MIGRATION MONITORING AT TTPBRS
Fall 2006

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Executive Summary

In 2003, Toronto and Region Conservation (TRCA) established a bird research station at Tommy Thompson Park. The core program of the research is Migration Monitoring, a scheme dedicated to gathering population trends on northern breeding landbirds that are not monitored effectively by other schemes (e.g. Breeding Bird Survey). Fall 2006 was the fourth consecutive season of the Migration Monitoring Program at Tommy Thompson Park Bird Research Station. Data collection in fall 2006 was consistent with methodology outlined in the Operations Manual for Tommy Thompson Park Bird Research Station (Derbyshire 2004).

Coverage was below average despite that 87 of 100 target days received at least some coverage. After each field day, a coverage code is assigned based on completeness of all surveys. The optimal coverage code of 7 indicates that there were 90 total net hours, complete census and 3 completed point counts. This fall 40 days were coded with a 7 compared to 48 days in 2005. In terms of net hours, 6,085 hours were logged which is 69% of the target (100days x 90hrs/day), down from 77% in 2005. A yearly comparison of coverage statistics indicates that overall coverage has been decreasing since 2004, which is due to an increase in weather conditions unsuitable for fieldwork in recent fall seasons.

Despite a decrease in overall coverage in fall 2006, a record 4,473 birds were banded, 429 recaptured and an additional 515 birds were released unbanded. A total of 176 species were recorded for the season. Fall 2006 was the busiest fall season ever at TTPBRS as banding totals for 36 species and forms were record high. Golden-winged Warbler, Oregon Junco, and Yellow Palm Warbler were banded in the fall for the first time in 2006. The months of August and September were unusually busy in fall 2006 as neotropical migrants were recorded in higher numbers than in any previous fall season, especially members of the warbler family. As with any migration season there were highs and lows this fall, and a few species were found in record low numbers, including White-throated Sparrow which dropped to a four-year low this fall.

The unusually abundant Yellow-rumped Warblers in late summer of 2005 were found once again in 2006, suggesting a substantial post-breeding dispersal occurs in some years on the Toronto lakeshore, perhaps correlating to high breeding productivity further north. The calculation of age ratios are an important aspect of fall bird banding programs as the proportion of young to adults points to breeding success in the north. The percentage of birds captured that were young or “hatch-year” was 89% in 2006, which is marginally higher than previous seasons. Considerable variation between species in age ratios is apparent.

Recaptures of banded birds were down this fall compared to previous years, although a remarkable number of Magnolia Warblers were banded and recaptured. We are continuing to monitor the condition of migrants at Tommy Thompson Park by comparing fat score and weight at time of banding compared to time of recapture. In fall 2006, Magnolia Warblers gained an average of 0.2 grams per stopover with 17 birds exhibiting a negative weight change and 49 exhibiting a positive weight gain. The highest weight gain was recorded for an individual banded on September 10 and recaptured on September 14, which added 14% to its initial body weight in 5 days. Monitoring the ecology of migrant stopover on the Toronto lakeshore will be extremely valuable to local conservation.

There were two new species recorded for the bird research station in 2006, Harlequin Duck and Broad-winged Hawk. The Nocturnal Owl Monitoring Program was in full swing for a fourth consecutive fall season. A total of 54 Northern Saw-whet Owls were banded, 36 of which were captured on one evening on October 26.

The research station at Tommy Thompson Park continues to engage the community through educational programming. A total of 359 visitors to Tommy Thompson Park were treated to bird banding demonstrations in fall 2006. This total includes a school class on October 5 and several clubs including the Toronto Ornithological Club, West Humber Field Naturalists and Toronto Field Naturalists. Volunteer support was exceptional once again as 22 volunteers contributed 1658 hours to the Fall Migration Monitoring Program. Training was also provided to volunteers of the Fatal Light Awareness Program for their bird rescue work as part of the Light Out Toronto campaign.

Introduction

In April of 2003, Toronto and Region Conservation Authority (TRCA) established a research station at Tommy Thompson Park (TTP). The primary objectives of the research station are to aid conservation efforts at the local, national and international level through monitoring, research and education. The core program of the Tommy Thompson Park Bird Research Station (TTPBRS) is the Migration Monitoring Program (MMP). This report details results of the fall 2006 MMP.

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 the park. Tommy Thompson Park 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.

Through natural succession much of the land area of TTP has been colonized by a variety of plant and animal communities. The geographic situation of the park and its natural features make it very suitable for large numbers of breeding and migrating birds. 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 2000.

The site selected for Migration Monitoring is located on peninsula D, which is one of several peninsulas that branch off the main spine of the spit. The peninsula is bordered by the Toronto harbour on the north side and an inner bay on the south side. The habitat is composed of early succession cottonwood, willow and birch forest. Beach and meadow features are also present in the study area.

Toronto and Region Conservation (TRCA)

Toronto and Region Conservation (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 watersheds, sound environmental 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 and conservation education and heritage programs.

Objectives of the Living City Campaign (run by TRCA) 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 this Living City vision.

Rationale

Migration Monitoring Overview

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

Methods

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. The Fall Migration Monitoring Program operates on a daily basis from August 5-November 10. There were no changes to the protocol prior to or during fall 2006.

Fall Migration Monitoring Program Results

Synopsis

August

August in the southern Great Lakes region typically features localized movement of post-breeding young and adult birds, however the most interesting aspect of the first week of fall 2006 at TTPBRS was a noticeable lack of local breeders, particularly Yellow Warblers. It seemed as though many birds had finished nesting early and left Tommy Thompson Park to finish moulting in other locations. Highlights of a hot and humid season opener on August 5 were single observations of Black-billed Cuckoo and **Eastern Meadowlark**. Bird activity was generally quiet until the all-important winds shifted to the north on the 10th, which increased the number of birds at TTPBRS. A decent push of Warbling Vireo was observed on this day and an early **Swainson's Thrush** was banded. Migration picked up on the 11th when a total of 30 Yellow Warblers, 18 Yellow-rumped “Myrtle” Warblers and over 100 Red-winged Blackbirds were recorded. Singles of Blackburnian Warbler, Bay-breasted Warbler and a very early **Slate-coloured Junco** were also noted.

The second week of fall migration began on August 12 with some strong early morning movement of warblers, mostly Yellow Warblers and **Myrtle Warblers**. An unusual daily occurrence throughout the week was the observation of substantial flocks of **Red-winged Blackbirds** passing over just after dawn, which we normally don't observe until late fall. August 16 was very interesting as both the diversity of species and overall abundance was rather high for August at Tommy Thompson Park. A total of 16 warbler species were recorded including an estimated 60 Myrtle, 5 Black-throated Green, 9 Blackburnian and 8 Northern Waterthrush. In 2005, the month of August was thought to be atypical at TTPBRS due in large part to the remarkable abundance of moulting juvenile and adult **Myrtle Warblers**. For a second consecutive year, moulting Myrtle Warblers were recorded in significant numbers at TTPBRS in August.

The week of August 19-25 was spectacular as unprecedented numbers of birds for August were found. The period started off slow as 17 birds were banded on the 19th. This was "the" day for swallows at Tommy Thompson Park in the fall as a steady stream of an estimated 650 Barn Swallows were tallied during the morning! On August 21st a total of 66 birds were banded, which included a sudden influx of Magnolia Warbler, American Redstart and Northern Waterthrush. First of fall species on the day included **Olive-sided Flycatcher**, **Yellow-billed Cuckoo**, and White-throated Sparrow. Migration was again steady on the 22nd as the daily totals included 90 Myrtle Warbler, 70 Magnolia Warbler and 18 American Redstart amongst 17 warbler species. August 23rd was record setting as 171 birds of 27 species were banded. Single-day banding records were set for Northern Waterthrush (19 banded, 35 daily total), Magnolia Warbler (36, 110), Chestnut-sided Warbler (18, 50) and Bay-breasted Warbler (7, 20). Twenty-one species of warbler were banded or observed and high numbers of Traill's Flycatcher, Veery and Bobolink were also recorded. The north winds

continued into the next day and there was no break in the action as 126 birds of 26 species were banded on the 24th, 50 of which were Magnolia Warblers (140 daily total). To put these numbers into context the previous high one-day banding total for August at TTPBRS was 62 on August 25, 2005.

As of late August, fall 2006 was shaping up to be a great season thanks at least in part to more favourable winds (from the north) than in any previous autumn at TTPBRS. Migrant activity was strong on the 28th with many warblers and vireos feeding on caterpillars in the canopy. East winds on the 29th brought higher numbers of American Redstart, Blackpoll and Bay-breasted Warbler and our first ever fall record of **Golden-winged Warbler**. The first push of **Common Loon** occurred on August 30 along with yet another surge of warblers and vireos. Cool temperatures and brisk north winds on the 31st made it feel like fall as did the arrival of both **Ruby-crowned Kinglet** and **Lincoln's Sparrow**.

September

The first week of September is an interesting period of fall migration, when flycatchers, orioles, and swallows have largely moved on, giving way to warblers, vireos, thrushes, and the first arrivals of late fall migrants such as the **Ruby-crowned Kinglet**. September 2 and 3 were a "no go" as the remnants of hurricane Ernesto brought substantial rain and wind to the Toronto area. Fieldwork resumed on the 4th when we found north winds and a substantial movement of birds. A total of 102 birds of 20 species were banded, which included high counts of Philadelphia Vireo, Magnolia, Black-throated Green, Blackburnian, Blackpoll, Wilson's and of course the omnipresent Myrtle Warblers of Tommy Thompson Park. Conditions were calm with low cloud on the following morning when 127 birds of 25 species were banded. Birding was very good once again on September 6 when the first noticeable movement of Sharp-shinned Hawks occurred. Also appearing on the 6th were Ruby-crowned Kinglets, American Pipit and **Solitary Sandpiper**. Between September 4 and 6, a total of 560 Yellow-rumped "myrtle" Warblers were tallied which is impressive for the time of year! Banding was quiet on the 7th, which gave us opportunity to observe a very good raptor day for Tommy Thompson Park. The sightings included an adult **Bald Eagle**, 15 Sharp-shinned Hawks, 7 Northern Harrier, our 1st ever **Broad-winged Hawk,** and over 3000 high-flying Monarch butterflies.

The week of September 9-15 featured plenty of rain and wind, which limited our coverage on several days. When the weather did cooperate we found good numbers of birds at TTPBRS. On September 9, just 4 birds were banded before the rain moved in around mid-morning. North winds and clear skies on September 10 resulted in a more active day as 90 birds were banded and a total of 57 species were captured and/or observed. Ruby-crowned Kinglets were abundant as were Nashville Warbler, Magnolia Warbler, Red-eyed Vireo, and Palm Warbler. A moderate movement of birds was recorded on September 14 as 42 birds of 15 species were banded, which included singles of Brown Creeper and Northern Parula, and 20 Magnolia Warblers. Thrushes, warblers, and vireos were numerous once again on the 15th when 45 birds were banded. This day featured the first sightings of Blue Jay, American Crow, White-crowned Sparrow, and **Northern Goshawk** of the fall.

The third week of bird migration in September was impressive to say the least. On September 16, a significant concentration of birds occurred with large numbers of Ruby-crowned Kinglet, Swainson's Thrush, Red-eyed Vireo, and many warbler species. A total of 19 warbler species were tallied on a day when 236 birds were banded and just 4 recaptured. September 19 was interesting as the first significant groups of Blue Jays were recorded and high counts of Blackpoll Warbler and Northern Harrier were noted. A **Northern Mockingbird** was observed trailing behind a flock of Blue Jays, which was the first fall record of the species at TTPBRS. On September 20, raptors and hummingbirds took centre stage. High numbers (for TTPBRS) of Ruby-throated Hummingbirds were captured daily for the remainder of the period. September 21 was a record day for raptor migration at TTPBRS. Stiff west winds brought all-time high counts of Northern Harrier (27), Sharp-shinned Hawk (35) and Cooper's Hawk (4). Also recorded on the day were first arrivals of Hermit Thrush and Orange-crowned Warbler. The winds calmed down that evening which likely led to another push of migrants on the 22nd. This time, Myrtle Warbler and White-throated Sparrow were the dominant species.

During the minutes before dawn on September 25, it was clear that a substantial migration event had occurred as a chorus of calls and partial songs were heard. A total of 221 birds were banded and 68 species were recorded by day's end. Yellow-bellied Sapsucker and Yellow-shafted Flicker were abundant on the day as were both species of kinglet. Nashville Warbler, Black-throated Blue Warbler, and Myrtle Warbler were the most conspicuous of 15 warbler species. Orange-crowned Warbler (2 banded, 8 total recorded) were also numerous. Bird activity was strong once again on the 26th as 140 birds were banded, consisting mostly of kinglets, thrushes, and Nashville Warblers. The highlight of the day was the capture and banding of a Scarlet Tanager and the observation of a **Whip-poor-will** (2nd for TTPBRS). Winds were light out of the north on the 29th, which likely assisted in bringing an influx of birds into Tommy Thompson Park. A total of 178 birds were banded on the day and no birds were recaptured. A day with no recaptures at TTPBRS is very unusual and is a sure sign that a turnover of birds had occurred. It was yet another big kinglet day as 220 Golden-crowns and 45 Ruby-crowns were counted. On September 30, several late fall waterfowl species arrived (Common Goldeneye, Bufflehead, Ring-necked Duck) and numbers of Yellow-bellied Sapsucker, White-throated Sparrow and Nashville Warbler were particularly high. A total of 105 birds were banded on the day.

October

On the first day of October, Blue Jays peaked for the fall as 400 were observed and high numbers of kinglets and sapsuckers were evident. A total of 151 birds were banded on the 2nd, which consisted of mostly kinglets, Hermit Thrushes, Eastern Phoebes, and Myrtle Warblers. On October 5 we experienced an unprecedented passage of kinglets. We began the day by cautiously opening only 12 of our 15 nets, sensing that large numbers of birds were in the area. The second net check of the day revealed that 190 birds (mostly kinglets) were in the nets all at once. We had never seen so many birds at TTPBRS before and by day's end we had banded 162 and released 373 birds unbanded. Conservative estimates of kinglet numbers were that 1500 Golden-crowned and 700 Ruby-crowned Kinglets poured through the study area that morning. Eastern Towhee and Fox Sparrow also appeared for the first time this fall.

Light north winds on the 7th of October resulted in a moderate influx of migrants. A total of 105 birds were banded on the day, which featured high numbers of Ruby-crowned Kinglet, Winter Wren, Hermit Thrush, and White-throated Sparrow. First records for the fall of Greater Scaup and White-winged Scoter were recorded, along with a late Red-eyed Vireo. The winds swung to the north on the 10th, which resulted in another surge of late fall migrants. A total of 168 birds were banded on this day. Eastern Phoebe, Golden-crowned Kinglet, and White-throated Sparrow were the most abundant species involved. A massive cold front moved into the Great Lakes on the 11th, which brought very high winds and rain. TTPBRS was closed for an unprecedented four consecutive days thereafter.

High winds relented on the 15th allowing us to run our full protocol. A total of 55 birds were banded on the day, which consisted of mostly kinglets. Conditions on the 16th of October were suitable for an active day and yet it was uncharacteristically quiet for birds at ground level. A total of 37 birds were banded, the highlights of which were two Fox Sparrows. Overhead, the skies were full of migrating Red-winged Blackbirds (760 counted), American Pipits (64) and various raptor species. Winds were strong from the south on October 18, which always limits the flow of birds into Tommy Thompson Park in the autumn. Despite this, there were some interesting sightings on the day which included captures of Field Sparrow, Orange-crowned Warbler and Blue-headed Vireo and a noticeable increase in numbers of Song Sparrow and Slate-colored Junco. On October 19, migrating birds were few as 27 birds were banded. Heavy precipitation moved in overnight, which caused a major grounding of nocturnal migrants. A wet and windy census on October 20 revealed a much higher density of birds than had been recorded previously in the week. Hermit Thrush, Golden-crowned Kinglet, and Myrtle Warbler were especially numerous. A **Wilson's Snipe** flushed from the sandy trail near net 4 was the first ever record of this species during the standard count period.

On October 21, a total of 211 birds were banded and 52 species were documented. Overhead, blackbirds were on the move as 3,500 were tallied (mostly Red-winged Blackbirds with some Rusty Blackbirds and Common Grackles mixed in). Also on the day were observations of **Green Heron**, **Eastern Bluebirds** and our second ever **Dickcissel**! Forty-one birds were banded on the 24th, the bulk of which were Hermit Thrushes and Golden-crowned Kinglets. Highlight of the day was a final tally of 46 American Crows, an unusual concentration of this species for the spit. October 25th featured an influx of Bufflehead and Long-tailed Duck, among other waterfowl species. Also recorded were the first American Tree Sparrows of the fall and a sharp increase in numbers of Slate-colored Juncos (140 observed). Cold and calm conditions occurred on the 26th,

which led to a moderate movement of birds. A total of 71 birds were banded and the first Long-eared Owl and Snow Buntings of the fall were observed. The conditions were good for migrating Northern Saw-whet Owls as 37 were captured that evening and overnight (36 banded, 1 foreign recovery). Slate-colored Juncos and American Tree Sparrows were the most conspicuous species on the following morning when 52 birds were banded. Two roosting Northern Saw-whets were found in the dense willow thicket, raising our cumulative species total to 172 for the season.

A full day's work on October 30th produced some interesting sightings including a single **Northern Shrike**, 6 Snow Buntings, and good tallies of several waterfowl species. The highlight of the 31st was our second ever capture of the maritime subspecies of Palm Warbler, the **"Yellow" Palm Warbler**.

November

It was a chilly start on the 1st of November with temperatures hovering around zero degrees Celsius. A total of 28 birds were banded on the day and a decent variety of late fall migrants were recorded. American Pipit, Cedar Waxwing, Slate-colored Junco and American Tree Sparrow were moving despite the cold headwinds.

The final week of the Fall Migration Monitoring Program began with west winds, which is a limiting factor on passerine migration. The absence of landbirds was made up for by the growing rafts of waterfowl in the inner bays of Tommy Thompson Park and surrounding waters. A full day of banding (15 mist nets in operation for 6 hours) produced just 2 birds on November 5, a result that lent itself nicely to the notion that fall migration was winding down. Amongst the collective thousands of Long-tailed Ducks, Buffleheads and Common Goldeneyes was a lone male **Harlequin Duck**, a first for TTPBRS. Conditions on November 6 were a bit more suitable for southbound migrants. Large numbers of American Pipits (204) and blackbirds (3320) were moving, although the action at ground level was expectedly low. Also on this day, a lone Pine Siskin passed over, which was the first of the fall. Diurnal migration was strong again on the 7th as American Pipits, Horned Larks, Cedar Waxwings and American Goldfinches were recorded in high numbers. Numbers of American Tree Sparrow and Slate-colored Junco increased on November 9, although few were captured. After a 10-day absence, north winds finally returned to Toronto on November 10. A total of 47 birds were banded, which consisted of mostly Golden-crowned Kinglets**,** American Tree Sparrows and Slate-colored Juncos. A couple of late Swamp Sparrows were also banded. Highlight of the day was the capture of our first ever **Oregon Junco**, a western subspecies of the Dark-eyed Junco.

Overview of Fall Coverage and Results

Coverage in fall 2006 was below average despite that 87 of 100 target days received at least some coverage. After each field day, a coverage code is assigned based on completeness of all surveys. The optimal coverage code of 7 indicates that there were 90 total net hours, complete census and 3 completed point counts. This fall 40 days were coded with a 7 compared to 48 days in 2005. In terms of net hours, 6,085 hours were logged which is 69% of the target (100days x 90hrs/day), down from 77% in 2005. A yearly comparison of coverage statistics (Table 1) indicates that overall coverage has been decreasing since 2004, which is due an increase in weather conditions unsuitable for fieldwork in recent fall seasons.

During fall 2006, a record 4,473 birds were banded, 429 recaptured and an additional 515 birds were released unbanded. A total of 176 species were recorded for the season.

Table 1. Coverage Statistics and Results Summary

Unit	2006	2005	2004	2003
Days with at least a census	87	91	95	84
Days with full coverage (Code 7)	40	48	60	0
Net Hours	6085	6816	7388	6726
Total Species Detected	176	180	173	161
Birds Banded	4473	4247	3870	3327
Birds Recaptured	429	560	614	623
Captured Unbanded	515	382	429	152
Total Captures	5419	5189	4913	4102
Birds banded/net hour	.74	.62	.52	.49

Capture Results

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.

Fall 2006 was the busiest fall season on record at TTPBRS as banding totals for 36 species and forms were record high. Golden-winged Warbler, Oregon Junco, and Yellow Palm Warbler were banded in the fall for the first time in 2006. Bird populations are constantly changing, which is a natural process reflecting annual variations, most notably weather, that affect survival and/or productivity at various times of the year. Although we now have four consecutive years of data from TTPBRS, it is still too early to perform trend analysis on the database. However, yearly variation (or lack thereof) in banding totals from TTPBRS indicates some preliminary patterns that are worth noting here. A complete breakdown of banding totals by species for all years is presented in Appendix A.

While fall 2006 set records for 36 species, 22 of those species were warblers. The most pronounced increases in abundance occurred for Magnolia Warbler and Nashville Warbler. These results echo the 2005 fall season when records were set in that year for 37 species including many warbler species. These findings may indicate that the past two summers have been prodigious breeding seasons for neotropical species. Significant decreases in banding totals per species were few in 2006, however, White-throated Sparrow continued to decline to a four-year low, and totals for Brown Creeper, Sharp-shinned Hawk and Black-capped Chickadee were particularly lean. Refer to Table 2 for a summary of selected species showing marked increase and decrease in fall 2006.

Table 2. Selected Species with Marked Increase/Decrease in 2006

Increase			**Decrease**		
Species	2006	03-05 average	Species	2006	03-05 average
Philadelphia Vireo	24	6	Sharp-shinned Hawk		7
Veery	41	22	Blue Jay	2	47
Wood Thrush	6	1	Black-capped Chickadee	7	190
Nashville Warbler	259	113	Red-breasted Nuthatch		10
Magnolia Warbler	345	100	Brown Creeper	65	109
Black-throated Blue Warbler	84	32	Winter Wren	20	56
Blackburnian Warbler	19	3	Hermit Thrush	156	206
Northern Waterthrush	57	21	White-throated Sparrow	183	321

The report on fall migration in 2005 included a brief examination of the unusually high number of Myrtle Warblers at TTPBRS in August of that year. In 2005, Myrtle Warblers were present throughout the fall season, beginning on August 6, which was in sharp contrast to 2003-2004 when Myrtles didn't appear until mid-September. It was noted that a high proportion of Myrtles were either in juvenile plumage or in the process of either complete or partial moult. A high proportion of birds in moult suggests a post-breeding dispersal, when adults and young move from natal areas to moult prior to fall migration. The story has become more intriguing based on results from fall 2006 when the species was recorded in higher densities during the August period. The phenology of Myrtle Warbler at TTPBRS for multiple years at TTPBRS (figure 1) indicates that results from 2005 and 2006 deviate from consistent migration timing in 2003 and 2004. This deviation includes a shift toward an earlier arrival and peak density and a pronounced increase in abundance in the months of August and September. Add to that the sudden appearance of Myrtle Warblers of both age classes in various stages of moult and a post-breeding dispersal is likely involved. These dispersals of Myrtles to the Toronto lakeshore are likely correlated with an exceptionally productive breeding season as indicated by much higher overall banding totals for the species in the last two seasons (381 in 2006, 285 in 2005) compared to 2003 (137) and 2004

(159). It is interesting that this phenomenon is being exhibited in a single species despite the remarkable results in 2006 for other warbler species that occupy a similar breeding distribution (i.e. Nashville Warbler) in southern Ontario.

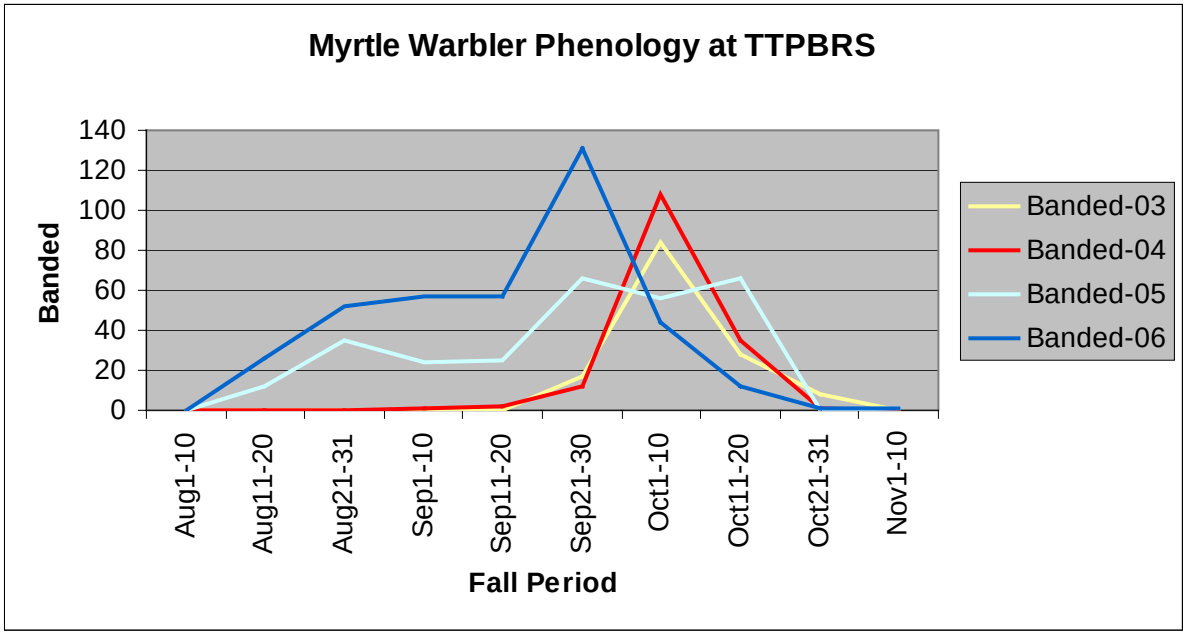


Figure 1. Myrtle Warbler Phenology at TTPBRS

Assessing the 2006 banding data by month it is clear that the largest increases in abundance of migrants by time period was in the first half of the fall season, August and September. An increase in capture volume in first half of the fall season is correlated with much higher capture rates of neotropical migrants in 2006, primarily warblers.

Table 3. Yearly Comparison of Monthly Banding Totals

Month	2003-2005 Average			2006 Results		
	Banded	Net Hours	Band/Net Hour	Banded	Net Hours	Band/Net Hour
August	485	2018	0.24	944	2263	0.42
September	1155	2307	0.50	1846	1931	0.95
October	2074	2137	0.97	1573	1357	1.16
November	99	514	0.19	110	532	0.21

One of the many values of Migration Monitoring data is the opportunity it affords to determine ratios of adults to young, which is thought to be an indicator of breeding success. By late summer, bird populations across the continent swell to an annual high as juveniles fledge and begin to disperse and/or migrate. This is one of the explanations for the disproportionately high number of hatch-year birds banded in the fall. Calculating annual age ratios is useful as year to year fluctuations provide markers of breeding productivity at the species level. These ratios are only useful if ageing banded birds is performed accurately and with caution. Refer to Table 4 for a list of species with percent HY calculations for all years.

Table 4. Yearly Comparison of Hatch-Year Percentages by Species

species	2006	2005	2004	2003	species	2006	2005	2004	2003
American Goldfinch	67	73	92	50	Least Flycatcher	97	97	100	100
American Redstart	88	91	88	82	Lincoln's Sparrow	100	93	75	100
American Robin	83	73	91	90	Magnolia Warbler	91	85	89	82
American Tree Sparrow	83	50	68	56	Mourning Warbler	75	67	86	100
Baltimore Oriole	88	80	90	100	Myrtle Warbler	91	80	87	91
Bay-breasted Warbler	88	71	100	100	Nashville Warbler	88	86	93	84
Black-and-White Warbler	90	100	82	78	Northern Cardinal	75	50	93	88
Blackburnian Warbler	95	100	80	100	Northern Parula	78	100	100	100
Black-capped Chickadee	100	97	100	94	Northern Waterthrush	88	72	86	82
Blackpoll Warbler	73	64	45	74	Orange-crowned Warbler	90	100	100	94
Black-thr. Blue Warbler	74	88	84	87	Ovenbird	97	79	97	88
Black-thr. Green Warbler	92	91	94	85	Philadelphia Vireo	79	100	50	75
Blue Jay	100	100	100	94	Red-eyed Vireo	82	95	97	85
Blue-headed Vireo	79	81	100	100	Rose-breasted Grosbeak	100	100	100	100
Brown Creeper	83	83	76	68	Ruby-crowned Kinglet	92	89	88	89
Canada Warbler	77	85	83	60	Scarlet Tanager	100	33	100	
Cape May Warbler	75	100	67	100	Slate-colored Junco	86	80	73	74
Cedar Waxwing	38	33	54	53	Song Sparrow	82	94	91	80
Chestnut-sided Warbler	93	89	90	91	Swainson's Thrush	81	78	86	72
Common Yellowthroat	83	92	82	77	Swamp Sparrow	78	81	57	72
Downy Woodpecker	100	83	100	100	Tennessee Warbler	77	72	100	81
Eastern Kingbird	86	40	80	50	Traill's Flycatcher	82	82	73	100
Eastern Phoebe	96	83	94	93	Veery	73	55	65	52
Eastern Towhee	100	100	100	50	Warbling Vireo	97	93	88	93
E. White-crown Sparrow	92	60	58	68	Western Palm Warbler	89	100	60	71
Eastern Wood-Pewee	100	100	100	100	White-throated Sparrow	86	91	85	78
European Starling	91	75	86	100	Wilson's Warbler	91	98	97	90
Field Sparrow	80	50	0	80	Winter Wren	100	91	98	94
Fox Sparrow	100	79	75	89	Wood Thrush	83	100	100	100
Golden-crowned Kinglet	94	95	94	91	Yellow Warbler	83	79	83	60
Gray Catbird	76	85	97	81	Yellow-bellied Flycatcher	92	100	81	100
Gray-cheeked Thrush	86	80	79	78	Yellow-bellied Sapsucker	94	100	100	67
Great Crested Flycatcher	100	100	100	100	Yellow-shafted Flicker	100	75	100	86
Hermit Thrush	89	89	93	87					
					Grand Total	89	88	87	83.7

Recaptures

There were 429 recaptures in fall 2006, which is the lowest number ever recorded in a fall season at TTPBRS. Of 429 recaptures, 25 were banded in a previous season at TTPBRS, also known as a “return.” A complete summary of returns is presented below in Table 5. The list of returns includes two individuals originally banded in spring 2003, our first season of operation. The Yellow-shafted Flicker was banded on the first day of banding at TTPBRS and was aged as a third-year male at that time, which would make the bird six years old at the time of recapture in fall 2006.

Table 5. Summary of Returns in Fall 2006

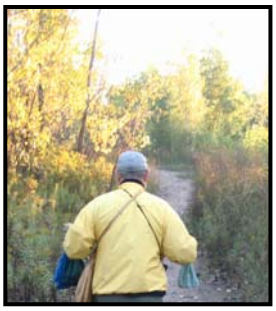
bandnumb	spcd	age	sex	day	mo	yr	net	banded
1453-31817	Yellow-shafted Flicker	6	4	24	8	2006	10	Spring 2003
2210-25899	Warbling Vireo	1	0	5	9	2006	04	Spring 2003
1142-12192	American Robin	1	4	9	8	2006	05	Spring 2004
2340-87065	Yellow Warbler	1	4	7	8	2006	04	Spring 2004
1212-61100	American Robin	1	4	11	8	2006	03	Spring 2005
1551-45318	American Tree Sparrow	1	0	10	11	2006	04	Spring 2005
1931-30300	Song Sparrow	1	4	7	8	2006	06	Spring 2005
1931-30899	Song Sparrow	1	0	1	9	2006	04	Spring 2005
2340-88442	American Goldfinch	1	5	8	8	2006	01	Spring 2005
1551-45602	American Tree Sparrow	1	0	6	11	2006	11	Fall 2005
1841-88467	Gray Catbird	1	0	5	8	2006	09	Fall 2005
1961-80068	Song Sparrow	1	0	14	8	2006	01	Fall 2005
1961-80762	Song Sparrow	1	0	12	8	2006	02	Fall 2005
2340-88754	Black-capped Chickadee	1	0	8	10	2006	04	Fall 2005
2430-32438	Black-capped Chickadee	1	0	15	10	2006	04	Fall 2005
1841-88621	Gray Catbird	1	5	10	8	2006	04	Spring 2006
1841-88639	Baltimore Oriole	1	4	15	8	2006	07	Spring 2006
1841-88691	Baltimore Oriole	1	4	9	8	2006	04	Spring 2006
1841-88694	Gray Catbird	1	0	16	9	2006	04	Spring 2006
1961-80773	Song Sparrow	1	0	16	8	2006	01	Spring 2006
1961-80821	Song Sparrow	1	5	6	8	2006	08	Spring 2006
2251-54161	Song Sparrow	1	5	5	8	2006	02	Spring 2006
2430-32725	Yellow Warbler	1	5	10	8	2006	07	Spring 2006
2430-32778	Yellow Warbler	1	5	9	8	2006	10	Spring 2006
2430-32782	American Goldfinch	1	5	26	8	2006	07	Spring 2006

The most commonly recaptured species in fall 2006 was Magnolia Warbler, as a record high 345 were banded and 71 recaptured. This is a remarkable total given that only 50 were recaptured in previous fall seasons combined. Magnolia Warblers gained an average of 0.2 grams per stopover with 17 birds exhibiting a negative weight change and 49 exhibiting a positive weight gain. The highest weight gain was recorded for an individual banded on September 10 and recaptured on September 14, which added 14% to its initial body weight in 5 days.

Table 6. Recapture Totals

Species	Recapture	Species	Recaptures	Species	Recaptures
AMGO	2	EAKI	1	PHVI	2
AMRE	11	EUST	1	RCKI	51
AMRO	2	FOSP	1	REVI	11
ATSP	3	GCKI	41	SCJU	4
BAOR	3	GCTH	3	SOSP	11
BAWW	7	GRCA	11	SWSP	1
BCCH	15	HETH	24	SWTH	3
BLBW	1	LEFL	6	TEWA	1
BRCR	5	LISP	1	TRFL	6
BTBW	11	MAWA	71	VEER	3
BTNW	3	MOWA	1	WAVI	8
CAWA	1	MYWA	27	WIWA	6
CEDW	1	NAWA	20	WTSP	9
CMWA	1	NOCA	2	YSFL	2
COYE	5	NOWA	2	YWAR	4
CSWA	8	OCWA	2		
DOWO	2	OVEN	12	total	429

Net Productivity



A fixture of the season reports from TTPBRS is the assessment of net capture rates. This information is useful as a means of monitoring the relationship between habitat succession/change and capture totals. Ideally habitat effects on net productivity are minimal as we want to avoid any bias on long-term trends. A complete 4-year picture of net location productivity is presented in Table 7. The top five most productive net locations in 2006 were nets 4, 1, 15, 2, and 7. Results for net 15 are perhaps the most surprising as this location has been average up until this year. Results for net 4 clearly indicate the significance of locating mistnets close to edges as the net was moved closer to the shoreline after 2003. Despite their reputation, nets 1-3 (net block A) was the most productive net group once again.

Table 7. Net Productivity

Net	Captured	Hours	2006 Rate	2005	2004	2003
1	474	417	1.13	0.99	0.69	0.86
2	357	415	0.86	0.72	0.76	0.71
3	329	418	0.78	0.57	0.49	0.46
4	559	428	1.3	0.94	0.85	0.35
5	218	427	0.51	0.44	0.38	0.31
6	228	427	0.53	0.54	0.49	0.35
7	349	425	0.82	0.79	0.72	0.42
8	327	430	0.76	1.18	0.67	0.52
9	195	359	0.54	0.55	0.52	0.75
10	284	359	0.79	0.41	0.43	1.01
11	183	359	0.51	0.43	0.33	0.81
12	234	399	0.58	0.32	0.24	0.34
13	186	399	0.46	0.33	0.34	0.4
14	175	400	0.43	0.34	0.34	0.34
15	375	426	0.88	0.67	0.55	0.57
Total	4473	6085	0.74	0.62	0.52	0.49

Unusual Records

Below are a few of the unusual records at the bird research station this fall. There were two new additions to the TTPBRS checklist. These new species bring the TTPBRS checklist to a total of 235 species and forms.

Alder Flycatcher- A singing male on August 5 (DGD)

Eastern Meadowlark- A single flyover on August 5 was the first fall record for the species (JM)

Golden-winged Warbler- Single captured on August 29 (mobs)

Broad-winged Hawk- (1st TTPBRS record) Single near net 15 on September 7 (DGD,NV)

Pied-billed Grebe- A single individual on September 11 (AJ)

Northern Mockingbird- Observed following a flock of Blue jays on September 19 (DGD)

Whip-poor-will- (2nd TTPBRS record) A roosting individual located on September 26 (IS et.al)

Wilson's Snipe- (2nd TTPBRS record) The first snipe during standard hours was found on October 20 (DGD)

Dickcissel- (2nd TTPBRS record) Single flyover on October 21 (DGD)

Green Heron- 1st fall record for TTPBRS on October 21 (DGD)

Northern Shrike- First shrike at TTPBRS since 2003 on October 30 (mobs)

Harlequin Duck- (1st TTPBRS record) Stunning male off the north trail on November 5 (AF)

Surf Scoter- First fall record on November 5 (DGD)

Oregon Junco- (1st TTPBRS record) A single individual banded on November 10 (mobs)

Slate-colored Junco- A record early bird on August 11 (mobs)

Olive-sided Flycatcher- The only fall record in 2006 occurred on August 21 (DGD)

Yellow-billed Cuckoo- First of two records this fall on August 21 (DJ)

Golden-crowned Kinglet- Record high count of 1500 birds on October 5 (mobs)

Ruby-crowned Kinglet- Record high count of 700 birds on October 5 (mobs)

Yellow Palm Warbler- First fall record of this subspecies on October 31 (mobs)

Observers

Dan Derbyshire	DGD	Ian Sturdee	IS
Julia Marko	JM	Attila Fust	AF
Norma Vanderzon	NV	Don Johnston	DJ
Andrew Jano	AJ	Many Observers	mobs

Personnel

Volunteer support for fall 2006 was exceptional once again as 1658 hours were contributed to the Fall Migration Monitoring Program. We welcomed new volunteers Joanna Jack and Andrew MacDonald this fall and we hope to see them return in the future. Thanks to all of the volunteers for their essential support in 2006!

Table 8. Volunteer Effort

Name	Hours	Name	Hours
Andrew Jano	255	Norma Vanderzon	44
Larry Menard	238	Steve Gillis	35
Ian Sturdee	182	Chris Dunn	29
Don Johnston	172	Jan McDonald	25
Teresa Carlin	120	Pierre Robillard	24
Seabrooke Leckie	77	Tom Flinn	21
Andrew Macdonald	76	Carol Gordon	19
Joanna Jack	73	Mitch Meredith	13
Attila Fust	72	Karina Dykstra	6
Bert Vanderzon	63	Paul Prior	4
Julia Marko	56		
Dave Langford	54	total	1658

Nocturnal Owl Monitoring Program

The Nocturnal Owl Monitoring Program was conducted on a volunteer basis for 18 nights starting on October 5 and ending on November 8. A total of 58 Northern Saw-whet Owls were captured this year, which includes 54 new bandings and 4 recaptures. Of four recaptures, 2 were recoveries of birds banded elsewhere. Overall it was a very quiet season for Saw-whets at TTPBRS with the exception of one evening when 66% of the owls for the fall were banded. On October 26, owls were on the move and at one point early in the evening 12 owls were extracted on a single net round! If it had not been possible to be at TTPBRS that evening our season would have been quiet indeed with just 18 owls banded, an all-time low. Populations of these migratory owls are cyclical and the last major southern irruption was 2003, which might mean that fall 2007 will be another big year.

Table 9. Nocturnal Owl Monitoring Summary

Date	Nets	Standard Hours	Non-standard Hours	Tot. Hours	Recoveries	Banded	Band/100 Hours
5-Oct	8	31			1	1	
6-Oct	8	32				1	
9-Oct	8	32					
10-Oct	7	28					
14-Oct	8	28					
16-Oct	8	24				1	
19-Oct	8	32	24			3	
20-Oct	8	32	40			2	
21-Oct	8	26				2	
24-Oct	3	3					
25-Oct	8	32	11.6			5	
26-Oct	8	32	48		1	36	
30-Oct	8	32	2			3	
4-Nov	8	16					
6-Nov	7	7					
8-Nov	8	16					
2003		549	75.25	624.25	3	184	29
2004		457	141	598		30	5
2005		526	210.6	736.6	5	65	8
2006		403	125.6	528.6	2	54	10

Education, Outreach and Collaborations

The research station at Tommy Thompson Park continues to engage the community through educational programming. A total of 359 visitors to Tommy Thompson Park were treated to bird banding demonstrations in fall 2006. This total includes a school class on October 5 and several clubs including the Toronto Ornithological Club, West Humber Field Naturalists and Toronto Field Naturalists. The Winged Migration program was inoperable this fall, which had a major impact on the amount of education being delivered through the research station. During winter 2007 we will be addressing this issue to ensure that we maintain a consistent and effective platform for providing information and demonstrations to the general public.

Volunteers are the foundation of TTPBRS and 2006 was a record year for volunteerism through our programs. Nearly 4,000 hours were contributed by over 30 volunteers, including six new volunteers. Training in field ornithology was provided to all of these volunteers, which will ensure that we maintain a high level of efficiency at TTPBRS in the future. Providing educational opportunities for those interested in bird research is a critical role for the research station, as venues for hands-on learning hard to find. Many of our trainees have gone on to bright futures in the environmental field through experience at TTPBRS. Since 2003, close to 100 volunteers have contributed nearly 12,000 hours!

In late 2006 a committee made up of TTPBRS volunteers was formed to increase capacity for project management, fundraising and program development. The committee will meet on a monthly basis and will contribute greatly to the evolution of the bird research station.

Data from the Fall Migration Monitoring Program at TTPBRS was submitted to the Canadian Bird Banding Office and Bird Studies Canada for archiving and analysis as per agreements of our bird banding license and membership with the Canadian Migration Monitoring Network. Scientists at Bird Studies Canada will be analyzing the five-year TTPBRS database in 2008 to add to continental population indexes.

During fall 2006, TTPBRS assisted the Fatal Light Awareness Program and the Lights Out Toronto campaign by providing training for bird rescue volunteers. This initiative was very successful and we will be continuing this partnership on an annual basis.

Collaborative research projects have become a staple of TTPBRS in recent years and in 2006 we assisted Dr. Simone Immler of the University of Sheffield in England for a project on the evolution of warblers. We also continued working with Dr. Ogden of the University of Guelph, for a multi-year project on the role of migratory birds in the dispersal of disease-bearing parasites. In 2005, TTPBRS collaborated with the Canadian Wildlife Service and Dr. Paul Hebert on genetic barcoding of Canadian bird species, a project that gained international attention in early 2007 and may lead to the identification of 15 new bird species in North America.

Acknowledgements

The following are to be acknowledged for their generous contributions to the Tommy Thompson Park Bird Research Station in 2006:

- Bird Studies Canada and the TTPBRS Baillie Birdathon Team
- Bushnell Outdoor Products
- Maclean Foundation
- Mountain Equipment Coop
- TD Friends of the Environment

We are also indebted to the volunteers who make all of our work possible:

- All the volunteers who lent their skills and time to the birds this fall
- Chris Dunn for his assistance with entry of the massive fall dataset!
- Seabrooke Leckie for all the vital work she does for TTPBRS

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Appendices

Appendix A. Banding Totals (highlighted species had record high banding totals in fall 2006)

species	2006	2005	2004	2003	species	2006	2005	2004	2003
Northern Harrier		1			Northern Parula	9	8	2	3
Sharp-shinned Hawk		4	3	15	Yellow Warbler	46	70	109	20
Cooper's Hawk				1	Chestnut-sided Warbler	54	27	20	21
Red-tailed Hawk			1		Magnolia Warbler	345	126	98	76
American Woodcock			1	2	Cape May Warbler	8	6	3	5
Yellow-billed Cuckoo			1		Black-throated Blue Warbler	84	33	32	31
Black-billed Cuckoo	2		2		Myrtle Warbler	381	285	159	137
Northern Saw-whet Owl				1	Black-throated Green Warbler	38	23	35	20
Yellow-bellied Sapsucker	18	19	20	6	Blackburnian Warbler	19	3	5	1
Downy Woodpecker	5	6	7	3	Pine Warbler		1		
Hairy Woodpecker		1			Western Palm Warbler	27	16	15	31
Yellow-shafted Flicker	6	8	15	14	Yellow Palm Warbler	1			
Eastern Wood-Pewee	3	1	2	5	Bay-breasted Warbler	25	7	4	4
Yellow-bellied Flycatcher	26	18	16	11	Blackpoll Warbler	37	36	20	53
Traill's Flycatcher	82	81	55	32	Black-and-White Warbler	38	19	11	9
Least Flycatcher	39	31	27	21	American Redstart	77	65	51	38
Eastern Phoebe	26	18	17	27	Ovenbird	62	38	34	16
Great Crested Flycatcher	1	5	1	3	Northern Waterthrush	57	25	22	17
Eastern Kingbird	7	5	10	2	Connecticut Warbler		1		1
Northern Shrike				1	Mourning Warbler	8	6	7	1
White-eyed Vireo			1		Common Yellowthroat	40	36	28	17
Blue-headed Vireo	14	21	17	11	Wilson's Warbler	66	42	29	29
Warbling Vireo	30	14	43	14	Canada Warbler	31	20	12	5
Philadelphia Vireo	24	10	4	4	Yellow-breasted Chat			1	
Red-eyed Vireo	66	60	39	13	Scarlet Tanager	3	3	1	
Blue Jay	2	8	9	123	Eastern Towhee	4	1	1	2
Barn Swallow		2			American Tree Sparrow	52	18	19	50
Black-capped Chickadee	7	484	54	32	Chipping Sparrow			2	
Red-breasted Nuthatch		5	23	2	Field Sparrow	5	2	1	5
White-breasted Nuthatch		5			Savannah Sparrow				1
Brown Creeper	65	90	97	139	Fox Sparrow	23	14	12	17
House Wren		5	3	1	Song Sparrow	50	48	44	64
Winter Wren	20	34	83	52	Lincoln's Sparrow	14	14	8	16
Marsh Wren				1	Swamp Sparrow	37	21	23	25
Golden-crowned Kinglet	723	685	856	525	White-throated Sparrow	183	265	305	394
Ruby-crowned Kinglet	539	536	401	399	Eastern White-crown Sparrow	12	15	26	19
Blue-gray Gnatcatcher	1		1		Gamb. White-crown Sparrow				2
Veery	41	29	17	21	White-crowned Sparrow	4			2
Gray-cheeked Thrush	42	92	70	23	Oregon Junco	1			
Gray-chee./Bick. Thrush			1		Slate-colored Junco	139	108	92	132
Swainson's Thrush	131	152	117	93	Northern Cardinal	8	4	15	8
Hermit Thrush	156	208	226	185	Rose-breasted Grosbeak	6	3	2	2
Wood Thrush	6	1	1	1	Indigo Bunting		1		
American Robin	18	11	33	38	Red-winged Blackbird			5	2
Gray Catbird	25	26	37	42	Common Grackle			4	
Brown Thrasher		3		3	Baltimore Oriole	17	10	19	4
European Starling	23	8	29	13	Purple Finch				2
Cedar Waxwing	8	3	83	19	American Goldfinch	6	15	24	2
Blue-winged Warbler		1							
Golden-winged Warbler	1								
Tennessee Warbler	30	18	6	16	Total	4473	4247	3870	3327
Orange-crowned Warbler	10	4	12	17					
Nashville Warbler	259	99	129	112					

Appendix B. Daily Totals

date	band	rec	cap	census	PC1	PC2	PC3	ST	casual	NST	Species
05-Aug-06	39	3	0	113	12	13	47	215	162	300	41
06-Aug-06	8	1	0	101	53	21	29	205	126	271	42
07-Aug-06	7	3	0	100	4	56	25	194	74	233	33
08-Aug-06	12	1	0	95	9	6	11	130	209	284	44
09-Aug-06	11	3	0	141	7	18	27	201	68	254	38
10-Aug-06	24	2	0	140	9	71	26	261	0	261	31
11-Aug-06	15	4	0	123	4	32	46	216	583	763	43
12-Aug-06	23	2	0	156	7	6	20	212	341	524	51
13-Aug-06	17	0	0	126	8	12	23	184	366	492	53
14-Aug-06	10	1	1	74	4	6	7	99	285	348	46
15-Aug-06	15	5	1	103	1	7	0	136	229	324	41
16-Aug-06	30	3	0	92	8	38	4	174	242	406	55
17-Aug-06	37	2	0	130	3	5	14	185	455	596	57
18-Aug-06	9	3	2	123	5	10	8	159	378	511	54
19-Aug-06	17	2	1	544	36	2	9	604	881	1394	52
20-Aug-06	10	0	0	19	0	0	0	29	49	76	29
21-Aug-06	66	3	2	129	5	1	11	217	358	523	64
22-Aug-06	58	6	0	156	5	7	4	236	318	502	60
23-Aug-06	171	6	12	178	0	11	9	386	432	787	58
24-Aug-06	126	19	1	153	3	22	4	328	326	615	58
25-Aug-06	0	0	0	59	0	0	0	59	0	59	18
26-Aug-06	62	23	0	81	2	0	1	169	175	332	52
27-Aug-06	23	8	3	199	1	12	16	261	307	527	55
28-Aug-06	29	7	3	131	1	7	2	179	258	394	53
29-Aug-06	32	14	0	118	1	2	3	169	372	461	56
30-Aug-06	38	2	3	86	4	1	4	138	523	626	62
31-Aug-06	55	3	1	152	4	3	0	218	448	629	62
01-Sep-06	78	12	1	135	0	0	0	227	293	465	55
03-Sep-06	0	0	0	101	0	0	0	101	0	101	27
04-Sep-06	102	17	1	117	4	5	2	246	381	595	51
05-Sep-06	127	13	7	158	37	55	14	410	746	1038	65
06-Sep-06	51	6	2	177	8	1	6	251	563	753	58
07-Sep-06	37	5	0	132	2	10	9	195	306	465	57
08-Sep-06	13	6	2	130	1	2	0	154	208	349	46
09-Sep-06	4	9	1	151	0	0	0	165	172	291	30
10-Sep-06	90	5	5	93	1	7	8	208	290	468	56
11-Sep-06	49	4	2	77	6	1	1	140	226	356	50
12-Sep-06	0	0	0	45	0	0	0	45	91	136	31
14-Sep-06	42	9	0	106	4	10	2	173	222	364	54
15-Sep-06	44	5	1	124	9	3	35	229	435	582	58
16-Sep-06	236	4	16	362	17	30	4	660	781	1327	72
17-Sep-06	47	8	2	269	5	3	8	332	502	731	64
18-Sep-06	16	7	0	139	2	2	9	175	344	436	52
19-Sep-06	43	8	2	193	1	1	5	253	503	639	60
20-Sep-06	47	7	2	83	4	4	2	149	239	364	58
21-Sep-06	26	1	3	145	6	0	19	200	372	543	62
22-Sep-06	110	4	1	106	42	1	2	265	413	584	64
23-Sep-06	21	7	1	199	0	1	2	225	241	377	41
25-Sep-06	221	4	4	465	20	10	8	703	595	1076	68
26-Sep-06	140	18	2	168	10	15	5	358	507	790	64
27-Sep-06	17	1	0	144	4	1	1	168	334	487	50
28-Sep-06	0	0	0	122	0	0	0	122	0	122	21
29-Sep-06	178	0	33	295	15	15	48	567	662	1049	65

date	band	rec	cap	census	PC1	PC2	PC3	ST	casual	NST	Species
30-Sep-06	105	8	0	134	13	4	0	257	365	553	55
01-Oct-06	90	14	0	248	8	12	7	376	706	980	50
02-Oct-06	150	6	8	133	2	7	5	308	504	736	46
03-Oct-06	0	0	0	85	0	0	0	85	0	85	19
05-Oct-06	162	0	363	247	23	20	3	818	2135	2780	46
06-Oct-06	162	3	2	253	19	13	11	466	517	873	52
07-Oct-06	105	4	0	351	32	5	5	499	379	799	56
08-Oct-06	30	10	0	217	5	7	5	273	343	547	43
09-Oct-06	23	14	0	164	1	9	8	218	348	465	42
10-Oct-06	168	3	7	284	20	7	4	486	345	801	45
13-Oct-06	0	0	0	105	0	0	0	105	0	105	19
14-Oct-06	0	0	0	127	0	0	0	127	0	127	18
15-Oct-06	56	7	0	151	8	3	5	229	108	322	41
16-Oct-06	37	7	0	466	5	15	7	537	799	1225	43
18-Oct-06	59	5	1	109	0	4	0	177	193	345	36
19-Oct-06	28	9	1	143	15	0	2	196	125	308	42
20-Oct-06	0	0	0	190	0	0	0	190	163	319	29
21-Oct-06	215	2	12	445	15	21	20	728	4133	4653	53
23-Oct-06	45	12	1	74	0	0	0	122	160	264	33
24-Oct-06	41	6	0	155	25	7	0	217	397	581	46
25-Oct-06	41	6	0	261	6	6	9	329	1603	1834	53
26-Oct-06	71	7	1	395	6	0	6	487	418	846	49
27-Oct-06	52	3	0	606	9	7	0	677	154	799	37
30-Oct-06	18	4	0	393	4	12	1	432	1565	1789	51
31-Oct-06	20	3	0	380	6	1	0	409	1150	1382	42
01-Nov-06	28	3	0	543	3	0	1	578	912	1147	49
02-Nov-06	0	0	0	444	0	0	0	444	99	519	25
04-Nov-06	9	2	1	1446	0	0	2	1460	216	1637	43
05-Nov-06	2	0	0	555	1	0	2	559	2286	2585	43
06-Nov-06	5	3	0	1018	2	0	6	1032	5338	5626	45
07-Nov-06	7	0	0	444	57	0	0	508	1958	2254	42
08-Nov-06	0	0	0	782	0	0	0	782	0	782	15
09-Nov-06	12	2	0	1183	9	0	0	1205	789	1928	32
10-Nov-06	47	2	0	545	7	10	0	591	1584	2111	45
	4471	431	515	20934	695	716	649	28192	47183	69087	4072