MIGRATION MONITORING AT TTPBRS:
Spring 2008

Dan Derbyshire

Toronto and Region Conservation Authority
Tommy Thompson Park Bird Research Station

June 2008

Table of Contents

Tables

Appendices

Suggested Citation:

Derbyshire, D.G. June 2008. Migration Monitoring at TTPBRS: Spring 2008. Unpublished.

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). Net closure on June 9, 2008, marked the completion of the 6th consecutive spring season of the Migration Monitoring Program at Tommy Thompson Park Bird Research Station. Data collection in spring 2008 was consistent with methodology outlined in the Operations Manual for Tommy Thompson Park Bird Research Station (Derbyshire 2004).

Coverage in spring 2008 was very good as 68 of 70 target days received at least some coverage. After each field day at TTPBRS, 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, a completed census and 3 completed point counts. This spring, a record low 34 days were coded with a 7 compared to 40 days in 2007 and 37 in 2006. Strong winds were more common than usual in spring 2008, which forced partial net closure on many mornings, thereby reducing the number of complete coverage days. In terms of net hours, 4,790 hours were logged, which is 76% of the target. Weather is responsible for most of the lost hours as high winds, precipitation and/or low temperatures limited net operation on many days.

During spring 2008, 1,893 birds were banded, 361 recaptured and an additional 35 birds were released unbanded. The total of birds banded in 2008 is a record low spring result for migrant abundance. Results for 30 species were record low including Yellow-bellied Flycatcher, Brown Creeper, Nashville Warbler and Fox Sparrow. Red-winged Blackbird, Rusty Blackbird, Northern Waterthrush and Yellow-bellied Sapsucker were amongst the few species with record high abundance. A remarkable total of 188 species were recorded for the season, which is 9 species higher than the previous record of 179 in 2006. The effect of increased effort for casual observations created by more quickly completed net rounds was likely a contributing factor to the high species count. Analysis of weekly capture statistics indicated that April was unusually slow despite some favourable warm fronts during the month. May was cool with persistently strong winds from the north, which likely limited numbers of birds passing through the region. Spring 2008 was a tremendous season for unusual species, which included four new species for the TTPBRS checklist.

The research station at Tommy Thompson Park continues to engage the community through educational programming. A total of 636 visitors to Tommy Thompson Park were welcomed at TTPBRS during the season. This was a record high total given that the Winged Migration program for schools was unable to operate due to funding constraints. Several community groups visited the station and TTPBRS was featured in both the Toronto Star and on Global TV news during the spring. Volunteer support was exceptional once again as 28 volunteers, including eight new applicants, contributed over 1,300 hours to TTPBRS programs.

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. This report details results of the Spring and Fall seasons at TTPBRS.

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 surveying. The remoteness of much of northern Canada precludes such survey methods. It is therefore necessary to monitor these populations on their southward and northward migrations.

Methods

Protocol

The protocol for data collection at TTPBRS is detailed in the Operations Manual for Tommy Thompson Park Bird Research Station (Derbyshire 2004). The protocol employs fixed effort census and point count surveys as well as a fully standardized capture regimen. Spring migration monitoring operates on a daily basis from April 1-June 9.

Spring Migration Monitoring Results

Synopsis

April

Our sixth season of the Migration Monitoring Program at TTPBRS got underway on April 1. A lot of discussion in the preceding weeks focused on whether or not the study area would be submerged under several inches of ice on opening day. We were pleased to find little or no snow and an impressive tally of 41 species on day one. Any thoughts that migration might be delayed in 2008 were quickly dismissed as a strong variety of migrants were noted including good numbers of Eastern Phoebes and Golden-crowned Kinglets as well as singles of **Evening Grosbeak**, Winter Wren and Yellow-bellied Sapsucker. Conditions turned cold on April 2, resulting in 15 birds banded in 3 hours of banding effort. Thirteen species were first arrivals for the spring, which included **Glaucous Gull**, Hermit Thrush and Rusty Blackbird. Overnight sub-zero temperatures on April 3 likely kept northbound migrants at bay as just 5 birds were banded in 4 hours of effort. None of this weather was helping migration as a meagre 4 birds were banded on April 5. Despite the low numbers of birds, new arrivals included Ruby-crowned Kinglet, Eastern Meadowlark and Osprey. April 6 was warm with winds from the ENE. Birding was much the same as the previous day although a **Sandhill Crane** flying low over the tree line was a definite highlight! Winds switched to south overnight which led to 54 birds banded on April 7. Suddenly, the study area was alive with the sights and sounds of spring. Fox Sparrows, Tree Swallows and White-throated Sparrows were welcome additions to the spring list.

The second week of the spring 2008 season at TTPBRS began with promising south winds and warm temperatures. Despite the favourable conditions, migration was quite sparse with just a sprinkling of Yellow-bellied Sapsuckers, Eastern Phoebes, Brown Creepers, sparrows and kinglets. A large flock of 52 **Bohemian Waxwings** noisily announced their presence in the tall poplars near the tip of peninsula D on April 8. This was the first record of this northern species for TTPBRS, which was followed by the 2nd record on April 9 and the third on April 10! Migration remained light into the 9th when rain arrived in Toronto around mid-morning. Steady rain and high winds moved in on the 11th, which succeeded in flooding two of our net lanes, a first since the spring of 2004. Thick fog settled over the area during the morning, which resulted in some excellent waterbird sightings. **Red-throated Loon**, **Harlequin Duck** and Ruddy Duck were just a few of many waterbird species viewable from the north shore. Also observed during the day were season firsts of Great Egret, Blue-winged Teal, Merlin, Caspian Tern and Swamp Sparrow.

The third week of Migration Monitoring this spring was exceptionally warm with record high water levels. Water striders, Leopard Frogs and the occasional Mallard were common sights in net lanes 4 and 9 at the south edge of the count area. The high-pressure system that lingered throughout the week produced little in the way of

landbird migration as daily banding totals ranged from a low of 9 (Apr 15) to a high of 27 (Apr 19). Common Terns arrived en masse on April 15 and were joined by first sightings of Northern Rough-winged Swallow and Red-necked Grebe for spring 2008. April 17 saw a shift to south winds, which likely caused a small increase in numbers of Hermit Thrush and Myrtle Warbler. A late Northern Saw-whet Owl was also spotted that morning. The following day was similar in terms of weather and birds found at TTPBRS. Highlights of the day included the arrival of Brown Thrashers and a total of 18 Myrtle Warblers detected during the morning. April 19 was a bit more active, particularly for 30 White-throated Sparrows busily tossing leaf litter for emerging insects. A Pine Warbler, Hairy Woodpecker and our first banding of a **Red-bellied Woodpecker** were highlights of the morning!

April 22 was warm with light east winds. The day featured moderate numbers of Hermit Thrush, Ruby-crowned Kinglet and White-throated Sparrow. Our second **Red-bellied Woodpecker** of the spring was observed on April 23, a day when just 19 birds were banded. The arrival of Palm Warbler on April 25 was a welcome sighting, although no significant changes in the migrant array were noted. A full cast of 6 volunteers was pleased by some new arrivals and increased activity on April 26. Yellow Warbler, Rough-legged Hawk and Northern Waterthrush were all new for the season. A total of 49 birds were banded, which included 33 White-throated Sparrows. April 29 was cool with north winds. Expectedly, the action was a little slow as 29 birds were banded and 29 species recorded on the daily census. Least Flycatcher and Common Yellowthroat were new arrivals that morning. April 30 was even quieter, which was made up for by the capture and banding of an immature Red-tailed Hawk, the second capture of the species since 2003!

May

The turn of the month brought a few familiar bird species to the station including Savannah and White-crowned Sparrow. A total of 12 birds were banded that morning indicating that migrants were few and far between. A change in the weather on May 2 brought substantial rain to the Toronto lakeshore, further raising the water levels in the study area. A rather quiet male Nashville Warbler was observed during a wet census. Overnight showers and early morning fog struck again in early May at TTPBRS, bringing 15 new arrivals and a remarkable volume of migrants on May 3. A total of 123 birds were banded and 14 warbler species recorded during a busy morning. **Whip-poor-will**, **Brewster's Warbler** and **Grasshopper Sparrow** were just a few of the many highlights. A remarkable 55 Palm Warblers were tallied, which is atypically high for the species at TTPBRS. Right on schedule, Yellow-rumped Warbler and White-throated Sparrow were easily the most numerous species during the week.

May 6-12, 2008, was a week with relatively few birds compared to previous spring seasons at TTPBRS. North winds were dominant during the period, which must have stalled northbound migrants. May 6 was the most active day of the week as 77 birds were banded and 72 species recorded in the seven hour count period. An impressive 40 Palm Warblers were noted, their buzzy trills seeming to echo from all directions throughout the morning. Ruby-crowned Kinglet, White-throated Sparrow, Palm and Myrtle Warblers were the most abundant species captured. Light south winds on May 7 pushed some migrants in from the south as another 74 birds were banded and just 6 recaptured. Scarlet Tanager, Wood Thrush and Eastern Kingbird were spotted for the first time in 2008. A group of 103 curious and eager students from Bishop Strachan School were welcomed late morning. North winds returned to hold the birds up again on May 8. Just 28 birds were banded during an abbreviated morning of coverage due to high winds. A Northern Parula was banded, and another tally of 40 Palm Warblers were notable. A cool and windy May 9 was even quieter with just 14 birds banded and 7 recaptured during the 2.5 hours of coverage. May 10 was the Tommy Thompson Park Spring Bird Festival, which ran from 7am-4pm. The event was very well attended and the birds did not disappoint. Thanks to all the volunteers, University of Guelph Wild Bird Clinic and the Fatal Light Awareness Program for their support! A record-setting estimate of 5-7 **Orchard Orioles** on the spit was the highlight of the day. Those pesky winds from the north forced an early closure once again on May 11. As expected, the weather kept things quiet as just 25 birds were banded. Twelve Least Flycatchers, a singing Tennessee Warbler and 10 Rose-breasted Grosbeaks were noteworthy.

The period of May 13-19 could be regarded as the "sweet spot" of spring migration as the last few early migrants intermingle with the peak for neotropicals in mid-May. This is one of the most popular weeks for birders at Point Pelee and other famous migrant traps in eastern North America. However, the quality of a May birding day is more dictated by weather systems than the calendar and this week at TTPBRS was a good example. Conditions were unusually cool for much of the week with winds dominating from the north. A total of 29 birds were banded on May 13, which included our first Orange-crowned Warbler of the spring. Light southerlies on the

14th produced a small push of migrants from the south as 69 birds were banded during the morning. Just 10 warbler species were noted, of which Magnolia and Myrtle were most numerous. A flyover Solitary Sandpiper and the arrival of Swainson's Thrush were also noteworthy. May 15 was a quieter day with 17 birds banded and 30 species recorded on census. Red-eyed Vireo made its first appearance for the season and another Orchard Oriole was spotted. Spring 2008 was remarkable for the number of Orchard Orioles observed. One was observed in each of 2006 and 2007 while a total of seven individuals were found in the TTPBRS count area alone this spring. The arrival of Gray-cheeked Thrush and Green Heron were highlights of the 16th, when just 16 birds were banded in six hours of effort. Warblers were few and far between at this point, and much of the activity in the study area was due to whirling pairs of nesting birds such as Yellow Warbler, Baltimore Oriole, American Robin, Warbling Vireo and Gray Catbird, among others. Wind and rain arrived mid-morning on May 17, forcing us to close up early for the day. Monitoring revealed no major changes in the composition and abundance of migrants that morning, although an especially vocal and 'well-dressed' Canada Warbler was well appreciated. The change in weather brought increased numbers of migrants to the site on May 18, with 51 birds banded before nets had to be closed by 10am. Warblers were well represented in the surveys, especially Magnolia (14 banded), along with Least Flycatcher, Veery and Swainson's Thrush. A biting wind blew from the northwest on May 19, which would normally translate to another quiet day; however, migrants were found in high numbers in sheltered areas where midges were abundant. The highlight of the day was a female **Summer Tanager** observed on census, a first record for TTPBRS!

A light breeze from the south on May 20 stimulated an impressive movement, which brought several new arrivals and a total of 78 species during that morning. A total of 151 birds of 39 species were banded, the highest single day banding total of spring 2008. Swainson's Thrush, Magnolia Warbler, Chestnut-sided Warbler, Northern Waterthrush and American Redstart were the most numerous species banded during the morning. Ruby-throated Hummingbird and Wilson's, Blackpoll and Mourning Warblers were all new arrivals for the spring. High winds and cool temperatures arrived the following day, leading to less bird activity in the study area. Many birds from the previous day opted to stopover, as evidenced by the 25 individuals recaptured. The banding of a female **Cerulean Warbler** and the observation of a **Yellow-throated Vireo** were both exceptional records as both were new for the TTPBRS Migration Monitoring Program! More high winds on May 22 forced many migrants to linger in sheltered areas on the Toronto lakeshore as recaptures (31) outnumbered new bandings (30) for the first time this spring. Warblers were well represented during the morning as 19 species were recorded and some high counts were noted such as 24 American Redstart and 28 Magnolia. May 23 was quite interesting as the strong north winds never relented and yet an increase in new migrants with very high fat scores were sampled. This was likely due to the many restless and corpulent migrants dispersing between greenspaces in wait for suitable winds. Swainson's Thrushes and Red-eyed Vireos were more apparent, adding some late spring flavour to the masses of warblers present. A total of 10 Blackburnian Warblers (including 4 males in a net at once!) was a standout amongst the 23 warbler species noted. More "weighty" warblers arrived on May 24 with strong north winds. Winds shifted to light southerlies for May 25, which resulted in the first significant wave of empidonax flycatchers, Gray-cheeked and Swainson's Thrushes and another strong push of warblers. **Common Nighthawk**, Orchard Oriole and Winter Wren were noteworthy sightings. The final day of the update period was a little less busy but still very productive for surveys and net checks. The composition of migrants had changed sharply overnight as thrushes, flycatchers and Cedar Waxwings took centre stage after a mass scale departure of most warbler species. A record high total of 30 Common Yellowthroats was significant (banded and observed).

Black-billed Cuckoo appeared in the study area for the first time this year on May 27, an otherwise unremarkable morning with strong northerlies and just 13 birds banded. By this time, the vegetation in the count area was quickly maturing, providing both insects and suitable cover for the late neotropical migrants such as Blackpoll Warbler and Yellow-bellied Flycatcher. Six flycatcher species were noted on May 28 along with a light movement of Catharus thrushes (e.g. Swainson's, Gray-cheeked), a few vireos and a lone Least Sandpiper. Species composition was much the same on May 29, although more Canada and Wilson's Warblers were evident. Winds switched to south on May 30, which brought a small dose of new migrants to the area. A total of 39 birds were banded, which included 12 Swainson's Thrushes, and small numbers of 9 warbler species. While the water levels were slowly receding, there was still an absence of suitable habitat for shorebirds on peninsula D. Despite this, Semipalmated Plover, Semipalmated Sandpiper, Black-bellied Plover and Dunlin were detected flying west during the morning of May 31.

June

High winds from the west returned around midmorning on June 1. At long last, our first Purple Martin of the spring was heard before the wind forced complete net closure. A **Black Tern** flew over during the census on June 2, the second record of this species for TTPBRS and first since 2004! The final week was all about nesting birds with the frenzied activity of the many Yellow Warblers, Gray Catbirds, Warbling Vireos, Eastern Kingbirds and Baltimore Orioles that call TTPBRS home. A few migrants were found on June 3, which included a Green Heron and a Myrtle Warbler. A total of 16 birds were banded for the morning of June 5, which included a couple of Yellow-bellied Flycatchers and a female Black-throated Blue Warbler. June 6 was noticeably more active with flycatchers as 4 Great Crested and the season's first and only **Olive-sided Flycatcher** were tallied. Also of note on this day was the banding of a record late White-throated Sparrow. Fifteen mist nets ran for 6 hours on June 7, which yielded just 6 birds, the highlight of which was a Veery. Common Loons were observed quietly passing overhead on a daily basis throughout the week and numbers of arctic-bound Canada Geese peaked at 105 on June 7.

Overview of Spring Coverage and Results

Coverage in spring 2008 was very good as 68 of 70 target days received at least some coverage. After each field day at TTPBRS, 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, a completed census and 3 completed point counts. This spring, a record low 34 days were coded with a 7 compared to 40 days in 2007 and 37 in 2006. Strong winds were more common than usual in spring 2008, which forced partial net closure on many mornings, thereby reducing the number of complete coverage days. In terms of net hours, 4,790 hours were logged, which is 76% of the target. Weather is responsible for most of the lost hours as high winds, precipitation and/or low temperatures limited net operation on many days.

During spring 2008, 1893 birds were banded, 361 recaptured and an additional 35 birds were released unbanded. The total of birds banded in 2008 is a record low spring result for migrant abundance. A remarkable total of 188 species were recorded for the season, which is 9 species higher than the previous record of 179 in 2006. The effect of increased effort for casual observations created by more quickly completed net rounds was likely a contributing factor to the high species count. Refer to Table 1 for a summary of spring 2008 coverage and results compared to previous years.

Table 1. Spring Coverage Statistics and Results Summary

Unit	2008	2007	2006	2005	2004
Days with at least some coverage	68	67	64	67	69
Days with full coverage (Code 7)	34	40	37	50	37
Total Species Detected	188	178	179	173	161
Birds Banded	1893	2638	2570	2547	2519
Birds Recaptured	361	369	470	468	604
Captured Unbanded	35	107	54	78	236
Total Captures	2289	3114	3094	3093	3359
Net Hours	4790	4595	4687	5492	5317
New birds banded/net hour	.39	.57	.54	.46	.47

Banding Summary and Discussion

Weather for much of the season was cool with high and persistent winds. This, and the fact that wintering bird populations were low from last summer's lackluster breeding season in some northern regions, are likely strong contributing factors to our lowest spring migration to date for migrant abundance. Periodic shifts in population densities are natural and we can expect highs and lows to be part of long-term trends.

This past season was our fifth "complete" season of spring migration monitoring because 2003 was a pilot year with coverage not beginning until early May. It certainly was a quiet season on the banding front as the total of 1,893 birds banded is 75% of the previous low of 2,519 in 2004. These reports on each individual season provide an opportunity to look a little deeper at the data with the intention of pinpointing some results of interest.

A look at weekly capture statistics (Table 2) by year indicates that April was very slow with no apparent surges in movement of early spring migrants, which also occurred in 2004. A few suitable warm fronts did occur during the month but failed to produce any significant migration. Doppler radar observations showed strong pulses of migrants passing through the Midwest with comparatively little migration happening in the east. This suggests that population levels were a factor in the relative absence of early spring migrants in 2008. Nothing really stands out in the weekly results for May as the capture rates (new birds banded/net hour) were lower than average across the board.

Table 2. Spring Weekly Capture Statistics

Week	Banded 2004	Rate	Banded 2005	Rate	Banded 2006	Rate	Banded 2007	Rate	Banded **2008**	Rate
April 1-7	42	0.09	252	0.65	71	0.24	193	0.88	95	0.24
April 8-14	67	0.12	283	0.47	199	0.48	45	0.24	84	0.20
April 15-21	161	0.3	138	0.23	200	0.34	114	0.28	126	0.21
April 22-28	153	0.28	71	0.21	167	0.46	390	0.66	132	0.24
April 29-May 5	249	0.49	133	0.25	487	0.78	348	0.65	269	0.56
May 6-12	663	1.15	418	0.66	332	0.67	584	0.96	278	0.57
May 13-19	265	0.44	410	0.65	244	0.51	317	0.56	202	0.44
May 20-26	575	1.03	281	0.46	347	0.97	314	0.54	498	0.87
May 27-June 2	267	0.52	446	0.75	409	0.69	290	0.50	173	0.32
June 3-8	77	0.14	115	0.19	114	0.23	43	0.13	36	0.13
April 1-June 8	2519	0.47	2547	0.46	2570	0.54	2638	0.57	1893	0.39

At the species level, there are some very sharp decreases in abundance evident from the banding data for 2008. A total of 30 species were banded in record low numbers this spring. The list of top ten species banded for all years shows that numbers of Golden-crowned Kinglet, Brown Creeper and Slate-colored Junco and Hermit Thrush were well below normal.

Table 3. Top Ten Species Banded, 2004-2008

2008 Rank	Species	2008 Banded	04-07 Ave	04-07 Ave Rank
1	White-throated Sparrow	255	307	1
2	Myrtle Warbler	125	182	2
3	Magnolia Warbler	110	116.5	5
4	Red-winged Blackbird	96	59.5	15
5	Swainson's Thrush	84	139.75	3
6	Song Sparrow	71	69.25	10
7	Ruby-crowned Kinglet	67	82.5	7
8	Yellow Warbler	63	64	11
9	Common Yellowthroat	62	60.75	14
10	Hermit Thrush	52	97.75	6
13	Golden-crowned Kinglet	43	132.5	4
22	Brown Creeper	26	73.5	8
16	Slate-colored Junco	33	71.5	9

Several species were sampled in record high numbers including Yellow-bellied Sapsucker, Red-winged Blackbird, Northern Waterthrush and Palm Warbler. The list of species with significant decreases is much longer. Most notable of the lot include Yellow-bellied Flycatcher, Golden-crowned Kinglet, Brown Creeper and Gray-cheeked Thrush. Both the decreased and increased groups of species are highly varied in terms of ecology, although the effects of high water levels may be a factor in the increases evident for several wetland species (e.g. Rusty Blackbird, Northern Waterthrush, Red-winged Blackbird). Refer to Appendix A for a complete list of individuals banded by species versus the long-term average.

Table 4. Selected species showing marked decrease/increase in 2008

Increase	2008 Banded	2004-2007 Ave	(+-%)	Decrease	2008 Banded	2004-2007 Ave	(+-%)
Yellow-bellied Sapsucker	10	1.66	600.00	Yellow-bellied Flycatcher	7	26.25	26.67
Northern Parula	4	1	400.00	Golden-crowned Kinglet	43	132.5	32.45
Northern Rough-wing. Swallow	4	1	400.00	Brown Creeper	26	73.5	35.37
Rusty Blackbird	4	1	400.00	Swamp Sparrow	23	63.5	36.22
Tennessee Warbler	4	1.75	228.57	Gray-cheeked Thrush	21	48.25	43.52
Red-winged Blackbird	96	59.5	161.34	Traill's Flycatcher	28	63.5	44.09
Northern Waterthrush	21	14.75	142.37	Slate-colored Junco	33	71.5	46.15
Western Palm Warbler	52	37.25	139.60	Nashville Warbler	25	49	51.02
American Robin	35	24.5	142.86	Fox Sparrow	10	18.75	53.33
				Swainson's Thrush	84	139.75	60.11
				Myrtle Warbler	125	182	68.68

Capture statistics were compiled for each individual net location in 2008 compared to 2004 and 2005. Net 10 and 11 were the most productive net locations this spring, which was the same result in 2004-2005. Nets 1,2,3, 5 and 6 show significant decreases in productivity. Cedar boardwalks were installed at net locations 4 and 9 and it is evident from the table that these structures had little or no effect on capture rates. An effort should still be made to better blend these structures into the habitat to mitigate any avoidance by birds.

Table 5. Spring 2008 Net productivity

Net	Captured	Hours	Banded/Hour 2008	Banded/Hour 2005	Banded/Hour 2004
1	123	311	0.40	0.61	0.55
2	96	309	0.31	0.52	0.51
3	103	312	0.33	0.48	0.5
4	120	329	0.36	0.43	0.57
5	46	329	0.14	0.29	0.34
6	62	329	0.19	0.43	0.49
7	142	329	0.43	0.38	0.5
8	190	329	0.58	0.49	0.54
9	116	323	0.36	0.43	0.5
10	252	324	0.78	0.58	0.63
11	198	324	0.61	0.68	0.74
12	137	310	0.44	0.45	0.3
13	100	310	0.32	0.29	0.25
14	85	312	0.27	0.32	0.25
15	116	310	0.37	0.55	0.37

Recaptures

A total of 360 birds were recaptured this spring, which is the lowest season total of recaptures since TTPBRS began. The low number of recaptures is, at least in part, due to the low number of new birds banded in spring 2008. Total number of recaptures has decreased steadily since 2004 when 604 birds were recaptured, nearly double that of the 2008 total. Explanations for this are not apparent but this trend may be significant to any future studies of migratory staging at TTPBRS.

Table 5. Spring 2008 Recapture Totals

species	recap	foreign	species	recap	foreign
Yellow Warbler	39	0	American Goldfinch	4	0
Song Sparrow	27	0	Slate-colored Junco	4	0
Magnolia Warbler	23	0	Veery	4	0
White-throated Sparrow	21	0	Least Flycatcher	3	0
Black-capped Chickadee	20	0	Black-and-White Warbler	3	0
Baltimore Oriole	19	0	Brown Thrasher	3	0
Gray Catbird	16	0	Traill's Flycatcher	2	0
Red-winged Blackbird	15	0	Swamp Sparrow	2	0
Myrtle Warbler	14	0	Northern Cardinal	2	0
American Robin	12	0	Nashville Warbler	2	0
Western Palm Warbler	11	0	Black-throated Blue Warbler	2	0
Golden-crowned Kinglet	11	0	Ovenbird	2	0
Hermit Thrush	11	0	Canada Warbler	2	0
Swainson's Thrush	10	1	Eastern Kingbird	1	0
Warbling Vireo	9	0	Eastern White-crowned Sparrow	1	0
Common Yellowthroat	9	0	Lincoln's Sparrow	1	0
American Redstart	9	0	Northern Rough-winged Swallow	1	0
Brown Creeper	9	0	Tennessee Warbler	1	0
Ruby-crowned Kinglet	9	0	Cape May Warbler	1	0
Brown-headed Cowbird	6	0	Wilson's Warbler	1	0
Tree Swallow	6	0	Wood Thrush	1	0
Northern Waterthrush	6	0			
Chestnut-sided Warbler	5	0	Total	360	1

Standard Totals

While banding totals offer more detail for analysis and discussion, the Standard Totals (ST) are more appropriate for assessing population trends. The Standard Total (ST) is a figure derived each day for each species using data from the census, point counts and captures during the count period. The ST is best for analysis because it integrates the strengths of both the visual and capture sampling methods. Spring 2008 totals for banding and ST are presented side-by-side in comparison to their respective 2004-2007 averages (Appendix C). It is interesting to note that the sample from banding alone is quite consistent with the ST for most species, however, there are instances where the figures moderately differ. In the case of Rusty Blackbird, banding totals are well above average while the ST figure is close to equal that of the long-term average. Once again, high water is a likely factor contributing to an increased capture probability for this species. This example illustrates the enhanced precision attained by using observation surveys and captures in concert to derive a sample of birds in an area. It is recommended that TTPBRS assess ST results alongside banding results as a means of evaluating localized effects of habitat structure changes.

Unusual Sightings

Spring 2008 was a phenomenal season for unusual sightings as a total of 188 species were recorded, which included four new species for the TTPBRS checklist. Bohemian Waxwing, Cerulean Warbler, Summer Tanager and Yellow-throated Vireo were all recorded for the first time this season. Details on the most noteworthy records are found below.

Black Tern: (2nd TTPBRS Record) A single flyover on June 2 was the first since 2005 (JMS)

Blue-winged Warbler: A slow season with just one bird on May 26 (DJ)

Bohemian Waxwing: (1st TTPBRS Record) A flock of 52 on April 8 and another flock of 23 on April 10 (DGD)

Cerulean Warbler: (1st TTPBRS Record) A female banded on May 21 (MOBS)

Common Nighthawk: A roosting bird found on May 28 (MOBS)

Common Redpoll: (1st Spring Banding Record) Five dates from April 3 to April 12 (MOBS)

Evening Grosbeak: (2nd TTPBRS Record) A single flyover on April 1 (DGD)

Forster's Tern: April 28 (DGD)

Grasshopper Sparrow: singles observed on May 3 and May 24 (DGD)

Harlequin Duck: (2nd TTPBRS Record) A flyover on April 12 (CJD)

Lapland Longspur: April 3 (DGD)

Northern Saw-whet Owl: A record season for spring with four sightings from April 1-April 17 (MOBS)

Olive-sided Flycatcher: June 6 (TF)

Orchard Oriole: A total of 7 individuals with the first on May 9 (CJD)

Red-bellied Woodpecker: (1st Banding Record) One banded on April 19 and another observed on April 24 (MOBS)

Red-throated Loon: (1st Spring Record) April 12 (CJD)

Rough-legged Hawk: (2nd Spring Record) Flyover on April 26 (CJD)

Sandhill Crane: (1st Spring Record) April 6 (DGD)

Summer Tanager: (1st TTPBRS Record) A female first observed on May 19 (DGD) lingered through at least May 22

Whip-poor-will: Flushed near net 3 on May 3 (DGD)

Yellow-throated Vireo: (1st TTPBRS Record) Long overdue, a single observed on May 21 (DGD)

Key to Observers

JMS	Josh Shook
DGD	Dan Derbyshire
MOBS	Many Observers
CJD	Chris Dunn
TF	Tom Flinn

Personnel

A total of 28 volunteers contributed 1,314 hours to the spring migration monitoring program at TTPBRS! Many of these volunteers put in extra hours toward data management and fundraisers. Eight new eager volunteers were welcomed to the TTPBRS team this spring. Thanks are due to all of our volunteers for their unwavering support this season!

Table 6. Volunteer Effort

Name	Hours	Name	Hours
Ian Sturdee	185	Javier Arata	35
Don Johnston	176	Attila Fust	31
Andrew Jano	117	Steve Gillis	31
Seabrooke Leckie	88	Tom Flinn	23
Chris Dunn	78	Marie-Pierre Desrosiers	20
Josh Shook	69	Elizabeth Underhill	20
Maya Ricker-Wilson	64	Marc Dupuis Desormeaux	15
Jan McDonald	47	Julia Marko Dunn	15
Josh Mansell	46	Dave Langford	14
Teresa Carlin	45	Mitch Meredith	12.8
Pierre Robillard	43	Knud Rasmussen	7
Bronwyn Dalziel	40	Bert Vanderzon	7
Larry Menard	39	Karina Dykstra	7
Victor Wong	36	Darci Lombard	3.8
		Total	1314.6

Education, Outreach and Collaborations

Collaborative Research Projects

In spring and fall 2007, TTPBRS participated in a landmark project by the Canadian Migration Monitoring Network to determine origins of select migratory species. The goal of this project was to draw stable isotopes from tail feathers of CMMN target species to more accurately determine breeding catchment areas that correspond to specific CMMN stations and migratory routes. Nearly 1000 samples were submitted to the project in 2007. In 2008, TTPBRS collected feathers from under sampled species last year (American Redstart, Orange-crowned Warbler and Tennessee Warbler).

We also collected ticks for John Scott, coordinator of the Bird Tick Project, which has been operating for over a decade to inventory transport of ticks by migratory birds. TTPBRS collected and submitted over 20 ticks of a variety of species, including several of tropical varieties.

Education and Outreach

The research station at Tommy Thompson Park continues to engage the community through educational programming. Banding demonstrations and interpretive talks were given to 636 people at TTPBRS in spring 2008. The Winged Migration program did not operate this spring due to funding constraints, which is the reason for the low total compared to other seasons. However, we did welcome a record high number of visitors on weekends and holidays to TTPBRS. Groups from York University, Toronto Outdoors Club, Toronto Ornithological Club, Fatal Light Awareness Club and the Out and Out Club were received at the station this spring along with two large contingents of students from local schools.

TTPBRS was well featured in the media this spring, which significantly increased our outreach to the public. Features in the Toronto Star and on Global TV news profiled the park and the work of TTPBRS in the understanding, protection and awareness of birds in Toronto.

Acknowledgements

The following are to be acknowledged for their generous contributions to the Tommy Thompson Park Bird Research Station in 2008:

- Bird Studies Canada and the TTPBRS Baillie Birdathon Team
- Bushnell Outdoor Products
- Mountain Equipment Coop
- TD Friends of the Environment
- Portlands Energy Centre
- Canadian Tire Corporation
- TTPBRS Members
- Proctor & Gamble

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

- All the volunteers who lent their eyes and ears to the birds during the spring
- The TTPBRS Committee: Don Johnston, Seabrooke Leckie, Ian Sturdee, Julia Marko Dunn and Norma Vanderzon

References

Derbyshire, D.G. January, 2004. *Pilot Migration Monitoring at Tommy Thompson Park: Spring and Fall 2003*. Unpublished report.

Derbyshire, D.G. April, 2004. *Operations Manual for Tommy Thompson Park Bird Research Station.* Unpublished.

Derbyshire, D.G. July, 2004. *Migration Monitoring at Tommy Thompson Park: Spring 2004*. Unpublished report.

Derbyshire, D.G. December, 2004. *Migration Monitoring at Tommy Thompson Park: Fall 2004*. Unpublished.

Derbyshire, D.G. July, 2005. *Migration Monitoring at Tommy Thompson Park: Spring 2005*. Unpublished report.

Derbyshire, D.G. February, 2006. *Migration Monitoring at Tommy Thompson Park: Fall 2005*. Unpublished report.

Derbyshire, D.G. 2006. *Migration Monitoring at Tommy Thompson Park: Spring 2006*. Unpublished report.

Derbyshire, D.G. February, 2007. *Migration Monitoring at Tommy Thompson Park: Fall 2006*. Unpublished report.

Derbyshire, D.G. January, 2008. Migration Monitoring at Tommy Thompson Park: Spring and Fall 2007. Unpublished report.

Appendices

Appendix A. Banding Totals, Spring 2008 (shaded species are new banding records for spring)

Species	Banded 2008	04-07 Ave	Species	Banded 2008	04-07 Ave
White-throated Sparrow	255	307	Warbling Vireo	6	7.5
Myrtle Warbler	125	182	Field Sparrow	6	5.5
Magnolia Warbler	110	116.5	Black-capped Chickadee	6	3.5
Red-winged Blackbird	96	59.5	Cape May Warbler	5	8
Swainson's Thrush	84	139.75	Yellow-shafted Flicker	5	7
Song Sparrow	71	69.25	Chipping Sparrow	5	3.5
Ruby-crowned Kinglet	67	82.5	Eastern Kingbird	5	2.25
Yellow Warbler	63	64	Northern Cardinal	4	4.5
Common Yellowthroat	62	60.75	Orange-crowned Warbler	4	3.25
Hermit Thrush	52	97.75	Tennessee Warbler	4	1.75
Western Palm Warbler	52	37.25	Northern Parula	4	1
Gray Catbird	48	55.75	Northern Rough-wing. Swallow	4	1
Golden-crowned Kinglet	43	132.5	Rusty Blackbird	4	1
American Redstart	39	44.75	Common Redpoll	3	0
American Robin	35	24.5	Bay-breasted Warbler	2	4.25
Slate-colored Junco	33	71.5	Blue-headed Vireo	2	3.25
Lincoln's Sparrow	32	38	Scarlet Tanager	2	2.75
Least Flycatcher	30	42.5	American Woodcock	2	2.5
Veery	29	39	Red-breasted Nuthatch	2	1
Traill's Flycatcher	28	63.5	Eastern Wood-Pewee	1	3.5
Chestnut-sided Warbler	28	33.5	European Starling	1	3
Brown Creeper	26	73.5	Great Crested Flycatcher	1	3
American Goldfinch	26	48.25	Eastern Towhee	1	2.5
Nashville Warbler	25	49	Downy Woodpecker	1	1.75
Eastern White-crown. Sparrow	25	26.5	Savannah Sparrow	1	1.5
Swamp Sparrow	23	63.5	Cedar Waxwing	1	1.25
Gray-cheeked Thrush	21	48.25	Blue-gray Gnatcatcher	1	1
Ovenbird	21	38.75	Hairy Woodpecker	1	0.5
Northern Waterthrush	21	14.75	Cerulean Warbler	1	0
Wilson's Warbler	19	34	Red-bellied Woodpecker	1	0
Black-throated Blue Warbler	18	22	Red-tailed Hawk	1	0
Blackpoll Warbler	16	17	Philadelphia Vireo	0	4.75
Black-throat. Green Warbler	13	17.25	Blue-winged Warbler	0	2.5
Black-and-White Warbler	12	19.5	Blue Jay	0	2.25
Winter Wren	12	16.25	Indigo Bunting	0	2
Brown-headed Cowbird	11	18.5	Golden-winged Warbler	0	1.25
Canada Warbler	11	15.75	Dunlin	0	1
Red-eyed Vireo	10	21.75	Pine Warbler	0	1
Fox Sparrow	10	18.75	Yellow-billed Cuckoo	0	0.75
Tree Swallow	10	10	Least Sandpiper	0	0.5
Blackburnian Warbler	10	9.25	Purple Finch	0	0.5
Eastern Phoebe	10	8	White-breasted Nuthatch	0	0.5
Yellow-bellied Sapsucker	10	1.6666667	Brewster's Warbler	0	0.25
Mourning Warbler	9	13.25	Gambel's White-crowned Sparrow	0	0.25
Brown Thrasher	8	13.75	Hooded Warbler	0	0.25
Yellow-bellied Flycatcher	7	26.25	Mourning Dove	0	0.25
Baltimore Oriole	7	13.5	Sharp-shinned Hawk	0	0.25
Common Grackle	7	11.5	Spotted Sandpiper	0	0.25
Wood Thrush	7	11	Yellow Palm Warbler	0	0.25
House Wren	7	6.75	Yellow-throated Warbler	0	0.25
American Tree Sparrow	6	12			
Rose-breasted Grosbeak	6	8	Total	1893	

Appendix B. Spring 2008 Daily Totals

date	pks	banded	recaps	Cap	census	PC1	PC2	PC3	ST	Casual	NST	tot_specie
01-Apr-08	2	11	2	0	780	0	0	0	791	189	939	41
02-Apr-08	3	15	3	0	529	7	34	11	595	685	933	48
03-Apr-08	5	5	5	0	417	26	15	8	472	1197	1441	51
04-Apr-08	0	0	0	0	165	0	0	0	165	0	165	23
05-Apr-08	5	4	5	0	542	15	10	5	578	244	762	45
06-Apr-08	5	6	5	0	240	8	18	7	276	390	587	40
07-Apr-08	2	54	2	0	313	28	24	10	428	618	800	55
08-Apr-08	8	25	8	0	245	62	13	17	369	1022	1309	60
09-Apr-08	6	20	6	0	183	3	0	0	211	494	661	45
10-Apr-08	2	5	2	0	174	12	6	8	200	494	582	53
12-Apr-08	2	14	2	0	222	11	12	0	256	607	714	63
13-Apr-08	2	11	2	0	327	13	11	22	381	309	621	51
14-Apr-08	6	9	6	0	181	11	28	21	244	360	534	48
15-Apr-08	1	9	1	0	186	18	13	10	230	878	986	61
16-Apr-08	2	13	2	0	255	28	14	10	317	988	1139	65
17-Apr-08	1	19	1	0	189	25	19	22	270	646	787	61
18-Apr-08	4	20	4	0	196	0	31	17	246	310	457	52
19-Apr-08	3	28	3	1	289	22	9	19	350	347	620	59
20-Apr-08	4	21	4	0	204	13	21	29	267	145	371	54
21-Apr-08	4	16	4	0	158	12	17	21	223	297	428	56
22-Apr-08	2	21	2	0	143	17	17	17	208	436	540	59
23-Apr-08	3	19	3	2	157	19	21	19	229	336	464	53
24-Apr-08	0	21	0	0	122	20	18	16	187	391	479	54
25-Apr-08	4	15	4	0	167	16	17	21	225	285	395	52
26-Apr-08	4	49	4	0	174	28	17	20	275	196	383	58
27-Apr-08	7	7	7	1	148	11	18	19	194	141	294	55
28-Apr-08	0	0	0	0	0	0	0	0	0	114	114	8
29-Apr-08	4	29	4	1	122	22	19	25	201	186	326	49
30-Apr-08	2	14	2	1	135	26	13	0	187	93	256	45
01-May-08	4	12	4	0	115	19	13	29	175	311	387	50
02-May-08	0	0	0	0	147	0	0	0	147	154	257	43
03-May-08	4	123	4	6	165	0	40	39	375	505	684	69
04-May-08	14	58	14	0	194	19	22	21	300	238	443	64
05-May-08	6	33	6	2	139	22	20	16	216	178	342	60
06-May-08	8	77	8	1	202	27	22	20	330	470	699	72
07-May-08	6	74	6	1	204	22	34	24	349	396	650	66
08-May-08	6	28	6	0	173	0	0	0	207	205	362	64
09-May-08	7	14	7	0	191	0	0	0	212	177	321	56
10-May-08	6	19	6	0	201	15	14	18	256	113	346	65
11-May-08	4	26	4	1	132	29	0	0	179	152	285	61
12-May-08	6	40	6	1	146	20	24	27	235	207	360	66
13-May-08	1	29	1	1	103	21	23	22	183	238	335	67
14-May-08	5	65	4	4	133	31	26	27	251	263	408	68
15-May-08	5	17	5	0	116	22	34	25	190	194	289	56
16-May-08	7	16	7	0	143	18	30	15	211	159	286	58
17-May-08	4	21	4	0	125	0	0	0	146	170	258	50
18-May-08	4	54	4	0	152	21	25	0	241	182	346	58
19-May-08	0	0	0	0	132	0	0	0	132	145	248	55
20-May-08	15	151	15	4	128	19	21	23	331	250	506	78
21-May-08	25	34	25	0	155	26	25	21	260	210	397	72
22-May-08	33	30	31	2	113	24	36	22	242	395	544	68
23-May-08	18	69	18	0	178	33	25	38	326	209	460	77
24-May-08	15	63	15	0	144	29	21	19	274	215	423	76
25-May-08	8	94	8	3	190	33	34	31	358	222	472	82
26-May-08	3	57	3	0	125	32	148	40	396	279	567	66
27-May-08	7	13	7	0	72	18	21	0	128	212	277	53
28-May-08	10	27	10	2	125	24	40	27	228	211	321	56
29-May-08	3	21	3	1	124	20	20	22	204	206	317	61
30-May-08	11	40	11	0	114	23	21	21	205	122	265	47
31-May-08	9	41	9	0	119	24	22	19	215	212	355	61
01-Jun-08	6	17	6	0	113	0	0	0	136	158	221	49
02-Jun-08	3	14	3	0	125	22	18	26	189	272	396	61
03-Jun-08	0	4	0	0	163	0	0	0	167	0	167	44
04-Jun-08	0	0	0	0	96	0	0	0	96	0	96	25
05-Jun-08	2	16	2	0	153	33	20	27	224	226	355	48
06-Jun-08	2	10	2	0	117	25	21	20	179	117	267	45
07-Jun-08	4	6	4	0	181	20	21	14	229	150	351	50
08-Jun-08	0	0	0	0	90	0	0	0	90	0	90	27

Appendix C. Spring 2008 Standard Total Results by Species (excluding casual observations).

SPC	2008 ST SUM	Ave. 04-07 ST	2008 Band total	Ave. 04-07 Banding	SPC	2008 ST SUM	Ave. 04-07 ST	2008 Band total	Ave. 04-07 Banding
ABDU	6	16.50	0		CONI	1	NA	0	
AGWT	1	2.33	0		CORE	4	NA	3	0
ALFL	7	8.25	0		COTE	53	NA	0	
AMCO	0	2.00	0		COYE	107	100.50	62	60.75
AMCR	27	26.00	0		CSWA	57	67.25	28	33.5
AMGO	265	450.00	26	48.25	DCCO	66	NA	0	
AMKE	0	1.33	0		DOWO	5	22.75	1	1.75
AMPI	5	7.00	0		DUNL	0	34.00	0	1
AMRE	108	93.75	39	44.75	EAKI	126	81.00	5	2.25
AMRO	577	400.25	35	24.5	EAME	1	1.00	0	
AMWI	7	5.50	0		EAPH	23	19.75	10	8
AMWO	11	7.50	2	2.5	EATO	9	14.00	1	2.5
ATSP	11	30.00	6	12	EAWP	21	29.00	1	3.5
BANS	15	58.25	0		EUGO		1.00		
BAOR	228	161.75	7	13.5	EUST	338	415.00	1	3
BARS	51	58.00	0		EVGR	0	NA	0	
BAWW	30	40.25	12	19.5	FISP	7	8.00	6	5.5
BBCU	0	1.00	0		FOSP	24	45.25	10	18.75
BBPL	15	2.50	0		FOTE	0	1.00	0	
BBWA	8	15.50	2	4.25	GADW	154	131.75	0	
BCCH	165	97.00	6	3.5	GBBG	13	6.25	0	
BCNH	38	NA	0		GBHE	4	7.25	0	
BEKI	59	44.00	0		GCFL	8	13.00	1	3
BGGN	4	8.00	1	1	GCKI	134	333.75	43	132.5
BHCO	510	690.50	11	18.5	GCTH	24	57.25	21	48.25
BHVI	3	6.75	1	3.25	GHOW	1	2.00	0	
BLBW	26	26.50	10	9.25	GLGU	0	1.67	0	
BLJA	80	33.25	0	2.25	GRCA	157	193.25	48	55.75
BLPW	55	44.75	16	17	GREG	7	5.75	0	
BLSC		2.00			GRHE	2	NA	0	
BLTE	1	1.00	0		GRSC	466	232.75	0	
BOBO	2	4.00	0		GRSP	1	NA	0	
BOGU	35	20.25	0		GRYE	7	5.25	0	
BOWA	0	NA	0		GWWA		2.33		1.25
BRCR	61	158.50	26	73.5	HARD	0	NA	0	
BRTH	42	53.75	8	13.75	HAWO	6	8.00	1	0.5
BRWA	1	1.00	0	0.25	HERG	50	69.00	0	
BTBW	37	44.25	18	22	HETH	91	170.25	52	97.75
BTNW	38	46.75	13	17.25	HOFI	0	2.00	0	
BUFF	788	864.75	0		HOGR	1	15.50	0	
BWTE	0	2.00	0		HOLA	5	2.00	0	
BWWA	1	5.33	0	2.5	HOME	7	2.33	0	
CACG		1.00			HOSP	1	1.50	0	
CAGO	575	515.00	0		HOWA		1.00		0.25
CANV	2	3.00	0		HOWR	36	35.25	7	6.75
CATE	32	NA	0		INBU	1	3.00	0	2
CAWA	18	27.75	11	15.75	KIEI		1.00		
CCSP		1.00			KILL	51	28.25	0	
CEDW	204	23.75	1	1.25	LALO	0	NA	0	
CERW	1	NA	1	0	LEFL	105	79.25	30	42.5
CHSP	12	14.75	5	3.5	LESA	0	1.50	0	0.5
CHSW	23	12.67	0		LESC	85	157.25	0	
CLSW	0	NA	0		LEYE	0	2.75	0	
CMWA	9	16.75	5	8	LISP	39	46.75	32	38
COGO	139	57.25	0		MALL	608	439.00	0	
COGR	363	467.00	7	11.5	MAWA	168	172.00	110	116.5
COHA	6	1.00	0		MERL	0	1.50	0	
COLO	36	29.00	0		MOWA	10	22.00	9	13.25
COME	140	57.75	0		MODO	16	32.25	0	0.25

MUSW	151	209.75	0		TRUS	0	1.33	0	
MYWA	388	443.75	125	182	TUSW		NA		
NAWA	49	87.50	25	49	TUVU	1	2.50	0	
NOCA	66	79.00	4	4.5	UNAC	0	NA	0	
NOGO	0	NA	0		UNBL	143	NA	0	
NOHA	1	2.50	0		UNCA	5	NA	0	
NOMO		1.00			UNSW	6	NA	0	
NOPA	7	5.33	4	1	UNWA	1	NA	0	
NOPI	2	4.00	0		USCA	361	NA	0	
NOWA	46	23.75	21	14.75	VEER	41	56.00	29	39
NRWS	29	25.75	4	1	WAVI	264	211.50	6	7.5
NSHO	11	4.67	0		WBNU	2	5.50	0	0.5
NSWO	0	NA	0		WCSP	54	56.00	25	26.5
OCWA	6	3.75	4	3.25	WHIM	1	NA	0	
OLDS	1923	2742.75	0		WIFL	16	59.25	0	
OROR	3	NA	0		WIWA	32	53.50	19	34
OSFL	1	1.00	0		WIWR	47	39.75	12	16.25
OSPR	1	1.00	0		WODU	4	7.50	0	
OVEN	33	58.25	22	38.75	WOTH	10	14.50	7	11
PBGR	0	2.00	0		WPWA	126	82.00	52	37.25
PEFA	1	2.00	0		WPWI	0	NA	0	
PHVI		8.50		4.75	WTSP	716	635.75	255	307
PISI		2.00			WWSC	30	143.25	0	
PIWA	3	5.25	0	1	YBCU		1.33		0.75
PUFI	7	5.67	0	0.5	YBFL	9	33.50	7	26.25
PUMA	1	2.00	0		YBSA	19	4.67	10	1.66666
RBGR	36	27.00	6	8	YPWA		1.00		0.25
RBGU	67	NA	0		YSFL	66	141.00	5	7
RBME	33	15.50	0		YTVI	0	NA	0	
RBNU	4	4.67	2	1	YTWA		1.00		0.25
RBWO	2	1.00	1	0	YWAR	718	661.50	63	64
RCKI	135	167.25	67	82.5		17387		1893	
REDH	4	4.50	0						
REVI	43	83.50	10	21.75					
RLHA	0	NA	0						
RNDU	4	5.50	0						
RNGR	0	2.33	0						
RODO	1	7.25	0						
RTHA	6	NA	1	0					
RTHU	4	6.50	0						
RTLO	0	NA	0						
RUBL	18	19.50	4	1					
RUDU	0	NA	0						
RUTU		1.00							
RWBL	2056	1537.00	96	59.5					
SACR	0	NA	0						
SAVS	1	4.75	1	1.5					
SBDO		4.00							
SCJU	93	187.75	33	71.5					
SCTA	12	11.25	2	2.75					
SEPL	0	1.00	0						
SESA	0	20.00	0						
SOSA	0	1.00	0						
SOSP	559	639.50	71	69.25					
SPSA	76	83.75	0	0.25					
SSHA	4	1.50	0	0.25					
SUTA	1	NA	0						
SWSP	38	100.50	23	63.5					
SWTH	120	179.00	84	139.75					
TEWA	10	5.50	4	1.75					
TRES	650	682.50	10	10					
TRFL	31	81.75	28	63.5					