
Christopher Dunn	Biothon Participant
Karina Dykstra	Biothon Participant
Steve Gillis	Biothon Participant
Don Johnston	FBS Volunteer
Bert Korporaal	Ontario Parks
Seabrooke Leckie	FBS Assistant (staff)
Julia Marko Dunn	Biothon Participant
Chris Robinson	Ontario Parks
Peter Vass	Ontario Ministry of Natural Resources
Ron Weir	Kingston Field Naturalists

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

John Hackney Foundation for the Noosphere



McLean Foundation

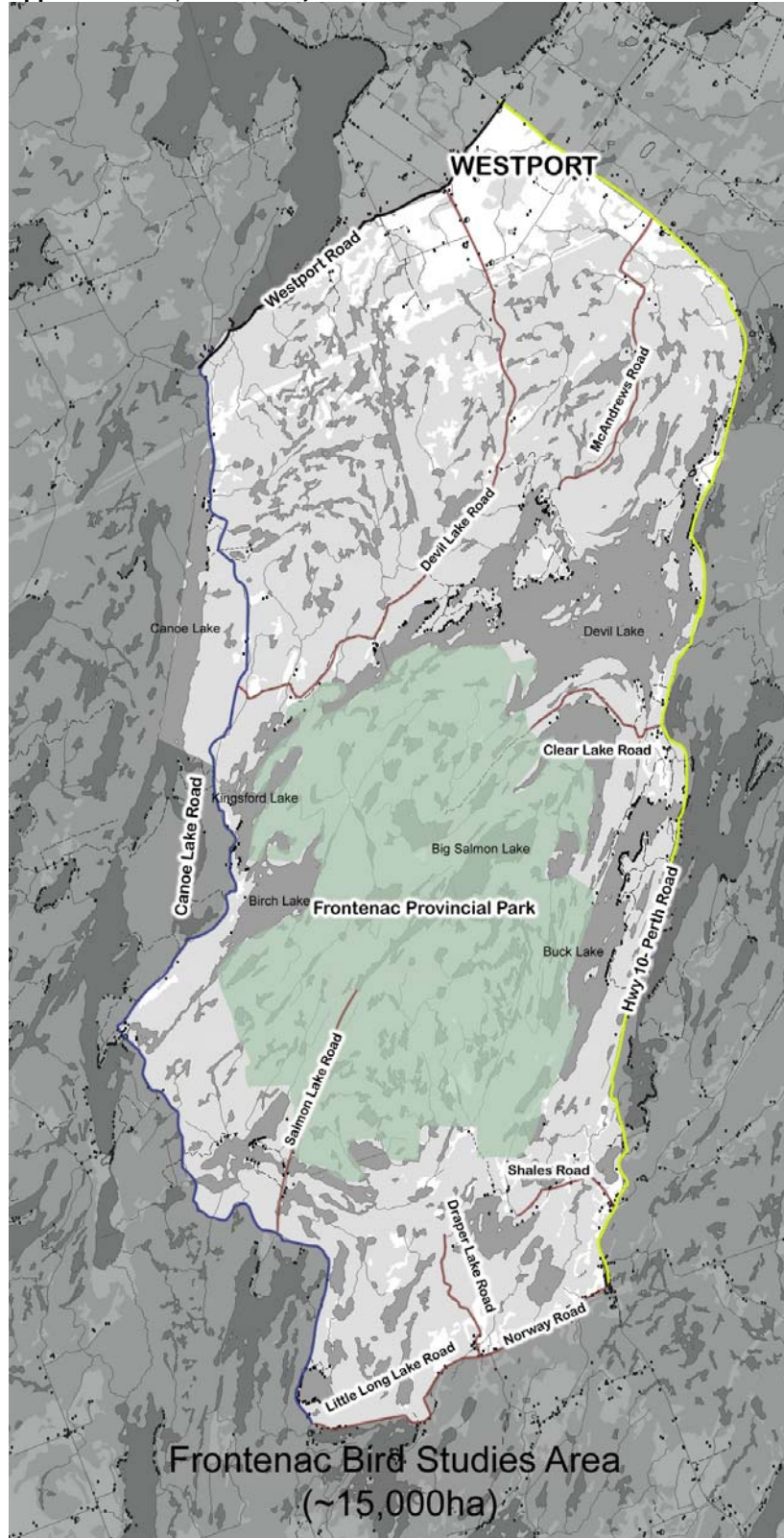


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Appendices

Appendix A. Map of FBS Study Area



Appendix B. 2009-2010 Breeding Bird Status - Frontenac Provincial Park. Breeding Status Codes: C=Confirmed, P=Probable, O=Observed, X=Probable migrant/transient. Highlighted species have not yet been recorded by FBS in Frontenac Provincial Park)

FPP Checklist Species	Known Breeder	Date	Code	2010 Breeding Status	2009 Breeding Status	FPP Checklist Species	Known Breeder	Date	Code	2010 Breeding Status	2009 Breeding Status
Alder Flycatcher	yes			---	O	Common Grackle	yes	20-Jun	CF	C	C
American Bittern	yes			---	---	Common Loon	yes	17-May	P	P	P
American Black Duck	yes			---	---	Common Moorhen	yes			---	---
American Crow	yes	17-May	H	O	P	Common Nighthawk	yes	10-Jul	A	P	C
American Goldfinch	yes	8-Jul	T	P	P	Common Raven	yes	26-May	FY	C	P
American Kestrel	yes			---	---	Common Yellowthroat	yes	20-Jun	fy	C	P
American Redstart	yes	20-Jun	FY	C	C	Downy Woodpecker	yes	15-Apr	H	O	O
American Robin	yes	30-Apr	NE	C	C	Eastern Bluebird	yes			---	---
American Woodcock	yes	6-May	H	O	P	Eastern Kingbird	yes	11-Jun	V	P	C
Bald Eagle	yes			---	---	Eastern Meadowlark	yes			---	---
Baltimore Oriole	yes	2-Jul	T	P	C	Eastern Phoebe	yes	6-May	NE	C	C
Bank Swallow	yes			---	O	Eastern Screech Owl	yes			---	---
Barn Swallow	yes	14-Jun	H	O	O	Eastern Towhee	yes	11-Jun	T	P	C
Barred Owl	yes	11-May	NY	C	O	Eastern Wood Pewee	yes	26-May	T	P	C
Belted Kingfisher	yes	2-Jun	CF	C	C	European Starling	yes			---	O
Black-and-white Warbler	yes	2-Jul	T	P	C	Evening Grosbeak	yes	2-Aug	X	X	---
Black-billed Cuckoo	yes	20-Jun	T	P	P	Field Sparrow	yes	11-Jun	FY	C	C
Blackburnian Warbler	yes			---	---	Golden-crown. Kinglet	yes			---	---
Black-capped Chickadee	yes	20-May	AE	C	C	Golden-wing. Warbler	yes			---	---
Black-throat. Green Warbler	yes	2-Jul	B	P	C	Gray Catbird	yes	17-May	H	O	C
Blue Jay	yes	11-Jun	FY	C	C	Great Blue Heron	yes	11-May	AE	C	C
Blue-gray Gnatcatcher	yes			---	---	Great Crest. Flycatcher	yes	8-Jul	T	P	C
Blue-winged Teal	yes			---	---	Great Horned Owl	yes	23-Jun	H	O	C
Bobolink	yes	2-Aug	X	X	O	Green Heron	yes			---	---
Broad-winged Hawk	yes	10-May	CF	C	O	Green-winged Teal	yes			---	---
Brown Creeper	yes			---	---	Hairy Woodpecker	yes	20-May	NY	C	C
Brown Thrasher	yes	20-Jun	T	P	P	Hermit Thrush	yes	11-Jun	T	P	C
Brown-headed Cowbird	yes			---	P	Hooded Merganser	yes	3-Apr	H	O	C
Cedar Waxwing	yes	16-May	H	O	P	Horned Lark	yes			---	O
Cerulean Warbler	yes	20-May	T	P	P	House Finch	yes			---	---
Chestnut-sided Warbler	yes	7-Jun	N	P	O	House Wren	yes			---	---
Chimney Swift	yes			---	---	Indigo Bunting	yes	23-Jun	S	O	P
Chipping Sparrow	yes	2-Jun	CF	C	C	Killdeer	yes	23-Apr	X	X	O
Cliff Swallow	yes			---	---	Least Flycatcher	yes	8-Jul	S	O	P

FPP Checklist Species	Known Breeder	Date	Code	2010 Breeding Status	2009 Breeding Status	FPP Checklist Species	Known Breeder	Date	Code	2010 Breeding Status	2009 Breeding Status
Mallard	yes	8-Jul	P	P	O	Veery	yes	20-May	S	O	C
Mourning Dove	yes	20-Jun	T	P	C	Vesper Sparrow	yes			---	O
Nashville Warbler	yes	20-Jun	CF	C	C	Virginia Rail	yes			---	O
Northern Flicker	yes	20-May	AE	C	C	Warbling Vireo	yes	14-Jun	S	O	P
Northern Goshawk	yes	17-May	H	O	---	Whip-poor-will	yes	20-Jun	S	O	C
Northern Pintail	yes			---	---	White-breast. Nuthatch	yes	15-Apr	H	O	P
Northern R-wing. Swallow	yes	14-Jun	P	P	C	White-throat. Sparrow	yes	2-Jul	CF	C	C
Northern Saw-whet Owl	yes			---	---	Willow Flycatcher	yes			---	---
Northern Waterthrush	yes	10-May	N	P	P	Wilson's Snipe	yes	2-Jul	D	P	P
Osprey	yes	10-May	CF	C	C	Winter Wren	yes	17-May	V	P	C
Ovenbird	yes	15-Jun	FY	C	C	Wood Duck	yes	18-Jun	FY	C	C
Pied-billed Grebe	yes			---	P	Wood Thrush	yes	31-May	AE	C	C
Pileated Woodpecker	yes	16-May	A	P	P	Yellow Warbler	yes	23-Jun	FY	C	P
Pine Warbler	yes	18-Jul	FY	C	C	Yellow-bell. Sapsucker	yes	20-Apr	D	P	O
Prairie Warbler	yes	23-Jun	FY	C	P	Yellow-billed Cuckoo	yes	18-Jul		C	P
Purple Finch	yes	17-May	FY	C	P	Yellow-rumped Warbler	yes	29-Jun	fy	C	C
Purple Martin	yes	11-Jun	H	O	P	Yellow-throated Vireo	yes	17-Jun	FY	C	P
Red-breasted Nuthatch	yes	20-Jun	FY	C	P	Blue-headed Vireo		21-Jun	S	O	P
Red-eyed Vireo	yes	2-Jul	T	P	C	Canada Goose		11-Jun	FY	C	O
Red-shouldered Hawk	yes	20-Apr	AE	C	P	Cooper's Hawk		2-Jun	H	O	---
Red-tailed Hawk	yes			---	O	Herring Gull		2-Jun	NE	C	---
Red-winged Blackbird	yes	17-May	NE	C	O	Louisiana Waterthrush		26-May	NE	C	O
Rose-breasted Grosbeak	yes	11-Jun	T	P	C	Pine Siskin				---	O
Ruby-throat. Hummingbird	yes	2-Jun	H	O	O	Red-bell. Woodpecker		7-Jun	H	O	---
Ruffed Grouse	yes	20-Jun	FY	C	C	Red-head. Woodpecker		10-Jul	P	P	---
Savannah Sparrow	yes			---	---	Ring-billed Gull		2-Jun	NE	C	O
Scarlet Tanager	yes	11-Jun	T	P	C						
Song Sparrow	yes	7-Jun	CF	C	C						
Sora	yes			---	---						
Spotted Sandpiper	yes			---	O						
Swamp Sparrow	yes	11-Jun	T	P	C						
Tree Swallow	yes	11-Jun	H	O	O						
Turkey Vulture	yes	8-Jul	P	P	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.

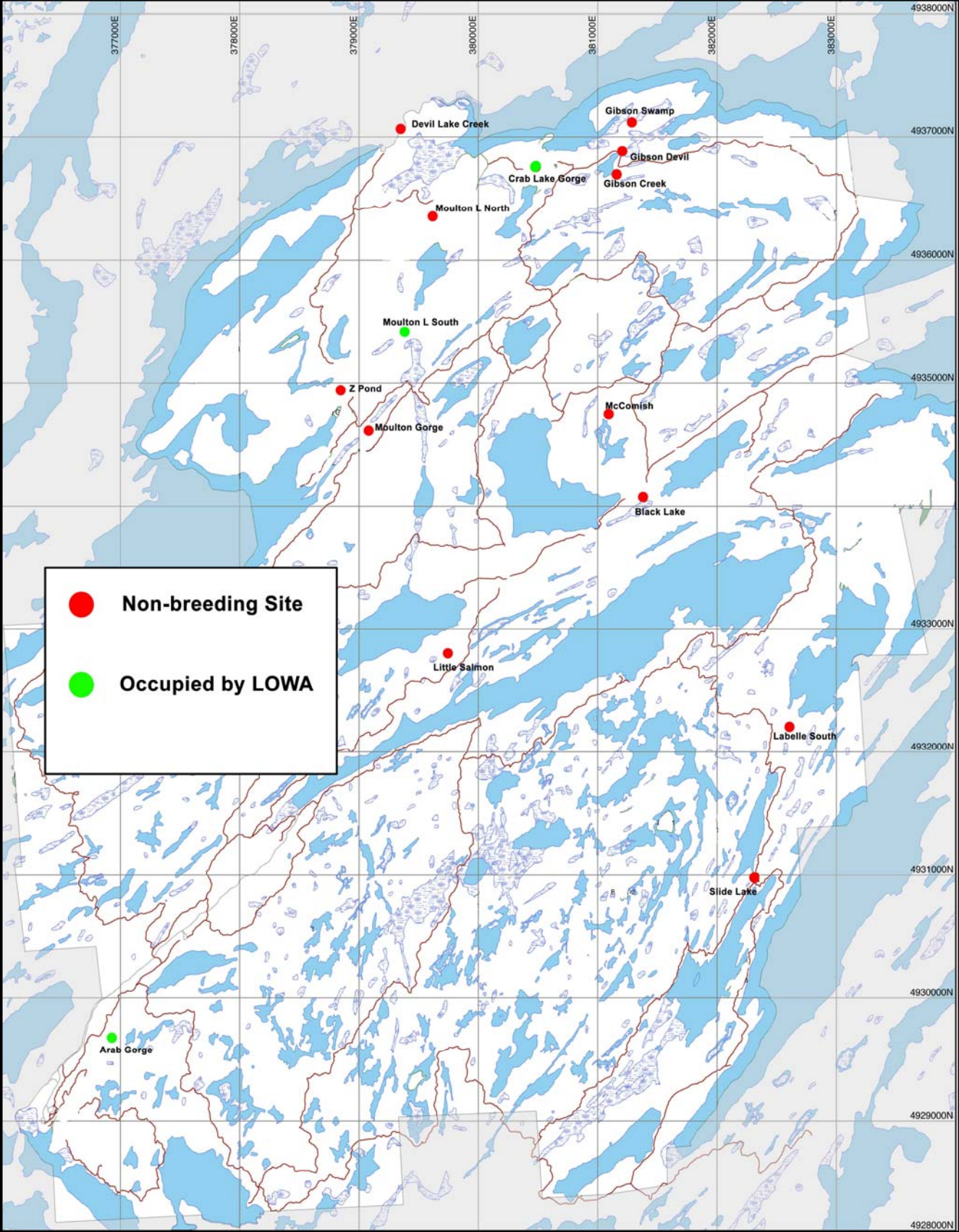
FS Adult carrying faecal sac.

CF Adult carrying food for young.

NE Nest containing eggs.

NY Nest with young seen or heard.

Appendix C. Map of LOWA survey sites in 2010 (Frontenac Provincial Park only)



Appendix D. Map of PRAW records in 2010

