



**Bruce Peninsula
Bird Observatory**

MIGRATION MONITORING AT CABOT HEAD

FALL 2015

by

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*prepared
for*

BRUCE PENINSULA BIRD OBSERVATORY

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Table of Contents

Preface.....	4
Executive Summary	5
1.0 Methods.....	6
2.0 Season Summary.....	7
August.....	7
September	11
October.....	19
3.0 Unusual Records	23
4.0 Banding Data Analysis	25
4.1 Weather	32
4.2 Recaptures.....	34
4.3 Net Analysis.....	38
5.0 Coverage and Protocol.....	39
6.0 Personnel.....	39
7.0 Conclusion	40
Acknowledgements.....	41
Literature Cited	41
Appendix I. Fall banding total 2015.	42
Appendix II. Detected Totals of species observed in fall from 2002 to 2015 at Cabot Head Research Station	44
Photo gallery	48

Figure 1. Estimated Totals of the most common species throughout the monitoring period at Cabot Head Research Station, fall 2015.	6
Figure 2. American Redstarts banded in spring and fall at Cabot Head Research Station between 2002 and 2015.	8
Figure 3. Highest daily Estimated Total for Barn Swallows at Cabot Head Research Station in fall 2002-2015, in relation to year.	10
Figure 4. Banding totals of Swainson's Thrush in the fall at Cabot Head Research Station from 2002 to 2015.....	13
Figure 5. 5-day total numbers of warbler species and 5-day Estimated Totals of warblers (all species combined) at Cabot Head Research Station in fall 2015.	14
Figure 6. 3-day average of Estimated Totals of Yellow-shafted Flickers for 2015 and the combined years of 2002 to 2014.....	17
Figure 7. 3-day average of Estimated Totals of Blue Jays for 2015 and the combined years of 2002 to 2015.....	17

Figure 8. Detected Totals of Common Loons detected at Cabot Head Research Station, in relation to year and time of monitoring.	18
Figure 9. Daily banding total in October by the most common species banded at Cabot Head research Station in 2015.	20
Figure 10. Estimated (top) and banding (bottom) Totals for Golden-crowned Kinglets at Cabot Head Research Station, 2002 - 2015.	21
Figure 10. Banding total of the most common captured species compared to average total of 2002-2010.	27
Figure 11. Daily banding and recapture total at Cabot Head, fall 2015.	27
Figure 12. Banding Totals of Black-capped Chickadees in fall seasons 2002 to 2015 at Cabot Head Research Station.	28
Figure 13. Banding Totals of Blackpoll Warblers in fall seasons 2002 to 2015 at Cabot Head Research Station.	28
Figure 14. Banding Totals of Magnolia (top) and Orange-crowned (bottom) Warblers in fall seasons 2002 to 2015 at Cabot Head Research Station.	29
Figure 15. Fall weekly capture rates at Cabot Head Research Station (without Black-capped Chickadee for average 2002-2010). Error bars show Standard Deviation.	31
Figure 16. Fall weekly number of banded birds at Cabot Head Research Station. Error bars show Standard Deviation.	31
Figure 17. Fall weekly proportion of realized mist net hours at Cabot Head Research Station. Error bars show Standard Deviation.	32
Figure 18. Wind pattern at Cabot Head Research Station, fall 2015.	33
Figure 19. Number of birds never recaptured and recaptured for species with recaptures at Cabot Head Research Station, fall 2015.	37
Figure 20. American Redstarts banded and recaptured or not in relation with time of banding at Cabot Head Research Station, fall 2015.	37
Figure 21. Capture rates per mist net for average 2003-2011 and for 2015 at Cabot Head Research Station.	38
Figure 22. Coverage (in mist net hour) at Cabot Head Research Station, fall 2015.	39
Table 1: Phenology of migration for warbler species.	15
Table 2. Monthly capture rates, fall 2015.	26
Table 3. Total recaptures by species in relation with year and season of banding (only one recapture per individual is included) at Cabot Head Research Station, fall 2015.	36
Table 4. Volunteer effort, spring 2015.	40
Photo 1: Male adult Scarlet Tanager banded at Cabot Head, fall 2015.	25

Preface

Cabot Head is a promontory of the northeast headland of the upper Bruce Peninsula in south-central Ontario, at the northern end of the Niagara Escarpment, in the mixedwood plains ecozone. Cabot Head Research Station (CHRS) is situated on a small spit of land (at 45°15'N, 81°18'W), bordered north by Georgian Bay and south by the western side of Wingfield Basin near the community of Dyer's Bay. In 2001, Cabot Head was designated as an Important Bird Area (IBA) by Birdlife International for its significant concentrations of migratory bird species (Cheskey and Wilson, 2001) and Red-necked Grebe in particular. Situated in a provincial nature reserve, Cabot Head Research Station is managed conjointly by Ontario Parks and Bruce Peninsula Bird Observatory (BPBO).

The Breeding Bird Survey (BBS) is the principle method for monitoring bird populations in the United States and the southern part of Canada. However, breeding ranges of many species in northern Canada are inaccessible to roadside surveys and are therefore poorly monitored by the BBS method. The Canadian Migration Monitoring Network (CMMN) is a nation wide Bird Studies Canada initiative, enacted to assess changes in populations during migration (<http://www.bsc-eoc.org/volunteer/cmmn>). There are around 25 stations across Canada where data are being collected for each bird species during spring and fall migrations, through a standardized capture and observation protocol. Bruce Peninsula Bird Observatory has demonstrated through data collection since 1998 that Cabot Head is a significant site for monitoring migrating landbirds and has been part of the CMMN since 2003.

Bruce Peninsula Bird Observatory was incorporated as a charitable non-profit organization in 2001 to initiate and direct ornithological assessments and monitoring at Cabot Head and surrounding areas. Migration monitoring has been the primary focus of bird research at Cabot Head since 1998. This document reports on results of the fall 2015, migration monitoring season at Cabot Head Research Station.

Executive Summary

In this document, the results of migration monitoring at Cabot Head in fall 2015 are summarized and analysed. It is the 14th year of consecutive monitoring following a research protocol established in 2002. Keeping a consistent monitoring effort helps insure the relevance of the information collected.

Fall fieldwork began on August 17 and ended on October 31 for a total of 76 consecutive days of coverage. A total of 130 species of birds were detected in the standard count area over the course of the field season. Among them, 81 species have been seen every fall (67%). In total, 1,462 birds of 71 species were banded and 176 birds of 29 species were recaptured. Recapture data indicate that stopover rates at Cabot Head are generally low but highly variable depending on species and year. It appears that some species, like thrushes, could extensively use Cabot Head as a stopover habitat, to rest and refuel, principally in years of local high food availability (like chokecherry or cone seeds). Analysis of capture rate per net location indicates a large degree of variation associated with habitat characteristics and species behaviour.

The defining characteristic of fall migration in 2015 was a good coverage; however, a below average number of species were seen this fall (average: 136; range: 127 species in falls 2006 and 2008 – 156 species in fall 2002). Most species were caught at slightly below average numbers this fall with only a few caught in record numbers, most notably American Tree Sparrow. As a consequence, the banding total is below average (see Appendix I for banding fall totals per year and Appendix II for species detected). A Hooded Warbler and a Clay-colored Sparrow were banded at Cabot Head, the second ever individual of these species ever banded in fall. No new species for the area were added this fall. The highest one-day species total was 42, recorded on September 3 and 23.

The fall 2015 migration monitoring season was a success thanks to the efforts of the 11 volunteers who contributed their time to this project.

1.0 Methods

The migration monitoring program at Cabot Head as any CMMN station follows a field protocol (established by Heagy et al, 2003) as it is essential for the production of population indices that data collection be consistent over the long term. At Cabot Head Research Station, fifteen mist nets are operated for 6 hours commencing no later than 1 half hour before sunrise, weather permitting. Personnel also complete a census done for one hour along a fixed route, where all bird seen or heard is recorded. Casual observations are also taken and all of the methods are used to determine an estimated total (ET) for each species within the area of the station during the sampling period each day. Supplemental surveys such as visible migration counts and bay watches are completed when circumstances permit. As expected, there is a tremendous variation in diversity and abundance throughout the season (Fig.1).

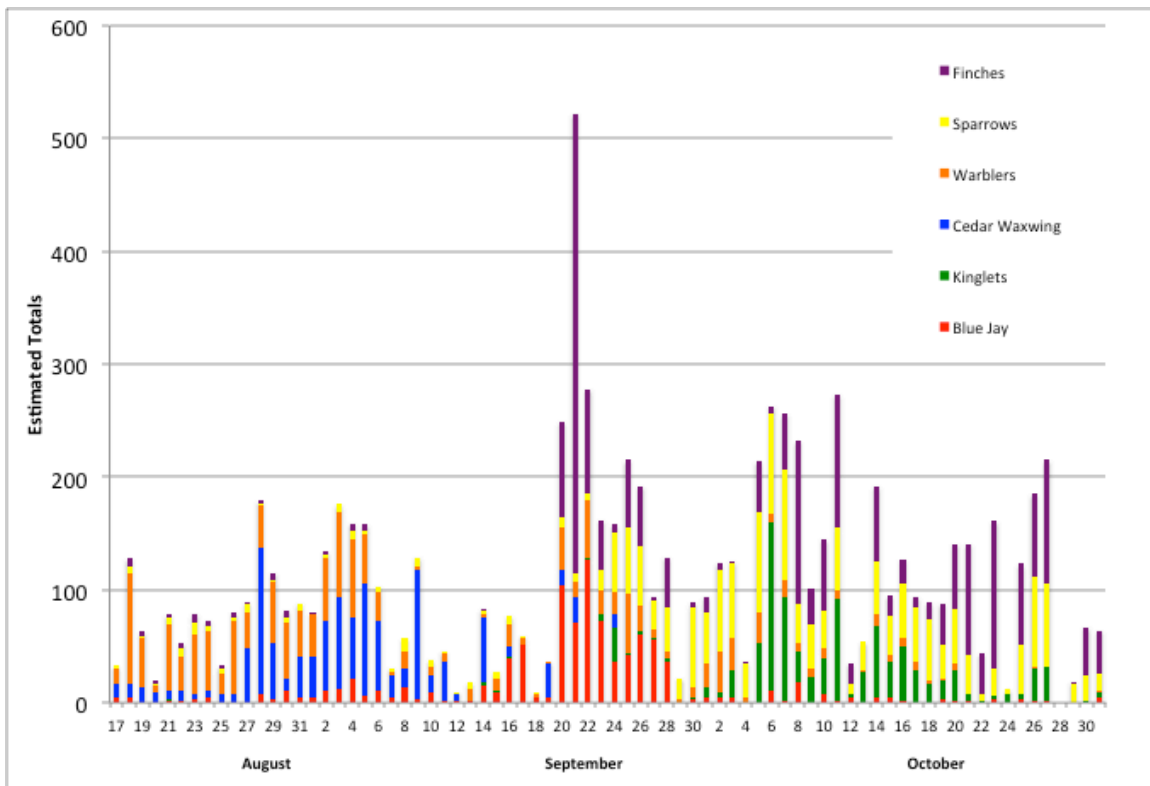


Figure 1. Estimated Totals of the most common species throughout the monitoring period at Cabot Head Research Station, fall 2015.

2.0 Season Summary

August

Fieldwork for fall migration monitoring began at Cabot Head Research Station on August 17 with fifteen mist nets in operation. August is normally a quiet month of migration in southern Ontario. Banding was possible for every day but one in this period, with only a few net hours lost to bad weather (82% of the potential mist net hours were realized). A total of 74 species were detected in August. On average, 28 species per day were detected. Only 5 species were seen on every single day in August: Double-crested Cormorant, Red-eyed Vireo, Cedar Waxwing, American Redstart, and Song Sparrow. A total of 22 species (including the previous ones) were seen on 10 days or more during the 15 days of monitoring in August. On the other end of the scale, 22 species (like Common Tern, Indigo Bunting, Warbling Vireo, etc.) were detected only once during this period. A total of 223 birds of 30 species – the third-lowest total for August before 2004 and 2009 - were banded. As usual, American Redstart was the most common species caught, with 26% of the monthly banding total, followed by Red-eyed Vireo and Black-throated Green Warbler (about 13% and 9%, respectively). The best days in August for banding were the 18th with 38 birds banded of 14 species, the 31st with 25 birds of 12 species, and the 30th with 24 birds of 13 species; the most common birds banded these days were American Redstart and Red-eyed Vireo. A relatively low of 16 birds per day, on average, were caught and banded during this month.

The 3-day period from August 28 to 30 was the most diverse in August with a total of 52 species detected, including 16 species of warblers. Out of the 52 species observed, only 20 were seen every day of that 3-day period, with another 16 observed on 2 days. The number of species detected was 37 both on August 28 and 30, and 34 on August 29. Interestingly, the Eastern Whip-poor-will was heard every dawn during this 3-day period. This species sings again in late summer and early fall. As a crepuscular species, it is not always recorded in the “official” monitoring period. This fall, it was detected (officially and unofficially) from August 18 to September 23.

The American Redstart is usually the most abundant species during this period, both observed and banded, because of a large breeding population around the station and a rather early fall migration. However, this fall, the banding total for American Redstart

is the fifth lowest of the 14 years of fall monitoring, with only 75 birds banded (with 77% of the redstarts banded in August). Between 2002 and 2014, an average of 102 (± 45) American Redstarts are banded, with a low of 44 in fall 2007 and a high of 191 in 2003. Even though an (unknown but likely) high proportion of redstarts banded both in spring and fall are local birds, a relationship between numbers of birds banded in spring and in subsequent fall does not appear to exist: a low or high number of redstart banded in spring does not automatically translate into low or high numbers banded in fall (Fig.2).

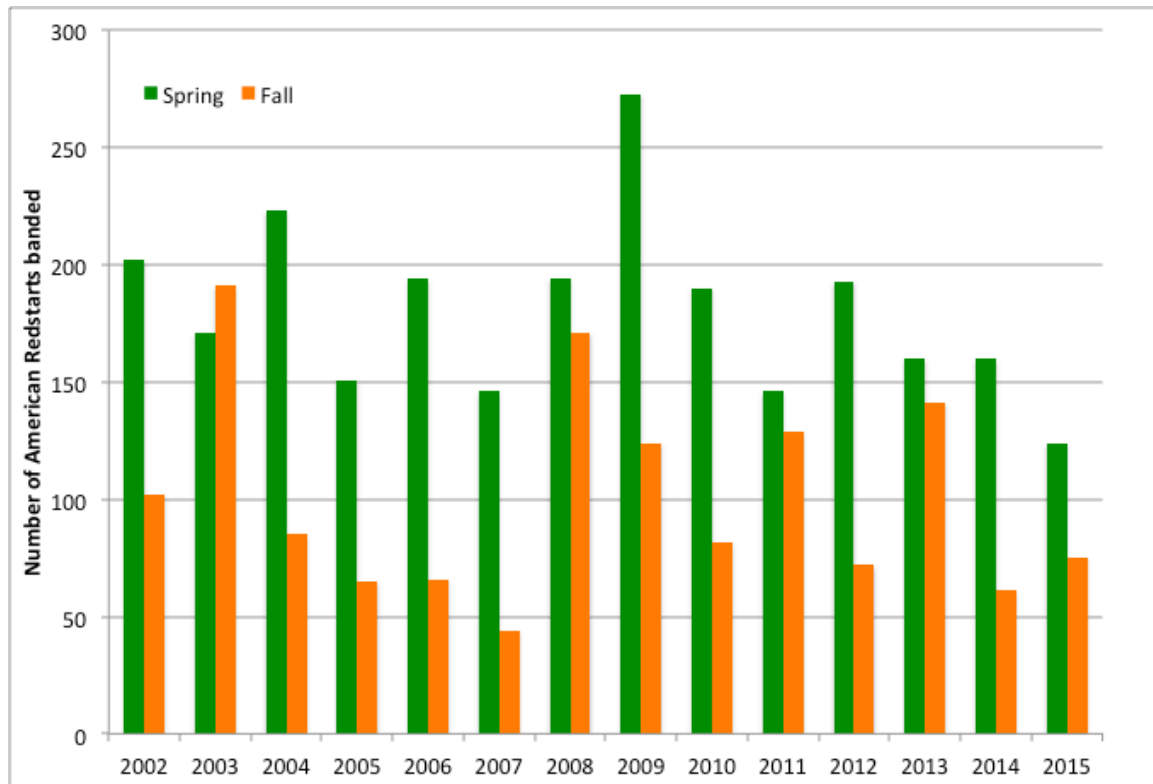


Figure 2. American Redstarts banded in spring and fall at Cabot Head Research Station between 2002 and 2015.

In August, migration monitoring is complicated by the presence of local birds. Even though they could be migratory species, they may not be migrating at this time. For example, an American Redstart observed in August may not be yet in migration mode, simply being a local bird. Nevertheless, migration does occur in August, as shown by the appearance of species that do not breed on the Bruce Peninsula. For example, the Greater Yellowlegs was noted first this fall on August 30. The first boreal warblers and “true”

migrants were the Tennessee and Wilson's Warblers seen both on August 27. Another species, the Northern Parula, which mostly breeds in the Boreal Forest, has a small foothold as a breeder on the Bruce Peninsula, according to the Ontario Breeding Bird Atlas. It is as a whole a relatively uncommon species, which, in summer, frequents the higher canopy of wet forest habitats. It is detected in very small numbers at Cabot Head, both in spring and fall. In the last 13 falls, Northern Parulas were missed in 6 seasons and detected only after early September and with one to three individuals in the other seasons. This fall, it was detected through observation for the first time in August, on the 17th. Two other Northern Parulas were detected in the rest of the season, through banding on September 1 and October 14 (a day earlier than the latest date on record, October 15 in 2008).

A very unlikely species was banded in August: one adult Eastern White-crowned Sparrow was captured on August 27 and it was in the process of moulting its wing and tail feathers. Because this moult happens in the summer grounds, before migration, it means that this individual has likely spent its summer on the Bruce Peninsula. It is very surprising for a species that breeds, in Ontario, exclusively in the far north (near, and north of, the tree line adjacent to Hudson's Bay)! The banded White-crowned Sparrow was not recaptured afterward during the season but was seen on August 31 and September 2. The next observations of White-crowned Sparrows were on September 24 with new arrivals, with numbers slowly building afterwards and peaking in early October. White-crowned Sparrows were detected in August only in 4 other years: in 2004, one individual was observed on August 28 (with the next observation that year on September 18); in 2007, one bird was observed on August 19, one was banded on August 24 (possibly the same one?), with active moult in its wings, and it was recaptured on September 3. In 2011, 2 individuals were banded with active moult on August 17 and 21. In 2013, 1 to 3 individuals were detected from August 14 to 28, with a bird banded on the 27th. White-crowned Sparrows on the Bruce Peninsula in the summer are thus not totally unusual. It is possible that they are birds in poor conditions in spring, which then make them unable to finish their migration to their northern breeding grounds.

This fall, Barn Swallows were seen in small numbers, continuing a worrying trend of declining abundance. The highest Estimated Total was of 12 on August 19 but all

other observations were in the single digit (Fig.3). The last Barn Swallows (a total of 3) were seen on August 29, with one straggler noted on September 15. Barn swallows are extremely visible, especially so at Cabot Head, since they use the shipwreck in the basin as a breeding ground. They are daily observed, when present, first heard chipping from within the wreck as the sun warms the day, then flying out and around conspicuously. It is thus very unlikely that Barn Swallows or other species of swallows are missed in the fall. Barn Swallow is the only species of swallow seen every fall, certainly because they breed yearly in the shipwreck. The other species of swallow observed this fall was Cliff Swallow with only one individual on August 19.

Other birds of summer were rarely observed this year: Common Terns were detected this summer only once above Wingfield Basin, with 2 birds on August 18. Although it is usually a common species both in spring and fall, there was only one observation of Eastern Phoebe this fall on August 27. Likewise, only one Eastern Kingbird was detected on August 22. This species prefers the marshy margins of the shallow lakes at the base of West and Middle Bluffs: it is thus not rare at Cabot Head but only occasionally seen around the station when moving from and to its favourite habitats.

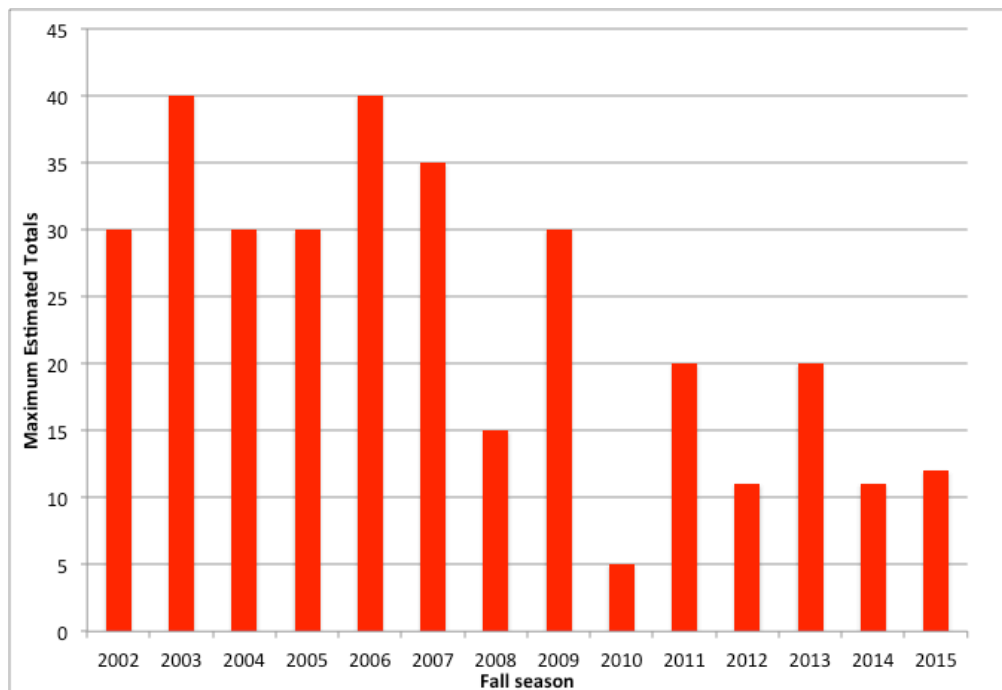


Figure 3. Highest daily Estimated Total for Barn Swallows at Cabot Head Research Station in fall 2002-2015, in relation to year.

September

Weather in September was mostly warm and dry, with only 5 days with showers or rain during the month (and only once in the morning during the monitoring period). As with birds, it is a time of transition between summer and fall. Only 3 full days of banding were lost because of high wind, as well as part of 9 other days, resulting in 17% of the possible mist net hours lost. A total of 94 species were detected during the month. The most frequently detected species were Ring-billed Gull, Blue Jay, and Red-breasted Nuthatch, with only one day in the month when they were missed. A total of 11 species (including the previous 3) were detected at least on 20 different days, while 47 species were rarely detected (on 5 days or less). A total of 537 birds of 53 species, well below the average of 622 (± 189) birds, were banded in September. The most common species caught were Swainson's Thrush and Cedar Waxwing (with 71 and 49 birds banded, respectively, accounting for about 13% and 9% of the monthly total), then Nashville Warbler, Slate-colored Junco, and Red-eyed Vireo (about 7% each). Huge variations in capture rates and number of banded birds occur in September, with a low of 331 birds in fall 2007 and a high of 1029 in fall 2005.

September is the most diverse month: 53 species were caught compared to 30 for August and 40 for October and 94 species were detected in total (compared to 74 and 86 for August and October, respectively). Many species migrate mainly during this month (i.e., warblers, White-throated Sparrow and Swainson's Thrush), while early migrants are still moving through (American Redstart and Black and White Warbler, for example). The earliest individuals of the late migrants can also be encountered at the end of the month (Kinglets, Hermit Thrush, Sparrows). Banding in September was relatively slow with an average of 20 birds a day (range from 2 to 46 birds). September 3 was the best day for the month: In 90 mist net hours, 46 birds of 18 species were banded. Captures were widespread across species but Cedar Waxwing was the most captured, with 13 individuals banded. September 22 and 25 were close second, with 45 birds banded each day of 16 and 15 species, respectively in 90 mist net hours for each day. On the 22nd, a total of 12 Nashville Warblers were banded, accounting for 23% of the season total. Despite being the most abundant bird in Ontario, with a population estimated at 15 million birds (Ontario Breeding Bird Atlas), it is rare to capture more than 10 Nashville

Warblers in a day at Cabot Head in the fall: in fact, it has happened only 5 times between 2002 and 2015, with 19 birds on August 25, 2005 being the highest daily total.

This fall, more Swainson's Thrushes were banded than in any other falls (Fig.4) with 79 birds, compared to an average of 27 (± 13) birds (low of 11 in 2002; high of 50 in 2009). As opposed to what happens sometimes in spring, there was no "fall-out", that is, no single day provided a disproportionate number of banded birds: it was more a steady stream of birds throughout the season, with small daily totals (highest day of 8 birds in September 6), indicating a very different migration strategy in fall compared to spring. Fall migration tends to have a more leisurely pace than in spring when the urge to reach the breeding area is very strong. About 90% of all Swainson's Thrushes banded this fall were captured in September, but with the first captured in August 29 and the last in October 10. The earliest ever captured was in August 24, 2006 and the latest in October 12, 2008. Swainson's Thrush does breed on the Bruce Peninsula, although at a very low density compared to the boreal forest populations: according to the Ontario Breeding Bird Atlas, this species is practically ubiquitous in the conifer-dominated Northern Shield. Birds captured earlier in the season (i.e. August) are thus potentially local birds but afterwards the vast majority of them are more likely to come from north of the Bruce.

The other species of thrush which migrate mostly in September, Veery and Gray-cheeked Thrush, were also captured in good numbers this fall, with 10 and 17 birds, respectively.

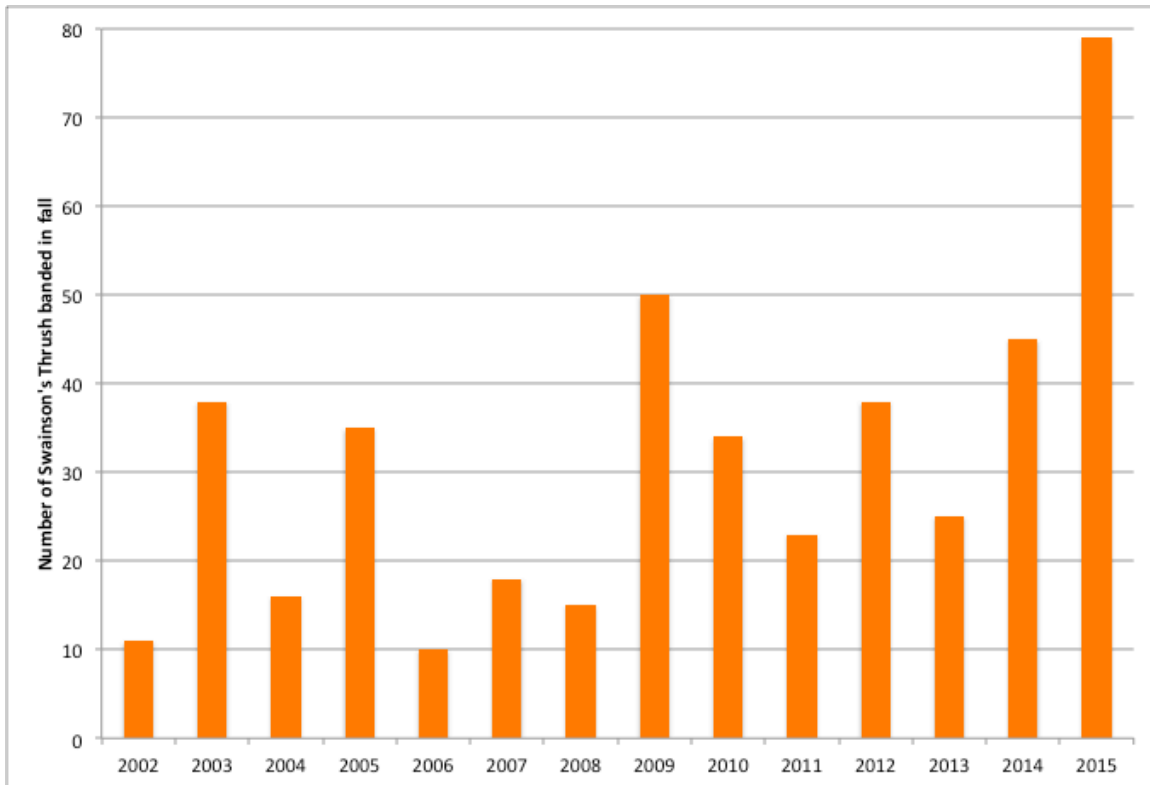


Figure 4. Banding totals of Swainson's Thrush in the fall at Cabot Head Research Station from 2002 to 2015.

Diversity reached high points throughout the month, especially early and late in the month. A total of 63 species were detected between September 2 and 5, with a high of 42 on the 3rd. Likewise, 64 species were detected in the 6-day period between September 20 and 25, with a high of 42 species - as well – on the 23rd. A total of 42 species were identical at these 2 periods, which also means that 21 and 22 species were different between the early and late periods, respectively. For example, diversity of warblers went from 20 to 13 (although with a newly arrival in the later period, the Orange-crowned Warbler). Flycatchers disappeared completely from early to late September. On the other hands, new species arrived, like Horned Lark and American Pipit, as well as both species of kinglets.

Diversity and abundance of warblers peaked in late August and early September (Fig.5 and Table 1): in the 5-day period between August 31 and September 4, a total of 21 warbler species was detected, with American Redstart, Common Yellowthroat, and Black-throated Green Warbler, being the most abundant. A few species (Pine, Tennessee,

Blackburnian Warblers) were only detected by one or two individuals during this period. In mid-September, both diversity and abundance of warblers dropped remarkably for a 10-day period. In late September, diversity and abundance peaked again, though not as high as in late August – early September, with only 13 species of warblers, including Bay-breasted and Orange-crowned Warblers not detected in the earlier period. The decline in diversity and abundance is even more drastic in October, when a handful of species of warblers were detected with only Myrtle and Orange-crowned Warblers seen in significant number for longer period during this month. Throughout the season, Myrtle Warbler, Common Yellowthroat, American Redstart, and Black-throated Green Warbler were the species most often detected and in the highest numbers.

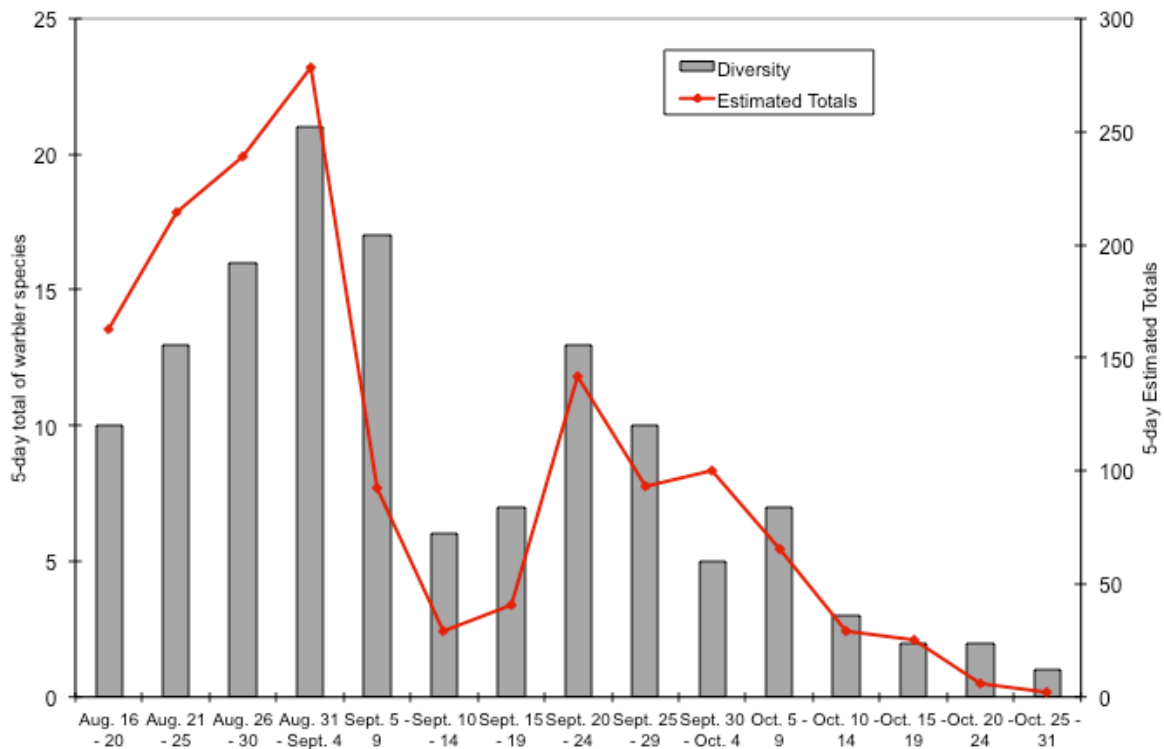


Figure 5. 5-day total numbers of warbler species and 5-day Estimated Totals of warblers (all species combined) at Cabot Head Research Station in fall 2015.

Table 1: Phenology of migration for warbler species, with dates of first and last observation, number of days between first and last observation, number of days with observation, and estimate totals.

	Dates of first and last observations			Number of days		Estimated Total
	August	September	October	between first and last observation	with observation	
Myrtle Warbler ^B	21		31	72	53	324
Black-throated Green Warbler ^B	17		5	50	32	144
American Redstart ^B	17		3	48	32	443
Common Yellowthroat ^B	17		8	53	30	138
Magnolia Warbler ^B	18	26		40	23	82
Black-and-White Warbler ^B	18	11		25	22	65
Orange-crowned Warbler		20	26	37	20	44
Nashville Warbler ^B	18	30		44	20	58
Ovenbird ^B	22	27		37	16	28
Blackpoll Warbler		3 - 27		25	15	62
Tennessee Warbler	27		7	42	11	18
Black-throated Blue Warbler ^B	18	23		37	8	9
Western Palm Warbler		3	6	34	8	10
Wilson's Warbler	27	16		21	8	20
Yellow Warbler ^B	18	3		17	5	7
Blackburnian Warbler	28	26		30	5	5
Bay-breasted Warbler		5	25	21	5	9
Northern Waterthrush ^B	29	4		7	5	8
Canada Warbler ^B	23	3		12	5	7
Pine Warbler ^B	23	3		12	4	10
Northern Parula ^B	17		14	59	3	3
Cape May Warbler		4 - 6		3	3	23
Chestnut-sided Warbler ^B	19 - 23			5	2	2
Hooded Warbler		29		-	1	1

^B: These species breed on the northern Bruce Peninsula (according to the Ontario Breeding Bird Atlas)

Many species not monitored by banding migrate mostly in September. The first flocks of Canada Geese were seen in early September, as usual, but no big movement was detected this fall. The highest Estimated Total was 66 birds on September 4. Double-crested Cormorants were seen daily from the start of monitoring period until mid-September. This species roosts in Wingfield Basin making it harder to differentiate migrants from local residents. Water levels this year were quite high, covering rocks that

cormorants (and other birds like gulls) like to use. As a consequence, numbers detected were lower, as cormorants crowded the few rocks still emerged as well as the navigational markers. Numbers of Cormorant dropped drastically after early-September from an average of 15 to less than 5, indicating that most of them have left. The last individual of the month (and the season) was seen on September 30.

An overwhelming majority of Blue Jays and Yellow-shafted Flickers migrate in September: this fall, 75% and 86% of Estimated Totals, respectively, occurred during this month. Even though the bulk of migration is in September for both species, their phenology is quite different (Fig.6&7). Yellow-shafted movements through Cabot Head are spread throughout September and involve small numbers: this fall, a below average year, a total of 134 Flickers were detected, with observations almost daily in September and a daily high of only 11 birds on September 13. On the opposite, Blue Jays movements usually involve a peak concentrated in a few days, which varies slightly between years. Most of the time, between a half and two-third of the season total is detected in a 7-day period. This fall, between September 19 and 25, 49% of all Blue Jays were detected, with a high of 104 ET on September 20 for a seasonal total of 964 birds (close to the 2002 - 2014 average of 1037 ET \pm 609; low of 490 in 2007 and high of 2825 in 2014)(Fig.7).

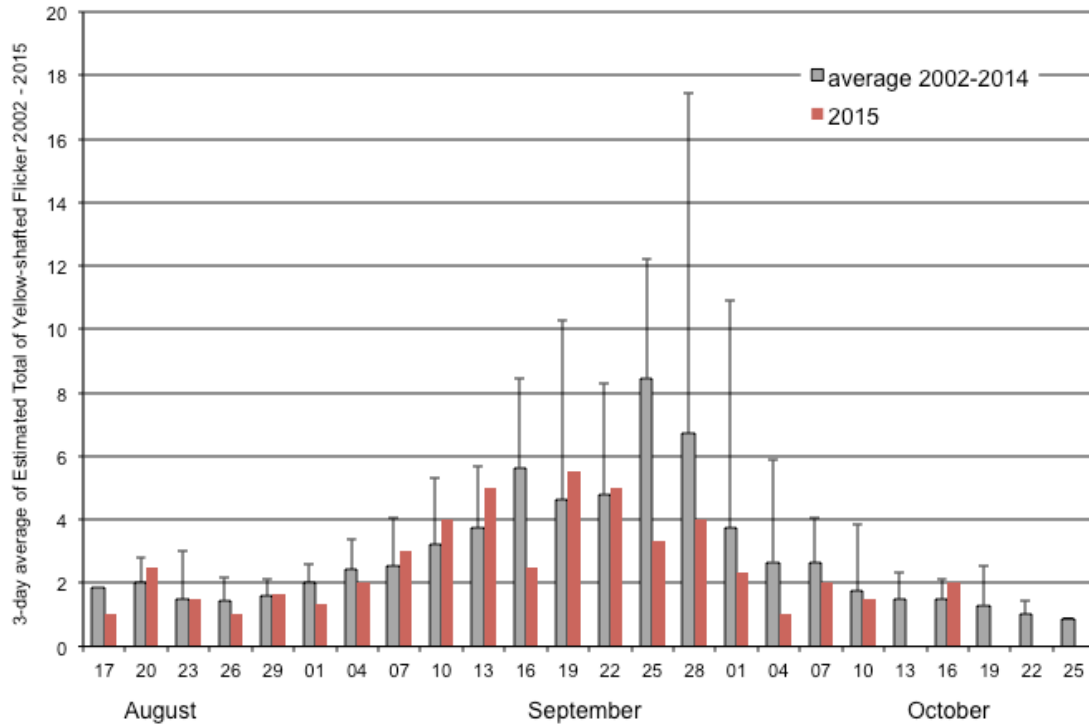


Figure 6. 3-day average of Estimated Totals of Yellow-shafted Flickers for 2015 and the combined years of 2002 to 2014.

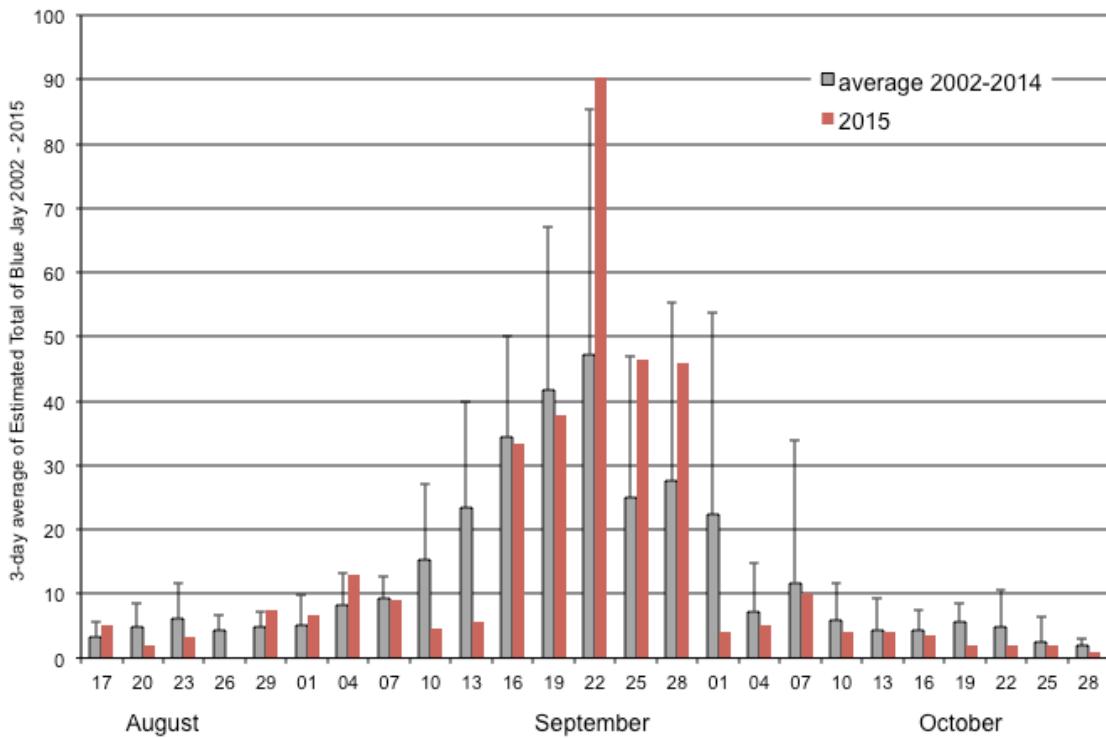


Figure 7. 3-day average of Estimated Totals of Blue Jays for 2015 and the combined years of 2002 to 2015.

Common Loons were seen throughout the entire season with about 70% of all observations made in September. Loons can usually be seen in small rafts on Georgian Bay or flying in a southeast direction, either over water or land. This fall, a total of only 110 Loons was detected, the lowest number in 14 years (range of 115 in 2011 and 997 in 2003; Fig.8). This species is a strong flyer and moves through the area rapidly, making detection difficult. Another potential problem is that it routinely flies, low or high, over Georgian Bay at any time of the day, which makes accurate monitoring difficult as well. However, detection problems should stay relatively similar between years, so the decline in numbers observed since fall 2008 is most likely real. In the fall of 2015, very few loons were seen resting on the water of Georgian Bay unlike in the first few years of monitoring. In these early years, it was easy to pick up moulted loon feathers off the water while kayaking just offshore from Cabot Head. That was definitively not the case this fall. Even though anecdotal, that would indicate a marked decrease in use of water off Georgian Bay by Common Loons.

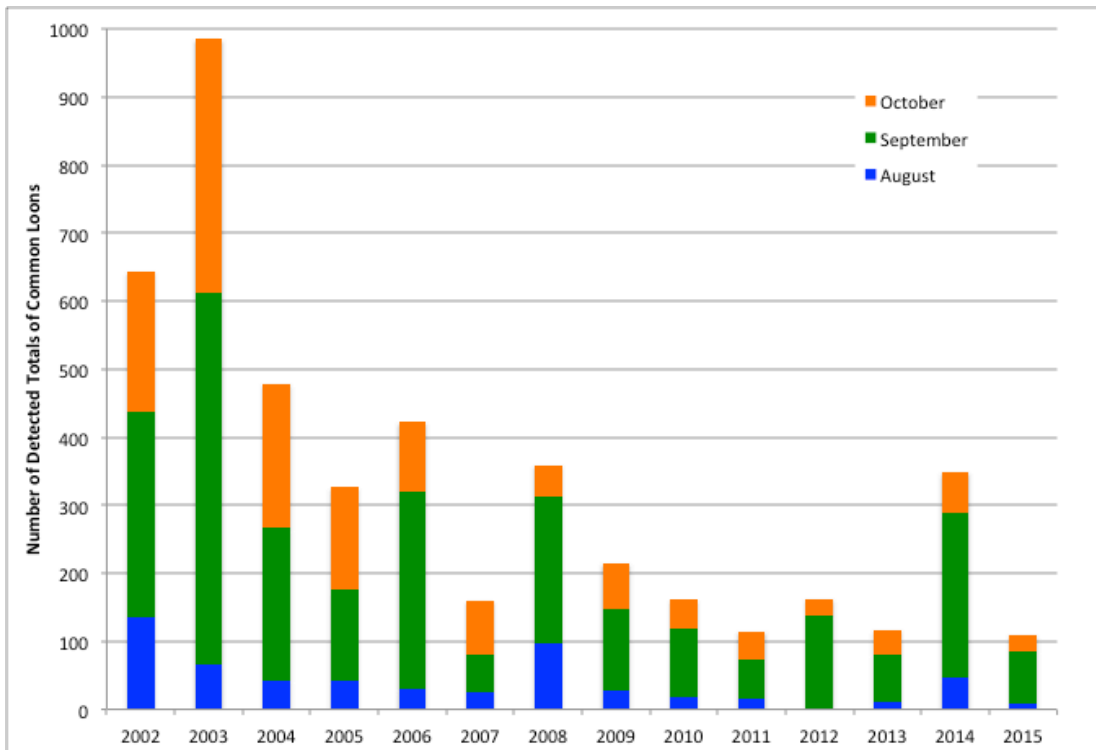


Figure 8. Detected Totals of Common Loons detected at Cabot Head Research Station, in relation to year and time of monitoring.

October

October is usually the busiest – although less diverse - banding period of the fall migration season at Cabot Head Research Station. This was again the case in 2015, as 702 birds of 40 species were banded (almost 50% of the seasonal total), for a daily average of 29 birds captured. Banding was hampered by weather relatively often in October, with 7 complete days lost due to rain and/or wind and 5 other days with only limited monitoring (either a few nets open for the full 6 hours or most nets open for a short time). As a consequence of the bad weather, only 62% of the potential mist net hours was realized in October. The most common species caught were Golden-crowned Kinglet, with 178 individuals banded (25% of the monthly total) followed by Slate-colored Junco and American Tree Sparrow (with 15% and 13%, respectively of the monthly total). A total of 86 species were detected during the month, not the least being the Clay-colored Sparrows (previously detected only in 5 other falls).

Daily numbers of birds banded in October were very variable, ranging from a 6 to 81 (highest daily total of the season)(Fig.9). As noted previously, quite a number of days were lost or with monitoring greatly reduced due to weather. Captures were thus concentrated in a few days, most notably in the first half of the month and in 2 days at the end. Golden-crowned Kinglets arrived later than average this fall but their numbers increased quickly in a well-marked peak between October 5 and 11. Their numbers declined rapidly afterwards, with a much smaller second peak in the second part of October. Their overall numbers were quite small this year, with the 4th lowest banding total and second-lowest Estimated Total (Fig.10). Numbers of Golden-crowned Kinglets are highly variable in fall, with a 7-fold difference between the lowest and the highest banding totals.

Unlike kinglets, Slate-colored Juncos (as well as White-crowned Sparrows) were captured throughout the month without any marked peak, resulting in the highest banding total ever for Juncos with 141 birds (previous record of 133 in fall 2014). American Tree Sparrows, on the other hand, became much more abundant at the end of October: it is a late migrant that could easily be missed at Cabot Head. This year, though, it was captured in record numbers, with a total of 94 birds. The first American Tree Sparrow was observed quite early on October 1. This species was not detected again until

October 7 with one bird captured. Observations were still sporadic afterwards for a few more days but became daily on October 13. Captures were also daily from October 14 onward (except when there was no banding due to weather, obviously). The best days were October 26 and 27, when 37 and 18 American Tree Sparrows were banded, respectively. The daily total of 37 birds is more than the seasonal total of all previous years, except 2004 and 2010.

The other species, which migrate in October, were captured in relatively low numbers this fall. For example, only 10 Red-breasted Nuthatches were banded, the lowest fall total, far below the average of 50 birds and the high of 160 Nuthatches in 2012. Likewise, only 26 Hermit Thrushes were banded, the third lowest total. However, variations in banding total are not as extreme for Hermit Thrush, with only a 5-fold difference between a low of 16 in 2002 and a high of 87 in 2011.

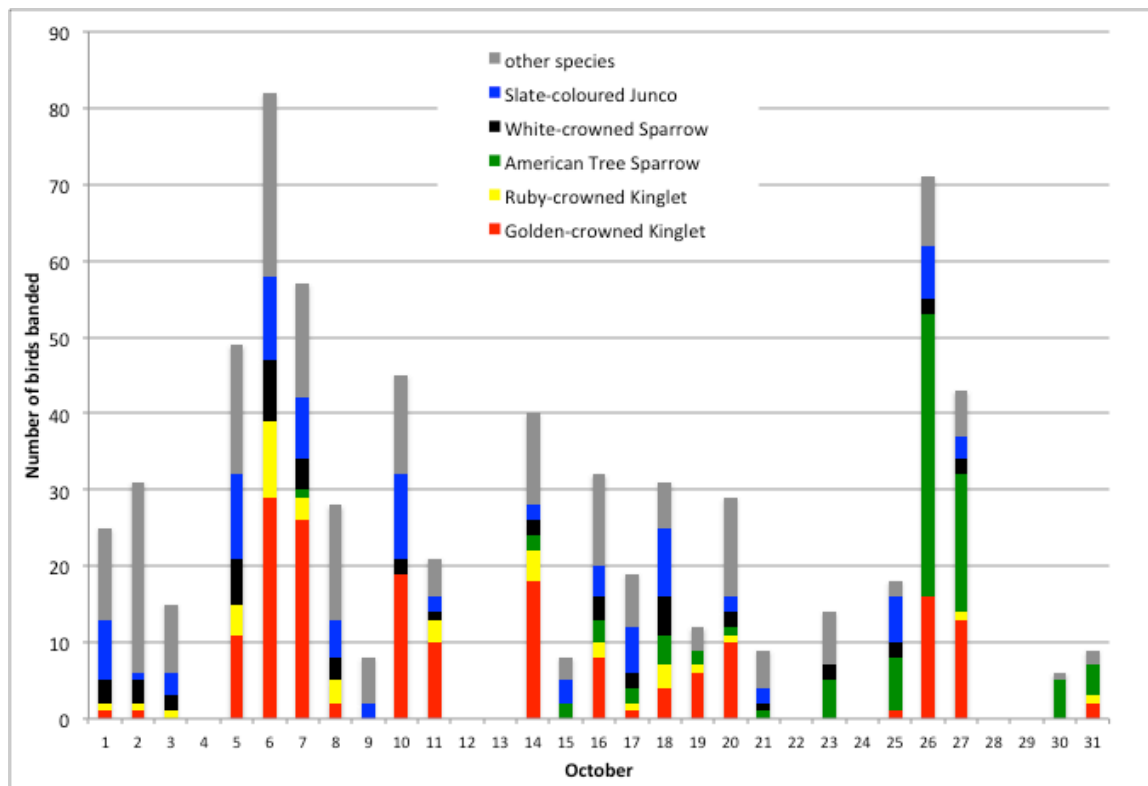


Figure 9. Daily banding total in October by the most common species banded at Cabot Head research Station in 2015.

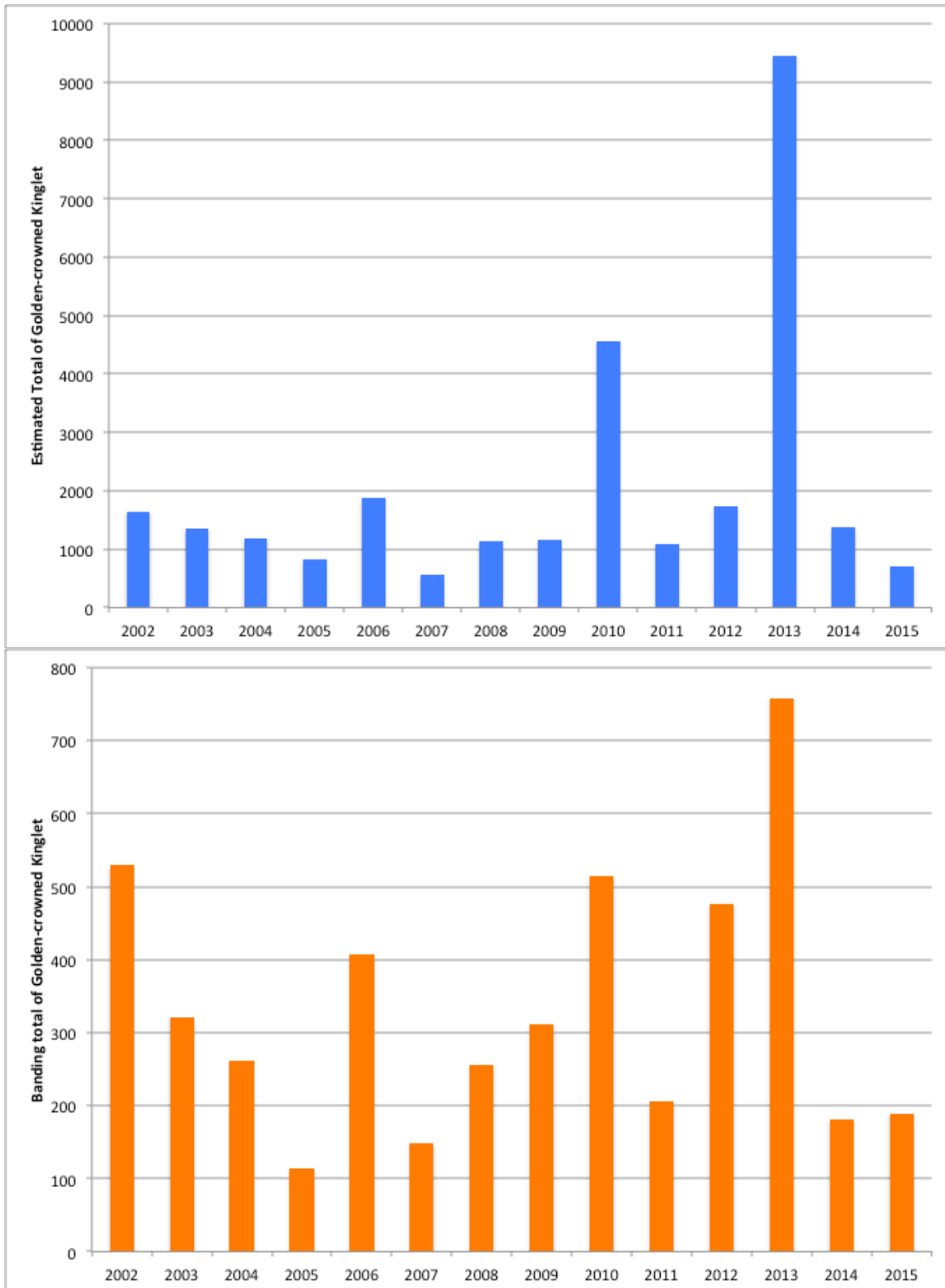


Figure 10. Estimated (top) and banding (bottom) Totals for Golden-crowned Kinglets at Cabot Head Research Station, 2002 - 2015.

In October, most warblers have usually already gone through the area: except for Orange-crowned and Yellow-rumped Warblers, which are late migrants, it is mostly stragglers that are observed. This fall, an impressive 9 species of warblers were detected in October. Nashville Warblers were only detected in 2 days this fall in early October, even though it is a species of warbler regularly detected throughout October every single year (with latest record on October 28, 2004). On the opposite, Northern Parulas have been detected only in two previous October, with one bird each on October 16, 2008 and on October 10, 2014. This fall, an individual was captured on October 15. Black-throated Green Warbler is somewhat intermediate in regard with detection in October compared to the previous species. It has been detected in October only in 6 seasons prior to 2015 within the first 10 days of the month. This fall, it was observed on October 1 and 5. Although not as abundant as Yellow-rumped and Orange-crowned Warblers in October, the Western Palm Warbler is frequently seen at this time of year: it was missed only in 2004. This fall, it was seen only once in October, on the 6th. This fall, the American Redstart captured on October 2 and recaptured the next day was definitively a straggler, as this species becomes rare after mid-September. That individual was certainly in poor conditions: its weight at capture was 6.7g, almost the lighter of all captures (average of 7.7 ± 0.5 g; range = 6.6 – 9.3). At recapture the next day, its weight had dropped to 6.4g. It was seen a few times during the morning, barely moving in the low shrubs. Unfortunately, it rained most of the following day, October 4, decreasing even further its chance of survival. Northern Waterthrush is another species rarely seen in October: one bird in October 6, 2006, one in October 11, and this year, one in October 20. Finally, the last Common Yellowthroat detected this fall was on October 8. It is a species that is observed slightly more than Northern Waterthrush in October, with observations in 5 years in October (latest record on October 13, 2002).

A late-fall migrant warbler, the Orange-crowned Warbler, was observed quite often this fall: detected first on September 20, it was seen up to October 26, with 20 days with observations and an above-average banding total of 21 birds. Another late-fall migrant, although more common, Myrtle Warbler was detected almost daily from mid-September to mid-October. However, no birds were observed after October 20, except on the 30th and 31st with one bird each.

3.0 Unusual Records

No new species was added to the area checklist this fall. However, a number of unusual species were seen and/or banded.

Some interesting birds banded this fall were: one Yellow-billed Cuckoo was banded on September 21, a species banded relatively regularly in fall (only missed in 5 falls) but always in small numbers (1 or 2 individuals at the most); a young female and a young male Pileated Woodpeckers were banded on October 20 and 26, respectively. This species is a common resident at Cabot Head but its large size prevents easy capture, as birds can relatively easily escape from the nets. Thus, only a total of 10 Pileated Woodpeckers (3 in spring and 7 in fall) have been banded from 2002 to 2014 and never before 2 individuals in the same season; an adult male White-breasted Nuthatch was banded on October 27. Only 4 birds of this species have been banded in previous falls (one in 2005, 2 in 2007, and one in 2012); 2 Eastern Wood-Pewees were banded this fall, a species banded only twice in previous falls (in 2009 and 2013); a Blue-gray Gnatcatcher was observed on August 29 and 31. This species is seen every spring (except in 2015) but not every fall: it has, in fact, been observed only in 6 falls prior to 2015, as early as August 19 (in 2006) and late as October 7 (in 2014); a species more often heard or seen flying overhead, an American Pipit was banded on September 30. A bird of open spaces, it is extremely unusual to capture this species in the net set-up of Cabot Head: previously, only one bird banded both in 2002 and 2004; a Brown Thrasher was banded on October 3. Although this species is present at Cabot Head every year, Brown Thrasher manages to elude the mistnets in fall, with captures only in 2002, 2012, and 2013, for a total of 5 birds; this fall, 2 Northern Parulas were banded, early (September 2) and late (October 14) in the season. It is very rarely banded (and observed as well) in fall, with only 2 other captures in the previous 13 years: one on September 9, 2005, and one on October 15, 2008; Pine Warblers breed at Cabot Head and are observed every spring and fall, although not very often captured in fall. Only one bird was banded this fall in early September. A total of 11 Pine Warblers have been previously banded in 6 years from 2002 to 2014, with captures from August 23 to October 13; on the opposite, no Hooded Warblers breed at Cabot Head or on the Bruce Peninsula except for a possible pair at Cape Crocker. A young female was banded on September 29 this year, the second only

ever to be banded in the fall at Cabot Head (with the previous one, a young male, on October 4, 2010); two Scarlet Tanagers were banded: a young on September 21 and an adult male on October 5 (see photo 1). Previously, a total of 10 scarlet tanagers were banded in 6 fall seasons, as early as August 21 and late as October 3; Northern Cardinals, on the other hand, are captured almost every fall (missed only in 2006, 2013, and 2014), albeit in small numbers (from one to 3 individuals per season). This fall, two adult females were banded on October 20 and 31; only one Rose-breasted Grosbeak was banded this fall, on August 21. This species is captured in small numbers in the fall (high of 8 birds in 2011) and was missed in 5 seasons; the second-ever Clay-colored Sparrow was banded on October 8. One was banded previously in 2002. It is a rare species at Cabot Head: besides the ones banded, it was observed in only 4 other years; a late migrant, a Common Redpoll was banded this year, on October 20. This species was banded in only 2 other falls previously, with 5 birds in 2005 and 6 in 2007.

Other noteworthy observations are: on the evening of August 25, one Common Nighthawk was seen flying above “Compass Lake” (the lake between Middle and West Bluffs), a rare sight of a declining species; an evening watch was operated at the station in August and early September with no sightings at all of nighthawks! Peregrine Falcons were seen 6 times this fall, from September 15 to October 5; for only the 4th time in the fall, a Vesper Sparrow was observed near the station feeding on September 22. All the previous observations were in October, from the 1st to the 21st; a few Rusty Blackbirds were observed throughout the season, with the first on September 30 and the last on October 9, with a high of 6 birds on October 8. More birds were seen in the Pine Barrens and around Compass Lake; one very famished young Lapland Longspur was observed feeding frantically on the ground on October 16 (and again on October 17). This species has been observed only in 4 other falls (2002, 2012, 2013, and 2014); a Northern Shrike was observed very briefly during census on October 24, a blustery, though warm, day; a Northern Goshawk was seen very briefly on October 25; Snow Buntings were detected only twice with just one individual each, on October 27 and 30. This species is observed every fall, mostly after mid-October, and sometimes in big numbers: for example, 89 Snow Buntings were observed on October 28, 2004.

A White-winged Scoter stayed on Wingfield Basin for an extended period of time

in October, probably because it was in poor conditions. One afternoon in late October, as a strong wind was blowing, we observed an adult Bald Eagle trying to catch the white-winged scoter for several minutes: it would hover right over it as the scoter surfaced for air and dove again to escape the eagle. Just when it seemed the eagle was about to get the scoter, another adult bald eagle arrived on the scene and chased off the other eagle. It is possible although impossible to prove that the second eagle was the resident eagle, fighting off a transient adult.



Photo 1: Male adult Scarlet Tanager banded at Cabot Head, fall 2015.

4.0 Banding Data Analysis

Banding totals for fall 2015 represent a well below average year, being the fourth-lowest total ever (Table 2). For the 23 species with more than 15 individuals captured, 8 species have banding totals above average and 10 have banding totals below average, although 5 species are very close to the average (Fig.10). Among the 71 species banded this fall, 8 species have the highest banding total ever this fall, most notably Swainson's Thrush, Blackpoll Warbler, American Tree Sparrow, and Slate-colored Junco. On the opposite range, 6 species (Common Yellowthroats and Song Sparrows, for

example) have the lowest banding total. Numerous variables could affect the capture rates: population dynamics, weather conditions during migration, food availability and vegetation changes at the site. As a consequence, daily captures are highly variable (Fig.11)

Black-capped Chickadees are mostly resident birds, but, occasionally, they can exhibit an “irruptive” behaviour, most often after a very successful breeding season, when young birds roam in search of new territories. As a consequence, banded numbers in fall are very variable at Cabot Head with a major irruption evident in the fall of 2005. On the opposite, very few chickadees were banded this fall, with only 10 birds banded, the lowest ever (Fig.12).

A total of 25 species of warblers were banded, including the second ever Hooded Warbler in the fall. Of the 10 species of warblers with more than 15 birds banded this fall, most are within range of the variation observed between seasons, except for Orange-crowned Warbler (highest total with 31 birds banded; fig.13) and Common Yellowthroat (lowest total of 17, as in 2008). Because numbers of warblers banded are generally small, they are difficult to interpret: any stochastic events, in relation to weather, food availability, breeding success – either local or regional – could easily influence their numbers up or down. For example, Magnolia Warblers, a common bird of the boreal forest, are captured in small, but relatively constant, numbers across the years, whereas Orange-crowned Warblers, which breed further north and migrate later than Magnolia, show more marked differences between seasons (Fig.14).

Table 2. Monthly capture rates, fall 2015.

Month	Birds Banded	Net Hour	Captures/ Net Hour
August	223	1106	0.20
September	537	2245.5	0.24
October	702	1727.6	0.41
Total	1462	5079	0.29

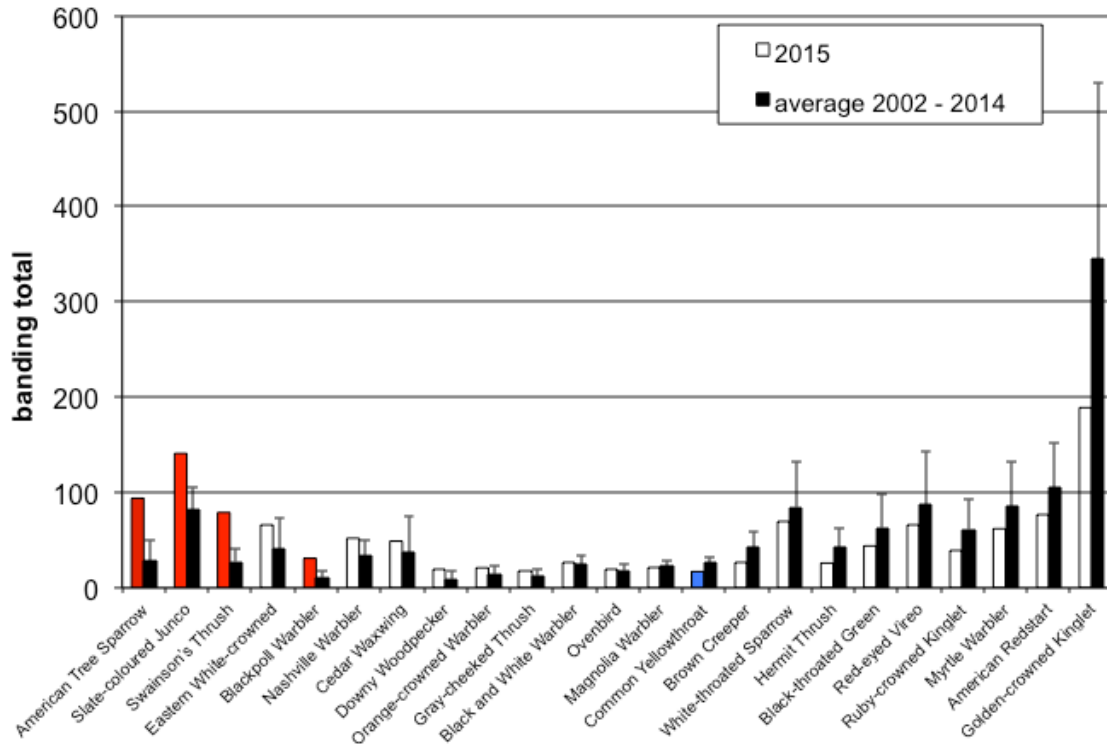


Figure 10. Banding total of the most common captured species (at least 15 individuals) compared to average total of 2002-2010 (highest total in red and lowest in blue). Differences from average in decreasing order from left to right.

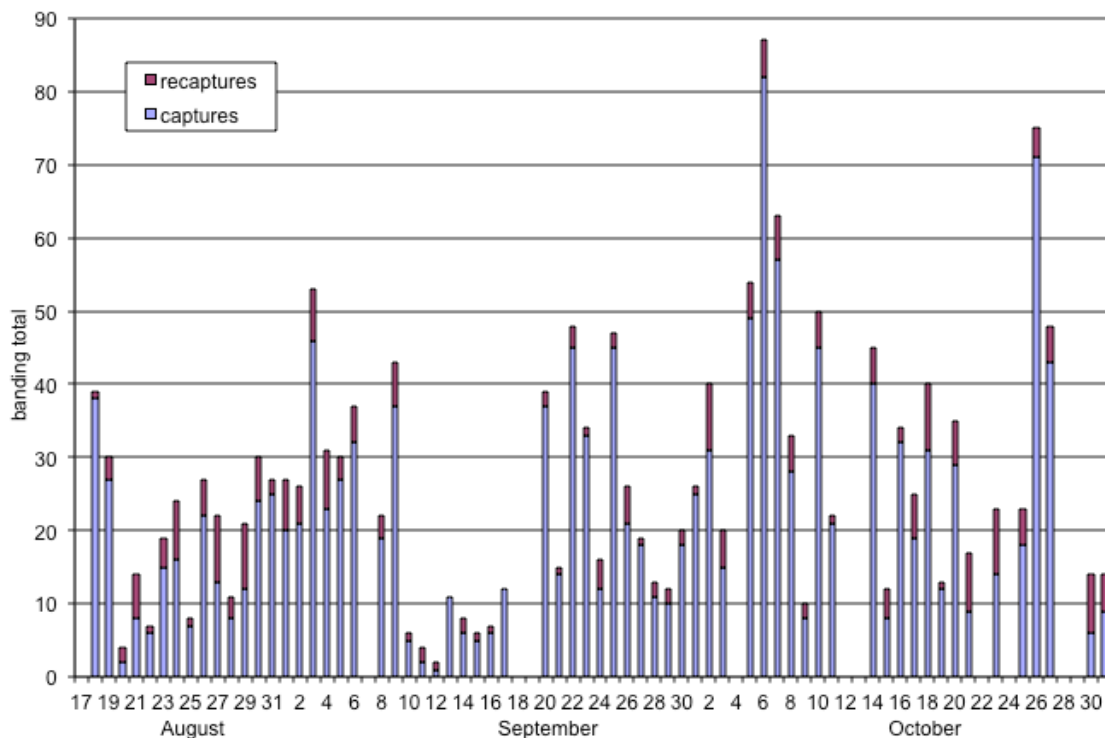


Figure 11. Daily banding and recapture total at Cabot Head Research Station, fall 2015.

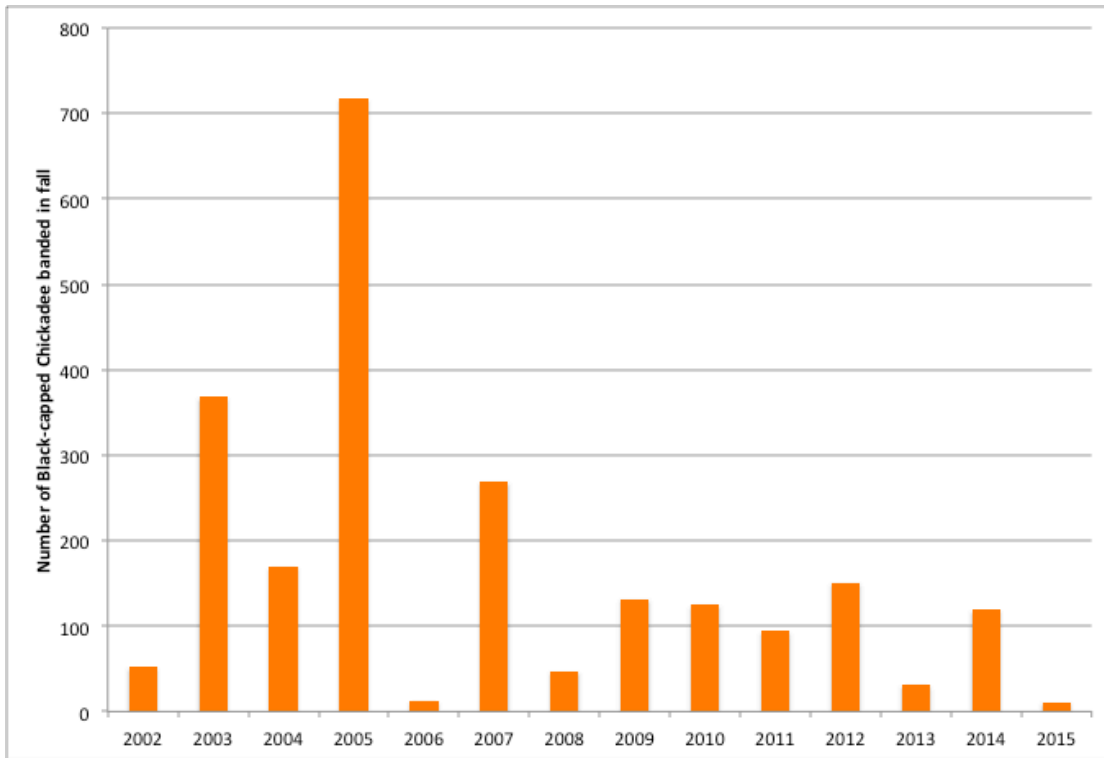


Figure 12. Banding Totals of Black-capped Chickadees in fall seasons 2002 to 2015 at Cabot Head Research Station.

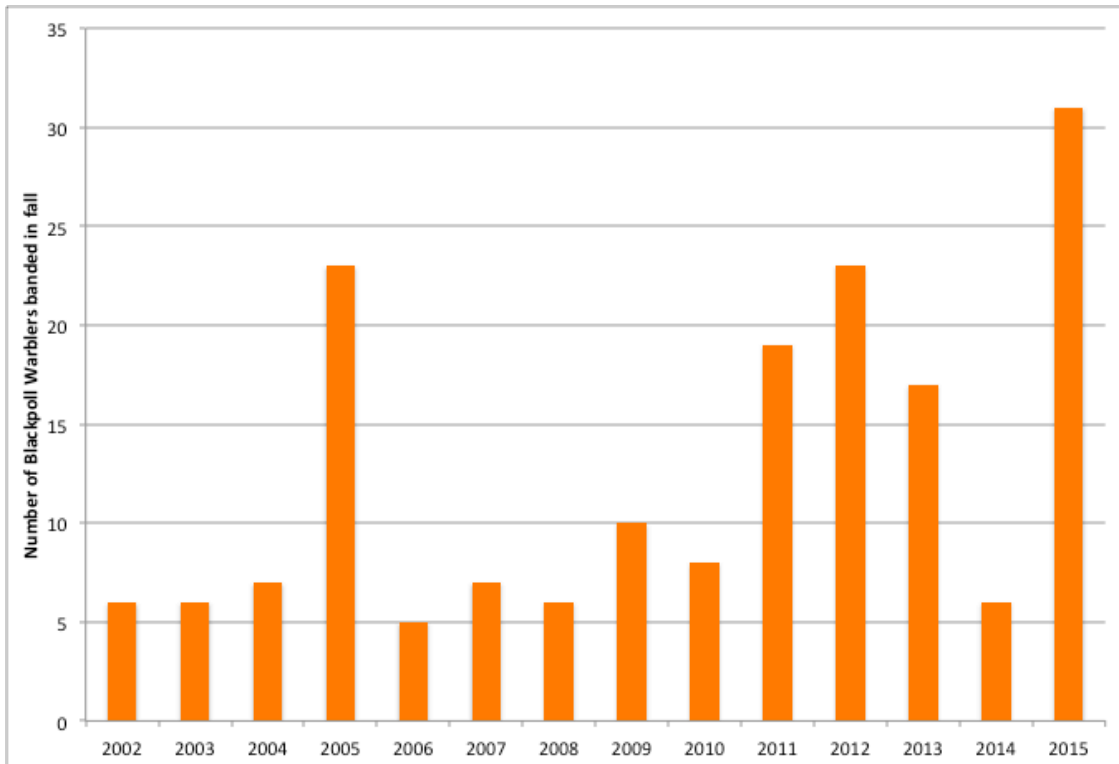


Figure 13. Banding Totals of Blackpoll Warblers in fall seasons 2002 to 2015 at Cabot Head Research Station.

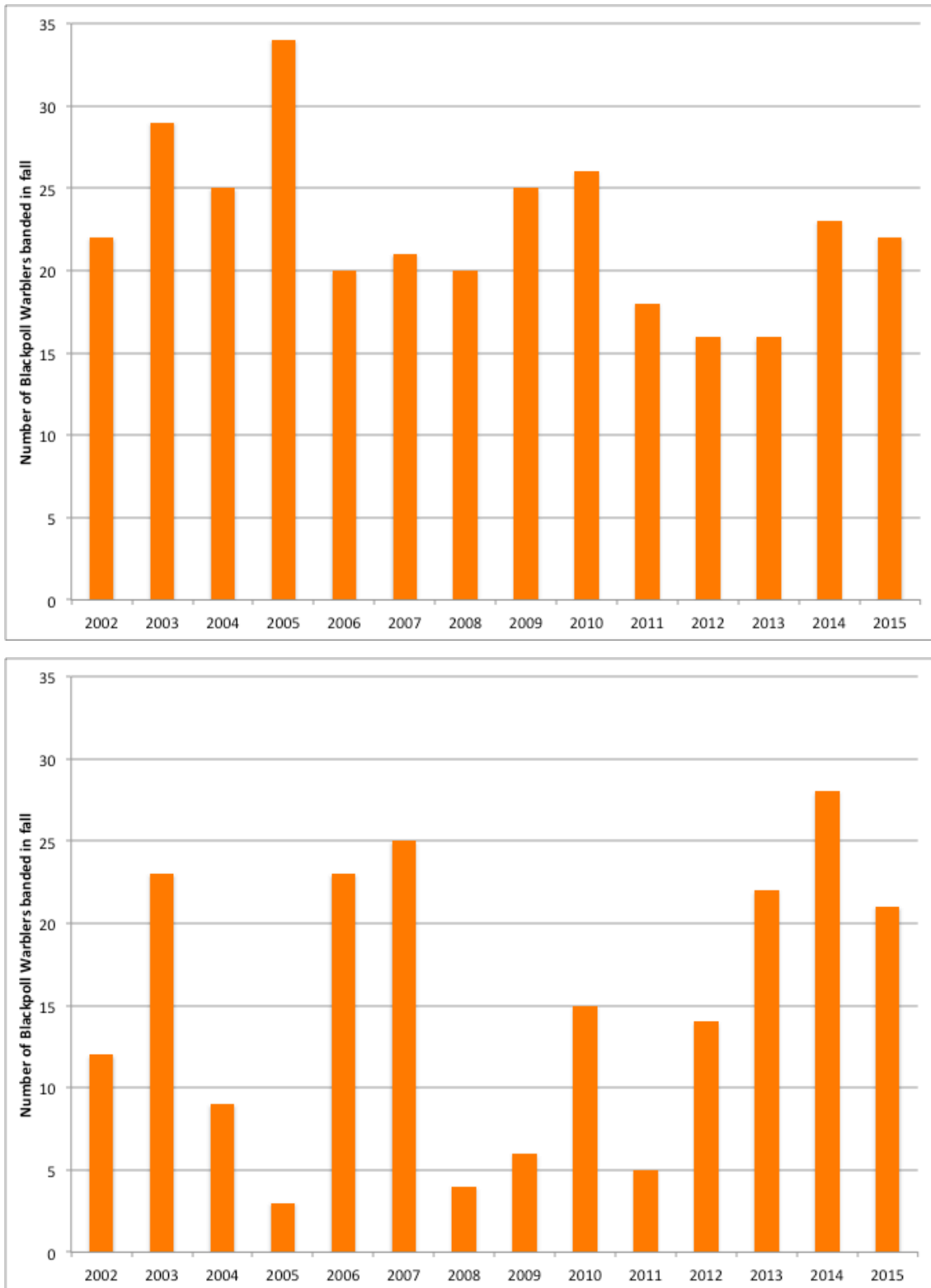


Figure 14. Banding Totals of Magnolia (top) and Orange-crowned (bottom) Warblers in fall seasons 2002 to 2015 at Cabot Head Research Station.

Capture rates varied greatly on a monthly, and even weekly, basis (Table 2 & Fig.15. NB: 2012-2014 data are not available in an electronic format and are thus not included in the following analysis). The capture rate is determined by dividing the number of birds caught in a net, or a group of nets, by the number of hours for which the net or nets were operated. Thus, variation in capture rate reflects variation in those two parameters, which are themselves dependent upon various conditions (weather being the major one). Mist net hours can be lost when weather conditions (i.e. rain or strong wind) or the presence of a predator pose a threat to the birds, forcing us to close nets.

In comparison to previous falls, weekly capture rates this fall were highly variable with strong departure from average for 3 weeks: the capture rates were at a record high for the last week of monitoring in October and at a record low between September 13 and 19 (Fig.15). Not surprisingly, these weeks correspond to the highest and lowest weekly totals, respectively (Fig.16). Weekly variations in mist net hours are usually important but variable among years (Fig.17). Coverage with 74% of potential mist net hours realized was very close to the 2002 – 2011 average of 72% (range 14% - 46%). However, coverage, as usual, was very variable throughout the season. Mist net hours realized were at or around average for most of the season, except for 3 weeks. Coverage was 100% or very close in 2 weeks (August 30 – September 5 and September 20 – 26) and, not surprisingly, numbers of birds banded were higher than average during these weeks. On the other hand, only 46% of mist net hours were realized from October 11 to 17, with a corresponding low number of birds captured during this time (but an average capture rate). However, the relationship is not always as straightforward: coverage was slightly below average for the week of September 13 to 19 whereas number of banded birds was extremely low during the same period. With 40 birds banded, it is the second-lowest total for that particular week, during which there was a persistent and strong south wind. Birds will refrain from migrating during periods of strong headwind.

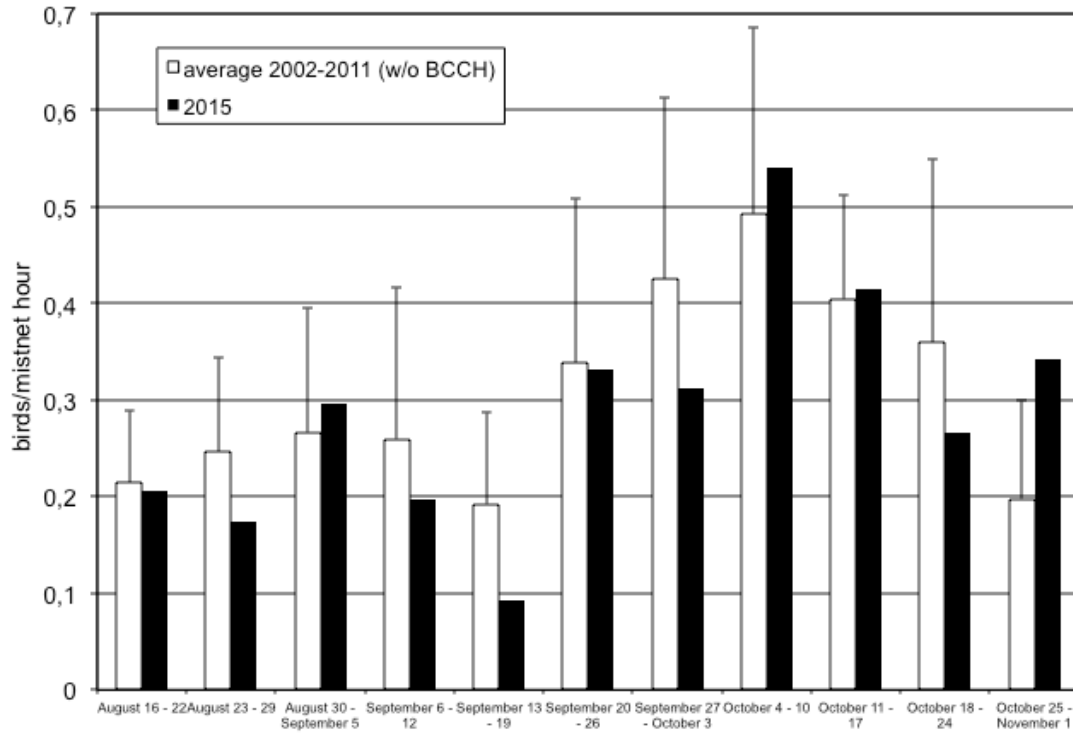


Figure 15. Fall weekly capture rates at Cabot Head Research Station (without Black-capped Chickadee for average 2002-2010). Error bars show Standard Deviation.

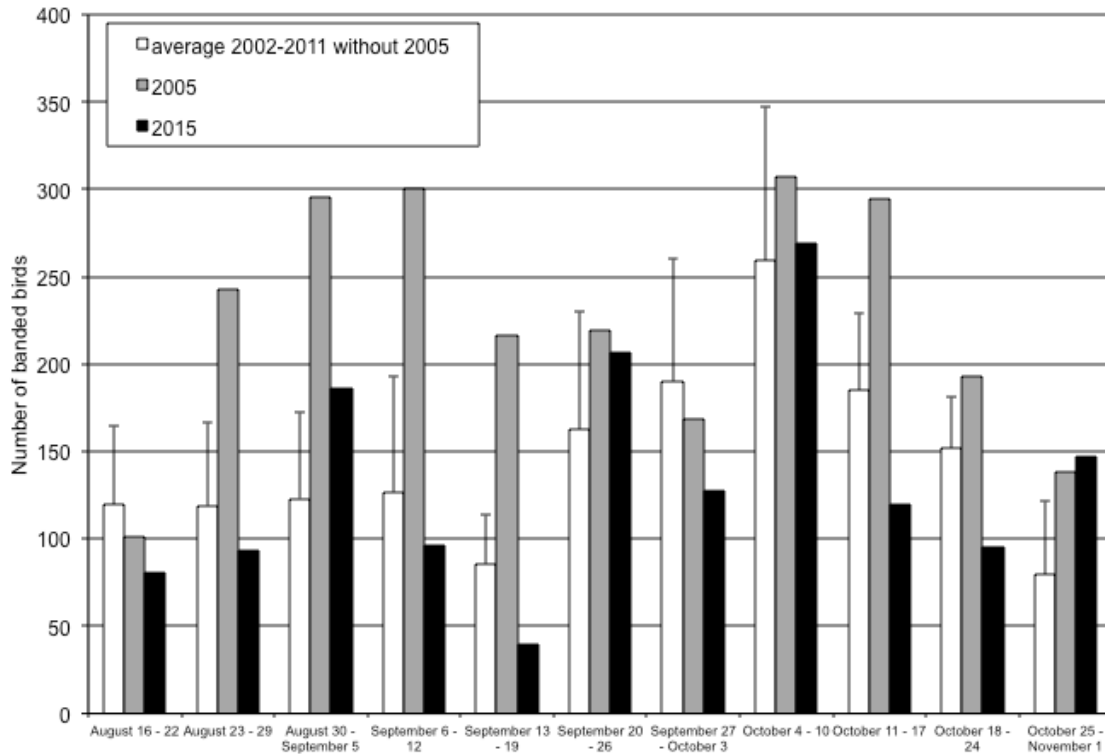


Figure 16. Fall weekly number of banded birds at Cabot Head Research Station. Error bars show Standard Deviation.

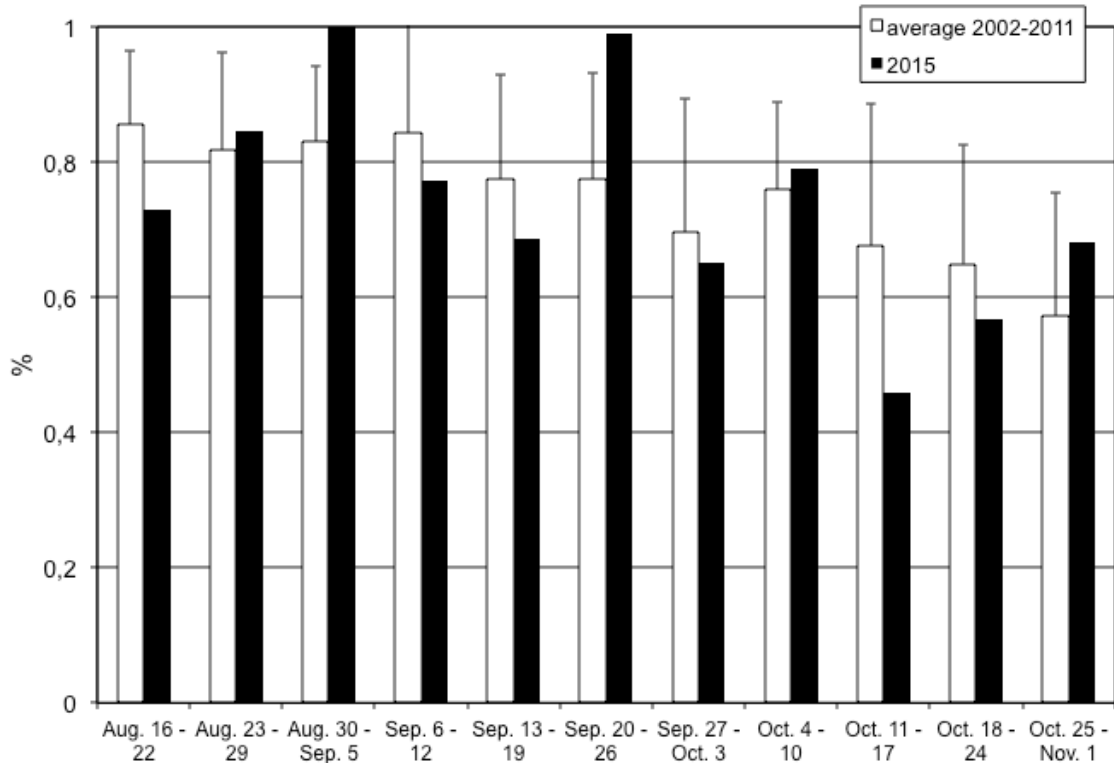


Figure 17. Fall weekly proportion of realized mist net hours at Cabot Head Research Station. Error bars show Standard Deviation.

4.1 Weather

Weather during the fall migration monitoring in August and early September was typical of summer: generally warm and sunny. As summer wanes into fall, the weather became more variable, mostly involving windier days. Fall this year was relatively dry, especially in August and September, as the 8 episodes of rain/showers were usually short and/or light. There was 6 episodes of rain in October, most of them light and/or short as well. Notably, there was a night thunderstorm on October 21 and an intense daylong rain on October 28, accompanied with very strong East wind, which continued in the morning of the 29th: that event was the remnant of hurricane Patricia, which struck the west coast of Mexico on October 23 and then tracked across the mid-section of North America. Banding was precluded completely for 11 days because of rain (for 4 days, often with high wind) or wind (for 7 days).

With rain, winds are a major factor that influences migration. For example, there was a period of very strong south wind almost uninterrupted between September 14 and

19, which, most likely, hampered migration (as indicated by very few birds captured). It is difficult to accurately quantify such a dynamic component of the weather, especially because wind strength and direction are recorded only at the start and end of the count period. To characterize wind strength (on the Beaufort scale) and direction, we considered only the strongest wind during the count period of 7 hours. Undoubtedly, this method would tend to over-represent strong winds. However, strong winds affect migration tremendously and their effect could probably be felt before they developed into full windstorm. This fall, strong winds (at least 5 on the Beaufort scale) occurred very frequently (47% of the season) and were mostly from South (half of the strong winds) or North. There were marked differences throughout the season in wind strength and direction: for example, north winds became more common in October, a month when there was almost no period of light winds (Fig.18). West winds were the least common throughout the season, occurring about 13% of the time.

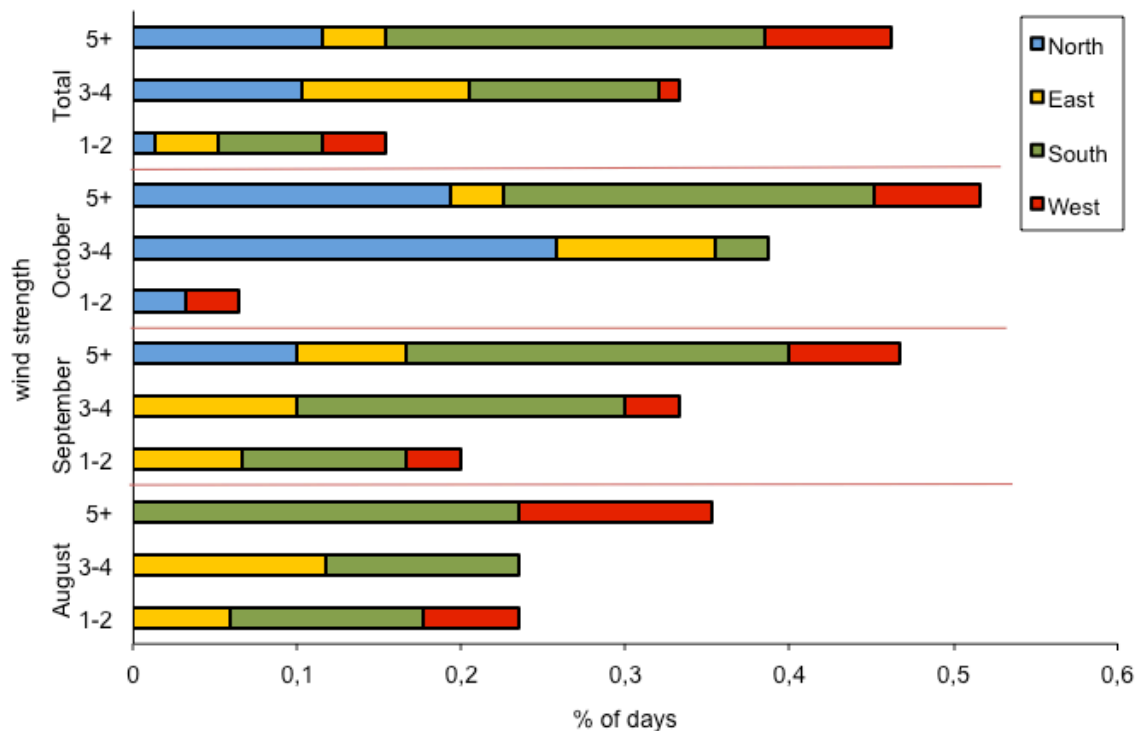


Figure 18. Wind pattern (strength on the Beaufort scale, direction and proportion of time) at Cabot Head Research Station, fall 2015.

4.2 Recaptures

The rate of recapture at Cabot Head was relatively high in fall 2015: A total of 255 recaptures for 176 individuals of 29 species were recaptured from August 18 to October 31 (Table 3). The vast majority of recaptures (156 i.e. 89%) came from birds banded this fall, which represent only 11% of birds banded during the season. There were also quite a few recaptures from the previous banding done at Cabot Head, with 15 birds of 7 species banded from fall 2011 to spring 2015 (Table 3). A Black-and-white Warbler was banded in fall of 2011 as an after-hatch-year. A Red-eyed Vireo banded as an after-hatch-year in fall of 2013 was recaptured on October 28. Half of the recaptured birds banded in a previous season were American Redstarts, with 7 individuals originally banded from spring 2013 to spring 2015.

Most of the recaptured birds were recaptured only once (129 out of 176 individuals, 73%) or twice (17%). However, a few birds were recaptured 4 times or more. For example, a Downy Woodpecker was recaptured 5 times, as well as a Magnolia Warbler and a Slate-colored Junco.

Within-season recapture rates are variable between species but relatively small (Fig.19). For species with significant numbers banded (50 individuals or more), recapture rate in fall 2015 varied greatly from 4% for Golden-crowned Kinglet to 23 % both for American Redstart and White-crowned Sparrow. White-crowned and White-throated Sparrows, as well as Juncos and, to a lesser degree, American Tree Sparrows, are recaptured in higher proportion than most other species, maybe because they feed mostly on the ground and linger more in the area of the station. Since most of the American Tree Sparrows were captured in the very last days of the banding period, there was less time to have recaptures. Nonetheless, the low capture rate (9%) seems to indicate a quick movement through the area. Interestingly, all the recaptured birds that were banded after October 20 lost weight at the recapture, whereas the birds banded earlier in the season and recaptured gained weight. However, changes were quite small, except for one bird that lost about 18% of its weight in 2 days. A few other species also have high rates of recapture: 24% for Gray-cheeked Thrush (from a total of 17 birds banded during the fall) and an impressive 47% of the 17 Common Yellowthroats banded this fall. Capture and recapture depend on several factors: presence of a local breeding population, different

foraging behaviour between species and individuals, variations in individual quality between- and within-season (for example, birds in bad conditions could require a longer stopover in the area, regardless or not on food availability).

Despite being captured in high numbers, Golden-crowned Kinglets are always recaptured in a quite low percentage: between 5 and 11%. This fall is no exception: only 8 Kinglets of the 181 banded were recaptured, all, but one, on the following day of banding. It shows that the vast majority of Golden-crowned Kinglets move through the area quickly, without lingering to feed or rest. American Redstarts, on the other hand, are recaptured in greater proportion and tend to stay longer at Cabot Head. Most American Redstarts recaptured later in the season were banded in August, potentially resident birds not yet in migration mode, with some of them still actively moulting their wing and tail feathers (Fig.20). They also tend to have an extended stay: the average “apparent” length of stay of the 18 American Redstarts recaptured was 9.2 ± 5.2 days (range from 2 days to 19 days). More adult are recaptured than young: 79% of recaptured American Redstarts are adult, whereas the proportion of adults in the banded sample is only 40%.

Swainson’s and Gray-cheeked Thrushes migrate approximately at the same time, in September. They are usually captured in small numbers in fall, with a season average of 28 and 13 birds, respectively. However, this fall, these 2 species were captured in higher numbers, with relatively high recapture rate as well. Of the 17 banded Gray-cheeked Thrushes, 4 were recaptured, all of them on the subsequent day of banding. Even in such a short time, 3 birds put on weight (up to 2.3g for one bird or an increase of 9%) but one lost 1.1g (4% of its original weight). The recapture rate of Swainson’s Thrush – 15% - was lower than of Gray-cheeked Thrush but it is out of a higher total: with 79 birds, it was the highest fall banding total for Swainson’s Thrush of any fall. Among the 12 Swainson’s Thrushes recaptured, 9 of them were recaptured the following day (including one that was again recaptured 3 days after initial banding). Only one of them lost weight but only 3% of its initial mass. For the other birds, weight gain was relatively modest, with the highest increase of 9%. Only 4 individuals were recaptured a few days after initial banding, with only one showing a very small weight decrease (of 2%) after 4 days. The biggest weight increase – of 13% - was for a bird recaptured 3 days after initial banding.

Table 3. Total recaptures by species in relation with year and season of banding (only one recapture per individual is included) at Cabot Head Research Station, fall 2015.

Species	2011	2013		2014		2015		Unknown
	fall	spring	fall	spring	fall	spring	fall	
Sharp-shinned Hawk							1	
Downy Woodpecker							5	
Blue-headed Vireo							1	
Red-eyed Vireo			1				7	
Black-capped Chickadee			1		1		3	1
Red-breasted Nuthatch							3	
Golden-crowned Kinglet							8	
Ruby-crowned Kinglet							2	
Veery							3	
Gray-cheeked Thrush							4	
Swainson's Thrush							13	
Hermit Thrush							4	
American Robin							1	
Gray Catbird							1	
Cedar Waxwing							1	
Orange-crowned Warbler							3	
Magnolia Warbler						2	5	
Black-throated Blue Warbler							1	
Myrtle Warbler						1	3	
Black and White Warbler	1						6	
American Redstart		1		1	3	2	18	
Ovenbird							2	
Common Yellowthroat					1		8	1
Canada Warbler							1	
American Tree Sparrow							8	
Fox Sparrow							1	
White-throated Sparrow							11	1
Slate-coloured Junco							17	2
White-crowned Sparrow							15	
Total	1	1	2	1	4	5	156	5

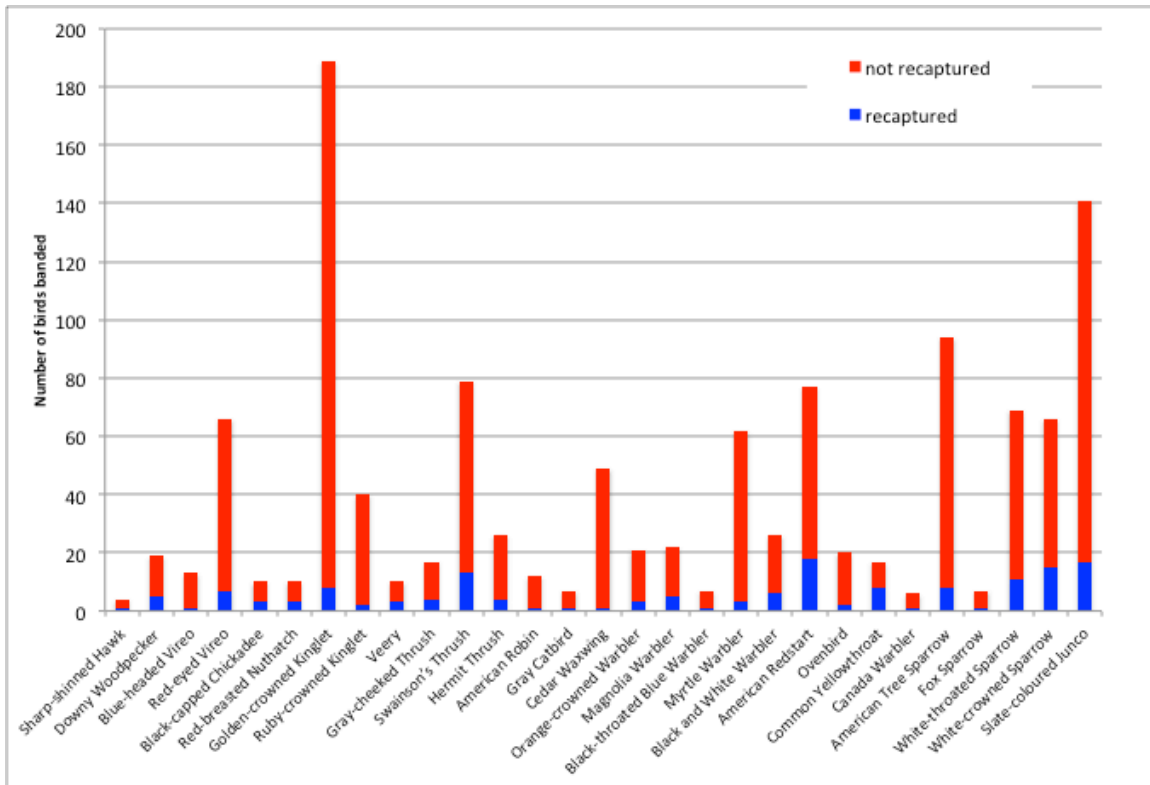


Figure 19. Number of birds never recaptured and recaptured for species with recaptures at Cabot Head Research Station, fall 2015.

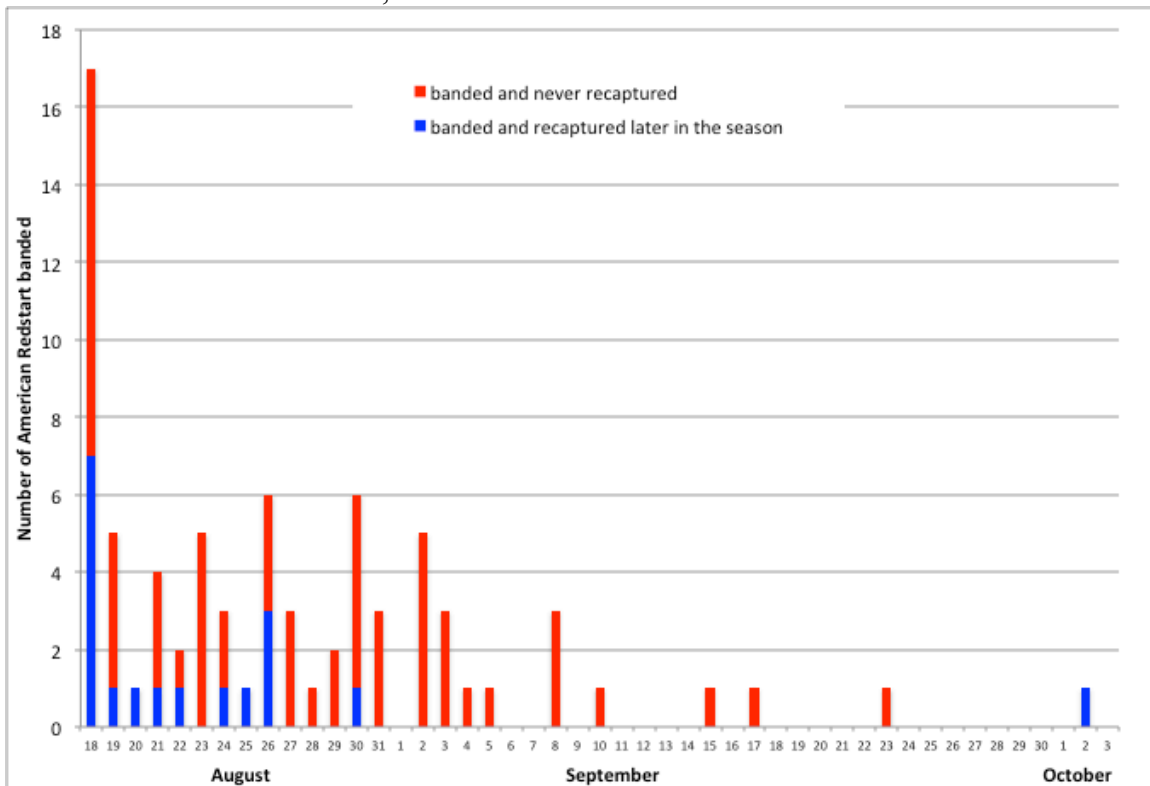


Figure 20. American Redstarts banded and recaptured or not in relation with time of banding at Cabot Head Research Station, fall 2015.

4.3 Net Analysis

Mist net locations at Cabot Head have been permanently set in place in 2002 to ensure standardized capture data. This fall, all nets but C13 were open for an average of 67 to 79% of the time. C13 was open only 58% of the time. This net is the most exposed of all, being closer to the Georgian Bay shore in an open area; it is thus relatively often affected by winds, especially northeast to northwest.

As usual, there was a significant amount of variation in capture rates for each net. Captures were localized in a few very productive nets, as in previous seasons, although differences were not as marked this fall (Fig. 21). Location, and thus difference in habitats, can explain variation in capture rates. However, differences in species behaviour may also account for variation. The five nets with the highest capture rate (in decreasing order, A1, C15, B9, A3, and A2) accounted for 51% of the total capture during 34% of the realized mist net hours. The least productive nets (in decreasing order, C11, A4, C12, B6, and A5) accounted for only 17% of the total capture during basically the same amount of time (33%).

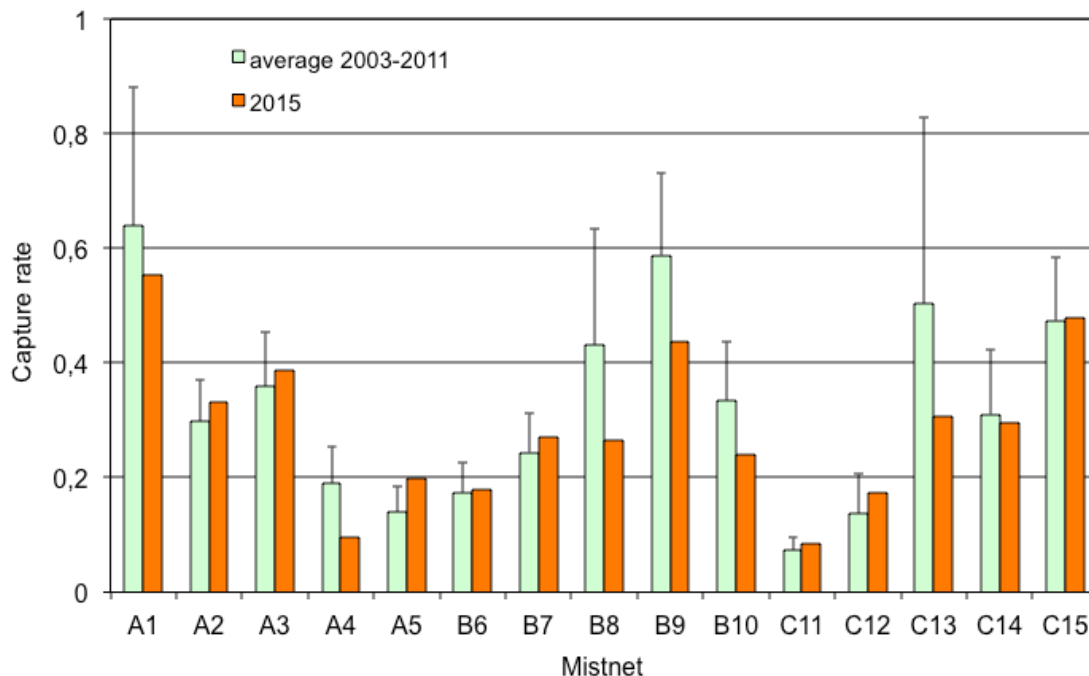


Figure 21. Capture rates per mist net for average 2003-2011 and for 2015 at Cabot Head Research Station.

5.0 Coverage and Protocol

This fall, 26% of the possible mist netting coverage (in hours) was lost due to weather, as high wind and precipitation were significant factors in determining daily net opening and closure (Fig.22). Fortunately, due to the density of habitat at Cabot Head, at least a portion of the nets can usually be operated on windy days. Coverage was relatively good as there was no banding in only 11 days (out of 76 days) and the daily average for days with banding was 67 mist net hours (out of a potential of 90). Species coverage at Cabot Head is consistent with coverage elsewhere in the Great Lakes region of the CMMN (Badzinski and Francis, 2000). According to the protocol, a census was carried out every day, except during heavy rain.

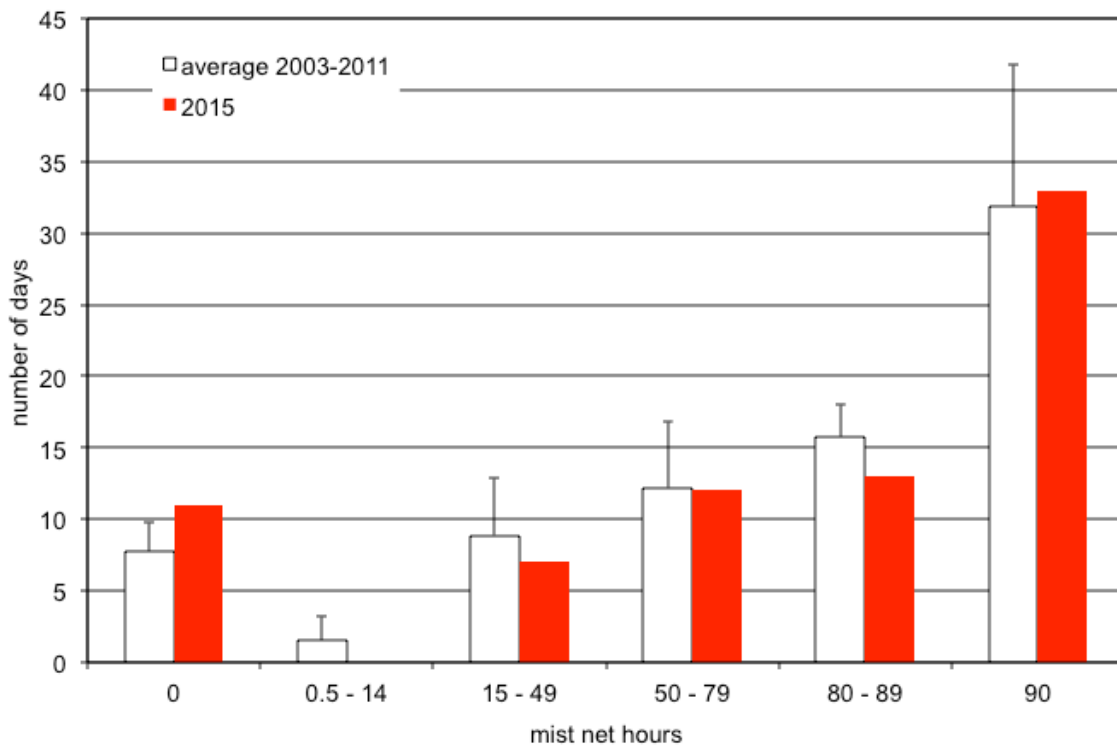


Figure 22. Coverage (in mist net hour) at Cabot Head Research Station, fall 2015.

6.0 Personnel

This fall, 9 volunteers contributed a total of 157 person-days to the fall migration monitoring season (Table 4). This fall, volunteers hailed from Ontario,

Wisconsin, Virginia, Alberta, and Québec. Some stayed for just a few days, while others were long-term, most notably Tristan (40 days) and Annick (62 days). Volunteers are an essential part of the success of the operations at Cabot Head and all help is appreciated.

Table 4. Volunteer effort, spring 2015.

40+ Days	7-14 Days	2-4 Days
Annick Antaya (QC)	Jamie Prime (ON)	Thea Carpenter (AB)
Tristan Luxner (VA)	Valérie Tchang (QC)	Al Woodhouse (ON)
	Ryan Lancour (WI)	Alex Mills (ON)
	Kitty Yang (ON)	

7.0 Conclusion

Bird migration monitoring was done daily from August 17 to October 31, thanks notably to a dedicated team of volunteers. The continuing monitoring throughout the years keeps providing a more detailed and precise picture of bird migration on the Bruce Peninsula, revealing insights in bird migration. Interestingly this fall, the number of species detected was quite low (with 130 species, it is below average), whereas the number of species banded was the second highest ever (with 71 species), including a number of species rarely banded.

A characteristic of the fall of 2015 was the preponderance of strong winds and warm weather. There were very often strong south winds, which were most likely detrimental to migration, as birds tend not to fly when encountering headwinds. It is possibly a reason for the lower banding totals and number of species detected. Within temporal constraints, migration is definitively a very variable phenomenon, most notably in numbers, resulting in highs and lows between years. For example, this fall, American Tree Sparrows and Swainson's Thrushes, species with very different migration patterns, were captured in record numbers. On the other hand, some regular species were not detected this fall, like Eastern Phoebe, Mourning Warbler, and Purple Finch.

Continuing migration monitoring at Cabot Head Research Station contributes to the efforts of the Canadian Migration Monitoring Network and ultimately to the understanding and monitoring of bird populations.

Acknowledgements

As a non-profit, volunteer-based initiative, the Bruce Peninsula Bird Observatory would not be operable without the overwhelming support of its membership, financial supporters and volunteers. BPBO wishes to thank Ontario Parks for their generous on-site management assistance.

The author wishes to thank all the members of the Bruce Peninsula Bird Observatory, as well as Ontario Parks for their support during the field season. A special thank is due to Mike and Sara Jane VanDeLaar as they graciously helped me in so many and various ways. I would also like to commend the 11 volunteers who helped make the field season efficient and enjoyable.

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Appendix I. Fall banding total 2015

Group	Species	2015	Av. \pm stdev.		Max.	Year	Min.	Year	#
raptors	Sharp-shinned Hawk	4	3	1	5	2011 - 2013	1	2009 - 2012	12
cuckoos	Yellow-billed Cuckoo	1	2	0	2	several years	1	2005 - 2010	8
woodpeckers	Downy Woodpecker	19	9	8	31	2009	2	2002	13
	Hairy Woodpecker	2	6	3	12	2007	2	2005	11
	Yellow-Shafted Flicker	3	4	2	8	2012	1	2005	12
	Pileated Woodpecker	2	1	0	1	several years			7
flycatchers	Eastern Wood-pewee	2	1	0	1	2009 - 2013			2
	Yellow-bellied Flycatcher	4	2	2	7	2014	1	several years	11
	Trail's Flycatcher	6	7	4	16	2007	1	2011	13
	Least Flycatcher	7	5	2	9	2010	3	several years	13
vireos	Blue-headed Vireo	13	6	3	11	2005	1	2002 - 2007	13
	Philadelphia Vireo	1	3	2	5	2012	1	2003/07/10	9
	Red-eyed Vireo	66	87	56	239	2005	24	2009	13
corvids	Blue Jay	5	5	4	16	2014	1	2007	12
paridae	Black-capped Chickadee	11	176	190	717	2005	12	2006	13
nuthatches	Red-breasted Nuthatch	10	50	44	160	2012	12	2013	13
	White-breasted Nuthatch	1	2	1	2	2007	1	2005	2
creepers	Brown Creeper	27	42	17	71	2012	19	2009	13
wrens	Winter Wren	2	5	2	8	2007/08/13	1	2003	12
kinglets	Golden-crowned Kinglet	189	345	185	758	2013	113	2005	13
	Ruby-crowned Kinglet	40	62	32	122	2003	20	2005	13
turdidae	Veery	10	3	2	6	2007	1	2010	10
	Gray-cheeked Thrush	17	13	6	23	2002	6	2010	13
	Swainson's Thrush	79	28	13	50	2009	10	2006	13
	Hermit Thrush	26	43	19	87	2011	16	2002	13
	American Robin	12	18	9	36	2006	1	2007	13
mimidae	Gray Catbird	7	6	4	17	2002	2	2010 - 2014	13
	Brown Thrasher	1	2	1	2	2012 - 2013	1	2002	3
pipits	American Pipit	1	1	0	1	2002 - 2004	1		2
bombycillidae	Cedar Waxwing	49	37	38	117	2005	1	2014	12
warblers	Tennessee Warbler	11	11	14	44	2005	2	2009	12
	Orange-crowned Warbler	21	15	9	28	2014	3	2005	13
	Nashville Warbler	52	34	16	78	2005	19	2010	13
	Northern Parula	2	1	0	1	2005 - 2008			2
	Yellow Warbler	1	4	3	13	2003	1	2007/08/14	13
	Chestnut-sided Warbler	1	2	1	5	2002	1	several years	11
	Magnolia Warbler	22	23	5	34	2005	16	2012 - 2013	13
	Cape May Warbler	7	2	1	3	2003 - 2007	1	several years	9
	Black-throat. Blue Warbler	7	14	5	22	2002	2	2014	13

Group	Species	2015	Av. \pm stdev.		Max.	Year	Min.	Year	#
warblers	Myrtle Warbler	62	85	47	204	2005	34	2004	13
	Black-thr. Green Warbler	44	63	36	120	2002	15	2007	13
	Blackburnian Warbler	1	4	3	10	2005	1	2012	10
	Pine Warbler	1	2	1	3	2011	1	2010 - 2014	6
	Palm Warbler	5	8	6	22	2012	1	2004	13
	Bay-breasted Warbler	6	5	3	10	2013	1	2009	11
	Blackpoll Warbler	31	11	7	23	2005	5	2006	13
	Black and White Warbler	26	24	9	37	2013	12	2006 - 2007	13
	American Redstart	77	105	47	198	2003	44	2007	13
	Ovenbird	20	18	6	31	2012	10	2007	13
	Northern Waterthrush	8	6	4	15	2010	1	2005	13
	Common Yellowthroat	17	26	6	39	2010	17	2008	13
	Hooded Warbler	1	1		1	2010			1
	Wilson's Warbler	9	7	3	12	2009	2	2004	13
	Canada Warbler	6	4	2	8	2002	1	2004 - 2006	13
tanagers	Scarlet Tanager	2	2	1	2	several years	1	2002 - 2010	6
sparrows	American Tree Sparrow	94	28	22	88	2010	11	2002	13
	Clay-coloured Sparrow	1	1		1	2002			1
	Fox Sparrow	7	3	1	5	2009 - 2011	1	2003/07/14	12
	Song Sparrow	7	15	6	28	2002	8	2012	13
	Lincoln's Sparrow	3	6	3	13	2010	2	2003	12
	Swamp Sparrow	1	5	2	11	2003	2	2007	13
	White-throated Sparrow	69	85	47	199	2005	39	2007	13
	White-crowned Sparrow	66	40	32	126	2007	11	2013	13
	Slate-coloured Junco	141	82	23	133	2014	47	2002	13
	Northern Cardinal	2	2	1	3	2003	1	several years	10
	Rose-breasted Grosbeak	1	4	3	8	2011	1	2002 - 2008	7
	Indigo Bunting	1	2	2	5	2003 - 2004	1	several years	9
finches	Common Redpoll	1	6	1	6	2007	5	2005	2
	Pine Siskin	8	33	57	170	2011	2	2014	8
	American Goldfinch	2	4	6	19	2014	1	2008/10/11	8
Total		2015	Av. \pm stdev.		Max.	Year	Min.	Year	#
		1462	1758	314	2477	2005	1418	2007	13

Record for fall 2015: **highest**, number highlighted in red; **lowest**, number highlighted in blue;

Black-throat. Blue Warbler: Black-throated Blue Warbler

Black-thr. Green Warbler: Black-throated Green Warbler

Av. \pm stdev.: Average \pm standard deviation

Max. : Maximum; Min.: Minimum; # : number of fall seasons with banding

Appendix II. Detected Totals of species observed in fall 2015 at Cabot Head Research Station

Group	Species	Season total	Average	Max. daily ET	Min. daily ET	Days with obs.	First obs.	Last obs.
waterbirds	Common Loon	110	3	16	1	36	21 Au.	31 Oc.
	Red-necked Grebe	7	2	4	1	3	23 Se.	18 Oc.
	Horned Grebe	4	2	3	1	2	23 Se.	24 Se.
	Double-crested Cormorant	367	11	40	1	34	17 Au.	30 Se.
	Great Blue Heron	17	1	2	1	16	17 Au.	20 Oc.
raptors	Turkey Vulture	10	2	4	1	6	20 Au.	1 Oc.
waterbirds	Canada Goose	328	9	66	1	37	18 Au.	21 Oc.
	Mallard	18	6	9	4	3	19 Au.	11 Oc.
	Ring-necked Duck	2	2	2	2	1	2 Oc.	2 Oc.
	White-winged Scoter	64	7	47	1	9	29 Se.	31 Oc.
	Long-tailed Duck	29	5	8	1	6	16 Oc.	24 Oc.
	Common Goldeneye	8	4	7	1	2	8 Oc.	24 Oc.
	Hooded Merganser	6	2	2	2	3	21 Au.	15 Oc.
	Common Merganser	25	2	3	1	16	19 Au.	16 Oc.
	Red-breasted Merganser	6	2	2	1	4	28 Au.	31 Oc.
raptors	Bald Eagle	100	2	5	1	54	17 Au.	31 Oc.
	Northern Harrier	2	1	1	1	2	30 Se.	20 Oc.
	Sharp-shinned Hawk	26	1	3	1	18	18 Au.	31 Oc.
	Northern Goshawk	1				1	25 Oc.	
	Broad-winged Hawk	2	1	1	1	2	19 Au.	20 Au.
	Red-tailed Hawk	1				1	26 Oc.	
	Rough-legged Hawk	1				1	23 Oc.	
	American Kestrel	1				1	11 Oc.	
	Merlin	28	1	2	1	24	24 Au.	19 Oc.
	Peregrine Falcon	5	1	1	1	6	5 Se.	5 Oc.
grouse	Ruffed Grouse	47	2	4	1	25	3 Se.	31 Oc.
shorebirds	Sandhill Crane	5	2	2	1	3	22 Se.	27 Se.
	Greater Yellowlegs	5	1	2	1	4	30 Au.	23 Oc.
	Spotted Sandpiper	3	1	1	1	3	31 Au.	8 Se.
	Wilson's Snipe	1				1	16 Oc.	
	American Woodcock	3	1	1	1	3	14 Se.	23 Se.
gulls	Ring-billed Gull	352	5	25	1	65	19 Au.	31 Oc.
	Herring Gull	37	5	25	1	7	19 Au.	12 Oc.
	Common Tern	3	2	2	1	2	18 Au.	5 Se.

Group	Species	Season total	Average	Max. daily ET	Min. daily ET	Days with obs.	First obs.	Last obs.
columbidae	Mourning Dove	1				1	19 Au.	
cuckoos	Yellow-billed Cuckoo	2	1	1	1	2	22 Se.	24 Se.
caprimulgidae	Eastern Whip-poor-will	7	1	1	1	12	18 Au.	23 Se.
hummingbirds	Ruby-throated Hummingbird	71	2	8	1	29	19 Au.	24 Se.
kingfishers	Belted Kingfisher	30	1	2	1	26	17 Au.	14 Oc.
woodpeckers	Red-headed Woodpecker	2	1	1	1	2	9 Se.	12 Oc.
	Yellow-bellied Sapsucker	3	1	1	1	3	1 Oc.	11 Oc.
	Downy Woodpecker	160	3	12	1	56	18 Au.	31 Oc.
	Hairy Woodpecker	23	1	3	1	18	30 Au.	26 Oc.
	Northern Flicker	134	3	11	1	49	17 Au.	16 Oc.
	Pileated Woodpecker	12	1	2	1	10	28 Au.	26 Oc.
flycatchers	Eastern Wood-Pewee	2	2	2	2	1	5 Se.	5 Se.
	Yellow-bellied Flycatcher	4	1	1	1	4	28 Au.	16 Se.
	Traill's Flycatcher	7	1	2	1	6	18 Au.	10 Se.
	Least Flycatcher	14	2	4	1	9	19 Au.	3 Se.
	Eastern Phoebe	1				1	27 Au.	
	Eastern Kingbird	1				1	22 Au.	
shrikes	Northern Shrike	1				1	24 Oc.	
vireos	Blue-headed Vireo	15	1	2	1	13	20 Se.	16 Oc.
	Warbling Vireo	2	1	1	1	2	27 Au.	2 Se.
	Philadelphia Vireo	3	2	2	1	2	5 Se.	21 Se.
	Red-eyed Vireo	203	6	20	1	33	17 Au.	5 Oc.
corvids	Blue Jay	964	16	127	1	59	17 Au.	31 Oc.
	American Crow	153	4	11	1	43	18 Au.	21 Oc.
	Common Raven	143	3	12	1	53	19 Au.	31 Oc.
larks	Horned Lark	17	3	10	1	5	13 Se.	23 Oc.
swallows	Cliff Swallow	1				1	19 Au.	
	Barn Swallow	62	5	12	1	13	17 Au.	15 Se.
paridae	Black-capped Chickadee	212	4	33	1	50	17 Au.	31 Oc.
nuthatches	Red-breasted Nuthatch	322	5	13	1	70	17 Au.	31 Oc.
	White-breasted Nuthatch	1				1	27 Oc.	
creepers	Brown Creeper	47	3	9	1	18	18 Au.	27 Oc.
wrens	House Wren	1				1	15 Se.	
	Winter Wren	4	1	2	1	3	2 Se.	6 Oc.
kinglets	Golden-crowned Kinglet	710	19	100	1	38	14 Se.	31 Oc.
	Ruby-crowned Kinglet	201	7	50	1	27	21 Au.	31 Oc.
gnatcatchers	Blue-gray Gnatcatcher	2	1	1	1	2	29 Au.	31 Au.

Group	Species	Season total	Average	Max. daily ET	Min. daily ET	Days with obs.	First obs.	Last obs.
turridae	Veery	15	1	3	1	12	22 Au.	14 Se.
	Gray-cheeked Thrush	18	1	3	1	14	2 Se.	2 Oc.
	Swainson's Thrush	133	4	20	1	32	29 Au.	10 Oc.
	Hermit Thrush	34	2	5	1	16	25 Se.	27 Oc.
	American Robin	157	3	16	1	48	17 Au.	27 Oc.
mimidae	Gray Catbird	55	2	4	1	34	17 Au.	11 Oc.
	Brown Thrasher	1				1	3 Oc.	
starlings	European Starling	2	1	1	1	2	18 Oc.	19 Oc.
pipits	American Pipit	105	4	33	1	24	16 Se.	26 Oc.
bombycillidae	Cedar Waxwing	1111	33	129	1	34	17 Au.	24 Se.
warblers	Tennessee Warbler	18	2	3	1	11	27 Au.	7 Oc.
	Orange-crowned Warbler	44	2	5	1	20	20 Se.	26 Oc.
	Nashville Warbler	58	3	16	1	20	18 Au.	7 Oc.
	Northern Parula	3	1	1	1	3	17 Au.	14 Oc.
	Yellow Warbler	7	1	2	1	5	18 Au.	3 Se.
	Chestnut-sided Warbler	2	1	1	1	2	19 Au.	23 Au.
	Magnolia Warbler	82	4	20	1	23	18 Au.	26 Se.
	Cape May Warbler	23	8	20	1	3	4 Se.	6 Se.
	Black-throated Blue Warbler	9	1	2	1	8	18 Au.	23 Se.
	Myrtle Warbler	324	6	30	1	53	21 Au.	31 Oc.
	Black-throated Green Warbler	144	5	20	1	32	17 Au.	5 Oc.
	Blackburnian Warbler	5	1	1	1	5	28 Au.	26 Se.
	Pine Warbler	10	3	4	1	4	23 Au.	3 Se.
	Western Palm Warbler	10	1	2	1	8	3 Se.	6 Oc.
	Bay-breasted Warbler	9	2	3	1	5	5 Se.	25 Se.
	Blackpoll Warbler	62	4	14	1	15	3 Se.	27 Se.
	Black-and-white Warbler	65	3	8	1	22	18 Au.	11 Se.
	American Redstart	443	14	50	1	32	17 Au.	3 Oc.
	Ovenbird	28	2	5	1	16	22 Au.	27 Se.
	Northern Waterthrush	8	2	3	1	5	29 Au.	20 Oc.
	Common Yellowthroat	138	5	20	1	30	17 Au.	8 Oc.
	Hooded Warbler	1				1	29 Se.	
	Wilson's Warbler	20	3	10	1	8	27 Au.	16 Se.
	Canada Warbler	7	1	2	1	5	23 Au.	3 Se.
tanagers	Scarlet Tanager	2	1	1	1	2	21 Se.	5 Oc.

Group	Species	Season total	Average	Max. daily ET	Min. daily ET	Days with obs.	First obs.	Last obs.
sparrows	American Tree Sparrow	202	10	53	1	21	1 Oc.	31 Oc.
	Chipping Sparrow	8	1	3	1	6	30 Au.	2 Oc.
	Clay-colored Sparrow	5	1	2	1	4	8 Oc.	21 Oc.
	Vesper Sparrow	1				1	22 Se.	
	Savannah Sparrow	2	1	1	1	2	16 Oc.	17 Oc.
	Fox Sparrow	13	2	3	1	8	17 Oc.	31 Oc.
	Song Sparrow	127	3	11	1	38	17 Au.	9 Oc.
	Lincoln's Sparrow	3	2	2	1	2	6 Se.	8 Se.
	Swamp Sparrow	1				1	27 Au.	
	White-throated Sparrow	290	8	31	1	38	28 Au.	27 Oc.
	White-crowned Sparrow	651	17	46	1	39	27 Au.	30 Oc.
	Dark-eyed Junco	520	13	32	1	41	3 Se.	30 Oc.
	Lapland Longspur	2	1	1	1	2	16 Oc.	17 Oc.
	Snow Bunting	2	1	1	1	2	27 Oc.	30 Oc.
	Northern Cardinal	2	1	1	1	2	20 Oc.	31 Oc.
	Rose-breasted Grosbeak	1				1	21 Au.	
sparrows	Indigo Bunting	1				1	27 Au.	
icteridae	Red-winged Blackbird	2	1	1	1	2	17 Oc.	23 Oc.
	Rusty Blackbird	11	2	6	1	6	29 Se.	9 Oc.
finches	Pine Grosbeak	2	2	2	2	1	31 Oc.	31 Oc.
	White-winged Crossbill	1				1	27 Oc.	
	Common Redpoll	1				1	20 Oc.	
	Pine Siskin	2027	55	403	1	37	20 Se.	31 Oc.
	American Goldfinch	170	4	24	1	38	18 Au.	31 Oc.

Average: average 2002 – 2014.

Max. daily ET: Maximum daily ET in fall 2015; Min. daily ET: Minimum in fall 2015.

First and last obs.: First and last observation in fall 2015.

Photo gallery



Yellow-billed Cuckoo



Pileated Woodpecker



White-breasted Nuthatch



American Pipit



Brown Thrasher



Northern Parula



Hooded Warbler



White-crowned Sparrow with moulting wing in August



Clay-coloured Sparrow



Common Redpoll