Migration Monitoring at Tommy Thompson Park, Fall 2004

White-eyed Vireo by Dan Derbyshire

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Table of Contents

List of Tables

Appendices

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INTRODUCTION

In April of 2003, Toronto and Region Conservation Authority (TRCA) and Toronto Bird Observatory (TBO) established a partnership to steer and develop a pilot migration monitoring station at Tommy Thompson Park (TTP). The objective of this endeavour was to accurately assess the significance of the park for migrating birds through research and also to increase awareness of migrant ecology and conservation through education.

Fall Migration Monitoring in 2004 established the first complete season of fall coverage. In 2004, data was collected on a daily basis from August 3-November 12 compared to August 13-November 10 in 2003. Therefore, results summarized in this report provide the first comprehensive assessment of fall migration at Tommy Thompson Park.

Study Site

Tommy Thompson Park (TTP) is located on Toronto's waterfront, which is situated on the northwestern shore of Lake Ontario. The park (formerly Leslie Street Spit) is a man made peninsula, which extends 5 kilometers in a southwestern direction into Lake Ontario. The Toronto Harbour Commission (now known as the Toronto Port Authority) began construction of a landbase at the foot of Leslie Street in the late 1950's to expand port facilities in anticipation of increased shipping activity on the Great Lakes. From the late 1950's until present day, a combination of lakefilling and dredging activities created the current configuration of TTP. TTP has a total land base of approximately 160 hectares and a water surface area of 100 hectares composed of the western embayments and the inner disposal cells.

Much of the land area of TTP has, through natural succession processes, been colonized by a variety of plant and animal communities. The geographical situation of the park and also its natural features, make it very suitable for large numbers of colonial waterbirds and migrating landbirds. Overall, the Park represents the largest area of existing natural habitat on the Toronto waterfront. Tommy Thompson Park has been designated as an Environmentally Significant Area (ESA) and was designated as an Important Bird Area (IBA) by Birdlife International in 2001.

The site selected for migration monitoring is located on peninsula D (one of several peninsulas which branch off the main spine of the spit). The habitat consists of early succession cottonwood, willow and birch. Silver Maple, alder and cedar are interspersed in low density.

Project Partners

The Toronto and Region Conservation Authority (TRCA) was formed in 1957 for the management and conservation of natural resources in the Greater Toronto Area (GTA). Since its formation Toronto and Region Conservation has prepared and delivered programs for the management of the renewable natural resources within its watersheds. Thanks to the support of all levels of government and the valuable partnerships we have established, the Authority provides: protection, enhancement, and regeneration of natural resources on a watershed basis sound environmental information and advice to promote good land management practices, community action on environmental projects outdoor recreation opportunities on 13,000 hectares of open space, forest lands, and Conservation Areas conservation education and heritage programs through our outreach education programs, residential and day-use Outdoor Education Centres and Black Creek Pioneer Village

Objectives of TRCA and the Living City Campaign include the maintenance of healthy rivers and shorelines, regional biodiversity, sustainable communities and business excellence. Migration monitoring at Tommy Thompson Park was born out of the objectives of TRCA's Living City vision.

Toronto Bird Observatory (TBO) is a non-profit organization dedicated to bird monitoring in the Toronto region. Formed in 1978, TBO was principally active on the Toronto Islands (adjacent to TTP), where through volunteer support, migration monitoring was the main objective.

TRCA and TBO are partners in the development and management of the Tommy Thompson Park Migration Monitoring Program. The objectives of the partnership are to collect quality scientific data that can be used for the monitoring of population changes in migratory landbirds and to foster awareness through education.

Methods

Migration Monitoring Overview

The Breeding Bird Survey (BBS) is the principal method employed by conservation organizations to monitor bird populations. This method is effective only where breeding populations are accessible by roadside data collection. The remoteness of northern Canada precludes such survey methods. It is therefore necessary to monitor these populations on their southward and northward movements during migration.

Protocol

The protocol for data collection at TTPBRS is detailed in “Operations Manual for Tommy Thompson Park Bird Research Station” version 2. The protocol employs fixed effort census and point count surveys as well as a fully standardized capture regimen.

Detected Totals vs. Daily Species Totals

The detected total (DT) is the figure used for trend analysis by Bird Studies Canada. The DT is an estimation of the number of individuals present on a given day per species. This estimation is based on totals derived from the census, point count and capture surveys only. The DT cannot be a larger figure than the sum of those three parts. The Daily Species Total (DST) includes the DT and casual observations. Throughout this report, totals are indicated as either (dt) or (dst).

Protocol Changes

The protocol remained unchanged from spring 2004 but does differ from fall 2003. The current protocol employs point count surveys, which were not used in 2003. Also, there were some minor shifts in mist net array from 2003 to 2004. The fall coverage period was expanded to 100 days with an earlier start date to account for early migrant species in August, particularly the Yellow Warbler. These shifts in protocol are temporary as we are adjusting methodology while experience is gained at the site. The following report draws more meaningful comparisons than any previous report from TTPBRS migration monitoring because of the continued standardization of operations.

FALL 2004 RESULTS

Monthly Synopsis

[Unless indicated as banding or (dt) for Detected Total, all totals are Daily Species Totals (dst), meaning they include non-standard casual observations]

August

The first official day of monitoring for fall 2004 was August 3. Typically, August is slower paced than September and October although this migration "window" is critical for some species such as Yellow Warblers, Catbirds, Swallows and empidonax flycatchers. There were respectable tallies of these species during the first week, although overall banding totals were modest. The decision to start earlier in 2004 was legitimized by the season high of 28 Yellow Warblers (dt) reached on August 8, which was an improvement over the season high of 13 in 2003. The juvenile plumaged White-throated Sparrow banded on August 6 was record early for the research station. Our first ever **Black-billed Cuckoo** was observed on the 5th.

The second week of fall migration monitoring was generally quiet except for the ever-present calls of young waxwings and starlings. However, detected totals of Baltimore Orioles, Eastern Kingbirds, and Traill's and Least Flycatchers had increased substantially. Singles of both Yellow-billed and Black-billed Cuckoo's were banded during this week. Never a common species in the fall, an impressive 3 Mourning Warblers were banded on August 13. Swallows and Waxwings were beginning to gather at Tommy Thompson Park during the week. Numbers of Cedar Waxwing and Purple Martin were substantially higher this fall than in 2003. A surprising 42 Purple Martins were observed flying southwest over peninsula D on August 12 (2003 season high was 3!).

Warblers were just starting to filter through during the third week of August in southern Ontario and we were hoping for a much better turnout for warblers in fall 2004. There was some question as to how the northern breeders had fared, considering how harsh the conditions were in the eastern arctic and sub-arctic this past summer. Highlights of the banding during this week were: 5 Eastern Kingbird and 7 Baltimore Oriole on the 19th, 2 Rose-breasted Grosbeak on the 20th, and 6 Ovenbird on the 22nd. Chimney Swifts were migrating past the research station in higher numbers than any other season as 32 were observed on August 22nd.

Birding improved at Tommy Thompson during the final week of August as warblers began to appear in small waves. The north winds that dominated the latter half of the week produced some solid migrant activity at the research station. Unfortunately, most of the birds favoured the cottonwood and birch canopy to the lower dogwood and willow where the nets are! 39 species were counted on census on August 28 and yet we only managed to band 6 birds. A second Black-billed Cuckoo was banded on the 27th and 3 Cape May Warbler were observed on the 28th. The period was dominated by the Magnolia Warbler as 20 were tallied on August 30.

September

Any momentum gathered in the latter half of August was halted by south winds during the first week of September. In fact, banding totals averaged about 12 birds per day for the week! Despite the near absence of birds, 53 park visitors were treated to banding demonstrations at TTPBRS on Labour Day weekend. We were fortunate to have a few interesting birds to show them! The first of just two records of Brown Thrasher in fall 2004 was observed on September 4.

Those unfavourable southern winds persisted through the second week of September, keeping banding totals down. Noticeable by their absence were Blue Jays in fall 2004. On September 16, 2003, 1700 were counted at TTPBRS. As of September 15, 2004, only a few had been

counted. The first Gray-cheeked Thrush of the season was banded on September 10 in what turned out to be an incredible year for this species! Singles of Blue-headed and Philadelphia Vireo and Northern Parula were detected. Warblers were also trickling through peninsula D, as 4 Wilson's were banded on September 11 and 3 Northern Waterthrush and 1 Bay-breasted Warbler were banded on the 13th.

North winds and cooler temperatures in the third week of September brought more birds into Tommy Thompson Park, most notably thrushes and the first of several late fall species. The 13 **Sandhill Cranes** flying over on the 17th were the first of this species for TTPBRS. The second record of **Olive-sided Flycatcher** was seen searching in vain for a tall spruce on the 18th. This weather pattern led to 97 birds being banded on the 18th and 95 banded on the 19th. Grey-cheeked and Swainson's Thrush along with Nashville and Black-throated Green Warbler were the dominant species on both days. The first fall banding record for Scarlet Tanager occurred on September 20. The migration of Grey-cheeked Thrushes was particularly impressive in fall 2004 as over 50 were banded up to this time (compared to a total of 23 for the same period last year). A remarkable tally of 70 species was recorded on the 18th making this the highest one-day species total for fall monitoring at TTP (52 was highest in 2003 on September 26). Also noteworthy, Yellow-bellied Sapsucker and Golden-crowned Kinglet started appearing during this week in higher than normal concentrations.

The last week of September was phenomenal at Tommy Thompson Park! The first few days of the period were fairly quiet due to westerly winds. The 58 birds banded on the 23rd were composed mainly of Swainson's and Grey-cheeked Thrush and Nashville Warbler. Migration slowed to a trickle again on the 25th when a mere 21 birds were banded. Two Cape May Warblers were banded on that day which was a treat to see as Cape May Warbler was one of the species we were targeting to sample in higher quantities this fall. Interesting observations from the 25th include 1 **American Golden Plover** and a **Red-headed Woodpecker**, both unusual species for TTPBRS. Winds switching to north caused a fallout of migrants on the 26th as 113 birds were banded. White-throated Sparrow, Swainson's Thrush, Myrtle Warbler and both species of kinglet were the primary species evident on the day. Seven Orange-crowned Warblers were observed on this day along with the only record of Savannah Sparrow of the fall, 2 Eastern Towhee and 45 Myrtle Warblers. The first **Bald Eagle** for TTPBRS was observed on September 28th. Another major fallout occurred on September 29 as 259 birds were banded, 4 Recaptured and 75 released unbanded. This was the third highest one-day banding total for TTPBRS. The final tally for Golden-crowned Kinglet on this day was 230 (dt)! Another 186 birds were banded on the following morning of the 26th. Golden-crowned Kinglet (74) and White-throated Sparrow (40) comprised the bulk of the banding total, which also featured a fair number of Brown Creepers (11) and Winter Wrens (12). A remarkable 11 Yellow-bellied Sapsuckers were detected on the day, which is by far the highest one-day tally for this species in the short history of this project.

October

The first day of October saw the arrival of Pine Siskin, Bufflehead and Fox Sparrow. Pine Siskins were recorded daily during the week and in higher than normal density. 105 birds were banded on October 1. October 2-4 was quiet due to a preponderance of southern weather. Wind direction switched to the north on the evening of the 4th and as a result, 210 birds were banded on October 5. Featured on this day were high numbers of Myrtle Warbler (45 banded), Hermit Thrush, Yellow-bellied Sapsucker (6 banded) as well as kinglets and white-throats. The highlight of the day was the capture and banding of a Red-tailed Hawk! This is the first of this species ever banded at TTPBRS. Another first was extracted from net 6 on October 6, a HY male **Yellow-breasted Chat**! On the same day there was a single sight record of a **Lewis' Woodpecker**! Pending OBRC acceptance, this would also be an exciting find.

The movement of Sapsuckers continued unabated through the first half of October as 8 were observed on October 8. Winds reared to the north on the 10th, resulting in yet another 100+ bird day at TTPBRS. The bulk of the banding total was made up of White-throated Sparrow (24),

Myrtle Warbler (21) and Golden-crowned Kinglet (17). Another 122 birds were banded on October 11th, however the biggest day of the week occurred on the 12th as 266 birds were banded, 5 recaptured and 168 released unbanded. An incredible 59 Hermit Thrush (95 DT) were banded along with 89 Golden-crowned Kinglet (210 DT), 8 Fox Sparrow and 14 Dark-eyed Junco. Observed on this day were: 1 **White-rumped Sandpiper**, 7 Black-bellied Plover, 1 Northern Saw-whet Owl and 1 **American Golden Plover**. Numbers of shorebirds in the TTPBRS count area had increased substantially due to sharply dropping water levels, which exposed mud flats and increased shoreline beach habitat.

The third week of October started off with moderate numbers of birds passing through Tommy Thompson Park. 64 birds were banded on the 14th, 46 on the 15th and 60 on the 16th. Golden and Ruby-crowned Kinglet, Brown Creeper and Dark-eyed Junco dominated species composition during the early part of the week. Highlights of the week included 3 Sanderling on the 14th, TTPBRS first records of **Vesper Sparrow** on the 16th, and **Barred Owl** and **Red Knot** on the 18th. The latter part of the week was essentially a bust for mistnetting as winds were too high to open the nets. Despite the winds, the birding was quite good during the week, especially for waterbirds. Tommy Thompson Park was flooded with ducks during the period. Long-tailed Duck, American Wigeon, Bufflehead, and Greater and Lesser Scaup were concentrating offshore and in TTP embayments.

The last week of October was fairly steady in terms of daily banding totals as we were averaging approximately 50 birds/day. Kinglets, Hermit Thrush and Slate-coloured Junco were the primary species captured on the 21st when 83 birds were banded. Another 77 birds were banded on the 22nd and 86 were banded on the 23rd. The only Field Sparrow captured of the fall was banded on October 23rd. Poor weather on the 24th resulted in only 23 birds being banded and 18 recaptured. This was rather fortuitous as it gave us ample opportunity to spend time with park visitors for the Tommy Thompson Park Fall Bird Festival. The banding demonstrations are becoming a staple at the research station and are extremely rewarding for both the visitors and station personnel! Heavy fog on the 25th resulted in high detection but few captures as Myrtle Warblers and Kinglets were observed feeding at canopy level on insect clouds. 55 Dunlin were observed on the beach on this day. A **White-eyed Vireo** banded on the 26th was the first of this species ever recorded at TTPBRS! The highlight for October 27th was the second record of **Yellow-breasted Chat** for the station. The first record was October 6 of this year. The bird was heard singing near net 3 just off the road and was not relocated, so we can't be sure that it was the same bird. The remaining few days of October were quiet except for the sudden influx of Black-capped Chickadees which peaked at 20 for the fall on October 28th and what turned out to be the last push of kinglets, creepers, juncos and American Tree Sparrows. A single Northern Goshawk and a late Tree Swallow were noted on October 29th.

November

Few net hours were logged and few birds were banded in November. Wind, rain and cold temperatures were unyielding. Regardless of the weather, birds were scarce at the research station in November. American Tree Sparrows were found in lower numbers than in 2003. In all, 16 birds were banded from November 4-12, most of those being Black-capped Chickadees. Season highs were achieved for Red-winged Blackbird (226 dt on the 1st), Rusty Blackbird (30 dt on the 3rd) and American Pipit (9 dt on the 8th). The second record of Rough-legged Hawk occurred on November 5th along with the second record of **Tundra Swan** and the first of **Black Scoter**! Thanks to the recent split by the AOU, the 2 **Cackling Geese** observed on November 9th constituted yet another TTPBRS first. Finally, census on the final day of fall migration monitoring yielded few migrants, large numbers of staging ducks, and 2 Common Redpolls.

Overview of Fall Coverage

Coverage in fall 2004 was very good thanks to reasonable weather conditions and excellent volunteer support. Migration was sampled on 95 of 102 attempted days in 2004 (93% of target) versus 84 of 95 attempted dates in 2003. 7 days of monitoring were lost entirely due to weather, mostly from late October and November. 7,388 net hours were logged (80% of target). 3,870 birds of 81 species were banded and 614 birds were recaptured. An additional 429 birds were released unbanded due to excessive capture volume. The birds banded/net hour rate was .52, which is higher than the .49 mark posted in 2003. Census was completed on 95 days and point counts were done on 86 days. A total of 173 species were observed in fall 2004 which is up from 161 in 2003.

Standardized Capture

Banding

Capturing and banding birds is an important component of the methodology at a migration monitoring site. A fully standardized banding program is a strong method of sampling bird populations, especially when utilized in concert with surveys. Banding also provides valuable information on migrant stopover rates and ecology, migrant fitness, age ratios, and is also an important aspect of our education program at TTPBRS.

Upon completion of the second year of monitoring at TTPBRS, we now have the opportunity to compare data between years. Looking at results of both fall 2003 and 2004, it is obvious that 2004 featured higher bird numbers. 3,870 birds were banded in 2004 compared to 3,327 in 2003. Higher banding totals in August of this year are likely a reflection of the earlier start date (see tables 1 and 2). More instructive is the higher capture rate in September 2004 compared to 2003. This is important as September features the highest number of neotropical migrant species. Although fewer birds were banded in October 2004 vs. 2003, there is a substantial difference in October net hours between years. This is reflected in the birds banded/net hour rate, which was actually higher in 2004 than 2003

Table 1. Monthly Capture Statisitics 2004

Month	Banded	Net Hours	Banded/Net Hour
August	581	2498.2	.23
September	1322	2550.5	.52
October	1909	1889.5	1.01
November	58	450	.13
Total	3870	7388.2	.52

Table 2. Monthly Capture Statistics 2003

Month	Banded	Net Hours	Banded/net hour
August	293	1433	.20
September	795	2344	.34
October	2111	2597	.81
November	128	352	.36
Total	3327	6726	.49

Tommy Thompson Park continues to be an important site for several key species. As shown in table 3, the order of our top 4 species banded in both years remained the same. Including spring and fall seasons, the Golden-crowned Kinglet (1,409) is far and away the most commonly banded bird at the research station, followed by White-throated Sparrow and Ruby-crowned Kinglet. The

rest of the top ten was re-shuffled in 2004 as Brown Creeper totals were eclipsed by Myrtle, Nashville, Yellow and Magnolia Warbler!

Table 3. Top Ten Species Banded for 2004 vs. 2003

Rank 2004	**Rank** 2003	**Species**	**Banded** 2004	**Banded** 2003
1	1	Golden-crowned Kinglet	856	526
2	2	Ruby-crowned Kinglet	401	399
3	3	White-throated Sparrow	305	394
4	4	Hermit Thrush	226	186
5	6	Myrtle Warbler	159	137
6	9	Nashville Warbler	129	112
7	10	Swainson's Thrush	117	93
8	-	Yellow Warbler	109	20
9	-	Magnolia Warbler	98	76
10	5	Brown Creeper	97	140
-	7	Slate-coloured Junco	92	132
-	8	Blue Jay	9	123

Fall banding totals for each species by year are presented in table 4. A total of 48 species were banded in higher numbers in 2004. Significant increases are evident for the following: Baltimore Oriole, Canada Warbler, Cedar Waxwing, Eastern Kingbird, Golden-crowned Kinglet, Gray-cheeked Thrush, Traill's Flycatcher, Red-eyed Vireo, Red-breasted Nuthatch, Warbling Vireo, Yellow Warbler, and Yellow-bellied Sapsucker.

Most impressive amongst these was the 2004 tally of Gray-cheeked Thrush (+300% increase), Yellow-bellied Sapsucker (+330% increase), and Golden-crowned Kinglet (+163% increase). It is likely that most of the increase shown for earlier migrating species such as kingbirds, flycatchers, vireos (except Blue-headed) and Yellow Warblers are attributable to the earlier start date.

Significant decreases occurred for: American Tree Sparrow, Blackpoll Warbler, Blue Jay, Brown Creeper, Slate-coloured Junco, Western Palm Warbler and White-throated Sparrow. There was much speculation over the impact of unusually cold summer conditions on breeding birds in the eastern arctic. This may have played a role in the reduced abundances detected for some of the above species.

The ratio of young birds to adult birds is a good indicator of breeding success for that year. There is always a high proportion of young birds captured during fall migration, however the year to fluctuations in the ratio is the key. In 2004, 3,365 hatch-year birds were banded vs. 461 after-hatch year birds. Therefore, the age ratio is 1 adult/9 young birds or 88% HY, which is 6% higher than the 82% HY ratio in 2003. This would suggest that nesting success during summer 2004 was comparable to the previous summer, if not slightly better. In the future, it would be useful to consider age ratios on a species by species basis (i.e. the data may reveal high success rate for warblers but low rates for sparrows).

A total of 4 new species were added to the TTPBRS banding list, which are: Black-billed Cuckoo, Red-tailed Hawk, White-eyed Vireo and Yellow-breasted Chat. The addition of these banding records brings the TTPBRS banding list to a total of 103 species. There were also 5 first fall banding records: Blue-gray Gnatcatcher, Chipping Sparrow, Common Grackle, Scarlet Tanager and Yellow-billed Cuckoo.

Table 4. Fall 2003 and 2004 Banding Totals. Species indicated in bold are record high totals. Species highlighted in red are new banding records for TTPBRS and underlined species are first fall banding records for TTPBRS.

Species	2003	2004	Species	2003	2004
American Goldfinch	2	24	Lincoln's Sparrow	16	8
American Redstart	38	51	**Magnolia Warbler**	76	98
American Robin	38	33	Marsh Wren	1	
American Tree Sparrow	50	19	**Mourning Warbler**	1	7
American Woodcock	2	1	**Myrtle Warbler**	137	159
Baltimore Oriole	4	19	**Nashville Warbler**	112	129
Bay-breasted Warbler	4	4	**Northern Cardinal**	8	15
Black-and-White Warbler	9	11	Northern Parula	3	2
Black-billed Cuckoo		2	Northern Saw-whet Owl	1	
Blackburnian Warbler	1	5	Northern Shrike	1	
Black-capped Chickadee	32	54	**Northern Waterthrush**	17	22
Blackpoll Warbler	53	20	Orange-crowned Warbler	17	12
Black-throat. Blue Warbler	31	32	**Ovenbird**	16	34
Black-throat. Green Warbler	20	35	Philadelphia Vireo	4	4
Blue Jay	123	9	Purple Finch	2	
Blue-gray Gnatcatcher		1	**Red-breasted Nuthatch**	2	23
Blue-headed Vireo	11	17	**Red-eyed Vireo**	13	39
Brown Creeper	139	97	**Red-tailed Hawk**		1
Brown Thrasher	3		**Red-winged Blackbird**	2	5
Canada Warbler	5	12	Rose-breasted Grosbeak	2	2
Cape May Warbler	5	3	**Ruby-crowned Kinglet**	399	401
Cedar Waxwing	19	83	Savannah Sparrow	1	
Chestnut-sided Warbler	21	20	**Scarlet Tanager**		1
Chipping Sparrow		2	Sharp-shinned Hawk	15	3
Common Grackle		4	Slate-colored Junco	132	92
Common Yellowthroat	17	28	Song Sparrow	64	44
Connecticut Warbler	1		**Swainson's Thrush**	93	117
Cooper's Hawk	1		Swamp Sparrow	25	23
Downy Woodpecker	3	7	Tennessee Warbler	16	6
Eastern Kingbird	2	10	**Traill's Flycatcher**	32	55
Eastern Phoebe	27	17	Veery	21	17
Eastern Towhee	2	1	**Warbling Vireo**	14	43
East. White-crown. Sparrow	19	26	Western Palm Warbler	31	15
Eastern Wood-Pewee	5	2	White-crowned Sparrow	2	
European Starling	13	29	**White-eyed Vireo**		1
Field Sparrow	5	1	White-throated Sparrow	394	305
Fox Sparrow	17	12	Wilson's Warbler	29	29
Gamb.White-crown Sparrow	2		**Winter Wren**	52	83
Golden-crowned Kinglet	525	856	Wood Thrush	1	1
Gray Catbird	42	37	**Yellow Warbler**	20	109
Gray-cheeked Thrush	23	70	**Yellow-bellied Flycatcher**	11	16
Gray-cheeked/Bick. Thrush		1	**Yellow-bellied Sapsucker**	6	20
Great Crested Flycatcher	3	1	**Yellow-billed Cuckoo**		1
Hermit Thrush	185	226	**Yellow-breasted Chat**		1
House Wren	1	3	**Yellow-shafted Flicker**	14	15
Least Flycatcher	21	27	Total	3327	3870

Recaptures

614 birds were recaptured in fall 2004. Fall 2004 is the first season we have had at TTPBRS without a foreign recovery. In fall 2003 there were 5, 3 of which were foreign banded Northern Saw-whets. Recapture totals by species are presented in table 5 below. Once again, Golden-crowned Kinglet, Ruby-crowned Kinglet and Black-capped Chickadee had the highest rates of recapture.

Table 5. Fall 2004 Recapture Totals

Species	Recap	Species	Recap
American Goldfinch	1	Hermit Thrush	34
American Redstart	6	House Wren	1
American Robin	3	Least Flycatcher	4
American Tree Sparrow	3	Magnolia Warbler	21
Baltimore Oriole	1	Myrtle Warbler	4
Black-and-White Warbler	3	Nashville Warbler	6
Black-billed Cuckoo	1	Northern Cardinal	5
Black-capped Chickadee	48	Orange-crowned Warbler	1
Blue-headed Vireo	4	Ovenbird	7
Blackpoll Warbler	1	Red-breasted Nuthatch	1
Brown Creeper	14	Ruby-crowned Kinglet	80
Brown Thrasher	1	Red-eyed Vireo	12
Black-throated Blue Warbler	6	Slate-colored Junco	4
Black-throated Green Warbler	1	Song Sparrow	4
Canada Warbler	1	Swamp Sparrow	1
Cedar Waxwing	14	Swainson's Thrush	6
Common Yellowthroat	9	Traill's Flycatcher	4
Chestnut-sided Warbler	1	Warbling Vireo	15
Downy Woodpecker	8	White-eyed Vireo	5
Eastern Kingbird	1	Wilson's Warbler	5
Eastern Phoebe	1	Winter Wren	12
Eastern White-crowned Sparrow	1	Western Palm Warbler	2
Fox Sparrow	2	White-throated Sparrow	24
Gray-cheeked/Bicknell's Thrush	3	Yellow-bellied Flycatcher	1
Golden-crowned Kinglet	150	Yellow-shafted Flicker	3
Gray-cheeked Thrush	11	Yellow Warbler	28
Gray Catbird	29	Total	614

Net Productivity

Net Productivity results for fall 2003 and 2004 are presented in table 6. Compared to fall 2003, individual net productivity shifted considerably in 2004. In 2003, the most productive net group was 9-11 (block e), which is located in the most mature habitat of the count area. Nets 10 and 11 were added midseason in 2003 with the hope of boosting capture totals for warblers, which were underrepresented by other net groups. We did have higher capture totals of warblers in fall 2004 but it was not due to the operation of nets 10 and 11 for the full season. In fact, while nets 9-11 were easily the most productive nets in 2003, the capture rate for these nets dropped considerably in 2004. The repositioning of net 4 and the earlier start date is probably responsible for the increased banding totals for warblers. Somewhat surprisingly, net 4 caught the most warblers in 2004, having caught 305 vs. 151 in 2003! The high capture rates for nets 9-11 in 2003 could be attributable to the fact that they were only operational starting in late September, the time when sparrows and thrushes are moving. Nets 9-11 were quite good at catching sparrows in both years. It will be interesting to monitor these changes over the course of time, so we can better understand fluctuations in capture rates at the site. It is important to understand whether variations are attributable to habitat change, protocol, or simply the natural ebb and flow of migrant bird density.

Table 6. Comparison of Net Productivity for 2003 and 2004

Net	Captured	Hours	2004 Banded/ Net Hour	Rank	2003 Banded/Net Hour	Rank
1	353	511	.69	4	.86	2
2	387	511	.76	2	.71	5
3	250	511	.49	8	.46	8
4	425	502	.85	1	.35	11
5	190	504	.38	9	.31	13
6	245	504	.49	8	.35	11
7	366	511	.72	3	.42	9
8	342	511	.67	5	.52	7
9	235	452	.52	7	.75	4
10	196	452	.43	10	1.01	1
11	150	452	.33	12	.81	3
12	116	489	.24	13	.34	12
13	168	487	.34	11	.40	10
14	165	489	.34	11	.34	12
15	280	505	.55	6	.57	6

Species Coverage

Species coverage is a significant factor in the evaluation of a prospective member station of the Canadian Migration Monitoring Network (CMMN). Bird Studies Canada uses a system that ranks each landbird species according to conservation priority. The rankings are primarily based on the percentage of a species range that is covered by Breeding Bird Survey. Therefore, priority a species (highest priority) are species whose range is covered the least by the Breeding Bird Survey because of the remoteness of breeding territories in northern Canada and Alaska.

While species coverage (the number of species successfully monitored) was good in fall 2003, there were gaps that we hoped to fill in 2004. This is the reason for extending the fall coverage window and the insertion of point counts into the protocol. Species coverage for fall 2004 is improved for priority c and d species, but not for a and b. Cape May Warbler (priority a), Savannah Sparrow (a), Common Redpoll (b), Snow Bunting (b) and Lapland Longspur (b) were the priority a and b species we were targeting by adjusting our operations. Unfortunately we were unsuccessful in monitoring any of these species. Quite simply, these species are hard to find at TTPBRS in the fall. We were able to detect two more Cape May's than in 2003, which was one shy of monitoring status. There was just a single non-standard record of Savannah Sparrow (casual observation), 4 Common Redpolls (dt) and 5 Snow Buntings (dt) detected for fall 2004. If casual observations are included, Snow Bunting and Cape May Warbler were monitored, however this data is unreliable. Unfortunately, Tennessee Warbler (a) was monitored in 2003 but not in 2004, as we fell short by 2 birds. We did improve on priority c species, as we successfully sampled an additional 5 species in 2004! These include: Chipping Sparrow, Canada Warbler, Eastern Kingbird, Tree Swallow and Bank Swallow. Finally, Pine Siskin (d) was successfully monitored in 2004, after weak results in 2003.

Despite some gaps, overall species coverage is good and it is reassuring that we are monitoring a good number of species with a very strict monitoring protocol. It is unlikely that the priority a and b species that were missed could be monitored on a consistent basis at TTPBRS. Hopefully, detected totals for Tennessee Warbler will return to 2003 levels in the future. It is not recommended that we adjust our operations any further to account for the missing species. See tables 7-9 for a complete assessment of species coverage for fall 2004.

Table 7. Fall 2003 Species Coverage Breakdown

Criteria	Priority A	Priority B	Priority C	Priority D	Total
Great Lakes target species	17	20	22	24	83
Species monitored at TTP (fall)	13	10	11	19	53
Breeders/residents	0	1	8	11	17

Table 8. Fall 2004 Species Coverage Breakdown

Criteria	Priority A	Priority B	Priority C	Priority D	Total
Great Lakes target species	17	20	22	24	83
Species monitored at TTP (fall)	12	10	16	20	58
Breeders/residents	0	1	8	11	17

Table 9. Fall Species Coverage Summary 2004

PRIORITY A	PRIORITY B	PRIORITY C	PRIORITY D
American Pipit	American Tree Sparrow	American Redstart	American Crow
Bay-breasted Warbler	Dark-eyed Junco	Black-and-white Warbler	American Robin
Blackpoll Warbler	Fox Sparrow	Black-throat. Green Warbler	Black-capped Chickadee
Gray-cheeked Thrush	Myrtle Warbler	Bank Swallow	Belted Kingfisher
Lincoln's Sparrow	Ruby-crowned Kinglet	Barn Swallow	Brown Creeper
Magnolia Warbler	Rusty Blackbird	Blue Headed Vireo	Cedar Waxwing
Northern Waterthrush	Swamp Sparrow	Canada Warbler	Common Grackle
Orange-crown. Warbler	Western Palm Warbler	Chipping Sparrow	Downy Woodpecker
Swainson's Thrush	White-crowned Sparrow	Common Yellowthroat	Eastern Phoebe
Wilson's Warbler	White-throated Sparrow	Eastern Kingbird	European Starling
Yellow-bell. Flycatcher	Bohemian Waxwing*	Least Flycatcher	Golden-crowned Kinglet
Yellow-bell. Sapsucker	Boreal Chickadee*	Ovenbird	Great-crested Flycatcher
Alder Flycatcher*	Common Redpoll	Red-eyed Vireo	Hermit Thrush
Cape May Warbler	Harris Sparrow*	Tree Swallow	Northern Flicker
Connecticut Warbler*	Lapland Longspur	Warbling Vireo	Pine Siskin
Savannah Sparrow	Leconte's Sparrow*	Yellow Warbler	Purple Finch
Tennessee Warbler	Northern Shrike	Clay-coloured Sparrow	Red-breasted Nuthatch
	Pine Grosbeak*	Cliff Swallow	Red-winged Blackbird
	Snow Bunting	Common Nighthawk	Song Sparrow
	White-winged Crossbill	Mourning Warbler	Winter Wren
		Olive-sided Flycatcher	Hairy Woodpecker
		Philadelphia Vireo	Horned Lark
			Marsh Wren
			Vesper Sparrow

*Species not monitored anywhere by CMMN or species not expected in the Lake Ontario region.

Survey Analysis

A significant change from last fall (2003) was the incorporation of three point counts into the daily routine. Ten-minute stationary counts were conducted from 3 fixed positions in the count area on a daily basis in fall 2004. Each day, weather permitting, a count was done at 3, 4, and 5 hours after sunrise. The purpose of these counts is to boost detected totals for landbirds with the hope of augmenting the census data. Results from this year's spring point counts were very positive as density and diversity of migrants were higher than we had hoped.

Point count results from fall 2004 were less impressive but still provided some valuable support to census totals. Five species were detected on point counts that were not sampled by the census, and they are: Hairy Woodpecker, Merlin, Snow Bunting, White-eyed Vireo and Willow Flycatcher. Looking at the comparison of spring to fall point count results (tables 10 and 11), it is clear that point counts are much more effective in spring. This is due to the effect of the observer being stationary during the survey. With the census, the observer covers more ground and is alerted to the presence of birds by song or call and also the disturbance caused by the observer's movement. Point count success primarily depends upon the degree to which birds are vocalizing, which is why this survey method is more effective in spring vs. fall migration (birds actively sing during spring migration). Despite this, fall point counts are effective in getting brief snapshots of migrant activity throughout the course of the morning and in sampling birds flying over. Therefore it is recommended that point counts remain part of the standardized protocol from now on.

Table 10. Comparison of Spring Point Counts and Census Surveys. Effort refers to "days", meaning that each of census, 3 point counts, and any amount of mistnetting are treated as the unit effort or "day".

Survey	Effort (days)	Abundance Detected	Average Abundance/Hour	Species
Census	67	6485	96	103
Point Counts	28.5	3790	132	94
Mistnetting	63	2519	40	87

Table 11. Comparison of Fall Point Counts and Census Surveys

Survey	Effort (days)	Abundance Detected	Average Abundance/Hour	Species
Census	97	6529	67.3	107
Point Counts	40.3	1892	47	75
Mistnetting	90	3870	43	81

There is significant variation between TTPBRS survey methods in terms of species representation. Particularly revealing is the importance of the mistnetting component for migration monitoring at TTPBRS. Mistnetting is able to sample many species in much higher quantities than either the point counts and census. This has been well noted by bird banders in the case of cryptic species such as thrushes and some ground dwelling sparrow and warbler species. However, TTPBRS data shows that many other species are being sampled predominantly by the mistnetting. Over 70% of the season detected total for the following species are from mistnetting: Gray-cheeked Thrush, Least Flycatcher, Nashville Warbler, Northern Waterthrush, Ovenbird, Swamp Sparrow, Traill's Flycatcher, Veery, Wilson's Warbler and Yellow-bellied Flycatcher. More than 50% are mistnetted for: American Redstart, Blue-headed Vireo, Brown Creeper, Black-throated Green Warbler, Black-throated Blue Warbler, Canada Warbler, Common Yellowthroat, Chestnut-sided Warbler, Hermit Thrush, Magnolia Warbler, Orange-crowned Warbler, Tennessee Warbler and Warbling Vireo. See appendix C for analysis of survey methods by species.

Personnel

Twenty-four volunteers contributed 1465.25 hours to the fall migration monitoring effort. Once again, we were fortunate to have many talented and affable volunteers at TTPBRS. The volunteers in table 12 below are thanked for their commitment to fall migration monitoring in 2004, we couldn't do it without you!

Table 12. Volunteer Effort

Volunteer	Hours	Volunteer	Hours
Julia Marko	325.75	Tom Flinn	35.5
Ian Sturdee	184	Diego Garcia-Bellido	28.75
Mary Boswell	139.75	Tove Christensen	26.5
Richard Joos	116.5	Lisa Wong	18
Stefanie Lazerte	94.5	Mitch Meredith	10.25
Jan Macdonald	87	Darci Lombard	9
Bert Vanderzon	78.75	Carol Gordon	6
Bob Kortright	76.5	Al Woodhouse	6
Paolo Viola	61.75	Lori Gilkes	4.25
Norma Vanderzon	58.75	Steve Gillis	2.5
Dave Langford	46.75	Linda Stemmler	2
Teresa Carlin	44.5	Mark Maftei	2

Northern Saw-whet Owl Monitoring

Owl monitoring was conducted on a volunteer basis for 13 nights starting on October 5th and ending on November 10th. In total, only 30 owls were captured this year, which is well down from 184 in 2003. In 2003 there were 5 nights with double-digit captures whereas there were none in 2004. We simply didn't encounter any nights with heavy movement by Saw-whets.

Table 13. Northern Saw-whet Owl Monitoring Summary

Date	No. Of Nets	Standard Hours	Non-standard Hours	Total Hours	Total Capture	Captures/ Net Hour
Oct-5	12	48		48	1	
Oct-8	10	40		40	0	
Oct-13	3	12	18	30	1	
Oct-14	7	28	42	70	0	
Oct-18	8	32		32	2	
Oct-19	7	28	42	70	0	
Oct-20	7	21		21	0	
Oct-21	10	40		40	2	
Oct-27	7	28		28	9	
Oct-28	12	48		48	6	
Nov-3	9	36	9	45	7	
Nov-6	10	40		40	2	
Nov-9	9	36		36	0	
Nov-10	5	20	30	50	0	
2004 total		457	141	598	30	.05
2003 total		549	75.25	624.25	184	.29

Education

Teaching the public about bird life and conservation is a key initiative of the Tommy Thompson Park Bird Research Station. In fall 2004, we took some important steps in the development of our education programs. Banding demonstrations and interpretive talks were given to 348 visitors at the research station this fall! The curriculum based education program offered to school groups at Tommy Thompson Park Bird Research Station is gaining some momentum. This fall, we were pleased to host two school groups in October, both of which were very successful. We are working on attracting more school groups for spring and fall 2005.

Training in field ornithology methods continues to be offered at TTPBRS to interested volunteers. In 2004 we have made some great strides with respect to training in such areas as: bird identification, bird banding, point count and census methodology, data recording and management, as well as interpretation. Some of our trainees from TTPBRS are already moving on toward employment in the ornithological field. The research station is important for providing an opportunity for people to participate in and receive valuable training in various aspects of field ornithology.

Acknowledgements

The following are to be acknowledged for their contributions to the Tommy Thompson Park Migration Monitoring Program in 2004.

- Toronto and Region Conservation Authority
- Toronto Bird Observatory
- Ontario Trillium Foundation
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- Jan MacDonald for her generous donations of equipment
- The 38 volunteers from spring and fall 2004 for their spirited support!

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Appendices

Appendix A. Summary of Fall 2004 records by Species. **Data includes Detected Totals only**.

Species	No. Dates	Peak Count	Peak Date	Total Sum
ABDU	47	23	09-Aug-04	180
AGWT	10	40	09-Oct-04	59
AMCR	14	11	21-Oct-04	27
AMGO	75	30	22-Aug-04	677
AMKE	5	1	multiple	5
AMPI	12	9	08-Nov-04	35
AMRE	35	7	multiple	92
AMRO	51	50	09-Aug-04	302
AMWI	9	21	22-Oct-04	62
AMWO	3	1	multiple	3
ATSP	10	9	28-Oct-04	42
BANS	8	5	multiple	19
BAOR	22	8	12-Aug-04	69
BARS	32	61	27-Aug-04	368
BAWW	20	2	multiple	27
BBCU	7	1	multiple	7
BBPL	14	6	15-Oct-04	34
BBWA	8	2	multiple	10
BCCH	67	20	multiple	323
BEKI	25	2	multiple	32
BGGN	7	2	multiple	9
BHVI	19	4	24-Sep-04	28
BLBW	12	3	18-Sep-04	16
BLJA	29	115	28-Sep-04	332
BLPW	19	9	10-Sep-04	55
BOBO	2	4	28-Aug-04	5
BRCR	39	20	18-Oct-04	174
BRTH	2	1	multiple	2
BTBW	30	6	29-Sep-04	58
BTNW	17	17	18-Sep-04	58
BUFF	22	400	09-Nov-04	1765
BWTE	2	1	multiple	2
CACG	1	2	09-Nov-04	2
CAGO	82	44	08-Sep-04	628
CANV	2	4	29-Oct-04	5
CATE	26	17	14-Aug-04	87
CAWA	15	3	25-Aug-04	22
CEDW	44	64	08-Aug-04	928
CHSP	4	2	05-Oct-04	5
CHSW	6	6	02-Sep-04	15
CMWA	7	2	multiple	9
COGO	7	38	14-Nov-04	107
COGR	26	20	06-Aug-04	76
COHA	5	2	28-Sep-04	6
COLO	9	3	multiple	14
COME	2	10	07-Nov-04	14
CORE	2	2	multiple	4
COTE	15	26	07-Aug-04	128
COYE	30	4	multiple	54
CSWA	18	6	18-Sep-04	29
DOWO	50	3	multiple	68
DUNL	10	47	24-Oct-04	118
EABL	2	2	26-Oct-04	3
EAKI	19	8	multiple	91
EAPH	22	9	26-Sep-04	46
EATO	5	2	multiple	7
EAWP	15	3	multiple	21

Species	No. Dates	Peak Count	Peak Date	Total Sum
EUST	75	750	17-Aug-04	2101
FISP	1	1	23-Oct-04	1
FOSP	5	8	12-Oct-04	17
GADW	48	77	14-Oct-04	713
GBBG	18	4	multiple	36
GBHE	38	9	07-Aug-04	63
GCFL	5	1	multiple	5
GCKI	46	200	29-Sep-04	1641
GCTH	17	13	20-Sep-04	89
GRCA	67	33	28-Sep-04	360
GREG	3	2	multiple	5
GRSC	5	200	09-Nov-04	208
GRYE	5	2	28-Aug-04	6
HAWO	2	1	multiple	2
HETH	37	85	12-Oct-04	393
HOFI	6	2	23-Oct-04	7
HOLA	2	3	26-Sep-04	5
HOME	30	23	27-Aug-04	168
HOSP	1	2	12-Oct-04	2
HOWR	4	1	multiple	4
KILL	21	5	multiple	38
LEFL	26	4	18-Sep-04	38
LESC	13	15	30-Oct-04	32
LEYE	2	1	multiple	2
LISP	8	3	19-Sep-04	11
MALL	97	220	16-Oct-04	5164
MAWA	40	12	01-Sep-04	174
MERL	2	1	multiple	2
MODO	18	4	multiple	29
MOWA	5	3	13-Aug-04	7
MUSW	93	55	07-Sep-04	1742
MYWA	42	70	05-Oct-04	388
NAWA	41	17	18-Sep-04	167
NOCA	51	5	01-Nov-04	90
NOGO	3	1	multiple	3
NOHA	3	1	multiple	3
NOPA	5	2	23-Sep-04	6
NOPI	6	44	30-Aug-04	62
NOWA	20	4	13-Sep-04	30
NRWS	5	6	07-Aug-04	14
NSHO	3	3	16-Oct-04	7
NSWO	1	1	26-Oct-04	1
OCWA	10	4	26-Sep-04	18
OLDS	22	3620	08-Nov-04	19310
OSPR	1	1	21-Aug-04	1
OVEN	29	6	22-Aug-04	44
PEFA	8	1	multiple	8
PESA	1	2	18-Oct-04	2
PHVI	4	1	multiple	4
PISI	15	14	03-Nov-04	43
PIWA	1	1	22-Oct-04	1
PUFI	5	2	multiple	8
PUMA	8	28	12-Aug-04	55
RBGR	4	2	20-Aug-04	5
RBME	4	1	multiple	4
RBNU	34	12	multiple	105
RCKI	42	100	12-Oct-04	757
REDH	1	6	09-Nov-04	6

Species	No. Dates	Peak Count	Peak Date	Total Sum
REKN	1	1	23-Oct-04	1
REVI	29	12	18-Sep-04	60
RHWO	1	1	26-Sep-04	1
RLHA	1	1	06-Nov-04	1
RNGR	1	1	01-Oct-04	1
RODO	2	2	08-Sep-04	3
RTHA	5	1	multiple	5
RTHU	18	3	multiple	27
RUBL	5	30	03-Nov-04	59
RWBL	34	226	01-Nov-04	450
SACR	1	13	17-Sep-04	13
SAND	3	4	06-Nov-04	10
SCJU	32	58	12-Oct-04	335
SCTA	1	1	20-Sep-04	1
SNBU	1	5	03-Nov-04	5
SOSP	71	13	08-Aug-04	245
SPSA	8	3	08-Aug-04	13
SSHA	10	3	13-Oct-04	13
SWSP	17	4	10-Oct-04	28
SWTH	31	26	23-Sep-04	151
TEWA	6	3	01-Sep-04	8
TRES	11	10	12-Aug-04	36
TRFL	31	5	multiple	79
TRUS	5	1	multiple	5
VEER	14	3	01-Sep-04	21
WAVI	26	13	17-Aug-04	84
WBNU	2	1	multiple	2
WCSP	22	18	12-Oct-04	84
WEVI	6	1	multiple	6
WIFL	1	1	07-Aug-04	1
WIWA	24	5	11-Sep-04	41
WIWR	42	22	30-Sep-04	211
WOTH	2	1	multiple	2
WPWA	19	4	multiple	34
WRSA	2	2	12-Oct-04	3
WTSP	57	75	29-Sep-04	858
YBCH	1	1	06-Oct-04	1
YBCU	3	1	multiple	3
YBFL	15	3	25-Aug-04	22
YBSA	23	9	30-Sep-04	74
YSFL	59	13	20-Sep-04	161
YWAR	31	28	08-Aug-04	298

Appendix B. List of Species detected, fall 2004. List includes 174 species, 16 species in bold were new records for TTPBRS. Records indicated by asterisk are pending OBRC approval.

American Black Duck
American Green-winged Teal
American Crow
American Goldfinch
American Golden Plover
American Kestrel
American Pipit
American Redstart
American Robin
American Wigeon
American Woodcock
American Tree Sparrow
Bald Eagle
Bank Swallow
Baltimore Oriole
Barn Swallow
Black-and-white Warbler
Black-billed Cuckoo
Black-bellied Plover
Bay-breasted Warbler
Black-capped Chickadee
Black-crowned Night Heron
Barred Owl
Belted Kingfisher
Blue-gray Gnatcatcher
Brown-headed Cowbird
Blue-headed Vireo
Blackburnian Warbler
Blue Jay
Blackpoll Warbler
Black Scoter
Bobolink
Bonaparte's Gull
Brown Creeper
Brown Thrasher
Black-throated Blue Warbler
Black-throated Green Warbler
Bufflehead
Blue-winged Teal
Cackling Goose
Canada Goose
Canvasback
Caspian Tern
Canada Warbler
Cedar Waxwing
Chipping Sparrow
Chimney Swift
Cliff Swallow
Cape May Warbler
Common Goldeneye
Common Grackle
Cooper's Hawk
Common Loon
Common Merganser
Common Redpoll
Common Tern
Common Yellowthroat
Chestnut-sided Warbler
Downy Woodpecker
Dunlin
Eastern Bluebird
Eastern Kingbird
Eastern Phoebe
Eastern Towhee
Eastern Wood-Pewee
European Starling
Field Sparrow
Fox Sparrow
Gadwall
Great Black-backed Gull
Great Blue Heron
Great-crested Flycatcher
Golden-crowned Kinglet
Gray-cheeked Thrush
Gray Catbird
Great Egret
Greater Scaup
Greater Yellowlegs
Hairy Woodpecker
Hermit Thrush
House Finch
Horned Lark
Hooded Merganser
House Sparrow
House Wren
Killdeer
Least Flycatcher
Least Sandpiper
Lesser Scaup
Lewis's Woodpecker*
Lesser Yellowlegs
Lincoln's Sparrow
Mallard
Magnolia Warbler
Marsh Wren
Merlin
Mourning Dove
Mourning Warbler
Mute Swan
Myrtle Warbler
Nashville Warbler
Northern Cardinal
Northern Goshawk
Northern Harrier
Northern Parula
Northern Pintail
Northern Waterthrush
Northern Rough-winged Swallow
Northern Shoveller
Northern Saw-whet Owl
Orange-crowned Warbler
Long-tailed Duck
Olive-sided Flycatcher
Osprey
Ovenbird
Peregrine Falcon
Pectoral Sandpiper
Philadelphia Vireo
Pine Siskin
Pine Warbler
Purple Finch
Purple Martin
Rose-breasted Grosbeak
Red-breasted Merganser
Red-breasted Nuthatch
Ruby-crowned Kinglet
Redhead
Red Knot
Red-eyed Vireo
Red-headed Woodpecker
Rough-legged Hawk
Red-necked Grebe
Rock Dove
Red-tailed Hawk
Ruby-throated Hummingbird
Rusty Blackbird
Red-winged Blackbird
Sandhill Crane
Sanderling
Savannah Sparrow
Slate-coloured Junco
Scarlet Tanager
Semipalmated Plover
Snow Bunting
Song Sparrow
Spotted Sandpiper
Sharp-shinned Hawk
Swamp Sparrow
Swainson's Thrush
Tennessee Warbler
Tree Swallow
Traill's Flycatcher
Trumpeter Swan
Tundra Swan
Veery
Vesper Sparrow
Warbling Vireo
White-breasted Nuthatch
White-crowned Sparrow
White-eyed Vireo
Willow Flycatcher
Wilson's Warbler
Winter Wren
Wood Duck
Wood Thrush
Western Palm Warbler
White-rumped Sandpiper
White-throated Sparrow
Yellow-breasted Chat
Yellow-billed Cuckoo
Yellow-bellied Flycatcher
Yellow-bellied Sapsucker
Yellow-shafted Flicker
Yellow Warbler

Appendix C. Survey Analysis Summary.

Species	Census Total	Point Count Total	Banding Total	Total	Banding- % of Total	Point Counts- % of Total
AMCR	23	4		27	0	15
AMGO	473	232	24	729	3	32
AMKE	5			5	0	0
AMPI	25	10		35	0	29
AMRE	36	3	51	90	57	3
AMRO	201	98	33	332	10	30
AMWO	1	1	1	3	33	33
ATSP	13	9	19	41	46	22
BANS	13	6		19	0	32
BAOR	43	11	19	73	26	15
BARS	288	81		369	0	22
BAWW	10	2	11	23	48	9
BBCU	3	3	2	8	25	38
BBWA	6		4	10	40	0
BCCH	196	73	54	323	17	23
BEKI	22	17		39	0	44
BGGN	8		1	9	11	0
BHVI	7	1	17	25	68	4
BLBW	11		5	16	31	0
BLJA	186	145	9	340	3	43
BLPW	31	2	20	53	38	4
BOBO	5			5	0	0
BRCR	62	9	97	168	58	5
BRTH	1			1	0	0
BTBW	19	1	32	52	62	2
BTNW	14	8	35	57	61	14
CAWA	9	1	12	22	55	5
CEDW	678	227	83	988	8	23
CHSP	3		2	5	40	0
CHSW	15			15	0	0
CMWA	6		3	9	33	0
COGR	47	31	4	82	5	38
COHA	4	2		6	0	33
CORE	4			4	0	0
COYE	16	2	28	46	61	4
CSWA	8	1	20	29	69	3
DOWO	47	11	7	65	11	17
EABL	3			3	0	0
EAKI	64	27	10	101	10	27
EAPH	22	9	17	48	35	19
EATO	6		1	7	14	0
EAWP	16	3	2	21	10	14
FISP			1	1	100	0
FOSP	3		12	15	80	0
GCFL	2	3	1	6	17	50
GCKI	543	111	856	1510	57	7
GCTH	4		71	75	95	0
GRCA	288	77	37	402	9	19
HAWO		2		2	0	100
HETH	120	25	226	371	61	7
HOFI	7			7	0	0
HOLA	5			5	0	0
HOSP	2			2	0	0
HOWR			3	3	100	0
LEFL	8		27	35	77	0
LISP	2		8	10	80	0
MAWA	49	11	98	158	62	7
MERL		2		2	0	100
MODO	20	9		29	0	31
MOWA			7	7	100	0

Species	Census Total	Point Count Total	Banding Total	Total	Banding % of Total	Point Counts % of Total
MYWA	195	38	159	392	41	10
NAWA	25	6	129	160	81	4
NOCA	61	18	15	94	16	19
NOGO	3			3	0	0
NOHA	2	1		3	0	33
NOPA	5		2	7	29	0
NOWA	8		22	30	73	0
NRWS	12	2		14	0	14
NSWO	1			1	0	0
OCWA	3	3	12	18	67	17
OSPR	1			1	0	0
OVEN	1		34	35	97	0
PEFA	6	2		8	0	25
PHVI			4	4	100	0
PISI	40	3		43	0	7
PIWA	1			1	0	0
PUFI	7	1		8	0	13
PUMA	43	12		55	0	22
RBGR	3		2	5	40	0
RBNU	73	24	23	120	19	20
RCKI	223	47	401	671	60	7
REVI	9	1	39	49	80	2
RHWO	1			1	0	0
RLHA	1			1	0	0
RODO	2	2		4	0	50
RTHA	3	1	1	5	20	20
RTHU	3	1		4	0	25
RUBL	57	2		59	0	3
RWBL	426	20	5	451	1	4
SCJU	230	21	92	343	27	6
SCTA			1	1	100	0
SNBU		5		5	0	100
SOSP	170	80	44	294	15	27
SSHA	4	6	3	13	23	46
SWSP	4		23	27	85	0
SWTH	25	5	117	147	80	3
TEWA	3		6	9	67	0
TRES	28	7		35	0	20
TRFL	13	6	55	74	74	8
VEER	3		17	20	85	0
WAVI	24	7	43	74	58	9
WBNU	2			2	0	0
WCSP	48	8	26	82	32	10
WEVI		1	1	2	50	50
WIWA	7		29	36	81	0
WIFL		1		1	0	100
WIWR	97	36	83	216	38	17
WOTH	1		1	2	50	0
WPWA	17	1	15	33	45	3
WTSP	513	146	305	964	32	15
YBCH			1	1	100	0
YBCU	1	2	1	4	25	50
YBFL	4	1	16	21	76	5
YBSA	50	10	20	80	25	13
YSFL	126	33	15	174	9	19
YWAR	179	49	109	337	32	15

Appendix D. Fall 2004 Daily Totals (Cap=Captured Unbanded, DT=Detected Total, Obs=Casual Observations, ks=Known Stopover, DST=Daily Species Total).

date	banded	recap	Cap.	PC1	PC2	PC3	census	DT	Obs	ks	dst	Species
03-Aug-04	37	3	0	0	0	0	152	192	236	7	366	37
04-Aug-04	14	2	1	0	0	0	126	137	120	10	213	32
05-Aug-04	28	4	0	10	16	14	106	150	177	8	246	31
06-Aug-04	36	5	0	38	36	93	167	322	214	5	443	38
07-Aug-04	22	4	0	13	30	26	250	314	257	4	502	46
08-Aug-04	19	7	0	11	9	16	200	236	146	7	317	35
09-Aug-04	20	4	0	17	19	33	186	254	146	5	353	37
10-Aug-04	5	5	0	1	12	43	81	138	400	5	508	30
11-Aug-04	33	9	0	19	16	18	165	235	283	9	463	34
12-Aug-04	14	4	0	15	59	13	185	275	451	4	658	35
13-Aug-04	10	2	0	9	0	0	151	172	219	2	347	34
14-Aug-04	18	2	0	27	16	23	154	222	253	2	415	46
15-Aug-04	32	3	0	38	33	121	199	369	213	18	489	42
16-Aug-04	23	2	0	26	26	24	158	230	191	2	372	42
17-Aug-04	29	9	0	43	17	704	182	941	680	9	1351	47
18-Aug-04	10	4	2	37	0	10	218	270	450	4	647	37
19-Aug-04	38	3	0	16	24	6	197	283	239	3	488	32
20-Aug-04	39	6	2	30	62	11	147	284	307	6	529	48
21-Aug-04	37	8	4	6	41	32	74	173	308	8	443	43
22-Aug-04	21	4	1	11	30	19	229	312	311	4	553	58
23-Aug-04	5	7	1	1	2	4	119	136	153	7	239	39
24-Aug-04	15	1	2	9	3	1	75	106	172	1	229	38
25-Aug-04	8	5	0	1	2	20	84	118	146	6	224	38
26-Aug-04	8	5	1	1	27	57	189	284	258	5	450	37
27-Aug-04	1	5	0	7	4	28	267	308	261	5	440	35
28-Aug-04	6	4	2	2	11	59	212	285	161	6	380	48
29-Aug-04	9	1	2	5	8	11	198	229	94	1	312	41
30-Aug-04	30	0	2	7	8	15	100	154	232	0	352	46
31-Aug-04	14	1	1	2	9	5	196	227	160	1	330	51
01-Sep-04	48	4	1	5	5	5	115	169	138	4	258	48
02-Sep-04	22	5	0	40	3	3	79	151	188	5	300	42
03-Sep-04	17	4	2	4	2	3	157	185	101	9	265	53
04-Sep-04	13	9	0	1	6	12	131	167	87	11	227	43
05-Sep-04	12	1	1	0	1	4	72	89	1	1	92	26
06-Sep-04	10	3	1	5	3	2	128	147	34	3	168	26
07-Sep-04	1	0	0	3	0	0	106	110	123	1	202	24

date	banded	recap	Cap.	PC1	PC2	PC3	census	DT	Obs	pks	dst	Species
08-Sep-04	28	0	3	3	8	6	133	175	120	1	258	51
10-Sep-04	22	3	1	7	7	6	127	165	166	4	275	47
11-Sep-04	19	5	1	4	4	24	154	203	134	6	273	46
12-Sep-04	12	5	0	0	7	0	74	97	0	5	97	27
13-Sep-04	24	0	0	0	2	0	60	86	31	0	112	34
14-Sep-04	11	0	0	1	5	0	68	85	167	0	241	38
15-Sep-04	6	1	1	4	6	19	123	157	158	1	223	37
16-Sep-04	4	2	0	0	1	1	82	90	73	2	123	22
17-Sep-04	37	0	0	7	3	33	135	201	190	0	349	54
18-Sep-04	97	1	1	11	15	40	102	252	198	1	401	66
19-Sep-04	95	1	1	9	7	20	127	253	289	1	466	57
20-Sep-04	57	8	0	6	0	0	188	250	104	8	317	51
21-Sep-04	27	5	1	2	2	5	79	117	171	5	236	41
22-Sep-04	14	12	1	7	19	34	140	199	201	12	317	56
23-Sep-04	65	4	1	4	3	3	106	186	177	4	331	60
24-Sep-04	38	7	1	1	6	1	87	135	148	7	254	49
25-Sep-04	21	2	1	73	5	39	114	229	896	2	1057	49
26-Sep-04	113	4	1	26	10	2	183	320	269	4	520	64
27-Sep-04	52	6	1	8	13	8	152	226	192	6	333	51
28-Sep-04	12	3	1	1	5	0	254	276	212	3	417	40
29-Sep-04	259	4	75	0	13	27	215	518	260	4	639	59
30-Sep-04	186	15	5	15	25	23	228	441	301	15	585	62
01-Oct-04	95	9	0	12	22	35	105	241	241	9	399	61
02-Oct-04	5	4	0	3	0	0	100	111	80	4	180	31
03-Oct-04	45	11	1	14	4	0	184	243	186	11	367	47
04-Oct-04	16	3	0	0	5	2	67	90	95	3	164	25
05-Oct-04	211	12	11	31	6	11	181	438	345	12	627	58
06-Oct-04	68	18	0	3	7	1	186	280	298	18	439	47
07-Oct-04	53	10	1	0	11	5	199	275	388	10	575	50
08-Oct-04	25	2	0	8	16	3	145	191	291	2	430	48
09-Oct-04	10	2	1	0	4	0	325	340	118	2	401	40
10-Oct-04	113	8	1	15	7	2	190	327	103	8	366	39
11-Oct-04	122	13	3	6	24	1	174	324	227	13	474	41
12-Oct-04	268	5	168	0	0	6	354	720	405	5	945	56
13-Oct-04	164	19	78	5	0	5	276	446	205	19	535	43
14-Oct-04	64	11	4	24	28	0	340	447	525	11	747	29
15-Oct-04	50	11	0	1	0	0	156	214	161	11	330	34
16-Oct-04	62	49	10	4	6	41	359	485	121	49	575	35

date	banded	recap	Cap.	PC1	PC2	PC3	census	DT	Obs	pks	dst	Species
18-Oct-04	55	24	8	6	0	6	263	340	159	24	427	41
19-Oct-04	0	0	0	0	0	0	139	139	60	0	199	26
21-Oct-04	89	15	5	8	12	25	329	446	539	15	791	53
22-Oct-04	77	21	5	3	0	3	294	388	427	21	644	35
23-Oct-04	86	22	1	2	9	2	353	472	288	22	699	48
24-Oct-04	23	18	0	2	8	0	207	254	151	18	365	31
25-Oct-04	50	11	0	22	12	7	468	527	414	11	770	38
26-Oct-04	26	8	1	2	14	29	108	179	347	8	489	38
27-Oct-04	69	13	2	13	6	11	200	306	709	14	888	57
28-Oct-04	39	24	4	3	1	1	403	470	515	24	730	47
29-Oct-04	16	14	1	2	2	2	708	744	638	14	958	31
30-Oct-04	8	3	0	0	0	0	782	792	12	3	804	22
31-Oct-04	0	1	0	0	0	0	285	286	3	1	289	23
01-Nov-04	26	6	0	6	5	11	972	1014	510	6	1491	31
03-Nov-04	10	8	2	508	37	637	1984	2423	3088	8	3891	44
04-Nov-04	1	3	0	0	0	0	1081	1085	1575	3	1829	23
06-Nov-04	11	1	0	8	16	0	2876	2904	2290	1	3314	41
07-Nov-04	7	2	0	1	0	0	697	707	2175	2	2734	33
08-Nov-04	0	0	0	0	0	0	3937	3937	0	0	3937	14
09-Nov-04	0	0	0	0	0	0	3833	3833	0	0	3833	25
10-Nov-04	3	0	0	2	95	0	2266	2338	67	0	2401	22
11-Nov-04	0	0	0	0	0	0	3445	3445	0	0	3445	13
14-Nov-04	0	0	0	0	0	0	846	846	0	0	846	15