Teslin Lake Bird Observatory Annual Report 2018

Yukon
BIRD OBSERVATORIES

Ben Schonewille
Society of Yukon Bird Observatories
February 2018

The 2018 operation of the Teslin Lake Bird Observatory was made possible due to support and financial contributions from the following organizations.

Environment Canada

Environnement Canada

Yukon Fish and Wildlife Enhancement Trust

Teslin Renewable Resources Council

EDI Environmental Dynamics Inc.

Yukon Environment

Yukon Bird Club

Cover Photo: A hatch year Philadelphia Vireo banded at the observatory on September 1, 2018 was the first record of the species at the site (Photo: Jukka Jantunen).

The Teslin Lake Bird Observatory is operated by the **Society of Yukon Bird Observatories** (SOYBO; PO Box 30056, Whitehorse, YT, Y1A 5M2). SOYBO was established in 2010 to serve as an umbrella society to coordinate bird monitoring activities and associated educational programs at the Yukon Bird Observatories field stations. The objectives of SOYBO are: (1) contribute to the conservation of migratory birds in western North America, (2) to help people learn about the natural history and conservation of Yukon avifauna, and, (3) to work with other societies, organizations and individuals with similar objectives. For further information, visit the SOYBO website at www.yukonbirdobservatories.org

SUMMARY

During 2015, the Yukon Bird Observatories (Teslin Lake and Albert Creek) were granted full membership status to the Canadian Migration Monitoring Network (CMMN). The Yukon Bird Observatories are the northernmost and the only stations located within the core of Canada's Boreal Forest.

The Teslin Lake Bird Observatory completed its eleventh consecutive year of fall migration monitoring in 2018. The field station operated for a total of 72 days between July 27 and October 8. The observatory has followed the same operating procedures since standardized migration monitoring began during the fall of 2008.

Crews followed standard methods to mist net, handle, band and record information from captured birds. They banded a total of 3,167 birds of 52 species with 7,615 net hours (41.59 birds/100 net hours). Myrtle Warbler, Alder Flycatcher, Slate-colored Junco, Yellow Warbler and Orange-crowned Warbler were the five most common species banded, accounting for over 53% of all individuals banded. These have been among the top species banded in previous years although the banding total of 358 Alder Flycatchers was the lowest since fall monitoring began at the site during 2008; banding totals of this species have averaged 660 individuals with a high total of 1,058 during 2015.

Visual migration and lake counts were conducted to collect monitoring data for bird species not adequately sampled by mist netting (for example diurnal raptors, loons and grebes). Between July 27 and October 8, personnel spent 186.7 hours doing visual counts and observed 16,443 individuals (138 birds per hour) which is below average and one of the lowest recorded to date. The 2018 observations included 1,268 individuals of 13 diurnal raptor species, of which two are regional species of interest for monitoring - Swainson's Hawk and American Kestrel. The remaining visual migrants included a number of species with the most common species being Greater White-fronted Goose, Tundra Swan, Sandhill Crane, Trumpeter Swan and Canada Goose. Relatively few passerines were observed on the visual migration counts during 2018 as compared to previous years. Lake counts were done daily throughout each day of the observatory's operation and tallied 94 bird days of shorebirds, 3,958 bird days of loons, grebes and gulls, and 841 bird days of waterfowl. The most frequently observed species within each species group included: Spotted Sandpiper, Herring Gull and Surf Scoter.

Building upon testing of methods in previous years, audio equipment was used to broadcast recorded calls to lure and band Boreal Owls in the standard count area. These methods were used on two evenings during (August 29 and September 8) and no owls were banded with 23.0 hours of net effort.

Noteworthy results from 2018 included:

- The number of birds banded was near the long term average and the capture rate of birds per 100 net hours (41.6) was slightly below the long-term average (43.9).
- Numerous species were banded in relatively high numbers with Myrtle Warbler and Swainson's Thrush being the most notable.
- A single new species was banded at the observatory (Philadelphia Vireo) and one new species was observed (Surfbird). A banded White-throated Sparrow also provided the second record (first during the fall) for the observatory.
- To date a total of 41,233 birds of 95 species have been banded at the observatory and 205 species have been observed.

- The visual counting effort was slightly lower than the amount of effort in previous years and the total number of birds observed (138 birds/hour) was below the long term average of 177 birds/hour.
- A total of 1,268 raptors and 11,689 waterfowl were observed on the visual migration counts with the most common species being Greater White-fronted Goose and Tundra Swan.
- The lake counts tallied a total of 94 bird days of shorebirds (12 species), 564 bird-days of loons (3 species), 1,226 bird-days of grebes (2 species) and 2,168 bird-days of gulls/terns/jaegers (7 species).
- A total of 30 volunteers spent a total of 874hours at the observatory and a total of 93 individuals visited the observatory totaling 161 visitor hours.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 Introduction

This report describes methods and results of work done at the Teslin Lake Bird Observatory from July 27 to October 8, 2018, the eleventh year of fall operation at this site. No new activities were undertaken at the observatory in 2017.

Previous annual reports and the database of band recoveries can be found on the Society of Yukon Bird Observatories website: www.yukonbirdobservatories.org

1.1 Background

The observatory collects information on birds which is shared through an international bird banding database (Canadian Wildlife Service Bird Banding Office and USGS Bird Banding Laboratory), Society of Yukon Bird Observatories annual station reports, and other publications. During 2015, the Yukon Bird Observatories (Teslin Lake and Albert Creek) were granted full membership status to the Canadian Migration Monitoring Network (CMMN). The CMMN is a nationwide network of 26 member stations from across Canada that collect standardized bird monitoring data and collaborate on research projects. The Yukon Bird Observatories are the northernmost stations and are located within the core of Canada's western Boreal Forest.

Many of the birds banded and observed at Teslin Lake are highly migratory, spending the winter months as far south as Central and South America. In addition to the knowledge gained from band recoveries, the observatory also continues to gather baseline data of birds (and their migration) in the Teslin region and the Yukon as a whole. Due to the large landmass of the territory, and the relatively few bird biologists and advanced birders in the Yukon, there is still a great deal to be learned regarding the bird life of the Yukon. The observatory serves as a highly valuable research and monitoring project to better understand the distribution of the Yukon's bird species, some of which are considered uncommon or rare. Over the long term, the data collected at the observatory will facilitate trend analysis for a number of species. Such information will be valuable for conservation and monitoring of bird populations not only in the Yukon, but North America as a whole. In addition to monitoring bird populations, the observatory collects a substantial amount of data on each bird banded. Information such as age, sex, measurements (wing, tail, etc.) and molt timing continue to add to the knowledge base of such information across North America.

The observatory plays a role in education as a place where the public, volunteers and students can take part in a unique, community-based research and monitoring project. Numerous people visit the observatory on an annual basis and the field station has become a valuable training opportunity for individuals interested in learning about ornithological research and monitoring methods.

1.2 Goals of the Teslin Lake Bird Observatory

The goals of the Teslin Lake Bird Observatory are to:

- Gather baseline information on birds and bird migration in the Teslin area.
- Collect data to facilitate the long-term monitoring (*i.e.* trend analysis) of birds in the southern Yukon.
- Conduct and participate in specific studies such as feather collecting for stable isotope analysis and color banding.
- Provide a setting for the public including school groups to learn about birds and bird migration.
- Provide employment and training opportunities for students and volunteers.
- Provide a unique tourist attraction for the community of Teslin.

1.3 Objectives of the 2018 Season

The objectives of the 2018 field season at the Teslin Lake Bird Observatory were to:

- Continue the fall monitoring work using previously established protocols,
- Collect an additional year of bird monitoring data to be used for future trend analysis,
- Further refine the techniques to capture and band owls,
- Collect information on the molt timing of adult passerines banded, and,
- Compare 2018 bird migration results to the previous 9 years of similarly collected data.

1.5 Acknowledgements

The 2018 operation of the Teslin Lake Bird Observatory would not have been possible without financial assistance from the following organizations/groups: Environment and Climate Change Canada (Canadian Wildlife Service), Yukon Fish & Wildlife Enhancement Trust Fund, Teslin Renewable Resources Council, Environment Yukon (Environmental Awareness Fund) and EDI Environmental Dynamics Inc. Yukon Parks provided use of a space in the Teslin Lake campground for an extended period of time to allow our long-term volunteers a place to camp for the duration of the 2018 season. Jukka Jantunen's excellent bird identification skills ensured high quality data collection, particularly during the visual migration counts which are challenging to complete with a high level of accuracy and consistency. Jukka has been the Bander in Charge at TLBO since full scale fall operation of the observatory began during 2008. Ted Murphy-Kelly assisted with field operations and observatory logistics including scheduling of volunteers. James Hawkings provided editorial comments on the draft version of this report.

We appreciate the help from the following volunteers without whom the operation of the observatory would not have been possible:

- more than 15 days – Ted Murphy-Kelly;
- 10 to 15 days – Evan Warren, Sam Gale, Julie Bauer, and Brenna Kelly;
- 5 to 10 days – Terry Skjonsberg, Amy Clark Courtney, Cora Kelly, Gwen Baluss, Ben Schonewille, Tove Christiansen, Hollie Murphy-Kelly and Cameron Eckert;

- Less than 5 days – Nathalie Paquette, Brad van Kessel, Janna van Kessel, Bart Koehler, Julie Koehler, Lea Roy Bernatchez, Kristina Beckman, Shyloh van Delft, Hannah Gray, Dawn Hansen, Lena Ware, Andera Sidler, Barbara Kelley, Beth Hawkings, Jim Hawkings, Paul Carrier, Maureen Carrier

2.0 Methods

2.1 Study Site

Teslin Lake is a 125 km long by 2-5 km wide lake in the south-central Yukon near the border with British Columbia. The standard count area is located near the outlet of 10 Mile Creek at the site known locally as Ten-mile Point; this area is located on the east shore within the north third of the lake. The lake falls in a natural trench that runs to the northwest and serves as a migration route for many bird species coming from breeding areas to the north in Yukon and Alaska. The site falls within the Yukon Southern Lakes Ecoregion (Boreal Cordillera Ecozone)[1].

During the 2005 season, the observatory was located on the shoreline of Nisutlin Bay; however, issues associated with land tenure of the site led to a new site being used since 2006. The current site is located on 10 Mile point approximately 10 km northwest of the community of Teslin. The observatory is located in the riparian zone between Teslin Lake and the Yukon Government Campground (Figure 1). The vegetation within the site is a mixture featuring a transition from bare gravel lakeshore to shrubs and larger deciduous trees. Also within the site is a small wetland area connected to Teslin Lake which has seasonally fluctuating water levels. The area is dominated by willow (*Salix* spp.) and alder (*Alnus* spp.) with some mature white spruce (*Picea glauca*), trembling aspen (*Populus tremuloides*) and balsam poplar (*P. balsamifera*) scattered throughout.

2.2 General Methods

The methods for the operation of the bird observatory follow the Teslin Lake Bird Observatory Field Protocol and Manual[2]. A summary of the field protocol is described in the following sections; however, for a detailed description refer to the publications page of the Society of Yukon Bird Observatories website (www.yukonbirdobservatories.org).

All monitoring activities at the observatory can be separated into standardized and non-standardized methods. To facilitate long-term analysis of the observatory's data, the standardized data is collected in the same format year after year. Non-standardized activities may include species-specific mist nets within the count area or the collection of banding/observation data outside of the standard count period.

[1] Smith, C.A.S., Meikle, J.C., and Roots, C.F. (editors), 2004. Ecoregions of the Yukon Territory: Biophysical properties of Yukon landscapes. Agriculture and Agri-Food Canada, PARC Technical Bulletin No. 04-01, Summerland, British Columbia, 313 p.

[2] Schonewille, B. 2011. Teslin Lake Bird Observatory (TLBO) Field Protocol (version 2). Society of Yukon Bird Observatories.

Figure 1. Overview of the Teslin Lake Bird Observatory (60.2319 °N, -132.9159 ° W). The numbers and red lines are mist nets, each 12 m long with the exception of net 28 which is 18 m in length. There is a campground bordering the mist netting area on the south side (right hand side of the photo. The red line with the "C" is the non-standard canopy net which was not used during 2017.

For every species observed, estimated totals are calculated for each day of operation using the following categories:

- Band: new birds banded.
- Recaptures: previously banded birds, not included if recaptured on the original day of banding.
- Visual Migrants
    - Migration Watch: birds observed in obvious migration flight, only includes individuals observed during the visual migration counts.
    - Incidental: birds observed in obvious migration flight, only includes individuals observed incidentally (i.e., not during the visual migration counts).
- Observed: birds observed, but not in obvious migration flight; includes incidental observations and the lake counts.

Using the categories outlined above, the Bander-In-Charge estimates the total number of individuals observed within/passing through the count area within the standard count period on a daily basis. Using only the standard count period data, this number represents the Daily Estimated Total (DET) and when the non-standard data is included, this number represents the Daily Species Total (DST). The DET data will provide the basis for future trend analysis of the data collected at the observatory.

During 2018, the operation of the Teslin Lake Bird Observatory was led by the Primary Bander in Charge Jukka Jantunen. Jukka was responsible for overseeing all activities at the observatory including the capture/banding of birds, supervising volunteers, conducting the visual migration watches, recording the daily estimated total data and entering the data. Ted Murphy-Kelly was Co-Station Manager which included station logistics, staffing and filling in for the primary bander. Ben Schonewille was also a Co-Station Manager and looked after data analysis and the preparation of this report. Board members of the Society of Yukon Bird Observatories helped administer the Yukon Bird Observatories.

Site infrastructure is minimal at this site. A narrow trail connects the banding table to the nets and to the station access point via the Yukon Government campground. There is no covered blind from which to watch birds and nets are removed at the end of the season and are stored away from the site. The site is partially below the high-water mark of Teslin Lake and on land owned by the Yukon Government as a component of the campground reserve. To date this level of activity has not required any permitting aside from the federal and territorial permits required for the capture and banding of birds, and a permit from Yukon Parks allowing extended use of a campground site.

2.3 Mist Netting

The primary method of monitoring the movement of birds through the study site is the use of mist nets for the purpose of capturing and banding birds. The observatory operates with 22 standard mist nets and one non-standard mist net (Figure 1). No non-standard nets were used in 2018; note that in previous years a trial canopy net (net ID = C on Figure 1) was used. All nets are 30 mm mesh, 4 panels tall, and 12 m in length, with the exception of net 28 which is 18 m in length. The standard mist netting effort begins at official sunrise and continues for 6 hours. The full mist netting effort is achieved only on days when adequate personnel are present onsite and weather conditions are favourable. If full effort is not possible, then the number of nets operated is reduced rather than reducing the duration of effort.

2.4 Visual Migration Watch

Visual migration counts are conducted on all days of operation to supplement the banding data. All watches are conducted from the observation site (Figure 1) and involve scanning the sky with binoculars and a spotting scope to observe and count all birds flying past the site. The protocol states that as a minimum, 10 minutes of watch shall be conducted per hour (6 hours) followed by a 1 hour watch at the end of the mist netting period. On many days of operation the visual count effort is substantially more. The visual migration counts aim to monitor diurnal migrating species such as raptors and large waterfowl. Most nocturnal migrants such as most warblers, sparrows and thrush are well-monitored by

mist netting. However, for some species which are not adequately covered by mist netting, the visual counts allow for monitoring data to be collected for these species.

Whenever possible, additional information on age, sex and/or color morph is collected for the birds observed during the visual migration watches. Particularly for raptors, the information can supplement the data collected by providing information on the proportion of younger birds.

2.5 Lake Counts

Completed in conjunction with the visual migration counts, a thorough lake count is performed daily from the observation site with a spotting scope to enumerate all birds on or over Teslin Lake which are visible from the predetermined viewing location. These counts target a wide range of species including; loons, grebes, some waterfowl, gulls and some species of shorebirds.

2.6 Incidental Observations

Incidental observations are collected on a continuous basis at the observatory. For example, birds observed on the ground or in the vegetation while conducting mist net checks would be considered incidental observations. Birds in obvious directed migration but not during standard visual migration watches, e.g. flying overhead in flocks or raptors passing overhead, were recorded as 'incidental migrants'.

2.7 Molt Scoring

As supplementary information, in order to assess the timing of molt, we rate the growth of new flight feathers in adult birds that are banded. Although information on the prebasic molt (amount of juvenile plumage remaining) is collected for hatch year birds, a particular emphasis was placed upon collecting wing molt scores for molting adult individuals because this tells us about the timing of the molt as it relates to the timing of migration in various species of adult birds.

Wing molt score is achieved by assigning each individual wing flight feather a score from zero (old feather remaining) to five (new feather fully grown) and adding them together. Birds that have not yet started to molt have a cumulative score of zero whereas individuals which have completed molt would have a score of 75 (based on 9 primary flight feathers) or 80 (10 primary flight feathers).

2.8 Special Projects

2.8.1 Owl Banding

Based on owl capture methods used to capture Northern Saw-whet Owls in southern Canada that we had tested in previous years on Boreal Owls, we decided to do additional trials using these methods to

build upon the success of this program during previous years. This method uses nocturnal call playback in the vicinity of a mist net array.

During 2018, we broadcasted only Boreal Owl calls using an IPod connected to a portable speaker system with an internal battery. We broadcast within the standard count area at the bird observatory. The effort was relatively limited, with the call playback used on two evenings: August 29 and September 8. Up to five 12 m nets were used in the standard count area. At this site the owl calls were broadcast constantly for between 2.0 and 4.0 hours beginning at dusk and ending shortly after midnight.

2.9 Public Engagement

To attract members of the public to the observatory, we put up posters at various common buildings in Teslin including the Nisutlin Trading Post, Yukon Motel, Teslin Tlingit Council Administration Office and Post Office. We also advertised the observation through digital media including the Yukon Bird Observatories blog, Facebook page and website. Interested individuals could also find articles in the Yukon News in May and September, on the Yukon Government Wildlife viewing program calendars and media advertising.

Thanks to a contribution from the Teslin RRC, a large sign was designed and erected adjacent to the bird observatory entrance on the Alaska Highway (beginning in 2017 and used again during 2018). The sign includes a sliding panel that observatory personnel could switch between open and closed to allow visitors to know when the station was open. A dry erase white board was also included on the sign to allow for station highlights to be recorded for the visiting public (Photo 1).

Photo 1. Large portable sign advertising TLBO.

3.0 Results & Discussion

3.1 Station Operation

The 2018 fall season included a total of 72 field days between July 27 and October 8. Standardized mist netting occurred on 66 days between July 27 and October 4 no opportunistic banding outside of these dates during 2018. After October 4, activities at the observatory were limited to visual migration counts, lake counts and incidental observations.

A total of 3,167 birds of 52 species were banded (excluding special projects) and 135 species were observed (Table 1, Table 2). The all-time total number of birds banded at Teslin Lake Bird Observatory is now 41,233 birds of 95 species and 205 species/forms have been observed (Appendix A). New species added to the station checklist during 2018 included: Surfbird and Philadelphia Vireo, the latter of which was also banded for the first time during 2018. A White-throated Sparrow banded during 2018 provided the first fall record of this species, one was banded previously during the spring of 2006.

Table 1. Summary statistics for the 2018 fall season.

Week	Date	Days Operated [1]	Birds Banded				Visual Counts		Total Species Observed
			#	Species	Net Hours	#/100 Net Hours	# of Visual Migrants[2]	Counting Hours	
1	27 Jul – 2 Aug	7	178	26	767.75	23.18	121	2.1	65
2	3 – 9 Aug	7	125	21	564.00	22.16	95	2.4	46
3	10 – 16 Aug	7	477	28	679.50	70.20	193	3.4	64
4	17 – 23 Aug	7	385	30	835.00	46.11	922	7.0	67
5	24 – 30 Aug	6	457	28	757.00	60.37	6389	21.3	80
6	31 Aug – 6 Sep	7	511	34	796.75	64.14	629	12.7	76
7	7 – 13 Sep	6	359	26	694.50	51.70	1378	7.1	66
8	14 – 20 Sep	7	392	27	920.50	42.58	1645	9.2	72
9	21 – 27 Sep	7	162	21	838.50	19.32	865	17.9	72
10	28 Sep – 4 Oct	7	96	12	761.26	12.61	673	14.8	59
11	5 – 8 Oct	4	-	-	-	-	6044	21.6	49
ALL	27 Jul – 8 Oct	72	3167	52	7614.75	41.59	18954	119.5	136

[1] Requires a minimum of 3 hours onsite with full estimated totals recorded (does not require mist netting if weather conditions are adverse).

[2] Note this total includes visual migrants counted during the visual counts and incidental visual migrants observed.

Table 2. Birds banded during the 2018 fall season (not including special projects).

Common Name	Scientific Name	# Banded	# Banded / 1000 Net Hrs
Sharp-shinned Hawk	*Accipiter striatus*	10	1.31
Merlin	*Falco columbarius*	2	0.26
Wilson's Snipe	*Gallinago delicata*	2	0.26
Belted Kingfisher	*Ceryle alcyon*	3	0.39
Downy Woodpecker	*Picoides pubescens*	4	0.53
Three-toed Woodpecker	*Picodes dorsalis*	1	0.13
Western Wood-Pewee	*Contopus sordidulus*	6	0.79
Yellow-bellied Flycatcher	*Empidonax flaviventris*	10	1.31
Alder Flycatcher	*Empidonax alnorum*	358	47.01
Least Flycatcher	*Empidonax minimus*	2	0.26
Hammond's Flycatcher	*Empidonax hammondii*	20	2.63
Dusky Flycatcher	*Empidonax oberholseri*	6	0.79
Northern Shrike	*Lanius excubitor*	1	0.13
Warbling Vireo	*Vireo gilvus*	17	2.23
Philadelphia Vireo	*Vireo philadelphicus*	1	0.13
Canada Jay	*Perisoreus canadensis*	4	0.53
Black-billed Magpie	*Pica hudsonica*	1	0.13
Black-capped Chickadee	*Poecile atricapillus*	55	7.22
Mountain Chickadee	*Poecile gambelli*	2	0.26
Boreal Chickadee	*Poecile hudsonicus*	234	30.73
Red-breasted Nuthatch	*Sitta canadensis*	4	0.53
Golden-crowned Kinglet	*Regulus satrapa*	7	0.92
Ruby-crowned Kinglet	*Regulus calendula*	150	19.70
Gray-cheeked Thrush	*Catharus minimus*	30	3.94
Swainson's Thrush	*Catharus ustulatus*	102	13.40
Hermit Thrush	*Catharus guttatus*	14	1.84
American Robin	*Turdus migratorius*	16	2.10
Varied Thrush	*Ixoreus neavius*	5	0.66
Lapland Longspur	*Calcarius lapponicus*	1	0.13
Northern Waterthrush	*Parkesia noveboracensis*	47	6.17
Tennessee Warbler	*Oreothlypis peregrina*	16	2.10
Orange-crowned Warbler	*Oreothlypis celata*	235	30.86
Common Yellowthroat	*Geothlypis trichas*	81	10.64
American Redstart	*Setophaga ruticilla*	28	3.68
Yellow Warbler	*Setophaga petechia*	266	34.93
Blackpoll Warbler	*Setophaga striata*	95	12.48
Myrtle Warbler	*Setophaga coronata*	478	62.77
Townsend's Warbler	*Setophaga townsendi*	10	1.31
Wilson's Warbler	*Cardellina pusilla*	164	21.54
American Tree Sparrow	*Spizella arborea*	88	11.56
Chipping Sparrow	*Spizella passerina*	18	2.36
Brewer's Sparrow	*Spizella breweri*	3	0.39
Savannah Sparrow	*Passerculus sandwichensis*	25	3.28
Fox Sparrow	*Passerella iliaca*	99	13.00
Lincoln's Sparrow	*Melospiza lincolnii*	54	7.09
White-crowned Sparrow	*Zonotrichia leucophrys*	31	4.07
White-throated Sparrow	*Zonotrichia albicollis*	1	0.13
Slate-colored Junco	*Junco hyemalis*	348	45.70
Rusty Blackbird	*Euphagus carolinus*	3	0.39
Purple Finch	*Carpodacus purpureus*	3	0.39
Common Redpoll	*Acanthis flammea*	4	0.53
Pine Siskin	*Spinus pinus*	2	0.26
TOTAL		3,167	415.90

Weather conditions largely influence the activities at the observatory. Windy conditions and periods of prolonged precipitation reduce the mist netting effort. Weather conditions also influence the number of birds counted on the visual migration counts due to challenges associated with visibility and the dynamic nature of bird migration in relation to wind patterns. The 2018 season saw temperatures which were near average compared to previous years and the amount of wind was above average (Table 3, Table 4). The number of days with precipitation (15) was below the average of 23.6 days.

Table 3. Summary of weather conditions during the 2018 fall season.

Weather Parameter	Week							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Average Opening Temperature (°C)	12.1	12.0	7.1	6.4	7.0	2.0	2.0	-4.9
Average Closing Temperature (°C)	23.4	19.3	17.9	19.6	14.0	12.1	12.7	9.1
Average Opening Wind (Beaufort scale)	1.0	1.5	1.7	1.3	1.3	1.7	1.2	1.1
Average Closing Wind (Beaufort scale)	1.7	2.7	2.3	1.6	2.0	2.6	2.8	0.9
Days with Rain (during count period)	0	2	2	1	3	2	1	0
Days with Snow (during count period)	0	0	0	0	0	0	0	0

Weather Parameter	Week			Whole Season
	9	**10**	**11**	
Average Opening Temperature (°C)	0.0	-5.9	1.3	**3.5**
Average Closing Temperature (°C)	12.3	8.5	4.3	**14.3**
Average Opening Wind (Beaufort scale)	1.4	1.1	1.5	**1.4**
Average Closing Wind (Beaufort scale)	2.0	1.8	2.5	**2.0**
Days with Rain (during count period)	1	0	2	**14**
Days with Snow (during count period)	0	0	1	**1**

Table 4. Comparison of weather conditions during 2018 as compared to previous years.

Weather Parameter	Annual Average									2010 - 2018 Average
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	
Average Opening Temperature (°C)	4.4	3.5	2.6	6.0	4.7	4.4	4.8	4.7	3.5	4.3
Average Closing Temperature (°C)	13.0	10.4	10.7	14.4	11.8	10.2	12.1	12.6	14.3	12.2
Average Opening Wind (Beaufort scale)	2.3	1.7	1.7	1.5	1.4	1.3	1.6	1.6	1.4	1.6
Average Closing Wind (Beaufort scale)	2.8	2.6	2.9	2.7	2.3	2.5	2.4	2.3	2.0	2.5
Days with Rain (during count period)	20	33	17	14	32	19	16	21	14	20.7
Days with Snow (during count period)	3	4	6	0	5	2	1	4	1	2.9

3.2 Patterns in Captures

Each component of the 2018 data is summarized and presented in the following subsections; however, a summary account of the 2018 estimated total data is shown in Appendix B. Unless otherwise stated, the results presented in this report combine and summarize both standard and non-standardized data. Note that the estimated totals are derived on a daily basis by the Bander in Charge and incorporate all data collection components (mist netting captures and all observations) to estimate the number of birds of each species within or passing through the count area.

Among the top 15 species banded during 2018, 12 were captured in above average numbers, 2 below average and one on average (Table 5). Among the species banded in above average numbers, Myrtle Warbler, Swainson's Thrush and Fox Sparrow were the most notable. A total of 478 Myrtle Warblers were banded compared to the long-term average of 310, although 2018 was not as high as 2017 with the record high of 654 were banded. Swainson's Thrush was banded in record high numbers during 2018 (102) compared to the long tern average of 57 and the previous high of 85 during 2011. Fox Sparrow followed a similar trend with 99 banded compared to the long term average of 26 and the previous high of 42 during 2015.

The most notable species banded in below average numbers were Alder Flycatcher and Yellow Warbler; these species have been the two most common species banded at the bird observatory to date. A total of 358 Alder Flycatchers were banded during 2018 compared to the long term average of 660. Annual banding totals of this species have ranged from a high of 1,058 during 2015 to the 2018 total of 358 which is the lowest to date. A total of 266 Yellow Warblers were banded during 2018 compared to the long term average of 372; annual banding totals of this species have ranged from a low of 163 (2017) to 556 (2015).

Table 5. The 15 most common bird species banded in 2018 as compared to 2008–2017 totals (numbers in brackets indicate the annual ranking in birds banded). The prefix "T" indicates a tied in annual banding totals.

Species	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2008-2017 Average
Myrtle Warbler	478 (1)	654 (1)	286 (4)	311 (5)	178 (4)	163 (4)	195 (3)	142 (5)	673 (1)	284 (5)	49 (9)	310 (4)
Alder Flycatcher	358 (2)	548 (2)	498 (1)	1,058 (1)	506 (1)	770 (1)	827 (1)	637 (1)	620 (2)	631 (2)	811 (1)	660 (1)
Slate-colored Junco	348 (3)	443 (4)	229 (5)	211 (7)	140 (7)	341 (2)	116 (7)	331 (2)	420 (4)	582 (3)	182 (3)	304 (4)
Yellow Warbler	266 (4)	163 (6)	449 (2)	556 (2)	504 (2)	333 (3)	225 (2)	310 (3)	471 (3)	325 (4)	486 (2)	372 (3)
Orange-crowned Warbler	235 (5)	176 (5)	364 (3)	331 (4)	149 (6)	124 (6)	88 (8)	57 (14)	271 (5)	180 (6)	101 (6)	189 (6)
Boreal Chickadee	234 (6)	473 (3)	40 (12)	131 (9)	3 (T31)	23 (16)	142 (4)	233 (4)	0 (-)	831 (1)	138 (4)	204 (13)
Wilson's Warbler	164 (7)	68 (11)	172 (6)	386 (3)	164 (5)	122 (7)	134 (T5)	133 (6)	177 (7)	161 (8)	113 (5)	163 (22)
Ruby-crowned Kinglet	150 (8)	114 (8)	89 (8)	284 (6)	69 (9)	125 (5)	134 (5)	86 (8)	109 (8)	175 (7)	29 (12)	124 (17)
Swainson's Thrush	102 (9)	26 (15)	82 (9)	68 (12)	49 (11)	55 (10)	41 (14)	85 (9)	53 (13)	49 (13)	19 (T13)	57 (12)
Fox Sparrow	99 (10)	13 (T24)	10 (T25)	42 (17)	17 (T15)	7 (T26)	6 (T27)	17 (T22)	28 (17)	28 (17)	17 (T11)	26 (19)
Blackpoll Warbler	95 (11)	71 (10)	134 (7)	99 (10)	61 (10)	87 (8)	87 (9)	58 (13)	194 (6)	107 (10)	47 (10)	95 (9)
American Tree Sparrow	88 (12)	27 (15)	20 (17)	137 (8)	22 (15)	19 (17)	17 (18)	77 (10)	21 (19)	54 (11)	19 (13)	46 (14)
Common Yellowthroat	81 (13)	59 (12)	57 (10)	89 (11)	82 (8)	65 (9)	45 (13)	72 (12)	70 (11)	113 (9)	66 (7)	73 (10)
Black-capped Chickadee	55 (14)	95 (9)	24 (15)	31 (18)	16 (18)	31 (14)	65 (10)	92 (7)	22 (18)	26 (19)	57 (8)	47 (14)
Lincoln's Sparrow	54 (15)	14 (T22)	13 (T23)	65 (13)	9 (T25)	9 (23)	9 (T25)	27 (20)	14 (T25)	16 (23)	5 (26)	21 (22)

Among the top 10 species banded in 2018, the majority of birds banded across all species were hatch year individuals (Table 6) which is consistent with previous years. Numerous species show a considerable amount of year to year variability in hatch year proportions. For example, Alder Flycatchers have ranged from 41 to 90% hatch year individuals banded. For such species banded in relatively high numbers, the proportion of hatch year birds may be able to be used to provide perspective on regional productivity.

Table 6. Age ratios (% hatch year) for the top 10 species banded during the fall of 2018.

Species	2018	2017	2016	2015	2014	2013	2012	2011	2011-2018 Average
Myrtle Warbler	96	98	90	76	90	81	83	70	86
Alder Flycatcher	81	83	41	73	85	84	81	72	75
Slate-colored Junco	84	95	97	69	94	94	89	81	88
Yellow Warbler	63	77	44	48	48	68	61	71	60
Orange-crowned Warbler	82	91	81	62	82	81	84	79	80
Boreal Chickadee	97	99	93	100	100	100	93	100	98
Wilson's Warbler	87	93	84	71	82	84	78	72	81
Ruby-crowned Kinglet	94	98	92	81	93	79	96	81	89
Swainson's Thrush	89	96	87	73	77	93	82	91	86
Fox Sparrow	86	85	90	85	94	100	100	94	92

The peak period for banding occurred during week 3 and 5-6 (August 10-16 and August 24-September 6) when the number of birds banded ranged from 60 to 70 birds/100 net hours; Figure 2). The daily banding totals during this period were dominated by various neotropical migrants including Myrtle, Yellow and Orange-crowned warblers.

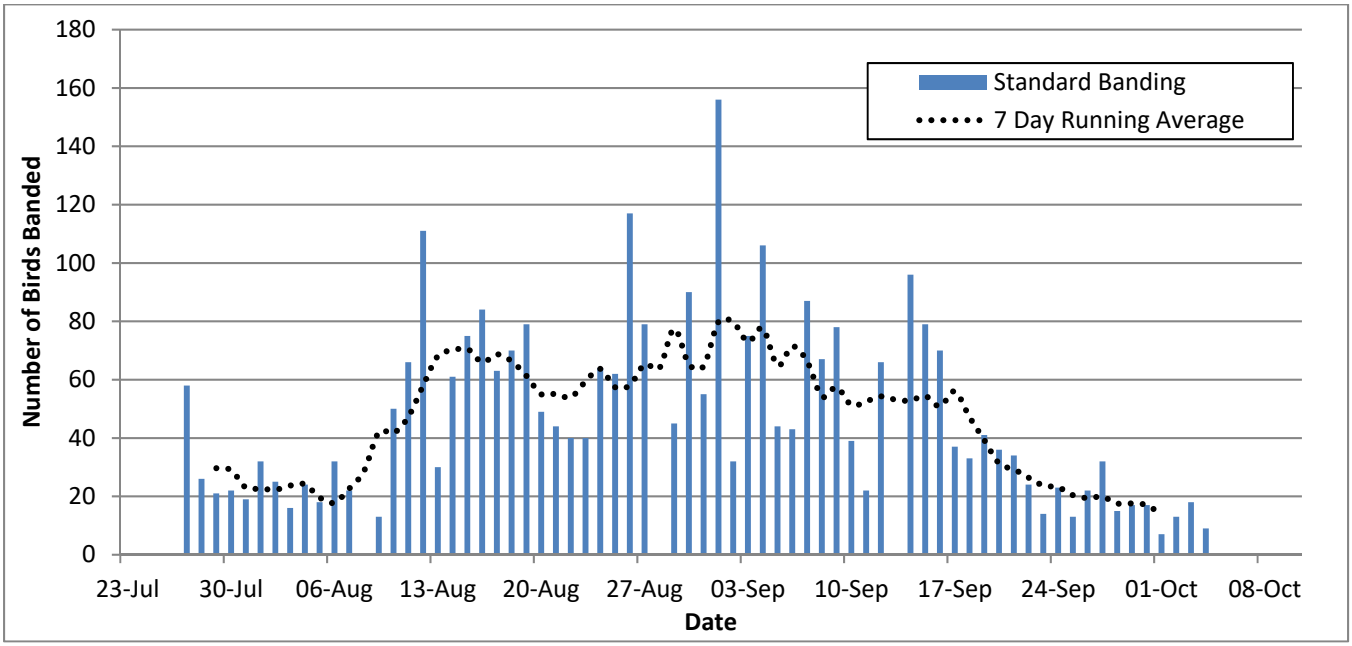

Figure 2. Summary of birds banded per day during the fall of 2018.

The 2018 banding total of 3,167 birds was just above the 2009 to 2018 average of 3,071 birds but considerably lower than the highest banding total of 4,186 during 2015. When the amount of mist

netting effort is taken into consideration, the number of birds/100 net hours in 2018 (41.6) which was just below the 2008 to 2018 average of 43.9 (Figure 3).

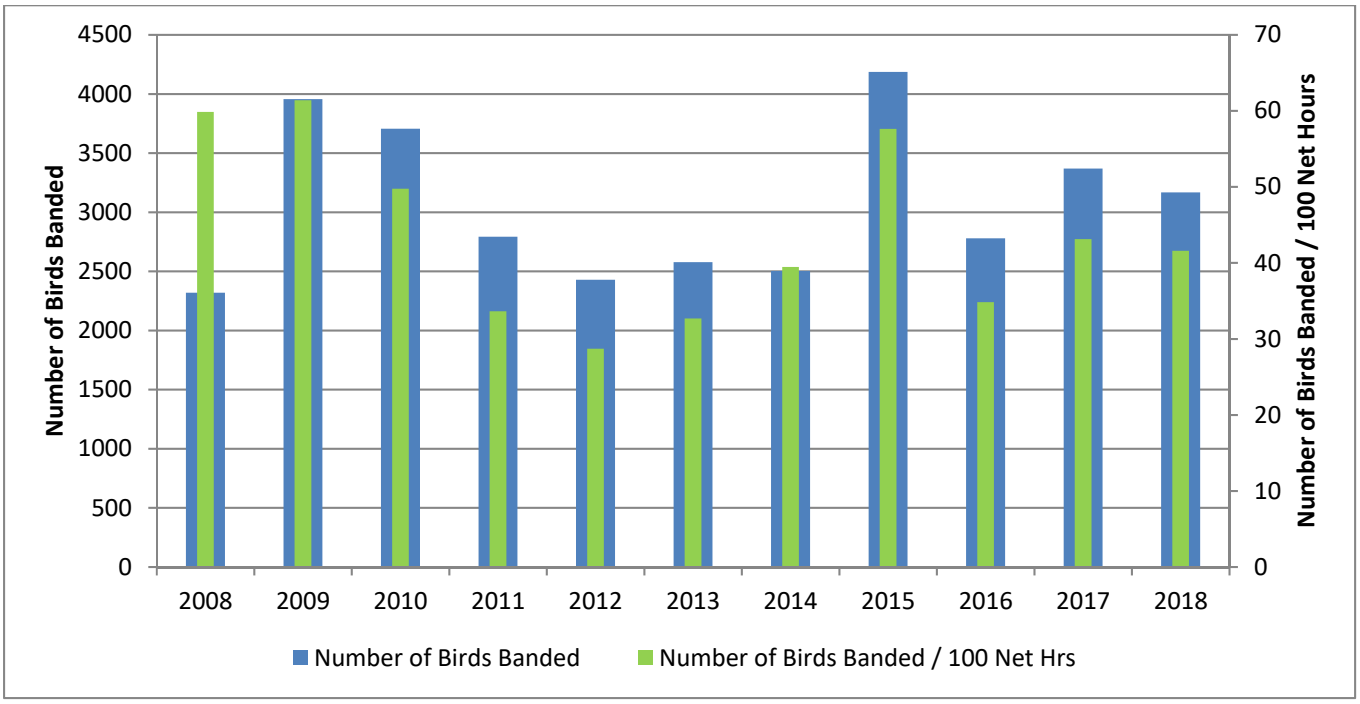

Figure 3. Summary of birds banded during the fall from 2008 to 2018.

The high level of consistency in effort across all standard mist nets (Figure 4) demonstrates the adherence to the observatory's monitoring protocol. Note that nets 7 10, 18 and 20 are located on the sparsely vegetated shoreline and are more frequently closed midway through the daily count period due to wind. Nets 5, 25, 26 and 27 are located the furthest from the primary mist netting effort and are only used when adequate personnel are available on site. Net 28 stands out in Figure 4 as it is an 18 m net meaning that the effort is multiplied by 1.5; this net is also frequently closed due to wind.

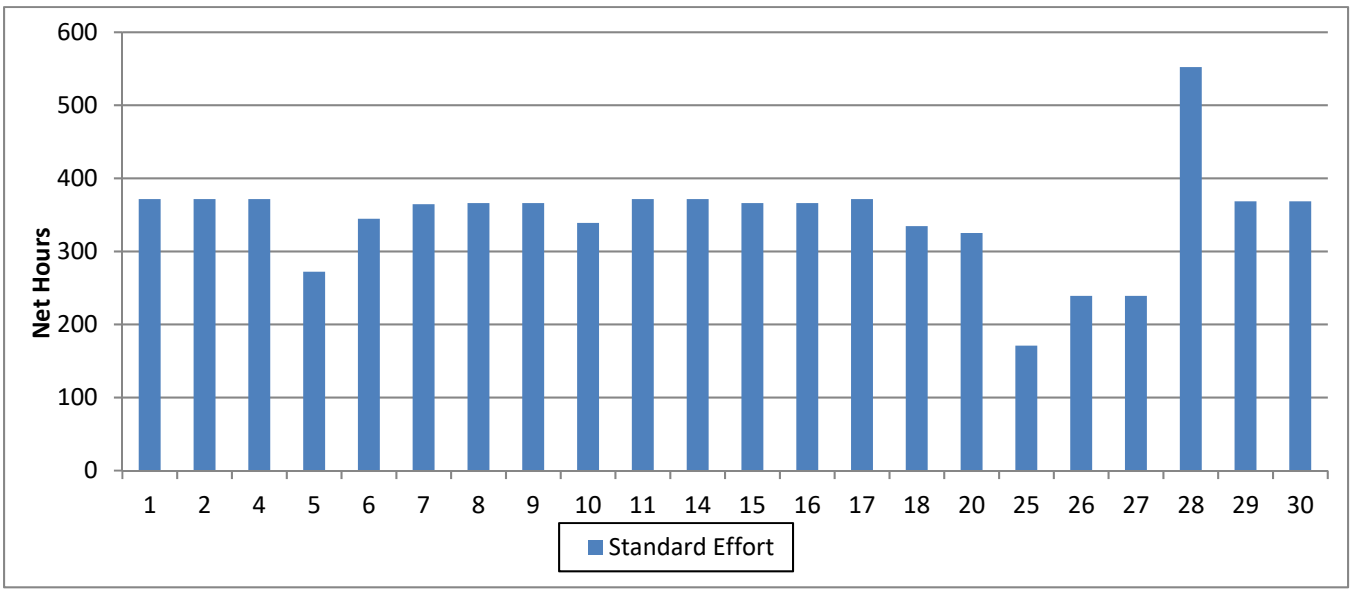

Figure 4. Summary of hours per mist net during the fall of 2018 (note net 28 is an 18 m net whereas all other nets are 12m).

The majority of birds and species moving through the count area that are captured in the nets pass directly along the shoreline of Teslin Lake or around the small wetland with the mist netting area. We see this in the highest capture rates in mist nets 2, 4, 7, 10, 18 and 28 (Figure 5) which are closest to the lake/wetland edge. This pattern is consistent with previous years. Although a portion of the mist nets placed away from the lakeshore and in taller vegetation (nets 5, 25, 26 and 27) catch fewer birds per net-hour, these nets capture species such as Swainson's Thrush and Varied Thrush which are not typically caught on the lakeshore.

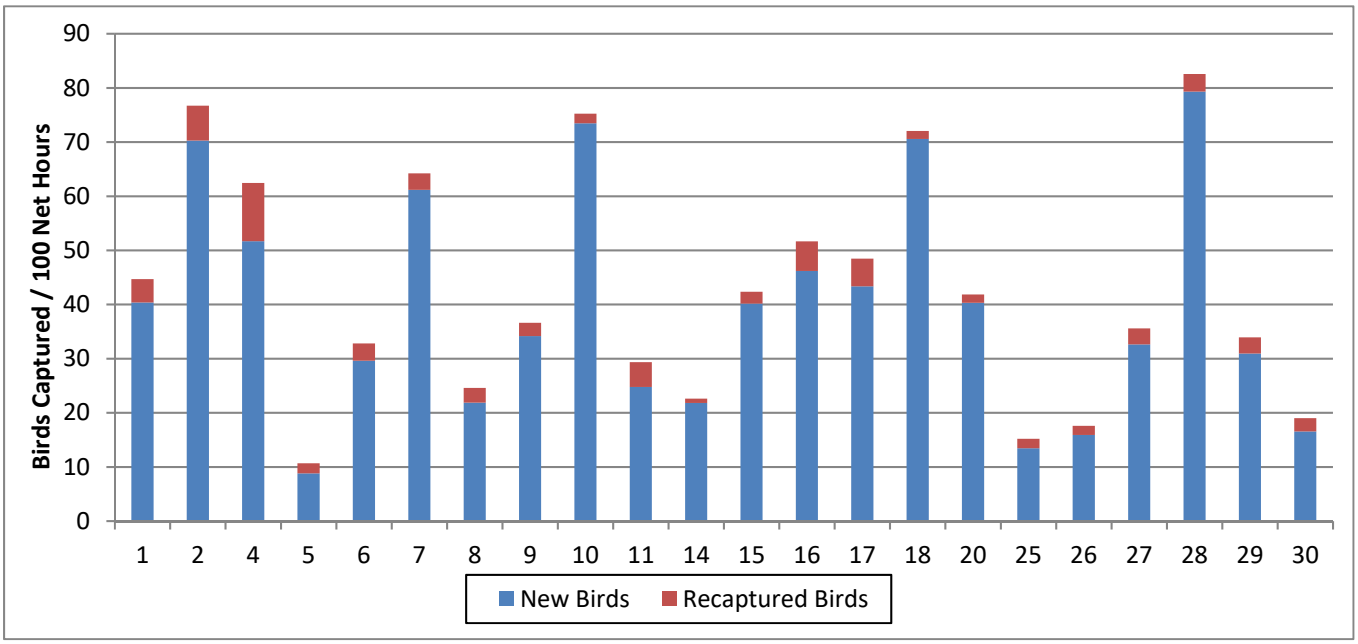

Figure 5. Number of birds banded per mist net during the fall of 2018.

3.3 Band Repeats, Returns & Recoveries

The proportion of birds caught that had been previously banded at the site in 2018 (band repeats) was low (5.3%) during the 2018 season (Table 7) which is within 1-1.5% of previous years. These results indicate that there continues to be a very high turnover of migrants through the study site, particularly for species banded in high numbers. For the purpose of migration monitoring, this is the preferred scenario as there is a limited amount of double counting the same individuals on consecutive days.

Table 7. Summary of band repeats during the fall of 2018.

Species	# of Individuals Recaptured	% of 2018 Original Bandings	Maximum # of Days From Original Banding	Average # of Days From Original Banding
Sharp-shinned Hawk	1	10.0	2	-
Merlin	1	50.0	9	-
Alder Flycatcher	2	0.50	2	1.5
Hammond's Flycatcher	4	20.0	7	4.5
Gray Jay	3	75.0	28	16.3
Black-capped Chickadee	8	14.5	62	19.5
Boreal Chickadee	1	0.42	16	-
Ruby-crowned Kinglet	9	6.0	11	3.6
Swainson's Thrush	2	1.9	7	5.5
Hermit Thrush	4	28.6	2	1.3
Northern Waterthrush	6	12.8	3	2.2
Orange-crowned Warbler	4	1.7	19	6.0
Myrtle Warbler	30	6.3	23	6.9
Yellow Warbler	22	8.3	15	4.5
Blackpoll Warbler	4	4.2	5	3.0
Common Yellowthroat	11	13.6	5	2.0
American Redstart	5	17.9	13	7.0
Wilson's Warbler	8	4.9	4	1.6
American Tree Sparrow	13	14.8	11	3.4
Lincoln's Sparrow	2	3.7	5	3.0
Fox Sparrow	8	8.1	6	3.1
Slate-colored Junco	18	5.2	35	13.0
Rusty Blackbird	1	33.3	1	-
TOTAL	167	5.3	62	6.2

Band **returns** (individuals banded at the site in previous years) typically represent individuals that breed within the study site as the likelihood of re-trapping migrants is relatively low. During 2018, the observatory had 7 band returns representing 3 species (Table 8). The oldest band recovery was a Black-capped Chickadee banded as a hatch year during August 2013.

Table 8. Summary of band returns during the fall of 2018.

Species	Band Number	Banded		Recaptured
		Date	Age – Sex [1]	Date in 2018
Black-capped Chickadee	2610-90865	29 Aug 2013	HY – U	29 Aug 2018
Black-capped Chickadee	2810-15085	10 Sep 2017	HY – U	25 Sep 2018
Swainson's Thrush	2431-77501	4 Jun 2017	SY – M	2 Sep 2018
Yellow Warbler	2810-13394	6 Aug 2016	AHY – M	19 Aug 2018
Yellow Warbler	2810-13725	19 Aug 2016	AHY – M	5 Aug 2018
Yellow Warbler	2810-14213	3 Jun 2017	AHY – M	15 Aug 2018
Yellow Warbler	2810-14273	27 Jul 2017	HY – M	11 Aug 2018

[1] HY – hatch year, AHY – after hatch year, ASY – after second year; M – male, F – female, U – unknown.

Foreign band **recoveries** are a very infrequent event; to date the observatory has had seven such recoveries and also recovered one bird from another SOYBO study site (Table 9). The most recent recovery was Swainson's Thrush banded at the Alaska Bird Observatory near Fairbanks, Alaska and recovered at Teslin Lake 6 days later. Another recovery reported during 2018 was an Orange-crowned Warbler banded at TLBO on August 15, 2017 and recovered new Gallup, New Mexico on May 9, 2018. The longest distance band recovery to date at TLBO is an Alder Flycatcher banded at Teslin Lake on August 24, 2009 and recaptured at Tacarcuna Nature Reserve in Colombia on April 29, 2011.

Table 9. Summary of foreign band returns for TLBO to date.

Species	Banded		Recovered	
	Location	Date	Location	Date
Yellow Warbler	Texas, USA	12 May 2008	Teslin Lake	9 Sep 2009
Alder Flycatcher	Teslin Lake	25 Aug 2008	SW Saskatchewan	12 Jun 2009
Sharp-shinned Hawk	Teslin Lake	14 Aug 2009	Boise, Idaho	9 Oct 2010
Alder Flycatcher	Teslin Lake	24 Aug 2009	Sapzurro, Choco, Colombia	29 Apr 2011
Myrtle Warbler	Teslin Lake	7 Sep 2010	McIntyre Marsh Bird Banding Station – Whitehorse, YT	25 May 2013
American Robin	Teslin Lake	8 Aug 2014	Dunburn, Saskatchewan	11 Apr 2015
Slate-colored Junco	Teslin Lake	5 Sep 2016	Grand Forks, North Dakota	14 Apr 2017
Orange-crowned Warbler	Teslin Lake	15 Aug 2017	Gallup, New Mexico	9 May 2018
Swainson's Thrush	Fairbanks, Alaska	12 Sep 2018	Teslin Lake	18 Sep 2018

3.5 Molt Scoring

As supplementary information, data was collected on the stage of molt for large proportion of the birds banded. Although information on the prebasic molt (amount of juvenile plumage remaining) was collected for hatch year birds, a particular emphasis was placed upon collecting wing molt scores for molting adult individuals as this provides information on the progress of molt in relation to migration timing for various species.

Wing molt score is achieved by assigning each individual wing flight feather a score from zero (old feather remaining) to five (new feather fully grown) and adding them together. Note that birds symmetrically molt their wing feathers; however, the scores collected are typically on the right wing. During 2018, a total of 101 molt scores were obtained from 95 individuals of 21 species (Table 10). No additional analysis is provided here; however, additional analysis could be conducted to compare the stage of molt in comparison to timing. This can be done to compare the timing of molt between species and/or sex within species. For example, females typically molt later than males due to the energetic requirements for females which are typically greater than that for males.

Table 10. Summary of wing molt scores collected from adult birds during the fall of 2018. Note that the total number of molt score is often greater than the number of individuals given that some recaptured birds are scored more than once on subsequent days.

Species	Number of Individuals Scored	Total Number of Molt Scores
Gray Jay	2	2
Hammond's Flycatcher	1	1
Black-capped Chickadee	3	5
Boreal Chickadee	1	1
Swainson's Thrush	5	5
Gray-cheeked Thrush	1	1
American Robin	5	5
Ruby-crowned Kinglet	2	2
Northern Waterthrush	1	1
Orange-crowned Warbler	2	2
Tennessee Warbler	1	1
Myrtle Warbler	14	14
Yellow Warbler	30	25
Blackpoll Warbler	11	11
Common Yellowthroat	2	2
American Redstart	2	2
Wilson's Warbler	5	5
White-crowned Sparrow	1	1
Lincoln's Sparrow	2	2
Slate-colored Junco	9	8
Pine Siskin	1	1
TOTAL	101	97

3.6 Visual Migration Counts

The visual migration counts provide a method of estimating relative numbers of individuals in the migrant species that would not be caught in mist nets. The counts are especially useful in observing raptors in migration and also serve as a method for monitoring waterbirds, waterfowl and some species of passerines. Note that birds seen during the migration counts which are not in active migration flight are not included in this section. Birds "in active migration flight" typically show a directed flight over the count area and do not appear to linger within the count area.

During the fall 2018 season, visual migration counts (standard & nonstandard) were conducted for 186.7 hours (Figure 6). Non-standard counts were limited to days when the total amount of observing effort was insufficient to constitute standard effort and days where the allowable duration of standard effort was too high (i.e., extra effort).

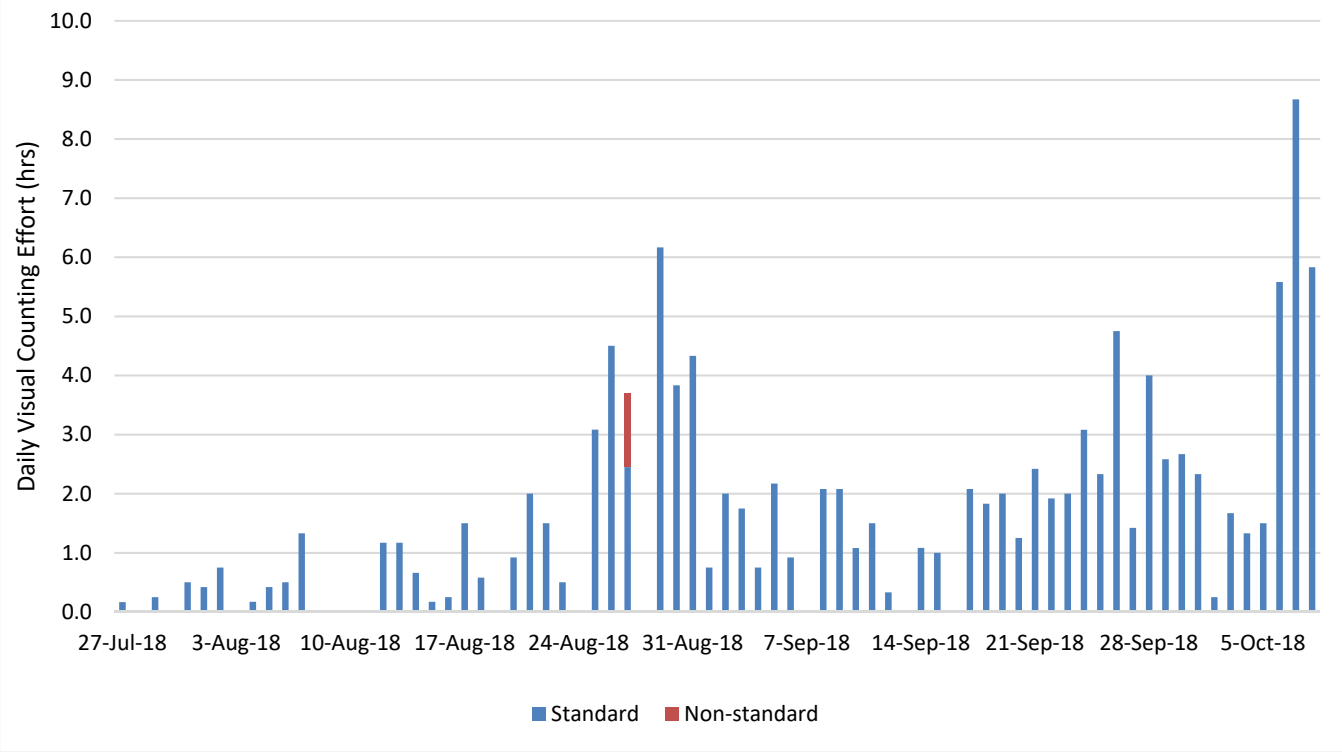

Figure 6. Visual counting effort, in hours each day, over the duration of the 2018 season.

A total of 16,443 birds were observed during the 2018 visual migration counts with waterfowl accounting for the largest proportion of the birds observed (**Error! Reference source not found.**). Compared to previous years, the number of birds observed during 2018 was the lowest recorded to date.

Table 11. Summary of birds observed on the visual migration counts from 2009 to 2018.

Year	Total Birds Observed					TOTAL BIRDS OBSERVED / HR	Visual Counting Effort (hrs)
	Waterbirds & shorebirds	Waterfowl	Raptors	Passerines	ALL SPECIES		
2009	4,927	8,219	1,612	11,000	25,758	201	128.1
2010	3,491	22,258	1,710	16,277	43,736	188	232.4
2011	1,072	31,548	3,680	37,951	74,251	218	340.6
2012	1,583	35,044	1,977	21,408	60,012	169	354.8
2013	2,166	7,852	2,466	28,839	41,323	147	280.9
2014	721	28,556	2,300	23,397	54,974	197	279.0
2015	3,878	22,560	4,211	11,797	42,446	218	194.6
2016	1,043	14,885	1,946	20,182	38,056	204	186.7
2017	436	9,497	980	13,626	24,539	87	235.6
2018	1,103	11,689	1,268	2,386	16,443	138	119.5
2009-2016 Average	2,042	19,211	2,215	18,686	42,154	177	235.2

3.6.1 Raptors

The number of raptors observed on the 2018 visual migration counts (1,265) was well below average and the second lo the lowest recorded to date; the lowest total of 980 raptors was recorded during 2017. The amount of watching effort was also less during 2018 as compared to previous years and when this is taken into consideration, the number of raptors observed per 100 hours was 1,058 compared to the 2008-2018 average of 982 and the previous high of 2,163 (2015) and low of 735 (2010; Figure 8). All regularly occurring species were observed during 2018, although all were observed in below average numbers. The most numerous species observed were Rough-legged Hawk (33% of all raptors), Harlan's Red-tailed Hawk (27%), Sharp-shinned Hawk (15%), Northern Harrier (8%) and Golden Eagle (4%; Table 12).

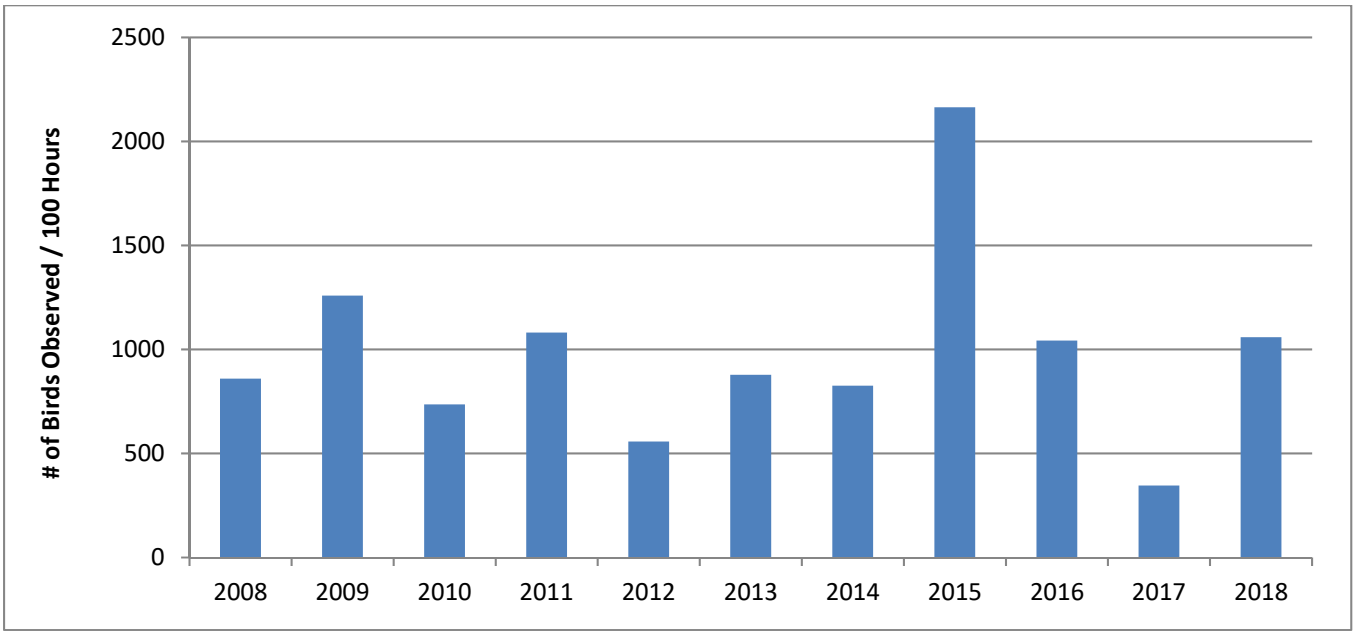

Figure 7. Number of raptors observed per 100 watching hours during 2018.

Table 12. Summary of raptor visual migrants observed during 2018.

Species	Total # Counted		
	Migration Counts	Incidental Migrants	TOTAL
Bald Eagle	24	0	24
Northern Harrier	103	5	108
Sharp-shinned Hawk	194	0	194
Northern Goshawk	1	0	0
Swainson's Hawk	24	0	24
Red-tailed Hawk (unspecified)	4	1	5
Red-tailed Hawk (Harlan's)	344	0	344
Rough-legged Hawk	416	0	416
Unidentified Buteo	2	0	0
Golden Eagle	57	1	58
American Kestrel	30	1	31
Merlin	35	0	35
Peregrine Falcon	2	0	2
Gyrfalcon	0	1	1
Osprey	23	2	25
Unidentified Raptor	9	0	9
TOTAL	**1,268**	**11**	**1,276**

A breakdown of color morph data collected from 2010 to 2017 is shown in Table 13 and Table 14 for Rough-legged and Red-tailed hawks, respectively. The majority of Rough-legged Hawks observed were classified as light morph individuals. By far the most common Red-tailed Hawk was the Harlan's dark morph, while the Harlan's light morph was the second most common. These patterns have been very consistent from year to year. The observation of possible western, northern and eastern Red-tailed Hawks are also notable given the limited information on these subspecies in the Yukon.

Table 13. Summary of color morph data recorded for Rough-legged Hawks observed from 2010 to 2018.

Year	Dark Morph (%)	Light Morph (%)
2010	21.7	78.3
2011	13.5	86.5
2012	18.8	81.2
2013	11.1	88.9
2014	11.8	88.2
2015	8.5	91.5
2016	7.3	92.7
2017	16.7	83.3
2018	21.2	78.8
Average	14.5	85.5

Table 14. Summary of color morph data recorded for Red-tailed Hawks observed from 2010 to 2018.

Year	Harlan's Dark Morph (%)	Harlan's Light Morph (%)	Western (*calarus*)	Northern (*abieticola*)	Eastern (*borealis*)
2010	95.1	4.3	0.5 (2 birds)		
2011	95.0	4.6	0.2 (2 bird)		0.2 (2 birds)
2012	92.0	7.1	0.3 (1 bird)		0.6 (2 birds)
2013	88.4	10.3	0.6 (3 birds)		0.6 (3 birds)
2014	91.3	7.1	1.0 (7 birds)		0.5 (3 birds)
2015[1]	91.0	8.6	0.3 (7 birds)		0.1 (2 birds)
2016	92.9	6.4	0.3 (2 birds)	0.3 (2 birds)	
2017	92.6	5.3	1.6 (3 birds)	0.5 (1 bird)	
2018	92.9	6.1		0.9 (3 birds)	
Average	92.4	6.6	0.5	0.2	0.2

[1] One additional leucistic individual was observed and not included in this table.

We could reliably determine the age and sex of five species of visual migrants when viewing conditions were suitable (Table 15). Since 2010, most raptor species show consistently low proportions of juveniles.

Table 15. Summary of age and sex data collected for raptors observed on visual migration counts from 2010 to 2018. Note that additional individuals with an undetermined color morph age/sex categories are excluded.

Species	Year	Proportion of Individuals Counted (%)						
		Adult			Sub - adult	Immature	Juvenile	Female Plumaged (juv/female)
		Male	Female	Not Determined				
Bald Eagle	2010	-	-	42.3	32.1	11.6	14.1	-
	2011	-	-	14.7	37.3	33.3	14.7	-
	2012	-	-	54.3	33.7	12.0	0.0	-
	2013	-	-	28.2	58.3	6.3	7.3	-
	2014	-	-	35.6	40.2	11.5	12.6	-
	2015	-	-	14.5	60.0	14.5	10.9	-
	2016	-	-	32.0	28.0	32.0	8.0	-
	2017	-	-	19.1	34.0	27.7	19.2	-
	2018	-	-	22.7	40.9	9.1	27.3	-
	Avg.	-	-	29.3	40.5	17.6	12.7	-
Golden Eagle	2010	-	-	68.2	12.6	8.3	10.9	-
	2011	-	-	52.3	18.7	18.0	11.0	-
	2012	-	-	74.5	9.2	12.3	4.1	-
	2013	-	-	63.7	26.7	5.0	4.6	-
	2014	-	-	77.3	8.5	7.8	6.4	-
	2015	-	-	40.2	27.1	22.4	10.3	-
	2016	-	-	50.0	14.4	21.1	14.4	-
	2017	-	-	57.5	18.9	6.3	17.3	-
	2018			48.9	21.3	8.5	21.3	
	Avg.	-	-	59.2	17.5	12.2	11.1	-
Northern Harrier	2010	11.3	12.2	-	-	-	37.1	39.3
	2011	8.9	10.7	-	-	-	26.5	53.9
	2012	13.9	13.1	-	-	-	26.4	46.6
	2013	12.0	14.3	-	-	-	22.3	51.5
	2014	16.4	16.4	-	-	-	19.5	47.7
	2015	6.8	8.2	-	-	-	22.1	62.9

Species	Year	Proportion of Individuals Counted (%)						
		Adult			Sub - adult	Immature	Juvenile	Female Plumaged (juv/female)
		Male	Female	Not Determined				
	2016	8.5	8.1	-	-	-	24.6	23.2
	2017	8.7	7.8	-	-	-	30.7	52.8
	2018	3.4	9.0	-	-	-	32.6	55.1
	Avg.	10.0	11.1	-	-	-	26.9	48.1
Rough-legged Hawk	2010	38.0	23.0	11.5	-	-	27.6	-
	2011	28.3	37.1	21.0	-	-	15.2	-
	2012	25.7	25.7	18.9	-	-	30.1	-
	2013	28.9	35.6	17.1	-	-	18.6	-
	2014	24.6	33.9	15.4	-	-	26.1	-
	2015	10.5	24.4	5.8	-	-	59.3	-
	2016	29.7	8.1	32.4	-	-	29.7	-
	2017	21.8	29.9	39.1	-	-	9.2	-
	2018	18.6	31.0	23.1	-	-	27.3	-
	Avg.	25.1	27.6	20.5	-	-	27.0	-
Harlans / Red-tailed Hawk	2013	-	-	94.0	-	-	6.0	-
	2014	-	-	89.3	-	-	10.7	-
	2015	-	-	86.9	-	-	13.1	-
	2016	-	-	92.6	-	-	7.4	-
	2017	-	-	94.5	-	-	5.5	-
	2018	-	-	93.7	-	-	6.3	-
	Avg.	-	-	91.8	-	-	8.2	-

3.7 Lake Counts

The lake counts provide monitoring data for various species of shorebirds, loons, grebes, waterfowl, and gulls/terns/ jaegers. Twelve shorebird species were observed during the lake counts with all species observed in relatively low numbers with the exception of Spotted Sandpiper. Although the total number of individuals observed was relatively low, the species diversity was modest with two locally rare species detected (Red Phalarope and Surfbird).

The majority of loons and grebes counted at the observatory are observed on the lake counts and this was once again the case during 2018 with a total of 564 loons and 1,226 grebes (Table 16). Geese and swans were observed in very low numbers during the lake counts; these species are typically observed flying over the site only (i.e. are visual migrants). However, for some duck species (scoters and mergansers), the lake counts record data to supplement the visual migration counts (Table 16). Only small numbers of dabbling and diving ducks are seen mostly due to scarcity of suitable stopover and feeding habitats near the observatory. As a group, gulls, terns and jaegers are well-monitored through the use of the lake counts; species of this group are the most commonly recorded birds using this method. A total of 7 species of gulls/terns/jaegers were observed on the 2018 lake counts.

Table 16. Summary of shorebirds (left), waterbirds (middle) and waterfowl (right) observed on the lake counts during 2018. One bird day represents one individual on one day; two bird days could represent single birds on two days or two birds on the same day.

Species	Total # of Bird Days	Species	Total # of Bird Days	Species	Total # of Bird Days
Semi-palmated Plover	2	Pacific Loon	95	Greater White-fronted Goose	3
Sanderling	3	Common Loon	393	Canada Goose	49
Least Sandpiper	14	Red-throated Loon	76	Trumpeter Swan	1
Semipalmated Sandpiper	6	Horned Grebe	106	*Unidentified Swan*	4
Pectoral Sandpiper	1	Red-necked Grebe	1,120	Mallard	86
Red-necked Phalarope	4	Mew Gull	75	Northern Pintail	4
Red Phalarope	2	Herring Gull	1,815	American Wigeon	34
Spotted Sandpiper	54	Thayer's Gull	71	Surf Scoter	415
Solitary Sandpiper	5	Glaucous Gull	9	White-winged Scoter	159
Greater Yellowlegs	1	Bonaparte's Gull	96	*Unidentified Scoter*	40
Lesser Yellowlegs	1	Arctic Tern	100	Lesser Scaup	45
Surfbird	1	Parasitic Jaeger	2	Harlequin Duck	1
				Ring-necked Duck	2
				Common Goldeneye	38
				Barrow's Goldeneye	35
				Unidentified Goldeneye	13
				Bufflehead	1
				Common Merganser	184
				Red-breasted Merganser	165
				Unidentified Merganser	13
TOTAL	**94**	**TOTAL**	**3,958**	**TOTAL**	**841**

3.8 Special Projects

3.8.1 Owl Banding

Call playback was used to target owls on 2 evenings (23.0 net hours) during 2018 and no owls were banded. This amount of effort was unlikely sufficient to allow a comparison of owl capture rates during previous years. Since owl banding began on a trial basis during the 2014, a total of 50 owls have been banded, the majority of which were Boreal Owls during 2014 (Table 17).

Table 17. Summary of owls banded at TLBO from 2014 to 2018.

Year	Total Net Hours	Boreal Owl		Northern Saw-whet Owl	
		Number	Number/100 Net Hours	Number	Number/100 Net Hours
2014	297.3	40	13.45	2	0.67
2015	77.0	3	3.90	0	0.00
2016	113.5	2	1.76	0	0.00
2017	30.5	3	9.84	0	0.00
2018	23.0	0	0.00	0	0.00

Owl populations and reproductive output are known to vary from year to year due to changes in prey (small mammal) abundance. These differences between years are likely to be exacerbated within the owl banding results as most owls captured are juvenile birds and these individuals are most likely to migrate/irrupt during years when the owls have high breeding success. There was also high variation in the captures between different evenings in 2014 when total captures were high. We may need to increase the number of evenings of sampling during future years to get a more representative sample. This is however very challenging for the personnel operating the observatory given that their priority is the standardized migration monitoring during the day time hours.

3.9 Interesting & Notable Captures / Observations

The vast majority of birds banded and observed at Teslin Lake in 2018 were species which are common and widespread north and west of the study site. These common species will be the primary focus of the long-term species trend analysis to be conducted following additional years of data collection. In addition to common species, the observatory continues to add to the knowledge base for rare and uncommon bird species in the Yukon. Notable captures and observations during 2018 included:

- Swainson's Hawk – a total of 24 individuals observed on visual migration counts, including a high count of 20 individuals on August 29.
- Surfbird – one individual observed on the lake shoreline on August 13. This provided the first record of this species at TLBO.
- Red Phalarope – single individuals observed on the lake counts on September 4 and 15.
- Parasitic Jaeger – single individuals observed on the lake counts on August 17 and September 12.
- Rufous Hummingbird – single individual observed on August 18.
- Philadelphia Vireo – one hatch year individual banded on September 1 provided the first record of this species at TLBO.
- Brewer's Sparrow – single hatch year individuals banded on August 16 and 21.
- Western Tanager – one individual observed on August 20.

3.9.1 Chickadees

Chickadees are considered year-round residents, but the observatory has documented Boreal Chickadee irruptions in seven of the last eleven years with variation in the magnitude of irruptions between years (Table 18). The high number of individuals banded and observed in some years indicates that a substantial number of birds are involved in these irruptions. The relative proportion of the species encountered is likely an indication of the relative abundance in the southern Yukon; however, it is possible that certain species may be more likely to stage fall irruptions. Of particular interest, nearly all chickadees banded are hatch year individuals. Also note that Black-capped Chickadee is the only chickadee species which breeds within the study site and therefore a portion of the individuals banded are probable local residents and their offspring.

Table 18. Summary of chickadees banded and observed at the observatory from 2008 to 2018.

Year		Boreal Chickadee	Black-capped Chickadee	Mountain Chickadee	Chestnut- backed Chickadee	Hybrid Chickadee
2008	# Banded	128	57	15	1	1
	# of Bird Days	293	172	20	1	1
2009	# Banded	831	26	11	-	-
	# of Bird Days	1,612	221	24	-	-
2010	# Banded	-	22	-	-	-
	# of Bird Days	12	295	-	-	-
2011	# Banded	233	92	2	-	-
	# of Bird Days	486	270	3	1	-
2012	# Banded	142	65	1	-	1
	# of Bird Days	230	231	5	-	-
2013	# Banded	24	33	-	-	-
	# of Bird Days	40	209	1	-	-
2014	# Banded	3	16	-	-	-
	# of Bird Days	9	157	-	-	-
2015	# Banded	131	31	4	-	-
	# of Bird Days	304	169	11	-	-
2016	# Banded	40	24	-	-	-
	# of Bird Days	62	162	-	-	
2017	# Banded	473	95	-	-	-
	# of Bird Days	1,047	330	-	-	-
2018	# Banded	234	55	2	-	-
	# of Bird Days	445	224	9	-	-

3.10 Species of Conservation Concern

In conjunction with the other Yukon Bird Observatories field stations, all Rusty Blackbirds captured were fitted with a color band (light blue) in addition to the regular numbered leg band. As each observatory uses a different color, the color bands help to identify the origin of a re-sighted individual without the need to recapture it. Additionally, from 2008 to 2010 a feather was collected from each Rusty Blackbird captured. Feather samples were analyzed for stable isotopes in an effort to make linkages between breeding and wintering grounds of this species. During the fall of 2018, four individuals were banded including one after hatch year and 3 hatch year birds. Throughout the fall season, a total of 174 bird days were recorded for this species which was observed on 33 days from August 29 to October 8; the daily high count was 23 individuals on September 15.

3.11 Visitors and Volunteers

Once again the observatory hosted numerous visitors and volunteers. On most days of operation, adequate personnel were available onsite to assist with the banding operation. This was largely due to the commitment of a number of volunteers who provide valuable assistance at the observatory. Qualified volunteers are necessary to allow for the observatory to be successful over the long term. During 2018, the observatory recorded a total of 1,392 hours of observer effort (paid and volunteer) by 31 individuals. A total of 94 individuals visited the observatory and tallied a total of 161 visitor hours.

Visitors were defined as those people who visited the observatory (often for a short time) and did not take part in activities at the observatory. Volunteers were those people who took part in the operation of the observatory (often extensively) without being financially compensated. Paid hours were spent by individuals being paid to be at the observatory. This category includes the Bander In Charge Jukka Jantunen. Note that the values shown for "paid hours" only include those spent at the observatory and do not include the extensive amount of travel to and from the site, data entry, data analysis, report writing and other communication of the observatory's results.

Table 19. Hours spent at the observatory by volunteers and paid observers during 2018.

Paid		Volunteer	
# of Individuals	**Hours**	**# of Individuals**	**Hours**
1	518	30	873.75

Table 20. Hours spent at the observatory by visitors during 2018.

Yukon		Canada		USA		International	
#	**Hours**	**#**	**Hours**	**#**	**Hours**	**#**	**Hours**
18	36.0	54	67.3	16	56.0	5	2.0

In comparison to previous years, the total number of volunteer hours was above average but less than the record high of 1,267 during 2015 (Figure 8). The total visitor hours was also less than the high of 210 hours during 2009 but still slightly above the average of 152 hours. The amount of paid hours has been declining over time and this is primarily due to having fewer paid personnel at the observatory on a daily basis. This has been possible in recent years due to the increased availability of qualified volunteers to assist with day to day activities at the observatory.

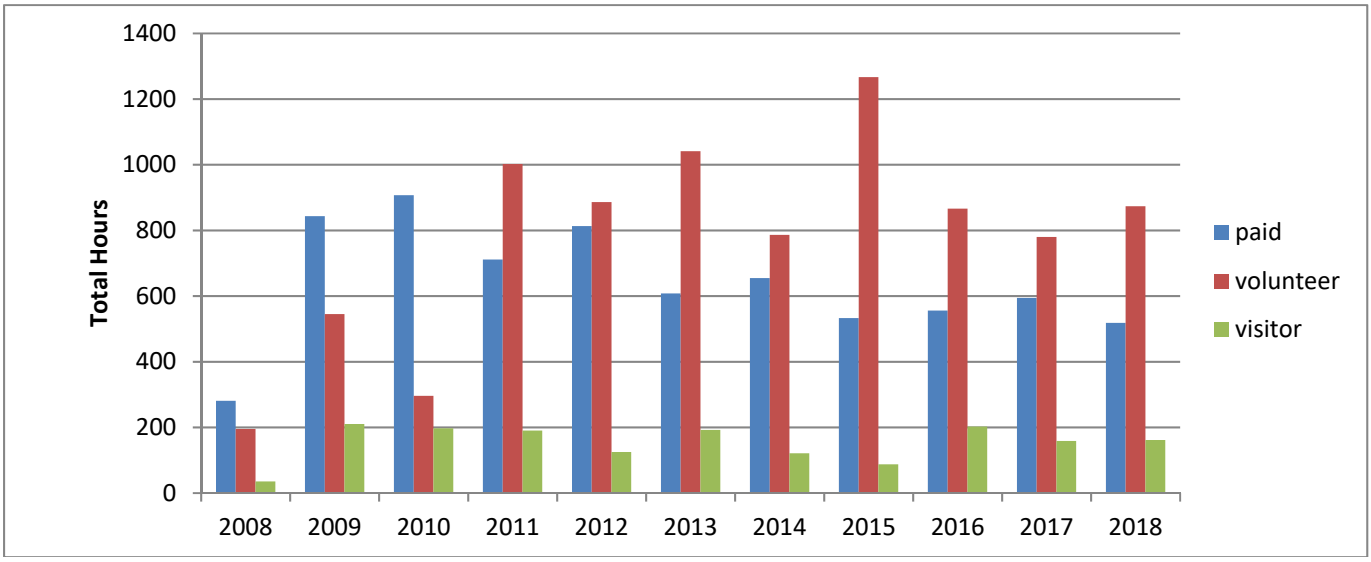

Figure 8. Volunteer and visitor hours at the observatory from 2008 to 2018.

4.0 Conclusion

The results from the operation of the Teslin Lake Bird Observatory in 2018 have continued to add to the knowledge of numerous aspects of bird biology in the Yukon, including: species distribution, migration timing and productivity. The location of the study site has proven to be effective for monitoring songbird migration. The primary reason for this is the close proximity of the site to Teslin Lake. As the lake is a very large body of water which migrating landbirds are hesitant to cross, many birds concentrate along the lakeshore and pass directly through and over the study site. On numerous occasions, flocks of migrating birds have been observed moving along the lakeshore and thus have yielded some very impressive banding and observation totals at the observatory.

Following eleven years of fall migration monitoring at the observatory, the ability to monitor songbirds has been well demonstrated by the large numbers of migrants observed and banded on an annual basis. The results gathered this season also confirm the previous assumption that few birds stopover at the study site for extended periods of time. The majority of birds simply pass through the site while in migration and this is supported by the low proportion of band repeats within each season.

The visual migration and lake counts increase the number of bird species which may be monitored at the observatory and are now a key component of the observatory's activities. Together they serve to collect monitoring data for species not banded (or banded only in low numbers) including: waterfowl, loons/grebes, gulls/terns, raptors and some species of passerines, particularly American Robin, Varied Thrush, American Pipit, Rusty Blackbird, Common Redpoll and Pine Siskin. The raptors are a primary focus of these counts as these species are readily observed and identified from a distance. The ability to collect data on ages and color morphs of these species make this data even more valuable.

Over the long term, the data collected at the observatory will be used to calculate species trends to determine the status on bird populations. Given the location of the observatory, the birds counted at the site are known to originate in the Yukon and Alaska. Species trend data from this relatively small catchment area will be useful when used in combination with more southerly bird observatories which monitor birds from a much larger catchment area. Bird Studies Canada will prepare the first set of species trends for TLBO in early 2019 and will be included as an appendix in future years' annual reports.

The observatory continues to be successful in attracting members of the public to the observatory to learn about birds and bird migration. During 2018, numerous individuals visited the observatory and were given an introduction to birds, their migration and methods used for ornithological data collection.

4.1 Recommendations

We recommend the following for the future operation of the Teslin Lake Bird Observatory:

- Continue standardized monitoring to allow for the continued analysis of species trends.
- Continue the owl banding program with more regular and frequent effort as available personnel allows.
- Continue to expand species specific banding projects at the observatory, particularly for species such as woodpeckers and potentially raptors which are seldom captured in the standard mist nets.
- Make efforts to attract additional qualified volunteers to assist with activities at the observatory.
- Make efforts to diversify the funding base for the bird observatory to ensure long-term operation.

Appendix A – Species Checklist

Table A1. Birds banded and observed (✓) at Teslin Lake Bird Observatory from 2008 to 2016. Note that observations were not collected during the fall of 2005, 2006 and 2007; observatory was located at a different location on Nisutlin Bay during 2005.

SPECIES	2005		2006		2007		2008		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	SPRING TOTAL	FALL TOTAL	ALL TIME TOTAL
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall			
Bean Goose										✓									-	-	-
Greater White-fronted Goose	✓		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Snow Goose					✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Cackling Goose												✓							-	-	-
Canada Goose	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Trumpeter Swan	✓		✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Tundra Swan			✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Bewick's Tundra Swan										✓	✓								-	-	-
Gadwall	✓						✓								✓				-	-	-
American Wigeon	✓		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Mallard	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Blue-winged Teal							✓												-	-	-
Northern Shoveler	✓						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Northern Pintail	✓				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
American Green-winged Teal	✓		✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		-	-	-
Canvasback								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Redhead									✓	✓				✓	✓				-	-	-
Ring-necked Duck	✓						✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Greater Scaup								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Lesser Scaup							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Harlequin Duck							✓	✓		✓	✓	✓	✓	✓		✓			-	-	-
Surf Scoter	✓						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
White-winged Scoter	✓							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Long-tailed Duck							✓			✓	✓	✓	✓	✓	✓	✓	✓		-	-	-
Bufflehead	✓				✓					✓	✓	✓	✓	✓		✓	✓	✓	-	-	-
Common Goldeneye	✓		✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Barrow's Goldeneye							✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	-	-	-
Hooded Merganser									✓	✓		✓				✓			-	-	-
Common Merganser	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Red-breasted Merganser	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Ruffed Grouse	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Spruce Grouse	✓						✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		-	-	-
Red-throated Loon	✓						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Pacific Loon								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Common Loon	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Yellow-billed Loon										✓	✓	✓		✓		✓	✓		-	-	-
Horned Grebe								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Red-necked Grebe	✓		✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-

SPECIES	2005		2006		2007		2008		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	SPRING TOTAL	FALL TOTAL	ALL TIME TOTAL
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall			
Western Grebe											✓						✓		-	-	-
Double-crested Cormorant							✓												-	-	-
Great Blue Heron																✓			-	-	-
Turkey Vulture														✓					-	-	-
Osprey	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Golden Eagle							✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	-	-	-
Northern Harrier	✓		✓		✓		1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	-	1
Sharp Shinned hawk	✓		✓		2		1	10	23	14	7	13	6	14	25	10	12	10	3	144	147
Northern Goshawk							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Bald Eagle	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Swainson's Hawk							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Red-tailed Hawk			✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Rough-legged Hawk							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Sandhill Crane								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Black-bellied Plover											✓			✓					-	-	-
American Golden-Plover							✓			✓	✓		✓		✓	✓	✓		-	-	-
Semipalmated Plover	✓				✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Killdeer	✓		✓		✓		✓			✓	✓					✓			-	-	-
Upland Sandpiper													✓		✓				-	-	-
Black Turnstone												✓			✓				-	-	-
Stilt Sandpiper													✓						-	-	-
Sanderling								✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	-	-	-
Baird's Sandpiper							✓	✓	✓		✓		✓		✓		✓		-	-	-
Least Sandpiper					✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	1	✓	✓	-	1	1
Pectoral Sandpiper					✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Semipalmated Sandpiper								✓	✓	✓	✓	✓	✓		✓	✓		✓	-	-	-
Western Sandpiper											✓					✓	✓		-	-	-
Surfbird																		✓	-	-	-
Short-billed Dowitcher							✓								✓				-	-	-
Long-billed Dowitcher								✓	✓	✓	✓	✓		✓	✓	✓	✓		-	-	-
Wilson's Snipe	✓		✓		✓		1	1	1	✓	✓	✓	✓	1	✓	1	✓	2	1	6	7
Red-necked Phalarope									✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Red Phalarope																✓			-	-	-
Spotted Sandpiper	1		2		1		1	✓	✓	1	2	✓	1	✓	✓	1	✓	✓	5	5	10
Solitary Sandpiper	✓		✓	2	✓		✓	2	5	1	3	3	2	1	3	✓	✓	✓	-	22	22
Wandering Tattler										✓									-	-	-
Greater Yellowlegs			✓		✓		✓		✓		✓		✓					✓	-	-	-
Lesser Yellowlegs	✓		✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Parasitic Jaeger								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-

SPECIES	2005		2006		2007		2008		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	SPRING TOTAL	FALL TOTAL	ALL TIME TOTAL
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall			
Long-tailed Jaeger													✓						-	-	-
Black-legged Kittiwake										✓				✓					-	-	-
Sabine's Gull								✓	✓	✓	✓	✓		✓		✓	✓		-	-	-
Bonaparte's Gull	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Little Gull										✓	✓								-	-	-
Mew Gull	✓		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Ring-billed Gull																	✓		-	-	-
California Gull										✓		✓					✓		-	-	-
Herring Gull	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Thayer's Gull								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Iceland Gull																✓			-	-	-
Glaucous-winged Gull										✓	✓								-	-	-
Glaucous Gull								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Arctic Tern	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Great Horned Owl								✓	✓	✓	✓			✓	✓	✓	✓		-	-	-
Northern Hawk Owl									✓	✓	✓	✓	✓	✓		✓		✓	-	-	-
Short-eared Owl			✓							✓	✓	✓							-	-	-
Boreal Owl											4			40	✓	5			-	49	49
Northern Saw-whet Owl														2					-	2	2
Common Nighthawk								✓	✓	✓	✓		✓	✓	✓		✓		-	-	-
Pacific Swift										✓									-	-	-
Rufous Hummingbird					✓											✓	✓	✓	-	-	-
Belted Kingfisher	✓		✓	8	✓		✓	8	6	5	6	6	2	9	6	4	3	3	-	66	66
Yellow-bellied Sapsucker	2		2		2		1		✓		3	1	1						7	5	12
Downy Woodpecker	✓		✓					2	1	3	7			1	1	✓	✓	4	4	23	27
Hairy Woodpecker	2		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2	-	2
Three-toed Woodpecker	✓							✓	✓	✓	✓	✓	1	✓	✓	✓	1	1	-	3	3
Black-backed Woodpecker								✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	-	-	-
Northern Flicker	1		✓		1		✓	✓	✓	1	1	✓	3	✓	✓	3	1	✓	2	9	11
Pileated Woodpecker	✓																		-	-	-
American Kestrel	✓						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Merlin					✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2	2	-	4	4
Gyrfalcon									✓	✓		✓		✓	✓			✓	-	-	-
Peregrine Falcon					✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Olive-sided Flycatcher	✓		11		✓		6		✓	✓	1	✓	✓	✓	2	✓	✓	✓	17	3	20
Western Wood-pewee	3		2		2		✓	3	6	5	10	3	4	4	4	✓	1	6	7	46	53
Yellow-bellied Flycatcher	2	2	1		1			9	8	11	7	9	11	3	11	16	14	10	4	111	115
Alder Flycatcher	17	9	41	18	10	5	9	811	631	620	637	827	770	506	1058	498	548	358	77	7654	7731
Least Flycatcher	3		4		3		2	2	1	3	10	3	6	2	4	7	2	2	12	42	54

SPECIES	2005		2006		2007		2008		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	SPRING TOTAL	FALL TOTAL	ALL TIME TOTAL
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall			
Hammond's Flycatcher	7		5		11		18	6	12	17	28	7	12	8	21	19	10	20	41	160	201
Dusky Flycatcher	2				2			1	6	3	6	3	3	4	2		4	6	4	38	42
Western Flycatcher												1				1			-	2	2
Eastern Phoebe			1																1	-	1
Say's Phoebe			2		2		1	1	1	1	✓	✓	✓	✓	2	2	✓	✓	5	7	12
Western Kingbird																	✓		-	-	-
Northern Shrike	✓								✓	1	1	1	1	1	✓	1	2	1	-	9	9
Warbling Vireo	13		1	4	✓		1	9	10	19	17	15	48	12	10	24	19	17	15	221	236
Philadelphia Vireo																		1	-	1	1
Gray Jay	5		✓		1		✓		5	4	✓	✓	✓	1	1	✓	✓	4	6	15	21
Steller's Jay											✓								-	-	-
Black-billed Magpie					✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	4	1	-	5	5
Clark's Nutcracker																	✓				
Common Raven	✓		✓		✓		✓	✓	1	1	✓	✓	✓	✓	1	✓	✓	✓	-	3	3
Horned Lark			3		✓		✓		✓	✓							✓	✓	3	-	3
Northern Rough-winged Swallow																✓					
Tree Swallow	5		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	5	-	5
Violet-green Swallow	✓		✓		✓		✓	✓		✓	✓	✓			✓	✓	✓	✓	-	-	-
Bank Swallow	✓		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Barn Swallow	✓		✓		✓			✓	1	✓	✓	✓	✓	✓		✓	✓	✓	-	1	1
Cliff Swallow	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Black-capped Chickadee	✓	4	4	3	2		2	57	26	22	92	65	31	16	31	24	95	55	8	576	584
Mountain Chickadee							2	15	11		2	1	✓		4		1	2	2	36	38
Chestnut-backed Chickadee								1			✓								-	1	1
Boreal Chickadee	2		3		2		8	138	831	✓	233	142	23	3	131	40	473	234	15	2482	2497
Hybrid Chickadee			1					1											1	1	2
Red-breasted Nuthatch	✓				✓		1	3	2	2	5	12	6	3	9	3	4	4	1	53	54
Brown Creeper											✓								-	-	-
Winter Wren	1										✓			1					1	1	2
American Dipper														✓					-	-	-
Golden-crowned Kinglet		1					✓		10	2	1	3	1		2	3	4	7	-	34	34
Ruby-crowned Kinglet	25	7	51	3	27		72	29	175	109	86	134	125	69	284	89	114	150	175	1524	1699
Mountain Bluebird	✓				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
Townsend's Solitaire								✓	1	✓	1	1	✓	✓	✓	2	✓	✓	-	5	5
Gray-cheeked Thrush	4	2	2		5		1	1	2	8	2	4	2	10	11	8	4	30	12	84	96
Swainson's Thrush	99	7	39	10	48		21	19	49	53	85	41	55	49	68	82	26	102	207	646	853
Hermit Thrush	1		1		✓		1	1	7	12	12	3	2	1	8	7	2	14	3	69	72
American Robin	27	1	36	5	17		4	✓	27	9	11	✓	4	9	3	✓	1	16	84	86	170
Varied Thrush	✓		1		2		✓	3	12	5	2	2	5	3	2	✓	5	5	3	44	47

SPECIES	2005		2006		2007		2008		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	SPRING TOTAL	FALL TOTAL	ALL TIME TOTAL
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall			
European Starling							✓												-	-	-
American Pipit	✓		2		✓		1	1	3	✓	2	✓	2	✓	6	2	✓	✓	3	16	19
Bohemian Waxwing	✓		40		✓		23	✓	✓	✓	1	✓	✓	✓	✓	✓	✓	✓	63	1	64
Cedar Waxwing									✓	2			8	✓			✓		-	10	10
Lapland Longspur	✓		✓		✓		5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	5	1	6
Smith's Longspur									✓				✓				✓		-	-	-
Snow Bunting										✓	✓	✓	✓	✓			✓	✓	-	-	-
Northern Waterthrush	4	1	14	10	11		4	46	53	54	42	47	46	48	53	34	34	47	33	562	595
Black-and-white Warbler															1					1	1
Tennessee Warbler	4		4		6		2		9	40	4	1	1	1	8	13	17	16	16	110	126
Orange-crowned Warbler	16	6	26	1	47		61	101	180	271	57	88	124	149	331	364	176	235	150	2318	2468
Nashville Warbler								1				1							-	2	2
MacGillivary's Warbler	1		1					1	3	2		1	1						2	8	10
Common Yellowthroat	1		17	4	11	6	21	66	113	70	72	45	65	82	89	57	59	81	50	890	940
American Redstart			6	4	1			10	43	30	39	21	33	25	47	15	23	28	7	346	353
Cape May Warbler							1					1							1	1	2
Magnolia Warbler	1							1			✓	1	1				1		1	4	5
Blackburnian Warbler															1					1	1
Yellow Warbler	10	6	50	19	37	3	31	486	325	471	310	225	333	504	556	449	163	266	128	4382	4510
Blackpoll Warbler	3	2	21	4	10		5	47	107	194	58	87	87	61	99	134	71	95	39	1141	1180
Yellow-rumped Warbler							1	1											1	1	2
Yellow-rumped Warbler (Myrtle)	60	3	63	5	29		78	49	284	673	142	195	163	178	311	286	654	478	230	3899	4129
Yellow-rumped Warbler (Audubon's)										✓	1								-	1	1
Townsend's Warbler			✓				1	✓	8	10	6	6	7	10	2	2	16	10	1	77	78
Wilson's Warbler	116	8	54	5	63		151	113	161	177	133	134	122	164	386	172	68	164	384	1947	2355
American-tree Sparrow	220		13	1	72		41	19	54	21	77	17	19	22	137	20	27	88	346	590	936
Chipping Sparrow	28		4	1	6		3	6	24	18	28	17	20	15	29	31	38	18	41	246	287
Brewer's Sparrow				1					1		2						1	3	-	8	8
Fox Sparrow	106		3		17		26	11	28	28	17	6	7	17	42	10	13	99	152	278	430
Dark-eyed Junco					9		31	11	✓	✓	✓	✓			2				40	13	53
Dark-eyed Junco (Slate-colored)	165	12	139	5	135		224	182	582	420	331	116	341	140	209	229	443	348	663	3708	4371
White-crowned Sparrow	86	3	13		579		311	1	33	36	34	22	16	15	23	15	20	31	989	280	1269
Golden-crowned Sparrow	1				16		9						1	1	2			✓	26	4	30
White-throated Sparrow			✓		1													1	1	1	2
Savannah Sparrow	11	2	2	2	24		10	14	18	18	23	25	18	17	55	17	12	25	47	246	293
Song Sparrow										1						1			-	2	2
Lincoln's Sparrow	9	1	6		39		21	5	16	15	27	9	9	9	65	13	14	54	75	291	366
Swamp Sparrow										1									-	1	1
Western Tanager			1						1		✓	✓						✓	1	1	2

SPECIES	2005		2006		2007		2008		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	SPRING TOTAL	FALL TOTAL	ALL TIME TOTAL
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall	Fall			
Red-winged Blackbird	✓		1		1		✓		✓		✓	✓	✓			✓		✓	2	-	2
Rusty Blackbird	19		3		2	1	✓	11	30	20	16	9	14	10	18	6	14	3	24	152	176
Brown-headed Cowbird	1		✓		✓		✓			✓	1		✓	2	1			✓	1	4	5
Pine Grosbeak			2					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2	-	2
Purple Finch	27		3		6		1	✓	✓	10	1	2	1	3	✓	✓	✓	3	37	20	57
Red Crossbill	3						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		3	-	3
White-winged Crossbill			5					2	2	100	1	2	5	2	✓	46	✓	✓	5	160	165
Common Redpoll	✓		107		1		22	✓	6	1	75	47	✓	1	8	3	2	4	130	147	277
Hoary Redpoll					3						2			✓					3	2	5
Pine Siskin	28		1				✓	1	1	91	10	3	8	303	1	3	151	2	29	574	601
Evening Grosbeak														✓					-	-	-
TOTAL SPECIES BANDED	**43**	**18**	**48**	**21**	**43**	**4**	**45**	**48**	**53**	**52**	**57**	**51**	**51**	**48**	**51**	**51**	**47**	**52**	**70**	**87**	**95**
TOTAL BIRDS BANDED	**1142**	**77**	**814**	**115**	**1267**	**15**	**1238**	**2319**	**3956**	**3706**	**2793**	**2429**	**2,577**	**2,510**	**4,186**	**2,780**	**3,369**	**3,167**	**4,461**	**36,746**	**41,223**

Appendix B – Daily Species Total Summary

Species	First Date	ALL OBS		Last Date	HIGH COUNT	
		# of Days	Bird Days		#	Date
Greater White-fronted Goose	17-Aug	13	5149	22-Sep	3339	29-Aug
Snow Goose	27-Sep	2	135	28-Sep	125	28-Sep
Canada Goose	27-Aug	16	624	08-Oct	175	07-Sep
Unidentified Goose	18-Aug	6	1539	8-Oct	1452	29-Aug
Trumpeter Swan	1-Sep	14	550	08-Oct	259	08-Oct
Tundra Swan	14-Sep	11	4071	08-Oct	1946	08-Oct
American Wigeon	5-Aug	7	62	30-Sep	23	27-Aug
Mallard	4-Aug	23	147	08-Oct	31	08-Oct
Northern Shoveler	18-Aug	2	7	27-Sep	6	27-Sep
Northern Pintail	26-Aug	8	32	05-Oct	16	26-Aug
Canvasback	19-Sep	3	31	29-Sep	20	26-Sep
Ring-necked Duck	23-Sep	5	14	30-Sep	5	26-Sep
Greater Scaup	26-Sep	3	14	08-Oct	8	08-Oct
Lesser Scaup	31-Jul	17	341	08-Oct	116	26-Sep
Unidentified Scaup	12-Aug	1	2	-	-	-
Surf Scoter	28-Jul	18	467	26-Sep	100	12-Sep
White-winged Scoter	30-Jul	15	168	02-Oct	90	18-Sep
Unidentified Scoter	18-Sep	1	40	-	-	-
Bufflehead	29-Jul	1	1	-	-	-
Common Goldeneye	27-Jul	11	39	06-Oct	15	06-Oct
Barrow's Goldeneye	8-Sep	7	37	30-Sep	11	27-Sep
Unidentified Goldeneye	17-Sep	5	28	30-Sep	11	30-Sep
Common Merganser	27-Jul	30	222	08-Oct	42	30-Jul
Red-breasted Merganser	27-Jul	30	170	08-Oct	21	07-Sep
Unidentified Merganser	17-Sep	1	13	-	-	-
Unidentified Duck	29-Sep	2	38	8-Oct	21	29-Sep
Ruffed Grouse	28-Jul	52	156	07-Oct	5	many days
Red-throated Loon	29-Jul	34	86	07-Oct	6	30/31 Aug
Pacific Loon	27-Jul	41	124	07-Oct	8	24-Sep

Common Loon	27-Jul	63	399	05-Oct	22	25-Aug
Unidentified Loon	31-Aug	3	4	19-Sep	2	31-Aug
Horned Grebe	1-Aug	23	107	07-Oct	31	27-Sep
Red-necked Grebe	27-Jul	69	1134	07-Oct	67	23-Aug
Osprey	21-Aug	15	26	08-Oct	6	26-Sep
Golden Eagle	9-Sep	13	59	08-Oct	19	07-Oct
Northern Harrier	7-Aug	30	109	08-Oct	25	07-Oct
Sharp-shinned Hawk	11-Aug	36	219	08-Oct	55	08-Oct
Northern Goshawk	20-Aug	15	21	08-Oct	3	29-Aug
Bald Eagle	27-Jul	51	85	08-Oct	13	08-Oct
Swainson's Hawk	26-Aug	3	24	31-Aug	20	29-Aug
Red-tailed Hawk	22-Aug	6	6	08-Oct	1	all days
Red-tailed Hawk (Harlan's)	26-Aug	23	351	08-Oct	239	29-Aug
Rough-legged Hawk	14-Sep	6	416	08-Oct	249	07-Oct
Unidentified Buteo	29-Aug	1	1	-	-	-
Unidentified Raptor	29-Aug	2	9	31-Aug	7	31-Aug
Sandhill Crane	8-Sep	9	2182	08-Oct	1320	14-Sep
Semipalmated Plover	11-Aug	3	3	25-Aug	1	all days
Sanderling	6-Sep	2	3	07-Sep	2	06-Sep
Least Sandpiper	29-Aug	5	15	10-Aug	3	10-Aug
Semipalmated Sandpiper	1-Aug	6	26	14-Aug	15	03-Aug
Pectoral Sandpiper	7-Sep	1	2	-	-	-
Surfbird	13-Aug	1	1	-	-	-
Unidentified Peep	31-Jul	2	14	2-Aug	12	31-Jul
Wilson's Snipe	17-Aug	6	6	21-Sep	1	all days
Red-necked Phalarope	2-Aug	2	5	01-Sep	4	01-Sep
Red Phalarope	4-Sep	2	2	15-Sep	1	both days
Spotted Sandpiper	28-Jul	26	54	27-Aug	4	06-Aug
Solitary Sandpiper	15-Aug	2	5	16-Aug	4	15-Aug
Lesser Yellowlegs	1-Aug	1	1	-	-	-
Greater Yellowlegs	27-Jul	1	1	-	-	-

Unidentified Shorebird	17-Aug	1	8	-	-	-
Parasitic Jaeger	17-Aug	2	2	12-Sep	1	both days
Bonaparte's Gull	27-Jul	19	96	18-Aug	15	29-Jul
Mew Gull	27-Jul	30	88	06-Sep	11	07-Aug
Herring Gull	27-Jul	67	1823	06-Oct	90	14-Aug
Thayer's Gull	26-Aug	24	74	08-Oct	8	22-Sep
Glaucous Gull	20-Sep	9	9	07-Oct	1	all days
Arctic Tern	27-Jul	19	125	09-Sep	27	28-Jul
Northern Hawk Owl	9-Sep	1	1	-	-	-
Rufous Hummingbird	18-Aug	1	1	-	-	-
Belted Kingfisher	27-Jul	25	35	12-Sep	3	04-Aug
Downy Woodpecker	20-Aug	10	10	01-Oct	1	all days
Hairy Woodpecker	28-Jul	4	4	27-Sep	1	all days
American Three-toed Woodpecker	25-Aug	15	16	01-Oct	2	28-Sep
Black-backed Woodpecker	15-Aug	1	1	-	-	-
Unidentified Woodpecker	20-Aug	1	1	-	-	-
Northern Flicker	29-Jul	9	10	08-Sep	2	26-Aug
American Kestrel	16-Aug	10	32	08-Oct	12	29-Aug
Merlin	11-Aug	26	55	08-Oct	8	31-Aug
Peregrine Falcon	9-Sep	2	2	11-Sep	1	both days
Gyrfalcon	27-Aug	2	2	30-Aug	1	both days
Olive-sided Flycatcher	3-Aug	3	3	25-Aug	1	all days
Western Wood-Pewee	28-Jul	7	11	27-Aug	4	24-Aug
Yellow-bellied Flycatcher	1-Aug	8	10	31-Aug	2	11/15 Aug
Alder Flycatcher	27-Jul	39	275	09-Sep	47	12-Aug
Least Flycatcher	14-Aug	2	2	25-Aug	1	both days
Hammond's Flycatcher	27-Jul	16	27	22-Aug	4	4/14 Aug
Dusky Flycatcher	31-Jul	6	6	31-Aug	1	all days
Say's Phoebe	11-Aug	1	1	-	-	
Northern Shrike	17-Sep	6	7	08-Oct	2	08-Oct
Warbling Vireo	27-Jul	17	26	29-Aug	4	07-Aug

Philadelphia Vireo	1-Sep	1	1	-	-	-
Gray Jay	2-Aug	24	50	07-Oct	4	many days
Black-billed Magpie	27-Aug	40	62	08-Oct	4	30-Sep
Common Raven	27-Jul	70	273	08-Oct	20	08-Oct
Horned Lark	29-Aug	2	2	14-Sep	1	both days
Tree Swallow	29-Jul	3	7	17-Sep	5	29-Jul
Violet-green Swallow	29-Jul	2	2	25-Aug	1	both days
Bank Swallow	28-Jul	4	19	25-Aug	10	25-Aug
Barn Swallow	29-Jul	1	2	-	-	-
Cliff Swallow	7-Aug	7	35	sep	16	25-Aug
Unidentified Swallow	28-Jul	7	51	27-Aug	25	7-Aug
Black-capped Chickadee	27-Jul	60	224	08-Oct	12	14-Sep
Mountain Chickadee	12-Sep	5	9	25-Sep	3	19-Sep
Boreal Chickadee	27-Jul	45	445	03-Oct	55	08-Sep
Red-breasted Nuthatch	27-Jul	11	11	21-Sep	1	all days
Golden-crowned Kinglet	25-Aug	3	9	09-Sep	6	09-Sep
Ruby-crowned Kinglet	27-Jul	61	196	08-Oct	15	06-Sep
Mountain Bluebird	8-Oct	1	10	-	-	-
Townsend's Solitaire	20-Aug	6	9	15-Sep	4	29-Aug
Gray-cheeked Thrush	24-Aug	16	36	21-Sep	7	16-Sep
Swainson's Thrush	27-Jul	40	121	20-Sep	11	26/31 Aug
Hermit Thrush	5-Sep	13	19	30-Sep	3	15-Sep
American Robin	27-Jul	48	443	08-Oct	264	08-Oct
Varied Thrush	28-Jul	25	80	08-Oct	11	30-Aug
Unidentified Large Thrush	23-Aug	11	52	26-Sep	17	15-Sep
American Pipit	25-Aug	26	67	04-Oct	8	15-Sep
Bohemian Waxwing	1-Aug	8	19	03-Oct		
Unidentified Waxwing	26-Aug	1	1	-	-	-
Lapland Longspur	25-Aug	18	72	08-Oct	20	30-Aug
Snow Bunting	28-Sep	1	1	-	-	-
Northern Waterthrush	29-Jul	30	62	21-Sep	9	12-Aug

Tennessee Warbler	27-Jul	15	17	14-Sep	2	11/30 Aug
Orange-crowned Warbler	27-Jul	47	283	07-Oct	25	14-Sep
Common Yellowthroat	27-Jul	41	96	24-Sep	6	1/7 Sep
American Redstart	27-Jul	27	49	16-Sep	4	27-Jul
Yellow Warbler	27-Jul	52	363	25-Sep	25	09-Sep
Blackpoll Warbler	27-Jul	40	141	19-Sep	10	20/27 Aug
Yellow-rumped Warbler (Myrtle)	27-Jul	61	1093	08-Oct	95	12-Aug
Townsend's Warbler	27-Jul	11	12	01-Sep	2	26-Aug
Wilson's Warbler	27-Jul	51	189	03-Oct	20	01-Sep
Unidentified Warbler	4-Aug	5	9	2-Sep	5	14-Aug
American Tree Sparrow	30-Aug	37	211	8 oxt	14	21-Sep
Chipping Sparrow	27-Jul	24	48	26-Aug	6	11/12 Aug
Brewer's Sparrow	16-Aug	1	2	21-Aug	2	16-Aug
Fox Sparrow	19-Aug	38	168	08-Oct	12	16-Sep
Dark-eyed Junco (Slate-colored)	27-Jul	70	1038	08-Oct	8	22-Aug
White-crowned Sparrow	14-Aug	22	41	24-Sep	6	30-Aug
White-throated Sparrow	24-Sep	1	1	-	-	-
Golden-crowned Sparrow	15-Sep	3	3	29-Sep	1	all days
Savannah Sparrow	30-Jul	35	72	04-Oct	6	19-Sep
Lincoln's Sparrow	27-Jul	34	65	03-Oct	7	16-Sep
Unidentified Sparrow	30-Aug	5	48	8-Oct	22	21-Sep
Western Tanager	20-Aug	1	1	-	-	-
Rusty Blackbird	29-Aug	33	174	08-Oct	23	15-Sep
Red-winged Blackbird	29-Jul	3	3	05-Aug	1	all days
Brown-headed Cowbird	14-Aug	1	1	-	-	-
Unidentified Blackbird	25-Aug	1	1	-	-	-
Pine Grosbeak	29-Sep	3	11	07-Oct	6	07-Oct
Purple Finch	27-Jul	7	8	12-Aug	2	01-Aug
White-winged Crossbill	27-Jul	30	248	08-Oct	43	06-Oct
Unidentified Crossbill	30-Aug	1	1			
Common Redpoll	30-Jul	14	220	08-Oct	138	08-Oct

Pine Siskin	27-Jul	24	37	23-Sep	5	03-Sep
Unidentified Small Finch	6-Sep	1	6	-	-	-
Unidentified Finch	28-Sep	1	1	-	-	-
Unidentified Passerine	7-Aug	45	713	8-Oct	62	30-Aug