Research - Conservation - Education

VANCOUVER AVIAN RESEARCH CENTRE

2024 Annual Report on Research and Education Activities

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June 2025

EXECUTIVE SUMMARY

In 2022, the Vancouver Avian Research Centre (VARC) rolled out its plan to transition from a predominantly Research Organization to a Public Outreach and Education Organization with a significant research component. Through this strategic change, VARC's goal is to create action-driven campaigns which encourage people to act in ways that will support birds and the environment. Our bird monitoring, research, and banding operations at VARC's ƛéxətəm (tla-hut-um) Regional Park (formerly known as Colony Farm Regional Park) field station is an important and key part of this strategy. Building on this new strategic direction, VARC focused significantly on its Schools Program in 2024, rolling out an entirely new program for K-6. VARC also expanded its collaboration with other groups in 2024, including becoming a member of Nature BC.

VARC's banding station was in operation in 2024 during spring (April 1 to June 15) and fall (August 1 to October 31) migration periods as well as during the summer breeding season (June 16 to July 31). Birds were captured using mist nets and other traps and banded following VARC protocols. Standard biological measurements were taken of all banded birds. The station was in operation 5,775 net hours with 3,162 birds processed for a total capture rate of 54.66 birds per 100 net hours. Capture rate peaked during the spring and fall migration periods and varied per net and habitat type. A total of 62 species were banded. The most frequently banded species include Orange-crowned Warbler, Common Yellowthroat, Song Sparrow, Willow Flycatcher, and Swainson's Thrush. As usual, many hatch year birds were banded during the late summer and fall migration periods showing the importance of the park as a breeding and stop-over site. There were 144 individual birds of 22 species recaptured in 2024 that were originally banded at the station during previous years, as far back as 2015. Several recaptured individuals show strong site fidelity as they have been captured at the study site for multiple consecutive years.

In addition to banding birds, the station conducts surveys and records bird observations of non-captured birds during banding sessions to provide a broader picture of avian species present in the park. A total of 119 species were detected during surveys and 108 species were observed during banding operations. This number includes rarer species as well as species that are more difficult to detect with mist netting. Breeding activity and characteristics assessed on surveys as well as on non-captured and captured birds during banding sessions established that 39.7% of the detected species were confirmed or probable breeders. Several species-specific studies continued at the banding station including research contributing to our understanding of Northern Saw-whet Owl migratory movements, Swainson's Thrush molt-migration and migratory movements, swallow abundance and diversity, and Willow Flycatcher molt.

VARC engaged in several collaborative programs at and away from the banding station. A total of 202 rehabilitated raptors were banded prior to release in 2024 at the Orphaned Wildlife facility (O.W.L.) in Delta. Twenty-nine raptors released since 2014 were recovered in 2024 in various locations around B.C. There were 485 nest boxes monitored around the Merritt area in 2024 as part of the VARC bluebird nest box program. Mountain or Western Bluebirds used 137 boxes yielding 480 fledged young. Nestlings were banded with purple-anodized federal

bands to specifically mark the 2024 cohort and aid in survivorship and site fidelity assessments. VARC also trialed a new raptor migration banding program in 2024 with hopes to do more banding on Sumas Mountain in Abbotsford during the fall of 2025.

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1 INTRODUCTION

1.1 Who is VARC?

At the Vancouver Avian Research Centre (VARC), everything we do is done with the express purpose of safeguarding birds and their habitats to ensure their long-term survival. VARC is a Registered Canadian Charity (#82118 2656 RR0001) dedicated to wild bird RESEARCH, CONSERVATION and EDUCATION.

We support these three vital areas through two key activities:

- Performing extensive public outreach and education programs to raise awareness of environmental issues as they relate to birds, and
- Collecting data and conducting research on bird populations.

Mission Statement:
Using birds as its focus, VARC's mission is to nurture nature's recovery through the provision of scientific data, action-driven education, and conservation tools. In this manner, VARC fosters behavioural change in individuals, educational institutions, and policymakers.

Vision Statement:
VARCs vision is an enduring and thriving future for birds delivered via direct actions taken by individuals to protect the natural world in the places where they live, work and study.

Theory of Change:
If we connect individuals and policymakers to birds and nature through action-driven education and conservation campaigns and programs they will become more aware of their impact, not only on birds but on nature and the environment and create change in their personal households and broader communities to protect them.

All VARC research projects provide volunteer opportunities for students in association with university study and for the public. They act as an educational tool for our adult, youth, and school programs where we teach, through birds, the importance of environmental conservation and what each individual can do to help.

VARC conducts bird monitoring and banding projects that will aid in formulating management decisions to maintain bird populations and their habitat. In 2024, VARC programs included long-term bird monitoring at ƛéxətəm (tla-hut-um) Regional Park (formerly known as Colony Farm Regional Park; hereafter referred to as "the Park") in Coquitlam, BC as well as multiple species-specific and collaborative studies at the same primary field station. Off-station programs were also conducted in 2024: banding rehabilitated raptors at Orphaned Wildlife Rehabilitation Society (O.W.L.) facility in Delta, BC, a bluebird nest box monitoring study in Merritt, BC, and a new raptor migration banding effort on Sumas Mountain in Abbotsford, BC.

2 ADMINISTRATIVE, FINANCIAL & STRATEGY NOTE

In 2024, VARC continued with its plan to transition from a predominantly Research Organization to a Public Outreach and Education Organization with a significant research component. The purpose of this change was to have a more immediate impact on issues relating to bird conservation and the environment through educating the public.

We have increased the number of activities we offer in support of this strategic change (Section 3). We have also increased our staffing focus to assist with these additional activities by adding a paid Executive Director role. We continue to contract a Project Manager three days per week. The addition of our integrated software package in 2022 continues to assist us in increasing the efficiency of our administration and accounting as we expanded the number of activities VARC offers. VARC processes all donations, program registration, payment and participation through this new database which interacts with all our other programs (e.g., Calendly, Donorbox, PayPal, MailChimp, Quickbooks)

2.1 Financial Highlights

For the last few years, we have had a strategic goal to move towards self-generating 1/3 of our budget through our courses and other programs, 1/3 through donations and reducing our dependence on grants to 1/3 of VARC's operating budget as getting grants continues to be a significant challenge and hampers our ability to expand (Table 2-1).

Table 2-1. Changing distributions of VARC funding sources.

	2022		2023		2024	
Self - generated	$ 33,587	27.6%	$ 39,408	38.5%	$ 31,462	37%
Donations	$ 36,641	30.1%	$ 58,938	42.6%	$ 29,092	34%
Grants	$ 51,411	42.3%	$ 39,990	28.9%	$ 21,000	24%
Total	$ 121,639		$ 138,336		$ 85,400	

VARC received a generous donation in 2023 of $100,000. We had intended to use this amount over four years, allowing $25,000 to be used each year, but due to a reduction in income in 2024 the funds will be spread over 3 years instead.

2.2 Membership

At the end of 2023, VARC added the option for people to become members. Membership for the following year is automatically given to individuals who have volunteered with VARC during the current year. Anyone making a payment to VARC as a donation or for a course is also automatically given the option to register as a member for the following 12 months. We hope to foster greater participation in VARC's Annual General Meeting and its involvement with the local community with this approach.

3 VISITOR SERVICES AND EDUCATION PROGRAMS

A large part of VARC's mandate is public outreach and education to raise awareness of environmental issues as they relate to birds. In 2024, VARCs outreach and education programs included:

- Bird Monitoring, Bird Identification and Shorebird Identification Workshops,
- Family Days & Hummingbird banding at the banding station,
- Group Visits to the banding station,
- In-class Schools Program,
- Presentations and public speaking engagements with special interest groups,
- Community Partner Programs,
- Social media outreach,
- Bird walks, and
- Off-season lectures and workshops.

3.1 Workshops

Our workshops are all offered over Zoom to make them available to a broader geographic audience. This has enabled us to include participants from across North America in the classroom sessions.

VARC offers a Bird Identification Workshop that runs for five sessions, one evening per week and a Shorebird Identification Workshop that runs for four sessions one evening per week. These are well attended and provide us with an opportunity to talk to people about things they can do to help birds and the environment.

VARC's other regular course, offered for over 10 years now, is our Birding Monitoring and Banding Course. Two levels of participation were offered:

- online theory/classroom sessions, and
- online/classroom sessions PLUS field sessions where there was the opportunity to attend practicum sessions at the banding station in 2024.

The second level attracts a smaller group as it is more specialized, but the virtual portion of the course was well attended. Most local participants also signed up for the practicum sessions to be scheduled for next year. VARC will maintain this virtual approach for future courses to expand its reach.

To maximize the number of attendees and also to help other groups (e.g. Van Dusen Gardens, Delta Naturalists) with their fund raising, we offer our Partners (Section 3.5) the opportunity to promote our courses and receive 50% of the enrollment fee for anyone that attends through their promotion.

3.2 Open Houses

Open House programs are structured morning field trips to the Park where participants are introduced to the research techniques required for monitoring migratory birds. Attendees of all ages learn about bird migration, the various habitats and communities that birds depend on during both spring and fall migration and the breeding season, and the conservation actions required to protect these habitats to ensure the long-term survival of bird species.

VARC held five Open Houses in 2024 and an additional five Hummingbird Banding sessions, most of which were fully booked.

3.3 Group Visits

VARC welcomes students and youth groups of all ages to the station and provides an instructive morning where students are introduced to research techniques required for monitoring migratory birds, as well as the population ecology and ecosystem dynamics of wild bird populations. The program provides an engaging educational experience, fostering awareness and appreciation of birds and the environment. Local colleges, universities and other youth group organizations typically book sessions each year. We also host companies and other groups that wish to reserve the station for themselves for a morning. This has worked well for Team Building events and even private family functions.

3.4 In-class Schools Program

VARC has been offering an in-class school program for primary grades in the Lower Mainland since 2018. Until this year, we offered presentations, primarily through a virtual platform, for grades K through 6, which dovetailed with each grades' curriculum. Appendix A outlines the various programs offered. These programs include a detailed instructional outline covering the lesson plan, connections to the BC curriculum, discussion prompts and activity ideas. Also provided are educational materials which can be integrated into the class curriculum leading up to the actual presentation day and continuing long after leaving the classroom. These extra materials are meant to garner a lasting and growing interest in the sciences and for nature.

In 2023, however, we realized that we could not expand the number of children we reach if we were limited to presenting this course content ourselves. Therefore, we developed an eight-unit program that teachers can download and deliver themselves (Appendix B). Each unit builds on the previous units and provides:

- Teachers Lesson Plan,
- Related Activity,
- Craft,
- Quiz, and
- Wordsearch or Crossword.

The units cover the following topics:

- Bird Silhouettes,
- Bird Groups,
- Body Parts,
- Song,
- Habitat,
- Nests and Baby Birds, and
- Migration.

At the end of 2024 we expanded our program to cover grade 7 & 8. We had hoped to receive payment from the teachers for the Lesson Plans but, to date, that has proven difficult so we have made them available for free.

3.5 Public Speaking Opportunities

VARC offers public speaking programs online and, where possible, in person. This has created great flexibility and enabled VARC to expand its reach and offer more presentations to Retirement Homes, Audubon chapters, Local Government, and everything in between. Presentations given included *Bird Friendly Gardening Workshops*, *The State of the World's Birds and What You Can Do to Help*, as well as *Hummingbirds of the World*.

3.6 Community Partner Programs

VARC continues to seek ways in which to collaborate with other groups in the community. In 2024 we expanded our program by which other groups can share in the revenue from our courses by promoting them. We also joined Nature BC and will continue to expand our collaboration and partnerships where possible.

3.7 Social Media Outreach

In 2024 VARC continued with its Social Media Outreach, using Facebook and Instagram to educate people about things they can do to help the birds and the environment.

We have found an additional way to engage people through online bird quizzes. Nearly 1,000 people took the quizzes in 2024 which were offered every other week through VARCs newsletter and Facebook page.

3.8 Bird walks

Building on the success of our Bird Identification course, VARC offered Bird Walks each month to the public for a fee, hosted by volunteers. We covered numerous locations in the lower mainland with 16 walks. This activity brought a significant number of new supporters to VARC.

3.9 Off-season workshops

Over the winter months we offer several programs to keep VARC supporters engaged and draw a wider audience that we can then educate about the plight of our birds. These included:

- A four-week Sketching Birds Course offered in conjunction with local artist Bea Martin.
- A Bird Friendly Gardening talk designed to help people incorporate plants and features to assist birds.
- State of the World's Birds and What You Can Do to Help

4 LONG-TERM MONITORING PROGRAM

Populations of migratory birds in North America are estimated to have lost 2.9 billion breeding adults since 1970 (Rosenberg et al. 2019). Habitat loss and degradation are the major causes of bird population declines and are the largest factors affecting migratory birds crossing increasingly fragmented, urban/suburban landscapes (e.g., Rushing et al. 2016, Sorte et al. 2017). In these urban/suburban landscapes, local and regional parks can provide critical oases for breeding and migratory birds. Situated at the confluence of the Coquitlam and Fraser Rivers, the Park (Figure 4-1) protects some of the most ecologically diverse lands in the Greater Vancouver area. The extensive old-field and riparian habitats within the Park represent high-value ecosystem features for resident and migrating birds.

Indirect effects of habitat alteration on birds are relevant in the evaluation of the importance of habitat oases, such as the Park, that are adjacent to urban development and are intensively used for recreation. Birds may continue to use these sites due to long-term site fidelity, even if these sites do not provide suitable habitat (or no longer provide the suitable habitat they once did). Additional stressors on birds living in urban and suburban environments include predation (largely from domesticated cats, Loss et al. 2013), noise and light pollution (Senzaki et al. 2020), habitat alteration because of invasive plant species (Gallinat et al. 2020) and outdoor recreational activities (e.g., Bötsch et al. 2018).

Starting in 2009, VARC has conducted a comprehensive monitoring program within the Park to assess the importance of this regionally unique ecosystem for bird populations. This monitoring program has already provided valuable information to Metro Vancouver (MV) on the importance of the Park as a stopover site for migratory birds and as a breeding area for resident and migratory species. In addition, VARC's monitoring efforts from 2013-2021 contributed to the understanding of the effects of habitat enhancement efforts completed in the Park as part of the Port Mann / Highway 1 Improvement Project. Ultimately, this information will be used to help guide the development of best management practices to integrate agriculture with wildlife conservation and recreation in the Park.

Figure 4-1. Map of Bird Monitoring Area at ƛéxətəm (tla-hut-um) Regional Park.

4.1 Banding Station

In 2024, VARC attempted to operate the ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station two days per week, depending on weather and availability of qualified volunteers. During spring migration (April 1 – June 15), 35 mist nets (Figure 4-2; Appendix C) were in operation for 1,684 hours. During the summer breeding season (June 16 - July 31), 35 mist nets were in operation for 1,657 hours. During fall migration (August 1 and October 31), 35 nets were in operation for 2,433 hours. No winter banding was conducted in 2024.

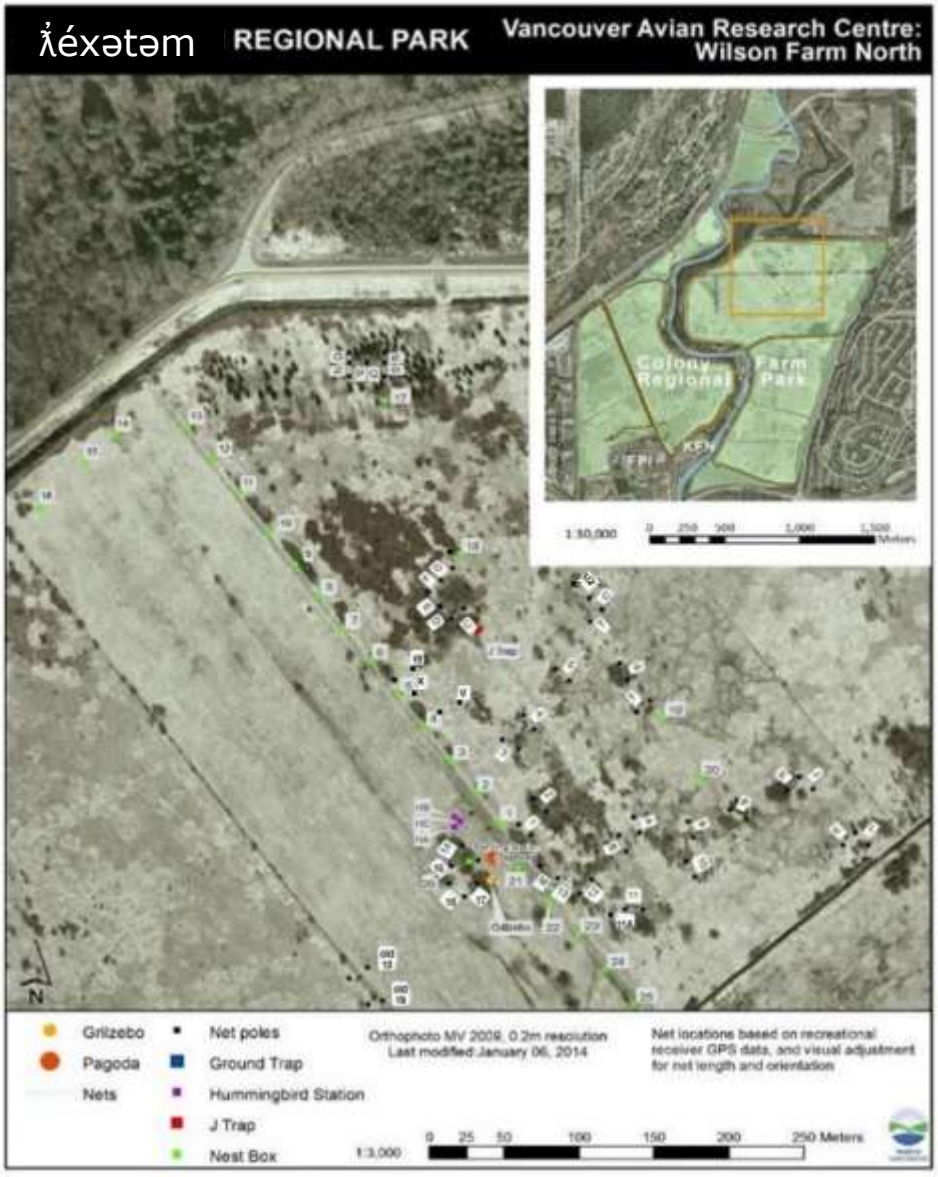

Figure 4-2. ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station

The 2024 capture strategy allowed for comprehensive monitoring over various habitat types. The number and type of traps used varied considerably depending on several factors, including time of year, anticipated capture rate, and availability of personnel. Full protocol details are provided in Appendix D.

During banding sessions, captured birds were identified to species and banded. Previously banded birds that were recaptured were recorded as such. Morphometric measurements were collected from the captured birds as was overall health (level of fat present), age, sex, and breeding characteristics. As part of the banding operation, daily activity data were collected for each day of banding: net hours, weather, personnel, and observations of non-banded birds.

4.2 Bird Survey

In previous years, surveys have been conducted along a specific transect route encompassing the ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station in the Wilson Farm North area of the Park, as well as a broader section of the Tidal Flow Restoration and Habitat Enhancement Project area (Figure 4-11). In a typical year, surveys are conducted once a week with no two surveys spaced less than five days apart. Each survey begins within the hour after sunrise and takes an average of three hours to conclude. The transect is walked slowly while all bird species are noted and counted. Behavioural observations are documented using protocols from the Institute for Bird Populations (DeSante et al. 2008) and the North American Ornithological Atlas Committee (Smith 1990). See Appendix E for full details on behavioral observations and documentation protocol.

Completing weekly bird surveys requires a significant time commitment from volunteers and organizers. Standardized surveys were not conducted in 2024 due to a shortage of available personnel. Instead, VARC has pulled citizen-science data from eBird (eBird 2025) to give an overview of the species detected in the Park outside of regular banding operations (Appendix L). Observations were retrieved from complete checklists, submitted for the Coquitlam--ƛ̓éxətəm (tla-hut-um) Regional Park hotspot between March 25th and October 27th. One complete checklist was used per week through this period and in order to keep effort and ability consistent, were restricted to up to three different observers (identified by eBird number) over the entire season.

4.3 Species-specific Studies

In addition to striving towards these long-term objectives, VARC conducts a series of species-specific studies.

Northern Saw-whet Owl (*Aegolius acadicus*) - migratory movements

The Northern Saw-whet Owl is a small, migratory raptor which is widespread across North America. This species occurs throughout much of British Columbia. It is on the provincial Yellow list (secure and not at risk of extinction) in most of British Columbia; the non-migratory *brooksi* subspecies endemic to Haida Gwaii is Blue-listed (of special concern). Northern Saw-whet Owls have been monitored extensively in eastern North America with well over 210,000 individuals banded since the 1950s. However, there has not been the same monitoring effort in place in the Pacific Northwest.

The Rocky Point Bird Observatory (RPBO), located at the southern tip of Vancouver Island, has actively monitored the fall migration of Northern Saw-whet Owl since the fall of 2002, and over 10,000 owls have been banded at RPBO since the start of this project (RPBO 2020). Owls banded at RPBO have been recaptured at their banding site in subsequent years, as well as in Washington, Oregon, Idaho, California, Alberta, Saskatchewan and at other sites in British Columbia including the ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station. Likewise, Northern Saw-whet Owls banded and released at locations in Washington,

California, Alberta and in the Chilcotin region of British Columbia, have been recaptured on Vancouver Island (RPBO 2020). These re-sighting events suggest a possible southward migration pathway for Northern Saw-whet Owls from the interior over the Coast Mountains and along the Strait of Georgia. However, these limited recapture events only provide a limited portal into the migratory movements of this species.

The purpose of this project is to capture and band Northern Saw-whet Owls at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station in Port Coquitlam, BC. This site represents an urban park that encompass a mixture of ecosystem types, including marsh and shallow water, riparian areas, upland forest, and old-field habitats. This project will contribute further to define the migratory path of Northern Saw-whet Owls along western British Columbia and will contribute to the continent-wide monitoring efforts of Project Owlnet (www.projectowlnet.org/).

Swainson's Thrush (*Catharus ustulatus*) - molt-migration

Unlike species which typically molt either on their summer grounds or on their winter grounds, individuals who exhibit molt-migration leave their breeding grounds and head south part way to find a suitable location to undergo their annual pre-basic molt before continuing southward migration. Some research has shown that Swainson's Thrushes are among those species that can undergo molt-migration, overlapping their molt with migration (Cherry 1985). Birds may continue to migrate while actively molting or they may initiate and/or complete their molt in an area south of their breeding grounds.

Some Swainson's Thrushes are local breeders in the Park; however, an influx of individuals during fall migration show that some of these birds stop over and use the old-field habitat within the Park (e.g., Kenwood et al. 2014, 2015 and 2020). The purpose of this study is to assess the numbers of Swainson's Thrushes caught for banding which are in flight feather molt and the extent of the molt.

Swallow Research – monitoring abundance, diversity, and demographics

Swallows, like nighthawks, swifts, martins and flycatchers, are part of the guild of aerial insectivores, birds that specialize in feeding on flying insects. Swallow populations have fallen steadily and consistently since 1970 (NABCI, 2012; Shutler et al. 2012). Research has shown, for example, that in the past four decades the population of Barn Swallow (*Hirundo rustica*) in Canada has fallen by approximately 78% (89% in British Columbia), Bank Swallow (*Riparia riparia*) and Black Swift (*Cypseloides niger*) by approximately 95% and Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) and Tree Swallow (*Tachycineta bicolor*) by more than 50% (Environment Canada 2015). Although the causes of these dramatic declines are still unclear, they are likely influenced by multiple factors - habitat loss, a reduction in insect abundance, pesticide use or climate change - and without a complete understanding of the causes that are driving population changes, it is difficult to imagine how the current decline can be reversed.

Researchers at Cornell University and elsewhere have launched a continent-wide research program (Golondrinas de Las Americas) to study swallows in the genus *Tachycineta* from northern Canada to Argentina to better understand the breeding biology of the swallows of the Americas. Seven of the eight species of North American swallow occur in the Park, sometimes in large numbers using the old field habitat. This provides an excellent opportunity to contribute to these nationwide monitoring studies.

Willow Flycatcher (*Empidonax traillii*) - molt

Four generally recognized subspecies of Willow Flycatcher occur in North America and occupy distinct breeding ranges (Sogge et al. 1997). The Park is within the breeding range of *E. t. brewsteri*. *Empidonax* flycatchers are extremely difficult to identify in the hand. More study is needed on molting patterns based on individuals of known species, subspecies, and age. Since VARC captures *E. t. brewsteri* exclusively, it provides the opportunity to better define the molt pattern of this subspecies.

Molt sequences and extent are known to differ among populations; Pyle (1997) outlines the general molt sequence for *E. t. brewsteri* as follows:

- Preformative molt, occurring primarily on the winter grounds, includes body feathers with most or all flight feathers retained.
- First prealternate molt is typically eccentric where the outer 5-10 primaries, the inner 3-9 secondaries and the retrices (but no pp covs) are replaced leaving the inner primaries and outer secondaries retained.
- Adult prebasic molt can sometimes skip a few middle secondaries which are then replaced during adult prealternate molt. These secondaries can then look slightly fresher than the surrounding secondaries and primaries.

E. t. brewsteri's north-south range extends from approximately the northern point of Vancouver Island to Bakersfield, CA, encompassing approximately 1,600 km. Any variation of individuals may be due to intraspecific differences between *brewsteri* populations. A detailed assessment of the Park's population may yield metrics that are much less variable and can be used to better and more easily identify birds from the northern extent of *brewsteri*'s range. The goal of this program is to document molt sequence related to age to further define the *E.t. brewsteri* subspecies.

4.4 Data Analysis

To understand the structure of the bird communities within the study area of Colony Farm several interrelated indices were measured or calculated. These were species presence, richness (i.e., number of species), relative abundance, diversity and evenness, species health and population demographics. Relative abundance relates to species' prevalence within a community relative to the total number of birds counted.

In addition to species richness, diversity was measured using several indices (Shannon-Wiener diversity index, evenness, Simpson's index of diversity, and the effective number of species for each of the diversity measurements) (Appendix F). The Shannon-Wiener Diversity Index and Simpson's Index of Diversity are both diversity measurements that consider the number of species in a habitat and their relative abundances. The relationship of abundance of all species to each other within a community is termed evenness and can be viewed as a measure of the homogeneity of the diversity estimate. Evenness ranges from 0 (one species dominant) to 1 (all species equally represented). Two communities with the same species richness (i.e., the same number of species) can have different Shannon-Wiener indices (i.e., differing estimates of species diversity) depending on the evenness within the two communities. More diverse communities possess many evenly distributed species and less diverse communities possess fewer species in which one or a few species are dominant. It should be noted that these indices are not linear, so a site that has twice the diversity as another site will not have an index that is twice as big. For this

reason, it is often desirable to convert indices to an effective number of species. This is the number of equally common species required to give a particular value of an index. Effective numbers of species are directly comparable and linear; if one site has twice the diversity of another, the effective number of species will be twice the value. This makes it very easy to compare the diversity of sites.

For the purposes of this report, species health refers to the general condition of individual birds measured by scoring fat deposits (Appendix G) on migrants caught for banding. Population demographics refers to the makeup of bird populations particularly as they relate to the numbers of males versus females and adults versus sub-adults in capture rates. Males and females are separated by plumage or physiological characteristics in sexually dimorphic species or by the presence of breeding characteristics in sexually monomorphic species. Adults are separated from sub-adults by physiological characteristics, skull ossification and molt patterns (Appendix H). Species health and population demography are important indicators in assessing the significance of habitat for both migratory and breeding birds.

4.5 Results

4.5.1 Banding Data

In 2024, the number of captured birds was significantly less than in 2023, corresponding with substantially fewer net hours (Table 4-1); capture rate was close to the median rate over the past 10 years. Over a 14-year period, capture rate continues to be variable among years. Some of these fluctuations can be attributed to weather variability among years and the potential that large movements of birds during spring and fall migration were missed in some years, as the banding station is not operated full time.

Table 4-1. 2010-2024 Banding Summary at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station.

Year	Individual Birds	Species Richness	Net Hours	Birds per 100 Net Hours
2010	3,695	62	5,826.1	77.22
2011	4,845	64	8,644.1	69.54
2012	4,819	71	10,995.1	55.77
2013	3,919	66	9,342.9	60.74
2014	5,625	71	14,101.8	52.00
2015	4,222	71	14,059.8	39.75
2016	3,450	65	11,496.3	37.08
2017	4,351	66	9,518.5	55.26
2018	2,382	59	5,487.5	43.41
2019	2,701	66	4,834.1	55.87
2020	1,631	54	2,837.2	57.49
2021	3,473	54	6,647.5	56.31
2022	4,349	58	8,156.0	51.07
2023	4,305	68	7,285.2	59.09
2024	3,162	62	5,774.5	54.66

Weekly capture rate during the banding period (April through October) of newly banded birds in 2024 follows the same general pattern as in previous years (Figure 4-3), though capture rates in the spring

(April-May) averaged lower than the mean since 2011. Capture rate shows an increase during late-August through early October which corresponds with the fall migration period. The spike in capture rates during August for 2024 corresponds with high numbers of dispersing hatch year birds.

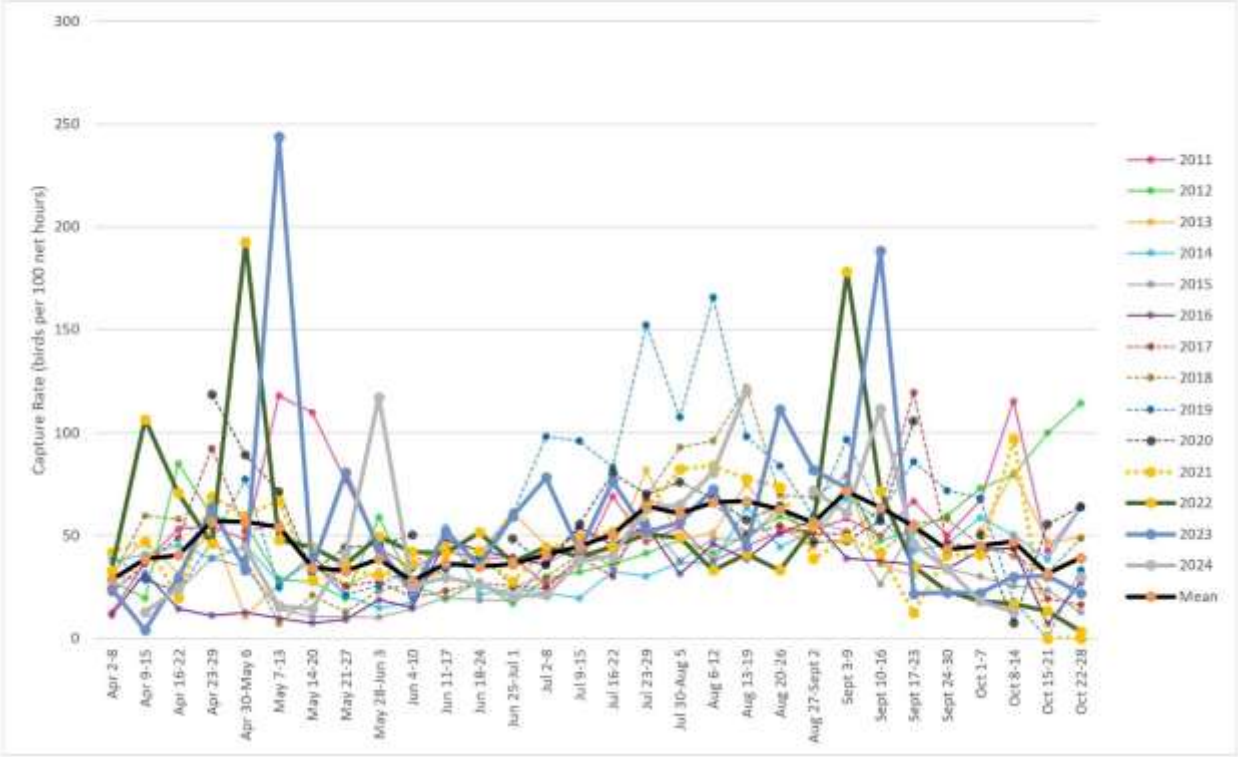

Figure 4-3. Per year and mean weekly capture rate from April through October at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station, 2011-2024.

The capture rate at individual mist nets varied across the project site. Capture rate was highest at net U (134.08 birds/100 net hours) and lowest at net 14U (0 birds/100 net hours); the canopy nets (14L and 14U) were not opened often in 2024. Average capture rate was highest for nets located in old-field, scrub habitat (Appendix I). Although most banded species were similar, the composition and relative abundance differed slightly among the years (Table 4-2; Appendix J).

Table 4-2. Most frequently banded species, 2010-2024, at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station. Species ranked in decreasing order of 2024 captures.

	Number of Individuals															
Species	**2024**	**2023**	**2022**	**2021**	**2020**	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**	**Total**
Orange-crowned Warbler	379	206	192	142	84	200	105	330	264	264	286	167	201	110	210	3140
Common Yellowthroat	225	240	208	102	86	227	143	152	250	290	210	248	176	206	249	3012
Song Sparrow	190	322	218	228	190	208	196	333	359	368	428	305	363	295	294	4297
Willow Flycatcher	173	203	357	229	107	173	138	231	206	185	248	150	170	130	138	2838
Swainson's Thrush	169	352	281	207	177	204	122	185	204	191	272	203	261	94	110	3032
Lincoln's Sparrow	155	112	241	160	76	112	161	322	280	379	554	144	501	375	252	3824
Yellow Warbler	107	90	68	34	13	27	27	99	46	27	68	45	79	45	105	880
Cedar Waxwing	93	178	168	126	86	125	130	189	121	94	139	130	170	177	172	2098
Wilson's Warbler	92	63	136	90	27	90	53	258	43	92	200	98	264	172	213	1891
Rufous Hummingbird	91	63	85	105	107	115	72	153	124	202	215	125	61	19	22	1559
Anna's Hummingbird	82	63	115	213	170	99	66	117	106	107	122	85	17	8	5	1375
Fox Sparrow	78	192	139	212	78	136	152	345	130	268	161	135	156	166	79	2427
American Goldfinch	72	157	149	84	27	64	51	102	105	202	119	145	55	66	125	1523
Black-headed Grosbeak	66	154	134	78	56	106	68	111	151	224	158	108	152	95	134	1795
Spotted Towhee	55	109	51	58	50	73	76	84	100	96	156	79	135	103	96	1321
Pacific Slope Flycatcher	49	46	46	16	14	20	10	28	30	34	35	22	21	20	27	418
Ruby-crowned Kinglet	49	125	182	87	9	52	151	157	34	112	134	31	65	132	23	1343
House Finch	42	93	60	84	23	67	21	50	32	20	192	205	101	260	274	1524
Purple Finch	42	143	115	4	20	77	95	127	182	170	283	395	416	550	144	2763
American Robin	39	81	71	45	13	42	45	85	72	57	63	38	55	60	54	820

An assessment of fat scores during spring (April 1 through June 15) and fall (August 1 through October 31) shows that 49.8% and 19.5% of birds caught for banding in 2024 in spring and fall respectively recorded some measure of visible fat (i.e., scores 1-5; Table 4-3).

Table 4-3. Furcular fat scores of birds captured for banding in 2024 at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station.

	Spring		Fall	
Fat Score	#	%	#	%
0	427	50.2%	1317	80.5%
1	65	7.6%	147	9.0%
2	53	6.2%	68	4.2%
3	73	8.6%	83	5.1%
4	58	6.8%	19	1.2%
5	174	20.5%	2	0.1%

The combination of diverse, structurally complex plant communities and the presence of resources – food, water and shelter with high aquatic insect productivity in spring and high insect/fruit production in fall - that are typically present in the Park, provide a high-quality environment for many migrant bird species. In the spring, the percentage of birds carrying fat has typically been above 50% except for 2013, 2016, 2019, 2020, 2023, and 2024. This variability in fat scores suggest that (a) the resources provided by the habitats within the Park may be more variable in spring than fall (e.g., changes in hydrology depending on snowpack, timing of spring plant and insect emergence) and (b) birds are arriving in the Park on their northward journeys carrying lower fat stores due to changes at stopover locations further south.

There are essentially equivalent numbers of sub-adults and adults during spring migration and substantially more sub-adults than adults during fall migration (Table 4-4). This is fairly consistent with the age structure of captured birds in previous years, further supporting the importance of habitat in the Park for dispersing juveniles in the fall.

Table 4-4. Age structures for birds captured for banding in 2024 at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station.

	Spring		Fall	
	#	%	#	%
Adults	257	50.6	103	7.5
Sub-adults	251	49.4	1276	92.5

In general, all years have very similar diversity indices (Table 4-5). No consistent differences are seen among the years; however, this does not mean that all the years are the same. Diversity indices look at species numbers and their relative abundances, not the actual species present. It has already been noted that while some species (e.g., Song Sparrow, Swainson's Thrush, and Willow Flycatcher) were abundant in all years, there are other species that were particularly abundant in one year and not another (Table 4-2, Appendix J).

Table 4-5. Species diversity at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station, 2010-2024.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Species Richness	62	64	71	66	71	71	65	66	59	66	54	54	58	38	62
Shannon Index	3.30	3.27	3.35	3.36	3.43	3.33	3.28	3.35	3.36	3.35	3.13	3.26	3.29	3.31	3.18
Evenness	0.80	0.79	0.81	0.80	0.80	0.78	0.78	0.80	0.83	0.80	0.78	0.82	0.81	0.78	0.77
Simpson Index of Diversity	0.95	0.95	0.95	0.95	0.96	0.95	0.95	0.96	0.96	0.95	0.94	0.95	0.95	.95	0.94
Shannon - Effective number of species	27.1	26.3	28.4	28.8	30.9	27.9	26.6	28.5	28.8	28.5	22.9	26.0	26.8	27.4	24.0
Simpson - Effective number of species	20.0	19.0	21.3	20.0	23.8	21.3	19.9	22.3	22.9	21.8	16.3	20.2	21.1	20.6	16.6

4.5.2 Recaptures

During 2024, 627 previously banded birds (including birds originally captured in previous years as well as earlier in 2024) were recaptured. The resulting capture rate was similar to the rate observed since 2017 (Table 4-6). As with overall capture rates, the pattern of recaptures is suggestive of an overall decline starting in 2013 but with inter-year variability.

Table 4-6. Recapture totals at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station.

	#	#/net hour
2010	**807**	**0.14**
2011	**1,568**	**0.18**
2012	**1,344**	**0.12**
2013	**1,756**	**0.19**
2014	**1,708**	**0.12**
2015	**1,367**	**0.10**
2016	**813**	**0.07**
2017	**909**	**0.10**
2018	**502**	**0.09**
2019	**521**	**0.11**
2020	**349**	**0.12**
2021	**660**	**0.10**
2022	**749**	**0.09**
2023	**789**	**0.11**
2024	**627**	**0.11**

The high number of recaptures at VARC (VARC 2010; Mathews et al. 2012 and 2013; Kenwood and Jones 2016, 2017, 2018 and 2019; Kenwood et al. 2014, 2015, 2020, 2021; Jones et al. 2022, 2023) supports the overall general understanding of site fidelity in songbirds across habitat types (e.g., grasslands; Bedard and LaPointe 1984) and foraging guilds (e.g., aerial insectivores; Sedgewick 2004, Kenwood and Paxton 2001, Kenwood and Kus 2007).

There were 144 individual birds of 22 species recaptured in 2024 that were originally banded in the Park during previous years (**Table 4-7**). Of these individual birds, 80% were first recaptured within the previous two years (2023: *n*=90; 2022: *n*=25). The remaining 20% of the birds were first recaptured in 2021 (*n*=13), 2020 (*n*=5), 2019 (*n*=5), 2018 (*n*=3), 2017 (*n*=1), 2016 (*n*=1, and 2015 (*n*=1). There were no recaptured birds originally banded in 2014 or before. The tendency for many species to exhibit high levels of site faithfulness across years highlights the importance of retaining and maintaining critical habitat, particularly for first-year birds returning to breed in the Park

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Table 4-7. Species first captured in previous years and recaptured in 2024 at ɬéxətəm (tla-hut-um) Regional Park Banding Station.

Species	Total Individuals
American Goldfinch	4
American Robin	3
Anna's Hummingbird	3
Black-capped Chickadee	2
Bewick's Wren	2
Brown-headed Cowbird	2
Black-headed Grosbeak	3
Bushtit	1
Cedar Waxwing	1
Common Yellowthroat	25
Downy Woodpecker	3
Fox Sparrow	13
Lazuli Bunting	1
Orange-crowned Warbler	2
Dark-eyed Junco	1
Pacific Wren	2
Purple Finch	4
Rufous Hummingbird	4
Song Sparrow	18
Spotted Towhee	9
Swainson's Thrush	26
Willow Flycatcher	15
Total	**144**

Of these recaptures, the two most notable (Appendix K) were:

- an Anna's Hummingbird (*Calypte anna*) banded in 2018 and not recaptured until 2024
- a Song Sparrow (*Melospiza melodia*) first banded in 2015

As part of a network of North American banders and researchers, VARC reports activities to a central Bird Banding Office. Through this collaboration we can collect data on birds on a much larger scale. There were three birds originally banded at ɬéxətəm (tla-hut-um) Regional Park Banding Station that were recovered or reported in 2024: a Fox Sparrow originally banded in April 2018 recovered north of Kitimat, BC, a Purple Finch banded in August 2018 recovered in Langley, and a Song Sparrow banded in September 2023 that was recovered near the Park.

4.5.3 Breeding Activity

4.5.3.1 Surveys and Non-banded Observations

The data collected during bird surveys provides a broader picture of avian species present in the Park. A total of 119 species were detected during the 2024 surveys (Appendix L). The ten species within the

highest counts for the year were American Crow (*Corvus brachyrhynchos*), Red-winged Blackbird (*Agelaius phoeniceus*), Song Sparrow (*Melospiza melodia*), American Robin (*Turdus migratorius*), European Starling (*Sturnus vulgaris*), Common Yellowthroat *(Geothlypis trichas*), Barn Swallow (*Hirundo rustica*), White-crowned Sparrow (*Zonotrichia leucophrys*), American Goldfinch (*Spinus tristis*), and Mallard (*Anas platyrhynchos*). The combined total detections of these ten species comprised 50% of all detections.

Survey results in 2024 were not directly comparable to prior years due to the limited survey effort and subsequent difference in survey methods (use of eBird data) in 2024. However, the 2024 results are qualitatively similar to results from 2020 to 2023.

A total of 108 species were recorded during bird observations during each banding session over the course of the season (Appendix M). Eight species were detected during 100% of the weekly banding sessions: American Crow, American Goldfinch, Bewick's Wren, Northern Flicker, Red-winged Blackbird, Song Sparrow, and Spotted Towhee. There were 8 non-captured species detected at banding sessions that were not detected on surveys and were added to the list of total species detections.

A total of 131 species were detected at the Park on survey transects, as observations made on non-captured birds during banding sessions, or were captured during banding sessions. With few exceptions, the species that were most frequently observed during surveys were also among the most frequently captured species at the banding station.

Sixty-one of the species on the surveyed species list and 53 on the observed species list were not captured at the banding station. These species can be broken down into several categories:

- the majority are not generally seen using the microhabitat surrounding the banding station and therefore not typically caught via mist net (e.g., waterfowl, Great Blue Heron *Ardea herodias*, Bald Eagle *Haliaeetus leucocephalus*).
- species observed on surveys or as non-captured birds during banding sessions are typically caught at least once in a season most years but were not captured in 2024 (e.g., Red-winged Blackbird (*Agelaius phoeniceus*)).
- species surveyed or observed as non-captured have been trapped in previous years but are either rare around the banding station or are difficult to capture using mist nets (e.g., Red Crossbill *Loxia curvirostra*).

The differences between the survey detections and mist-netting detections indicate how important it is to combine survey, bird observation and banding data to provide a more complete list of species using the Park.

The majority of the bird species detected in the Park during 2024 are federally protected by the *Migratory Birds Convention Act* (1994). Fifteen species detected in 2024 have additional provincial or federal designations (Appendix N). The presence of these protected species further indicates the importance of ƛéxətəm (tla-hut-um) Regional Park and the habitat it provides for bird species of conservation concern.

4.5.3.2 Breeding Behaviour and Condition

Breeding activity is assessed by two different methods at the Park: direct evidence of breeding characteristics noted during the banding process (e.g., brood patch); and behavioural evidence observed during surveys and observations of non-captured birds during banding sessions (Appendix E).

Of the species caught for banding during the breeding season, 76% were confirmed breeders (*n*=31 species) and 5% were probable breeders (*n*=2 species). Based on the bird surveys and observations made on non-captured birds during banding sessions, we estimate that 17% (*n*=9 species) of non-captured species detected during the breeding season were confirmed breeders and another 26% (*n*=14 species) were probable breeders as they were consistently seen exhibiting territorial behaviour. Appendix O shows all species detected during the breeding season, both captured and observed.

4.5.4 Species-Specific Studies

Northern Saw-whet Owl - migratory movements

Northern Saw-whet Owl mist-netting at the ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station was not conducted in 2024 due to low capture rates at the Park in previous years. In prior years, mist-netting was conducted using seven passerine mist nets: six 12 m long and one 18 m long. All nets were 2.6 m high, made of polyester yarn, with 30 mm mesh size. The nets were set up in an H-shape around an audio lure. Each captured bird was extracted from the net and transferred into a cloth bag until further processing at the banding table. The banding process involved the following steps: species identification, band application, age and sex determination, crop fullness and biometrics (e.g., wing and tail length, weight).

In 2023, VARC deployed a MOTUS Wildlife Tracking System in the Park. Owls of suitable size and condition were outfitted with MOTUS VHF radio tags. Any time an owl with an active tag passed within 15-40 km or any MOTUS tower, the tower will record the unique signal of the radio tag, thereby affording us an opportunity to learn important information about migration pathways and local movements. One of the hatch-year Northern Saw-whet Owls that VARC banded in 2023 was detected by a MOTUS station at Ingenika Point, BC on May 28th of 2024, over 850km north of where it was banded in the Park.

Swainson's Thrush - molt-migration and migration tracking

Molt migration in Swainson's Thrushes has been documented in all years since 2010 (VARC 2010; Mathews et al. 2012 and 2013; Kenwood and Jones 2016, 2017, 2018, and 2019; Kenwood et al. 2014, 2015, 2020 and 2021; Jones et al. 2022, 2023); molt migration is a strategy in which individuals leave their breeding grounds and head south to find a suitable location to undergo their annual pre-basic molt before continuing southward migration. Recapture data continues to show the importance of the Park for both breeding Swainson's Thrushes and those migratory birds undergoing molt.

All Swainson's Thrushes caught during regular banding sessions in 2024 were assessed to determine whether they were currently in active molt. Captures included 103 Swainson's Thrushes in the fall (Aug 1 – Oct 31) following the main breeding season (81 new captures and 22 recaptures): 7 adults

(AHY and ASY), 76 young birds (HY and SY), and 20 of unknown age. All 7 of the adults were in active flight feather molt.

Data collected over the last 13 years shows an influx of unbanded Swainson's Thrushes into the Park. Continued research on adult birds shows that many adults caught for banding after the breeding season are in flight feather molt. It appears that these birds may not be local breeders but birds from further north, suggesting that the old field habitat of Colony Farm could be a special molting area for this species in British Columbia.

VARC tagged 20 Swainson's Thrushes as part of the Motus program during the period of Jun 7 to August 30, 2023. Most (18 of 20 birds) have been subsequently detected at other Motus towers along the Pacific Flyway, including in Washington State, Oregon, California, and Sinaloa, Mexico. In 2024, three of the tagged individuals were recaptured at the Park between May and June. All three birds were sexed as male by breeding characteristics.

The Motus tower at the Park has detected 13 species that had been tagged by VARC or by other researchers during the May 6, 2022 to March 25, 2024 period: Eastern Whip-poor-will (*Antrostomus vociferous*), Western Sandpiper (*Calidris mauri*), Northern Saw-whet Owl, Bank Swallow, Veery (*Catharus fuscescens*), Hermit Thrush, American Robin, Golden-crowned Sparrow, White-throated Sparrow, Bobolink (*Dolichonyx oryzivorus*), Magnolia Warbler (*Setophaga magnolia*), and Yellow-rumped Warbler.

Swallow research – monitoring abundance, diversity, and demographics

Regular data were taken, as per Appendix D, from any swallow species captured during regular banding sessions in 2024. Swallows are notoriously difficult to catch in open areas with mist nets due to their exceptional eyesight and the fact they often feed well above the height of the nets. Therefore, it is difficult to draw any immediate conclusions from the twelve years of available banding data. Overall, general declines are noticeable in all swallow species banded in the park since 2009. Only 1 Tree Swallow was captured in a mist net in 2024 (**Error! Reference source not found.**). The existing nest boxes at the Park were monitored occasionally, but no formal monitoring program was followed in 2024.

Table 4-8. Swallow species banded at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station 2009-2024.

Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Tree Swallow*	7	7	8	5	4	4	4	0	1	2	7	4	1	11	0	1	128
Barn Swallow	107	13	0	9	3	15	11	2	3	0	4	0	0	0	0	0	167
Violet-green Swallow	8	2	2	0	1	0	1	0	0	0	6	0	0	0	0	0	20
Northern Rough-winged Swallow	5	1	0	2	1	0	2	1	1	0	1	0	0	1	0	0	15
Bank Swallow	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Cliff Swallow	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
Total	129	27	12	21	10	25	26	17	19	11	22	4	1	12	0	1	333

***numbers reflect individuals caught in mist nets only (captures of adults and nestlings directly from nest boxes have been excluded)**

Willow Flycatcher - morphology and molt

Monitoring continued in a limited capacity in 2024, with extra data collected for five Willow Flycatchers caught during regular banding sessions. Each individual flight feather (primaries, secondaries and tertials) as well as primary and greater coverts of both wings were examined and aged. Future study could involve taking additional measurements of the wing and tail. Assessing the molt patterns of recaptured flycatchers of known age would also provide valuable data on Willow Flycatcher molt.

Data collection on Willow Flycatcher molt sequences continued in 2024. Of the 240 birds captured during regular banding sessions, 173 were new captures, and 67 were recaptures. Of the captured birds, 37 were adults (SY, ASY or AHY), 136 were hatch years (HY), and 67 were not aged. Of the 37 adult birds, four were assessed to have no molt limits and 2 were assessed to have flight feather molt limits in which the wing contained feathers that were either two or three different ages (retained juvenile, retained adult pre-basic and new prealternate feathers). The remaining birds were aged using a combination of characteristics. We reinforced that molt sequence in flycatchers is complex and that continued study and documentation would be valuable to contribute to the overall knowledge of the species. Long-term monitoring continues with plans to assess molt patterns on recaptured flycatchers of known age.

5 BLUEBIRD NEST BOX MONITORING

Mountain Bluebirds occur commonly throughout southern BC, but according to the North American Breeding Bird Survey, their populations have declined significantly (USGS 2021). Bluebird populations benefited from the spread of logging and grazing in the late nineteenth and early twentieth centuries when these practices created open habitats for foraging. The waning of these industries, coupled with the deliberate suppression of wildfires, has led to a dwindling of open acreage in Western North America and the decline of the species (Cornell Lab 2021).

More recently, as land-use practices have stabilized, so have some Mountain Bluebird populations. However, in areas where trees are too small to provide natural nesting cavities, and where forest and agricultural management practices have reduced the availability of suitable nest sites, bluebird populations are still in decline (Cornell Lab 2021). Competition is high among cavity-nesting birds that are not capable of excavation and must use pre-existing cavities. House Sparrows *(Passer domesticus*), European Starlings (*Sturnus vulgaris*) and House Wrens (*Troglodytes aedon*) also compete fiercely with bluebirds for nest sites. The installation of man-made nest boxes in suitable habitat can provide a population boost.

To this end, VARC manages a Mountain and Western Bluebird nest box monitoring and banding program in Merritt, BC (Figure 5-1). Originally established by citizen science individuals, VARC took over the program in 2018. The ultimate objectives of this project include:

- To establish long-term monitoring and research to provide invaluable data for regional conservation initiatives and international migration monitoring efforts.

- To initiate community outreach by involving citizen science individuals and groups as well as schools to ultimately provide conservation education by way of monitoring boxes.
- To color band bluebird (Mountain Bluebird as well as Western Bluebird) nestlings using nest boxes to document dispersal, site fidelity and population dynamics.

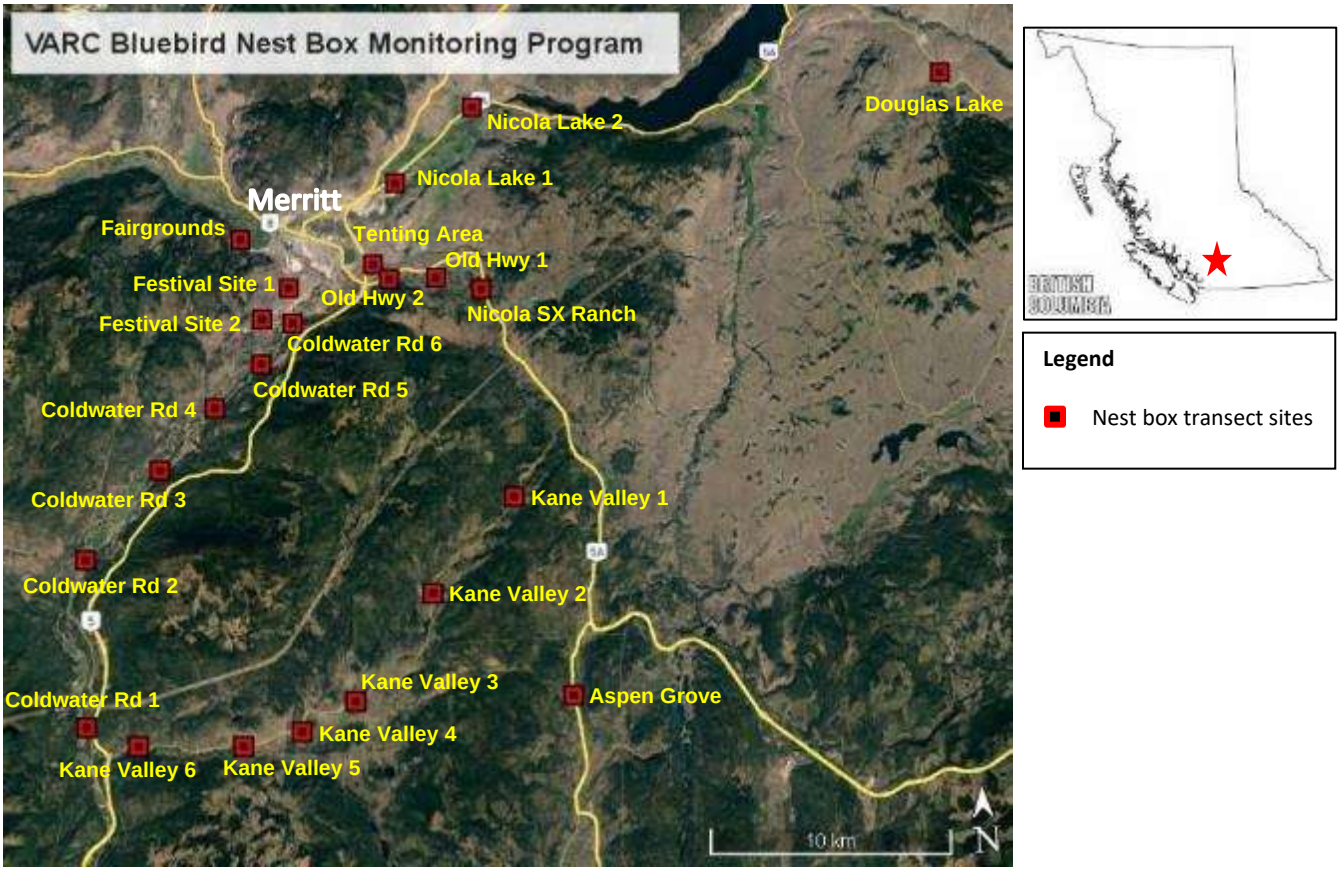

Figure 5-1. Map of Bluebird Nest Box Monitoring Sites, Merritt, BC.

5.1 Methodology

Since 2018, nest box routes have been refined according to some landowner requests for box removal, condition of boxes, appropriate habitat type and appropriate placement. Routes and individual boxes have also been added in areas with appropriate habitat for bluebirds. Box spacing was carefully considered in order to deter competition between bluebirds and other species.

In 2024, 485 nest boxes were separated into 24 sites (Figure 5-21), each site consisting of an average of approximately 20 boxes configured along existing roadways. The total number of nest boxes monitored across all routes increased in 2024 compared to 2023. Table 5-1 outlines the change of monitoring effort since the start of the program in 2018. At each site, boxes were spaced at least 90m apart, except for 201 locations where boxes were intentionally paired (two boxes placed less than 3m apart to diminish competition between swallows and bluebirds). Volunteers monitored nest box sites every 10 to 14 days

through the breeding season (roughly May 1 through August 15) following the nest check protocols outlined in Appendix P.

Table 5-1. Per year monitoring effort for the nest box monitoring program, Merritt, BC.

Year	2019	2020	2021	2022	2023	2024
Total # of boxes	243	306	433	460	472	485
Total # of routes	19	18	23	23	24	24
Average # of boxes per route	14	17	18.8	20	19.7	20.2
# of times route checked per year	8	8	3 to 10	3 to 10	2 to 10	2 to 9

Volunteers assessed species, nest stage, age of nestlings and nest outcome, when possible, allowing VARC banders to band bluebird nestlings within the optimal age range (10 to 14 days old). Each year, nestlings are banded with a unique colour that corresponds to the year they were born. In 2024, both Mountain and Western Bluebird nestlings were banded with federally numbered aluminum bands that had been anodized purple. Volunteers on the ground will continue to record birds with colour bands, documenting survival, population dynamics, site fidelity and distribution of each year's brood.

Figure 5-2. Bluebird Nest Boxes in Merritt, BC.

5.2 Results

Nest boxes were used by Mountain and Western Bluebird, Tree Swallow, House Wren, Mountain Chickadee (*Poecile gambeli*), Black-capped Chickadee, White-breasted Nuthatch (*Sitta carolinensis*), Violet-green Swallow (*Tachycineta thalassina)*, House Sparrow (*Passer domesticus*) and European Starling as well as unidentified small rodents. Of the 201 sets of paired boxes, 20.4% (*n*=41 pairs) were used by Tree Swallow and either Mountain or Western Bluebird.

A total of 411 nesting attempts were recorded over all avian species. This includes two different species using the same box at different times (e.g., House Wren building either a dummy or real nest on top of another species' nest) as well as the same species or pair using the same box/nest for a second nesting attempt. Appendix Q outlines box usage and nesting attempts at each site.

Twenty-eight percent of all monitored nest boxes were used by bluebirds (*n*=137) in 2024: 26.2% (*n*=127) used by Mountain Bluebird and 2.1% (*n*=10) used by Western Bluebird, an overall minimal increase from 2023 (
Table 5-2). However, due to double use in some boxes, there were 143 Mountain Bluebird nesting attempts and 13 Western Bluebird (Appendix Q); a total of 38% of all nesting attempts were made by bluebirds.

Table 5-2. Per year comparison of Western and Mountain Bluebird usage and activity as part of the nest box monitoring program in Merritt, BC.

	2019		2020		2021		2022		2023		2024	
	WEBL	MOBL	WEBL	MOBL	WEBL	MOBL	WEBL	MOBL	WEBL	MOBL	WEBL	MOBL
# boxes used	8	42	5	55	6	102	10	102	12	105	10	127
usage rate (of total boxes)	3.4%	18.0%	1.6%	18.0%	1.4%	23.6%	2.2%	22.2%	2.5%	22.3%	2.1%	26.2%
# fledglings	36	114	19	142	23	326	29	383	38	388	54	426
# nestlings banded	17	96	20	146	23	329	19	351	33	354	46	325

Where Mountain Bluebirds had the highest number of nest attempts, the success rate of these attempts was 66%. This was the second highest rate behind Western Bluebird, White-breasted Nuthatch and European Starling all of which had 100% success rate (Appendix Q). For the bluebird species combined, 107 nests fledged at least some young. Of the 541 documented bluebird nestlings, 89% (*n*=480) fledged.

There were 371 bluebird nestlings banded from 87 nests in 2024 with a purple anodized federal band. Of the nesting adults, there were eight bluebirds originally banded in 2021 (2 female and 1 male Western Bluebird as well as 3 female and 2 male Mountain Bluebird), three returning bluebirds originally banded in 2022 (2 female and 1 male Mountain Bluebird), and one returning bluebird originally banded in 2023 (1 male Mountain Bluebird). Observations of returning colour-banded birds can help assess survivorship and site fidelity of both species of bluebird.

5.3 Community Outreach

In addition to providing nesting habitat as well as valuable information on the health of bird populations and changes in the environment, one of the goals of this program is to involve the local community. Nest box monitoring programs are well suited as Citizen Science projects due to their accessibility and the impact of close interactions with birds. Ultimately, local involvement allowed VARC to educate the community about the plight of the bluebirds, increase awareness about their local natural world, and about conservation in general.

The box monitoring team in 2024 included approximately 20 local members. This included Merritt area residents, students from Thompson Rivers University, and members of the Scw'ex community. In addition to monitoring nest boxes, volunteers donated box building materials, constructed new/replacement nest boxes, engaged with local business owners, engaged with local farmers about keeping boxes on their land, and attended street fairs to educate their community. VARC volunteers also gave presentations about the program in school classrooms, to youth groups and to a local Nature group. The local paper, the Merritt Herald, wrote an article about the bluebird program and the involvement of the community.

Goals for 2025 include continuing VARC's established outreach programs and seeking to increase the involvement of local residents, especially that of the local Indigenous community.

6 HUMMINGBIRD RESEARCH - investigating pesticide residue

Since 2015, the Science and Technology Branch of Environment and Climate Change Canada and other collaborators have been conducting studies of the quality of agroecosystem habitats for hummingbirds. This produced the development of a non-invasive sampling procedure and chemical methods to measure neonicotinoid insecticides in the cloacal fluid of hummingbirds living near blueberry fields (Bishop et al. 2018). VARC has been involved in the research into the accumulation of neonicotinoids and other insecticides in hummingbirds and honeybees since 2020.

Neonicotinoids, such as imidacloprid, are among the most widely used insecticides in the world, but there is accumulating evidence that some breakdown products are toxic to some animals and they have been linked to Colony Collapse Disorder of honeybees and other adverse ecological effects. Neonicotinoids are routinely sprayed on agricultural crops, such as blueberry fields found throughout the Fraser Valley of British Columbia. These insecticides can then be picked up by animals feeding on the pollen and nectar from the blueberry flowers. This research is comparing insecticide levels in the cloacal fluids of Anna's Hummingbirds (*Calypte anna*) and Rufous Hummingbird (*Selasphorus rufus*) as well as honeybee nectar and water in hives near sprayed fields and at control sites away from sprayed fields.

No hummingbird cloacal fluid was collected at the Park in 2024. However, sampling continued at a satellite banding station in Tsawwassen, BC:

- Anna's Hummingbird
    - AHY male: 0, HY male: 36, AHY female: 2, HY female: 13

- Rufous Hummingbird
    - AHY male: 1, HY male: 2, AHY female: 2, HY female: 1

VARC data from previous survey years contributed to a recent publication on patterns of insecticide distribution (Bishop et al. 2022).

7 REHABILITATED RAPTORS AT O.W.L.

O.W.L. is a non-profit organization whose staff and volunteers are dedicated to the rescue, rehabilitation, and release of injured and orphaned raptors and to educating the public on their conservation and importance. VARC banders routinely visit O.W.L.'s rehab facility to band all their rehabilitated birds before they are sent out for release across the province. Recovery and sightings of these banded individuals can provide valuable information about the life history of rehabilitated birds.

VARC conducts sessions at the O.W.L. facility where birds that have been successfully rehabilitated and are slated for imminent release are banded. Each rehabilitated bird receives a federal band with a unique number which allows identification if it is ever sighted or recovered in the future. All banding protocols are followed as outlined in Appendix D. After banding, birds are scheduled for release as soon as possible and typically in the same location where they were recovered; the only exceptions would be if behavioural or environmental conditions prohibit return to the original recovery site.

Many of the raptors treated by O.W.L. are large birds and so the bands they receive are large enough to be read at a distance through binoculars or with a digital camera. Birds may also get re-injured and be taken in to rehab again or may be found dead. In any of these cases, the identity of the bird can be discovered by reporting the band number and in turn can provide valuable information about the life history of rehabilitated birds.

In 2024, 202 birds were banded at the O.W.L. rehabilitation facility and released soon after. Twenty-nine birds banded and released over the eleven years that VARC has been banding rehabilitated raptors were recovered in 2024 (Appendix R). These records aid in assessing the survivorship and dispersal of rehabilitated birds.

Since VARC first started banding rehabilitated raptors at OWL, nearly 2,000 birds have been banded and released. The most common species banded were Barred Owl (*Strix varia*) and Bald Eagle, each making up approximately 20% of the total birds banded at OWL. Nearly all causes for rehabilitation were tied to human-related injuries; the most common of these were caused by early or forced fledging or being hit by a vehicle or other related road injuries (Brown 2020).

8 RAPTOR MIGRATION BANDING

Raptors migrate through British Columbia (BC) in the spring and fall with many stop-over sites along their migration routes. Well-known viewing sites in Langford on Vancouver Island and Kamloops draw bird watchers, but an established monitoring network across the province does not yet exist; there is no

dedicated wild raptor banding program of free-living birds in BC. Capturing and banding raptors with well-established techniques will provide invaluable data and information on raptor distribution, movement patterns, dispersal, plumage variation, and life span. VARC is well positioned in the Lower Mainland to expand its current banding activities to the Fraser Valley and aims to begin raptor banding as a means of monitoring their use of the local migration route. The primary objectives of this project include:

- To define flight path, wintering areas, and origins of migrating raptors in southwestern BC.
- To identify seasonal timing of migration for individual raptor species.
- To assess the health and condition of migrating raptors.
- To define the morphometric characteristics of particular raptor species, including subspecies and populations, utilizing this particular migratory route in spring and in fall.

Fall operations in 2024 were postponed due to concerns about Highly pathogenic avian influenza (HPAI). In British Columbia (B.C.), HPAI has affected raptors as part of a global outbreak with hundreds of bald eagles, hawks, owls, and falcons affected, with most cases being fatal. The federal Bird Banding Office (BBO) continues to advise that banders carefully consider if the benefits of research outweigh the risk of potential HPAIV transmission.

In summary, the project successfully achieved its objectives in finding a suitable location, housing lure birds on site, and the set up and skill development within VARC's team of permitted banders. Our objective is to continue raptor monitoring and trapping during fall migration each year subject to the restrictions imposed by the BBO with regard to HPAI.

9 ACKNOWLEDGEMENTS

2024 was yet another successful year for VARC. As a non-profit organization, our future depends on the financial support of caring and forward-thinking sponsors. VARC is very thankful to the dedicated individuals and volunteers, organizations and corporations that have donated time, money, and resources to furthering our cause and ensuring the future of what we do. We would like to acknowledge all the friends of VARC and the following major sponsors for their continuing support:

- BC Nature Foundation
- British Columbia Community Gaming Grants
- Government of Canada Summer Jobs Program
- Coquitlam Foundation
- Fortis BC
- University of the Fraser Valley
- Pacific Parklands Foundation
- Metro Vancouver Parks
- Wild Birds Unlimited
- Jim Pike Ltd. – McDonald's
- Backyard Bird Centre

Finally, special thanks to all our dedicated volunteers who contributed countless hours towards the success of our programs: Alain Boisclair-Joly, Angela Hansen, Ariella Eini, Bekah Persad, Bob Grahauer, Bridget MacGillivray, Brittany Borean, Caio Conradt, Carol Holmes, Carol Matthews, Celia Chui, Christian Cruz, Christina Kallianiotis, Debbie Wheeler, Derek Matthews, Elisha Miller, Emily Hood, Gerry Lane, Hanna Jackson, Jacquelynn Papineau, Jason Jones, Jenna Kissel, Joanna Chin, Karen Cargnelli, Karen Haskins, Katie Chettle, Katie Schellenberg, Keira Fritsch, Kerry Kenwood, Kevin Krebs, Kyra Rolfe, Lindi Hall, Louise Routledge, Lucas Towers, Maggie Fung, Maleen Mund, Mark Habdas, Mark Swanson, Mel Chanona, Michelle Hintz, Monica Durigon, Morgan Kempton, Morgan Nichols, Naomi Fota, Olivia Lustosa, Portia McCracken, Qian Chu, Ralph Kossinn, Shae Turner, Sharon Chan, Sheri Evans-Nowick, Sofia Shivji, Summer Boghetti-Smith, Sunny Park, Susan & Vic Newton, Suzanne & Christian Shears, Tonya Chyzowski, Triana Hohn, Yvonne Lord, and Zoe Simard.

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Appendix A – Sample brochure outlining the various in-class school programs VARC offers.

PRESENTATIONS

We offer a variety of topics as well as special seasonal options.

Backyard Birds
K through 3
Themes:
- Recognizing and naming local birds
- Foods and habitats of local birds
- Caring for local birds and environments

Wild Spaces & Fun Places
K through 2
Themes:
- Roles that birds play to keep our ecosystems healthy
- How our actions are affecting birds and nature
- Top things we can do to help birds survive

Amazing Adaptations
1 through 5
Themes:
- Recognizing/ naming types of birds and their features
- Physical and behavioural adaptations
- Identifying adaptations and their purpose
- Caring for local birds and the environments they call home

Working Birds
4 and up
Themes:
- Biodiversity in local bird species
- Diverse roles of birds that help maintain ecosystems
- Ecosystem connections and the broader world
- Modern issues birds face and how to help

Seasonal Presentation
Tailored to Age Group

Caring For Birds In Winter: explores how we can help residential birds survive Canadian winters

TEACHERS PACKAGE

MAKING IT EASY!

Our virtual presentations offer teachers extra materials, videos and activities to reinforce learning and inspire a deeper interest in nature. We also remain a resource to you long after presentation day with an open door policy for questions and dialogue with you and your students.

PAM

GRADE 7 TEACHER

"The presentation flowed well - a good intro, a good amount of information, and great questions and discussions. VARC connected well with the students - they were friendly, positive and engaging. I also liked that it had a positive message while explaining the reality of the situation for birds around the world. I appreciated having time for questions and a discussion at the end, and VARC passed on specific resources related to our questions (citizen science app). It was an hour well spent!"

BOOK TODAY!

Visit our website to find out more about our registered Canadian, non-profit charity
www.birdvancouver.com

Appendix B – Information package for stand-alone teaching units.

SCIENCE AND NATURE LESSON PLANS

This teacher led program is designed to have each unit build upon the previous one, fostering continuous learning and a deeper understanding of our natural world. Units are also available individually for exploration and discovery of one topic.

8 Engaging Units

- Silhouettes
- Bird Groups
- Body Parts
- Beaks and Feet
- Song
- Habitat
- Nests and Baby Birds
- Migration

Each Unit Comes With:

- Lesson Plan
- Powerpoint with images and content
- Powerpoint with just images
- Activities
- Crafts
- Handouts

POST COMPLETION

Bring your classroom outdoors with a field session! Contact us with a date and location, and we will provide photographs and information about local bird species you are likely to see. This interactive session allows students to apply their newfound knowledge in a thrilling bird treasure hunt, fostering a deeper connection with nature!

USE THE QR CODE FOR MORE INFORMATION

Visit our website to find out more about our registered Canadian, non-profit charity
www.birdvancouver.com

Appendix C. Mist net and station coordinates, in UTM Zone 10 U.

ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station Wilson's Farm North	Easting (x)	Northing (y)
WFN Pagoda	514748	5454117
Grilzebo	514756	5454103
Bathroom & Nest Box	514717	5454136
J Trap*	514749	5454278
Hummingbird Station A - HA	514732	5454140
Hummingbird Station B - HB*	514732	5454147
Hummingbird Station C - HC*	514736	5454144
Nest Box 1	514762	5454143
Nest Box 2	514746	5454164
Nest Box 3	514730	5454186
Nest Box 4	514712	5454209
Nest Box 5	514695	5454233
Nest Box 6	514676	5454256
Nest Box 7	514658	5454278
Nest Box 8	514642	5454301
Nest Box 9*	514626	5454323
Nest Box 10*	514608	5454344
Nest Box 11*	514583	5454368
Nest Box 12*	514562	5454388
Nest Box 13*	514550	5454415
Nest Box 14*	514506	5454413
Nest Box 15*	514486	5454393
Nest Box 16*	514456	5454362
Nest Box 17*	514689	5454437
Nest Box 18*	514736	5454330
Nest Box 19*	514872	5454216
Nest Box 20*	514896	5454175
Nest Box 21*	514775	5454112
Nest Box 22*	514796	5454088
Nest Box 23*	514815	5454065
Nest Box 24*	514833	5454041
Nest Box 25*	514852	5454017
Nest Box 26*	514732	5454114
WFN net 1	514775	5454142
	514783	5454134
WFN net 2	514785	5454160
	514793	5454152
WFN net 3	514764	5454201
	514776	5454194
WFN net 4	514778	5454218

ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station Wilson's Farm North	Easting (x)	Northing (y)
	514787	5454207
WFN net 5	514800	5454250
	514809	5454242
WFN net 6	514843	5454254
	514847	5454245
WFN net 7	514863	5454228
	514854	5454220
WFN net 8	514916	5454152
	514927	5454146
WFN net 9	514888	5454144
	514892	5454133
WFN net 10	514887	5454116
	514894	5454102
WFN net 11	514858	5454083
	514846	5454083
WFN net 11A	514846	5454083
	514833	5454079
WFN net 12	514826	5454101
	514816	5454094
WFN net 13	514816	5454094
	514800	5454105
WFN net A	514852	5454147
	514856	5454135
WFN net B	514842	5454134
	514847	5454122
WFN net M	514799	5454116
	514795	5454119
WFN net 14L and 14U	514729	5454111
	514738	5454127
WFN net 15*	514739	5454092
	514729	5454101
WFN net 16*	514745	5454106
	514738	5454095
WFN net 17*	514741	5454098
	514749	5454100
WFN net C	514737	5454292
	514730	5454285
WFN net D	514730	5454285
	514723	5454294
WFN net E	514723	5454294
	514716	5454302
WFN net F	514712	5454303
	514723	5454309

ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station Wilson's Farm North	Easting (x)	Northing (y)
WFN net G	514723	5454312
	514731	5454322
WFN net H	514962	5454175
	514960	5454168
WFN net J	514969	5454165
	514963	5454175
WFN net K	514995	5454130
	514999	5454134
WFN net L	515000	5454136
	515008	5454129
WFN net N	514683	5454464
	514660	5454459
WFN net O	514662	5454463
	514663	5454470
WFN net P	514663	5454464
	514670	5454463
WFN net Q	514675	5454464
	514683	5454462
WFN net R	514685	5454461
	514684	5454468
WFN net RA	514684	5454468
	514709	5454487
WFN net S	514687	5454463
	514688	5454446
WFN net T	514819	5454282
	514830	5454291
WFN net U	514830	5454292
	514828	5454298
WFN net U2	514822	5454307
	514815	5454318
WFN net U3	514814	5454319
	514808	5454330
WFN net V	514713	5454213
	514721	5454220
WFN net W	514686	5454241
	514695	5454249
WFN net X	514682	5454236
	514673	5454230

*net/trap/net boxes not set up during 2024 or no longer operational.

Appendix D. Banding and station protocols.

Bird Banding

During banding sessions, wild birds are trapped and mist-netted, identified to species, banded and measured, held for short periods and released unharmed. All banding activities are conducted under permit and according to procedures prescribed by the Bird Banding Office of the Canadian Wildlife Service (CWS). The banding station is run by at least two people, one of which is always a licensed bird bander capable of acting as Bander-in-Charge (BIC). The BIC is responsible for the daily operation of the station and for the safety and welfare of every bird. All banding operations adhere to VARC's strict protocol:

- http://www.birdvancouver.com/pdf/banding_protocol.pdf

VARC has developed a graduated Volunteer Level Assessment training program for all personnel including net extraction training and ongoing development of ageing and sexing skills:

- http://birdvancouver.com/pdf/volunteer_assessment.pdf

The purpose of the training program is to ensure that all visitors and volunteers are fully trained and evaluated before handling birds and that the welfare of the birds is always the top priority. All VARC personnel are also required to complete the Canadian Council on Animal Care core module and birds in research module:

- Core Module:

http://www.ccac.ca/en_/education/niaut/stream

- Birds in research:

http://www.ccac.ca/Documents/Education/Birds/Bird_Module_handouts.pdf

Banding Operations in the Park

VARC can operate the following capture capacity at the WFN study site in the Park:

- 40 mist nets – British Trust for Ornithology (BTO) North Ronaldsay 12-meter (m) polyester passerine nets, with the exception of 10 18-m nets (13, 14L, 14U, J, N, U, U2, V, W, and X). The location of mist nets (Appendix C) is stratified as follows based on habitat conditions and capture purpose:
  - Old-field, dry habitat (main monitoring loop) – 16 nets labeled 1-13, A, B and M (core nets) as well as 1 net labeled 11A.
  - Old-field, wet habitat – 4 nets labeled H, J, K and L.
  - Old-field, scrub habitat – 6 nets labeled T, U, U2, V, W, and X.
  - Deciduous woodland – 5 nets labeled C, D, E, F and G as well as 2 nets labeled 14L and 14U.
  - Mixed woodland – 6 nets labeled N, O, P, Q, R, and S.
- The mixed woodland nets have been used to explore the potential role of conspecific attraction (i.e., the tendency of birds to settle in areas where members of their own species have already settled) in habitat selection by birds.
- The Feeder/Winter nets are placed around a centrally located platform feeder and ensure higher capture rates in the otherwise quiet winter, making these nets useful in training new volunteers on net extraction. The feeder and surrounding nets were not employed in 2023 or 2024 due to concerns about attracting bears. Use of a feeder would add positive bias to capture rate

calculations and data from these nets would not be incorporated into long-term data sets. The three net locations previously used as feeder nets were labeled 15 (deciduous woodland), 16 (old-field, scrub) and 17 (old-field, dry).

- The deciduous woodland nets include a canopy net in which VARC has designed and built. Net 14 is sectioned into a double net, upper and lower (14L and 14U), mounted one above the other to a pulley system on a double height pole. The upper nets provide an increased chance of capturing the higher canopy birds using the woodland habitat. The canopy nets were only opened for one day during 2024.
- 1 hummingbird trap (Station A - HA) – custom-built remote-control drop-net set around a hummingbird bird feeder for VARC's resident and migratory hummingbird monitoring program.
- 10 nest boxes (#7 through 16 of the original 26) - VARC has installed nest boxes with dimensions appropriate for tree swallows and black-capped chickadees. In addition to providing nesting habitat, the boxes can provide a simple capture opportunity in support of VARC's swallow research.
- Raptor trap for larger raptors which was not employed in 2023 or 2024.

This capture capacity allows for comprehensive monitoring of bird species that differ in distribution, habitat use, behavior and likelihood of capture. It also reflects the diversity of habitat types and structure present in the Park. These capture methods are consistent with those employed at numerous bird banding stations across North America.

The number and type of capture methods deployed on any banding day depends on the time of year, anticipated and actual capture rate and availability of personnel. The minimum monitoring effort generally consists of the main monitoring loop during spring, summer and fall seasons, and the feeder / winter nets during winter.

A daily activity summary is completed for each banding session that includes weather, personnel and net hour data. The weather data outlines general conditions, temperature, wind speed and barometric pressure. Personnel data includes all staff and volunteers and the duties assigned to them as well as any visitors in attendance at the session. The opening and closing time are recorded for each net. A list of non-captured bird observations made by qualified staff and volunteers is also incorporated into the daily activity summary where exhibited behaviour (Appendix E) is recorded for each species observed. Bird observations are made on all species detected in the Park, but most specifically around the banding station during each banding session.

A comprehensive data set is collected for each newly banded and recaptured bird. During banding sessions, captured birds are identified to species and banded. Previously banded birds that are recaptured are recorded as such. Morphometric measurements are collected from the captured birds including wing length (length of the longest primary with any factors affecting length noted, ie. broken, bent or missing feathers, heavy feather wear) and body mass (as taken on a digital scale to the tenth of a gram). Each bird is assessed by scoring furcular fat deposits on a scale of 0 - 5 (Appendix G). Age codes used by the Bird Banding Laboratory (Appendix H) split passerines into four age categories based on the time of year the bird was banded: Hatch Year (HY), After Hatch Year (AHY), Second Year (SY) and After Second Year (ASY).

Adult birds are defined as an AHY or ASY and sub-adult is defined as a HY or SY bird. Non-passerines such as woodpeckers can be aged to after third year (ATY) and older. Age is based on the degree of skull pneumatization, plumage or soft part coloration, and/or wing molt limits. Each bird is also sexed male or female based on physical evidence or reliable (95% confidence) plumage and/or wing length criteria. Sexually monomorphic species (e.g. those without sex-specific breeding characteristics) are recorded as sex unknown. Confirmed breeding characteristics (presence of a cloacal protuberance or brood patch) are documented. Net number and bander identification codes are recorded as well as other comments and data regarding physical abnormalities, species specific measurements or characteristics. All captured birds are released in a timely manner and unharmed.

Nets are not operated when temperatures in direct sun rise above 24-26 °C or fall well below freezing as birds easily become overheated or hypothermic, or if steady rain heavier than a light drizzle falls or sustained strong winds occur.

Net rounds are conducted every 30 minutes and birds are extracted and placed into clean, cloth bags and returned to the banding station for processing. Processing of birds is conducted in our banding station, a 10’ x 10’ cedar pagoda (Figure 1A) and a second smaller shelter (Figure 1B) used for socially distanced banding, research, and educational activities.

Figure 1 - A. Main banding pagoda. B. Secondary banding location.

Appendix E. Hierarchical categories of breeding status (upper case) and associated behavior or observation sub-codes (lower case).

C - Confirmed: the criteria confirm a species as a breeder

- **n** - current year's nest found with eggs or young, in the process of being built, or already depredated or abandoned
- **m** - adult seen gathering or carrying nesting material
- **f** - adult seen carrying food or fecal sac to or from a likely nest site
- **d** - distraction display or injury feigning by an adult bird
- **l** - capture of a young bird with the degree of skull pneumatization, plumage or soft part coloration indicating locally hatched & incapable of sustained flight or observation of young fledglings being fed by parents
- **e** - capture of adult female with egg in oviduct or very highly vascularized brood patch (BP 4)

P - Probable: the criteria suggests, but does not confirm evidence of local breeding

- **c** - copulation or courtship observed of a species, including interaction between a male and female
- **t** - territorial behavior such as song, drumming, anxiety call, or other
- **p** - capture of adult birds with brood patch or cloacal protuberance

O - Observed: the criteria indicate the species was detected however no evidence of local breeding

- **b** - bird captured or banded during breeding season
- **o** - bird detected in the study area but with no territorial behavior
- **y** - bird encountered flying over the study area

The highest hierarchical breeding status detected (i.e., Confirmed - C; Probable - P; Observed - O) of each species encountered is recorded using upper case letters and then, using lower case letters, the appropriate behavior sub-codes associated with that breeding status. Note that sub-codes can only be combined with other sub-codes at the same breeding status level. For example, Cf and Pte are acceptable combinations; Cb and Olc are not. Also note that the certainty of breeding status codes likely will decrease for most species as the season progresses and breeding behavior diminishes.

Appendix F. Description of diversity indices.

Diversity indices are quantitative measures that reflect how many species occur in a community (species richness), and simultaneously accounts for how evenly abundant the species are within the community (species evenness). The value of a diversity index increases when both the number of species and their evenness increase. For a given number of species, the value of a diversity index is maximized when all species are equally abundant.

Shannon-Weiner index

The Shannon-Weiner index (*H*) is calculated as follows:

$$H = -\sum_{i=1}^{S} (p_i \cdot \ln p_i)$$

where: S = total number of species, p_i = proportion of species i, and ln p_i is the natural logarithm of p_i.

This index is defined as a measure of "uncertainty" in predicting to what species an individual chosen at random from a collection of *S* species and *n* individuals will belong. It ranges from 0 (low diversity) to *ln S* (high diversity).

Species Evenness index

The Species Evenness index (*E*) is calculated as follows:

$$E = \frac{H}{\ln S}$$

where: H = Shannon-Weiner Index, and ln S = natural logarithm of the total number of species (S).

This index ranges from 0 (low evenness) to 1 (high evenness).

Simpson's Index

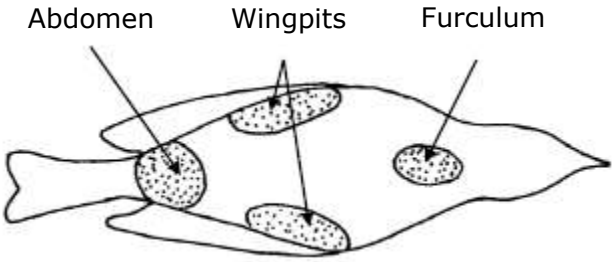
The Simpson's Index (*D*) is calculated as follows:

$$D = \frac{\sum_{i=1}^{S} n_i (n_i - 1)}{N(N-1)}$$

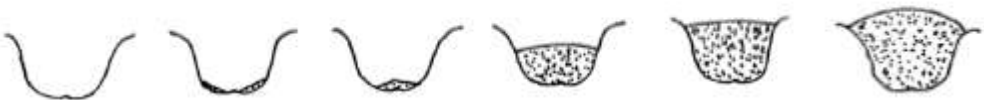
where: S = total number of species, n_i = abundance of species i, and N =total abundance of all species.

This index measures the probability that any two individuals picked independently at random from the community will belong to the same species. It ranges from 0 (low diversity) to 1 (high diversity).

Appendix G. Fat scores.



Cross-section of furculum showing fat accumulation and score



Fat Class	Furculum	Abdomen
0	No visible fat	No visible fat
1	Some fat visible, but region is still deeply concave	Trace of visible fat
2	Region filling with fat, but still concave.	Fat not covering, some small patches
3	Filled	Fat covering abdomen, not markedly mounded.
4	Filled, with some fat overflowing up interclavicles	Mounded pad of fat becoming distended
5	Convex, overflowing over length of furculum	Greatly distended mound

Appendix H. Age (year class) codes.

NUMERIC CODE	ALPHA CODE	ALPHA TRANSLATION	DESCRIPTION
0	U	UNKNOWN	A bird that cannot be placed in any classes below. Except in cases where data were not recorded or have been lost during the nesting season, ONLY BIRDS BANDED AFTER THE BREEDING SEASON AND BEFORE JANUARY 1 CAN BE CORRECTLY CODED "U".
4	L	LOCAL	A young bird incapable of sustained flight. After a young bird achieves sustained flight it becomes an "HY" until December 31.
2	HY	HATCHING YEAR	A bird capable of sustained flight and known to have hatched during the calendar year in which it was banded. Example: Banded 2011 - Hatched 2011.
1	AHY	AFTER HATCHING YEAR	A bird known to have hatched before the calendar year of banding; year of hatch otherwise unknown. Example: Banded 2011 - Hatched before January 1, 2011. Birds that would have been coded "U" on December 31 "graduate" to class "AHY" on January 1.
5	SY	SECOND YEAR	A bird known to have hatched in the calendar year preceding the year of banding and in its second calendar year of life. Example: Banded 2011 - Hatched 2010.
6	ASY	AFTER SECOND YEAR	A bird known to have hatched earlier than the calendar year preceding the year of banding; year of hatch otherwise unknown. Example: Banded 2011 - Hatched 2009 or earlier.
7	TY	THIRD YEAR	A bird known to have hatched in the calendar year two years prior to the year of banding, now in its third calendar year of life. Example: Banded 2011 - Hatched 2009.
8	ATY	AFTER THIRD YEAR	A bird known to have hatched in the calendar year three years prior to the year of banding, now in at least its fourth calendar year of life. Example: Banded 2011 - Hatched 2008 or earlier.

Appendix I. Capture Rate at each mist net within each habitat type at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station, 2024.

Habitat Type	Net Number	Number Banded	Number Recaptured	Total Number Captured	Net Hours	Capture Rate (Birds/100 Net Hrs)
Old-field, Dry	1	57	32	89	217.68	40.89
	2	61	17	78	218.68	35.67
	3	82	29	111	220.33	50.38
	4	85	20	105	221.33	47.44
	5	63	13	76	221.18	34.36
	6	40	21	61	223.33	27.31
	7	82	27	109	224.33	48.59
	8	77	34	111	221.57	50.10
	9	71	13	84	221.32	37.95
	10	64	18	82	221.82	36.97
	11	140	30	170	219.32	77.51
	11A	112	24	136	219.57	61.94
	12	72	18	90	220.93	40.74
	13	63	12	75	221.57	33.85
	A	85	16	101	219.32	46.05
	B	124	17	141	221.57	63.64
	M	74	19	93	218.07	42.65
Deciduous Woodland	C	26	8	34	65.30	52.07
	D	17	7	24	65.30	36.75
	E	14	5	19	65.30	29.10
	F	12	9	21	65.30	32.16
	G	19	12	31	65.30	47.47
	14L	4	0	4	9.67	41.38
	14U	0	0	0	9.67	0.00
Old-Field, Wet	H	19	4	23	125.05	18.39
	J	85	36	121	131.05	92.33
	K	42	9	51	132.05	38.62
	L	59	5	64	132.05	48.47
Old-field, Scrub	T	96	20	116	218.52	53.09
	U	263	34	297	221.52	134.08
	U2	103	30	133	221.02	60.18
	U3	16	4	20	49.50	40.40
	V	115	20	135	147.33	91.63
	W	95	25	120	148.83	80.63
	X	138	28	166	149.83	110.79

Appendix J. Species captured and banded in 2024 at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station.

English Name	Species Code	Number Banded
American Crow	AMCR	1
American Goldfinch	AMGO	72
American Robin	AMRO	39
American Tree Sparrow	ATSP	1
Anna's Hummingbird	ANHU	82
Bewick's Wren	BEWR	19
Black-capped Chickadee	BCCH	19
Black-headed Grosbeak	BHGR	66
Black-throated Gray Warbler	BTYW	6
Brown Creeper	BRCR	2
Brown-headed Cowbird	BHCO	4
Bullock's Oriole	BUOR	3
Bushtit	BUSH	12
Cedar Waxwing	CEDW	93
Chipping Sparrow	CHSP	1
Common Yellowthroat	COYE	225
Cooper's Hawk	COHA	1
Dark-eyed Junco	ORJU & SCJU	8
Downy Woodpecker	DOWO	9
Dusky Flycatcher	DUFL	3
Evening Grosbeak	EVGR	1
Fox Sparrow	FOSP	78
Golden-crowned Kinglet	GCKI	10
Golden-crowned Sparrow	GCSP	6
Hammond's Flycatcher	HAFL	1
Hermit Thrush	HETH	16
House Finch	HOFI	42
House Wren	HOWR	3
Lazuli Bunting	LAZB	5
Lincoln's Sparrow	LISP	155
Long-eared Owl	LEOW	1
MacGillivray's Warbler	MGWA	24
Marsh Wren	MAWR	2
Mourning Dove	MODO	2
Northern Flicker	NOFL	2
Olive-sided Flycatcher	OSFL	1
Orange-crowned Warbler	OCWA	379
Western Flycatcher	WEFL (previously PSFL)	49
Pacific Wren	PAWR	2
Pine Siskin	PISI	13

Purple Finch	PUFI	42
Red-breasted Nuthatch	RBNU	1
Red-eyed Vireo	REVI	3
Ruby-crowned Kinglet	RCKI	49
Rufous Hummingbird	RUHU	91
Savannah Sparrow	SAVS	8
Sharp-shinned Hawk	SSHA	1
Song Sparrow	SOSP	190
Spotted Towhee	SPTO	55
Swainson's Thrush	SWTH	169
Tree Swallow	TRES	1
Varied Thrush	VATH	3
Vaux's Swift	VASW	1
Warbling Vireo	WAVI	36
Western Tanager	WETA	5
Western Wood-pewee	WEWP	5
White-crowned Sparrow	GWCS & UWCS	31
White-throated Sparrow	WTSP	2
Willow Flycatcher	WIFL	173
Wilson's Warbler	WIWA	92
Yellow Warbler	YEWA	107
Yellow-rumped Warbler	AUWA, MYWA & UYRW	12

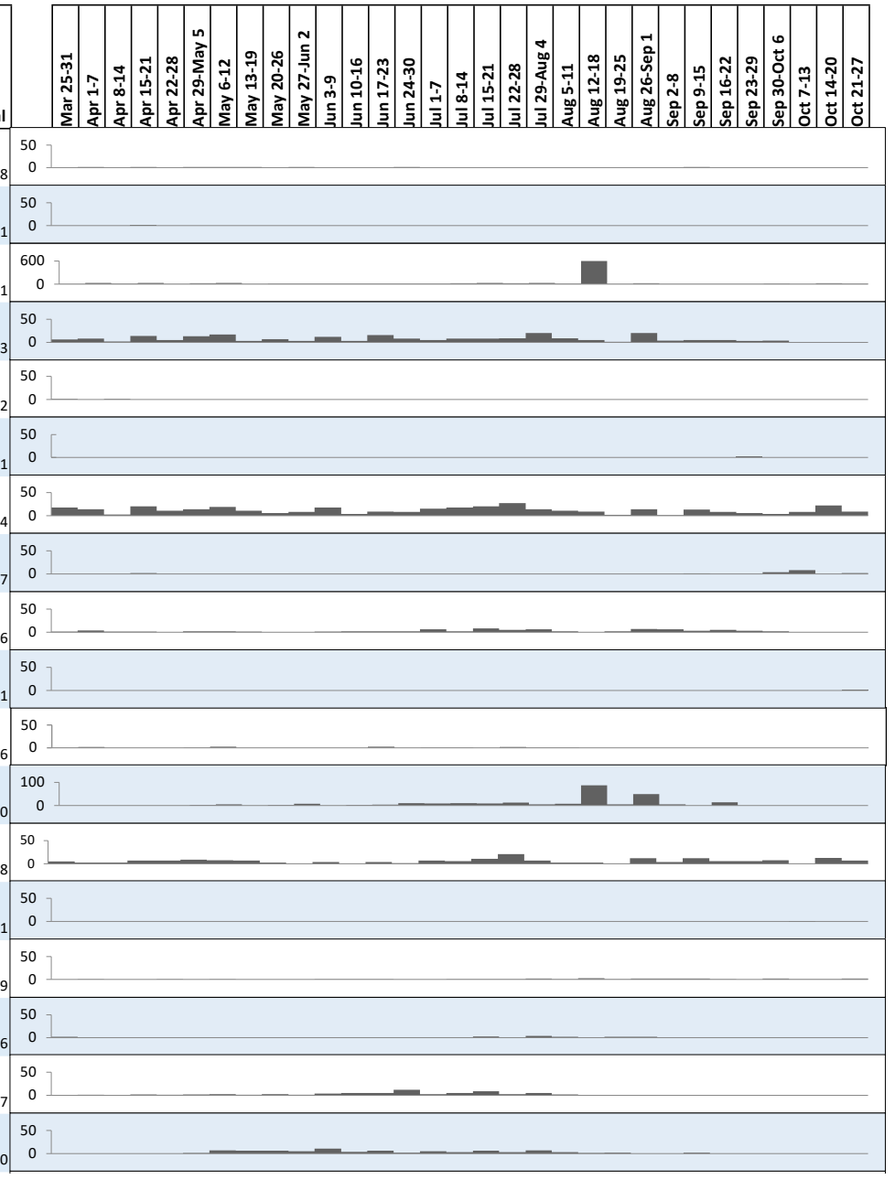
Appendix K. Significant recaptures of selected individuals originally banded prior to 2024 at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station.

Only individuals originally banded prior to 2019 are included.

Species	Band Number	Date Originally Banded	Date Recaptured	Age (Yrs)	Number of Recaptures Including 2024	Years Captured prior to 2024
Anna's Hummingbird	610054914	5/13/2018	6/8/2024	**≥7**	**1**	**2018**
Song Sparrow	269147403	8/1/2015	4/20/2024	**9**	**15**	**2015 2016 2017 2019 2021**
Spotted Towhee	175136186	9/3/2017	10/23/2024	**7**	**8**	**2017 2019 2020 2022**
Spotted Towhee	264118486	9/29/2016	5/15/2024	**8**	**8**	**2016 2017 2018 2021 2022 2023**
Swainson's Thrush	247152079	7/21/2018	8/17/2024	**6**	**9**	**2018 2019 2020 2021 2023**
Willow Flycatcher	250074754	8/18/2018	7/31/2024	**6**	**14**	**2018 2019 2020 2021 2023**

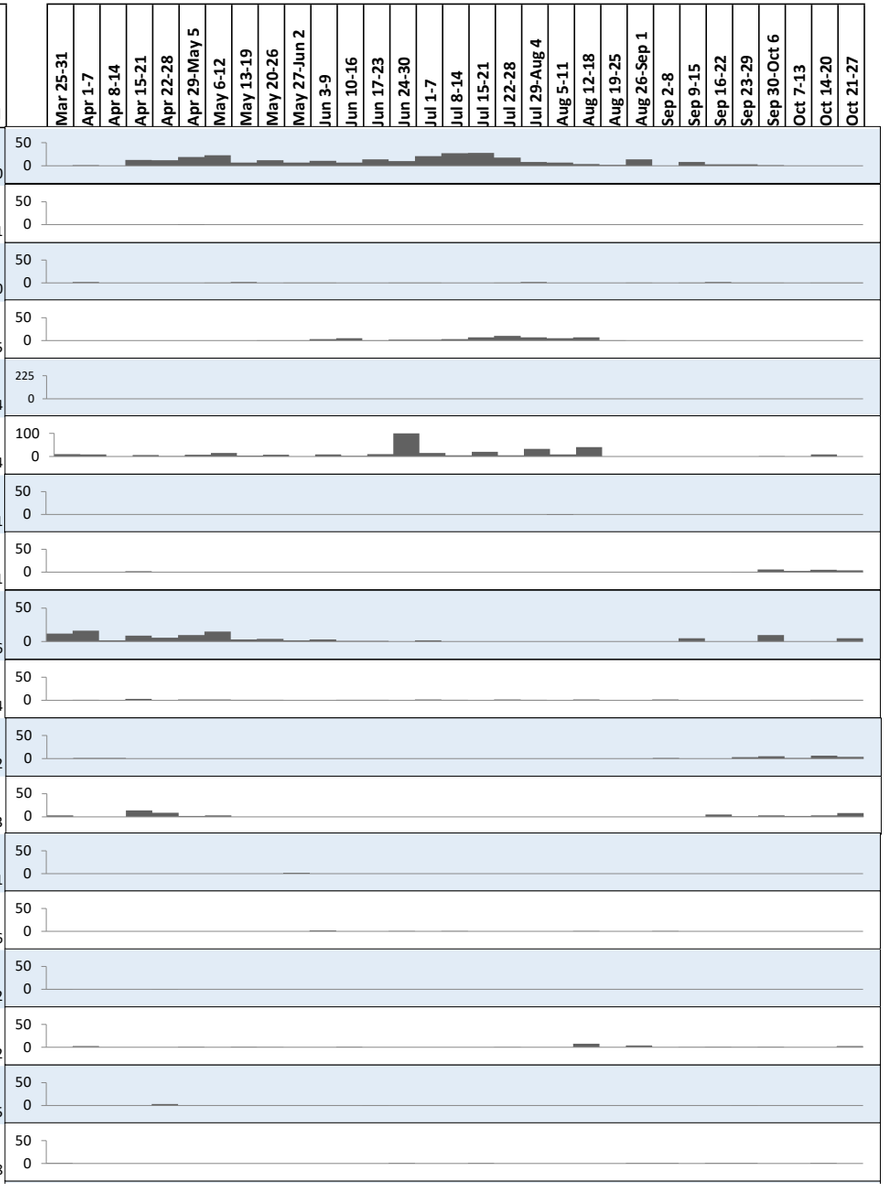
Appendix L. Species abundance derived from weekly bird surveys in 2024 at Colony Farm Regional Park.

Species	AOU	Mar 25-31	Apr 1-7	Apr 8-14	Apr 15-21	Apr 22-28	Apr 29-May 5	May 6-12	May 13-19	May 20-26	May 27-Jun 2	Jun 3-9	Jun 10-16	Jun 17-23	Jun 24-30	Jul 1-7	Jul 8-14	Jul 15-21	Jul 22-28	Jul 29-Aug 4	Aug 5-11	Aug 12-18	Aug 19-25	Aug 26-Sep 1	Sep 2-8	Sep 9-15	Sep 16-22	Sep 23-29	Sep 30-Oct 6	Oct 7-13	Oct 14-20	Oct 21-27	Total
AMERICAN BITTERN	AMBI		1		1		1	1	1		1				1										1							8
AMERICAN COOT	AMCO				1																											1
AMERICAN CROW	AMCR	10	29	11	26	7	21	27	8	15	20	18	15	18	14	18	21	27	21	29	15	600	2	25	10	9	8	2	13	6	25	11	1081
AMERICAN GOLDFINCH	AMGO	6	8	2	14	5	13	17	3	7	3	12	3	16	8	5	8	8	9	20	9	5	1	20	4	5	5	3	4				223
AMERICAN KESTREL	AMKE	1		1																												2
AMERICAN PIPIT	AMPI																											1				1
AMERICAN ROBIN	AMRO	18	14	3	20	11	14	19	11	6	8	18	4	9	8	15	18	20	27	14	11	9	2	14	1	13	8	6	4	8	22	9	364
AMERICAN WIGEON	AMWI				2																					1			4	8		2	17
ANNA'S HUMMINGBIRD	ANHU	1	4	1	1		2	2	1			1	2	2	2	6	2	8	5	6	2		2	7	6	3	5	3	2				76
AMERICAN TREE SPARROW	ATSP																															1	1
BALD EAGLE	BAEA	1	2				1	3						3		1	1		2	1	1												16
BARN SWALLOW	BARS		0	0	0	0	2	5	1	2	7		3	4	10	9	10	9	12	6	7	88	5	50	5		15						250
BLACK-CAPPED CHICKADEE	BCCH	5	3	3	7	7	9	8	7	3		4		4	2	7	6	11	21	7	3	3		12	4	12	6	6	8		13	7	188
BARRED OWL	BDOW																													1			1
BELTED KINGFISHER	BEKI		1			1		1				1	1	1			1	1	1	2	1	3	1	2	2	2	1		2	1	1	2	29
BEWICK'S WREN	BEWR	2	1				1						1	1	1	1	1	3	1	4	2		2	2			1	1	1				26
BROWN-HEADED COWBIRD	BHCO		1		2	1	2	3	1	3	1	4	5	5	12	3	5	9	3	5	2												67
BLACK-HEADED GROSBEAK	BHGR						1	7	6	6	5	11	4	6	2	5	3	6	3	7	3	1	2			2							80

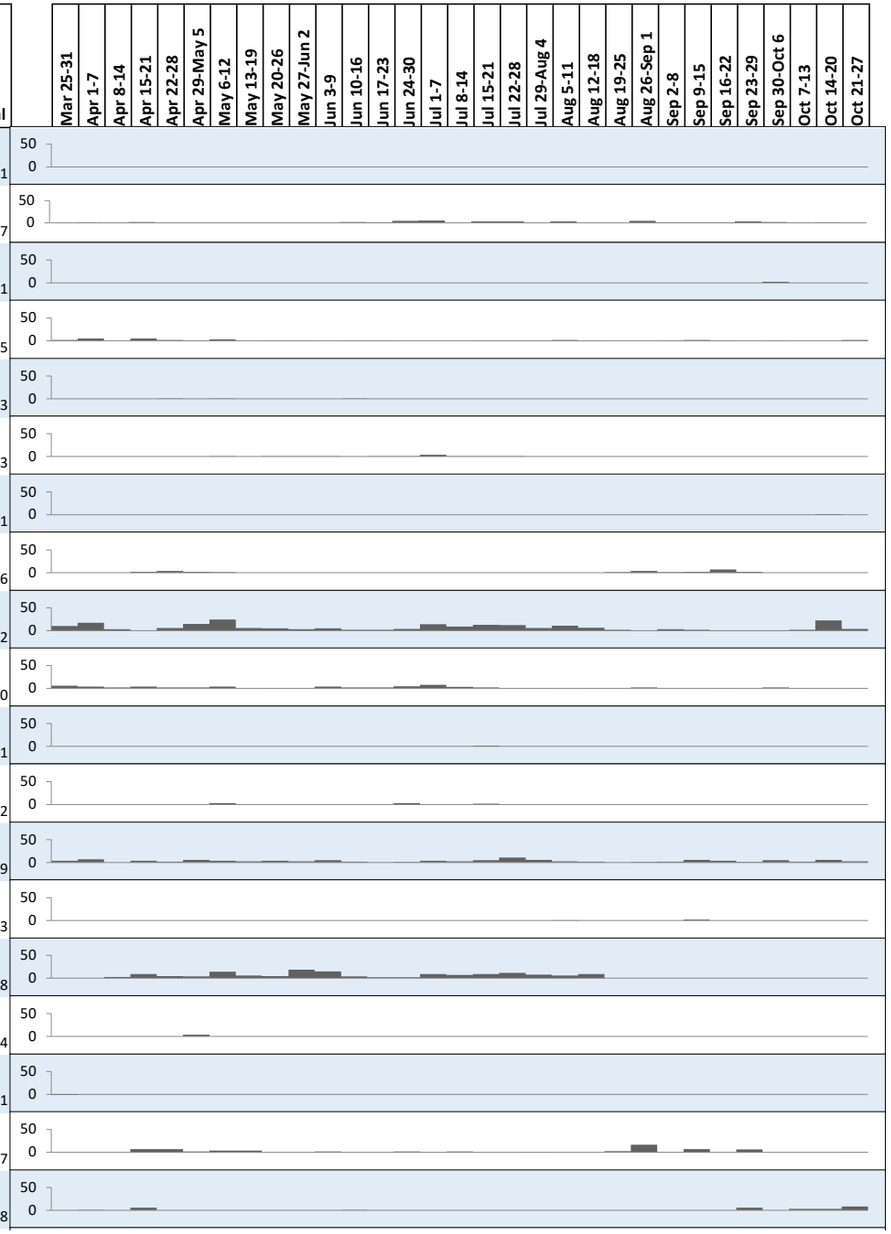


Species	AOU	Mar 25-31	Apr 1-7	Apr 8-14	Apr 15-21	Apr 22-28	Apr 29-May 5	May 6-12	May 13-19	May 20-26	May 27-Jun 2	Jun 3-9	Jun 10-16	Jun 17-23	Jun 24-30	Jul 1-7	Jul 8-14	Jul 15-21	Jul 22-28	Jul 29-Aug 4	Aug 5-11	Aug 12-18	Aug 19-25	Aug 26-Sep 1	Sep 2-8	Sep 9-15	Sep 16-22	Sep 23-29	Sep 30-Oct 6	Oct 7-13	Oct 14-20	Oct 21-27	Total
BLACK SWIFT	BLSW									15					4							1										20
BROWN CREEPER	BRCR		1		1	1	1	1	1		1			1							1							1				10
BAND-TAILED PIGEON	BTPI						6	2	6	11		35		14	30	7		2															113
BLACK-THROATED GRAY WARBLER	BTYW						1	1																								2
BUFFLEHEAD	BUFF	5	4	5	5	3	5																									27
BULLOCK'S ORIOLE	BUOR								1	1		1					3															6
BUSHTIT	BUSH	2	2	2	2	12	1	9	5	3	2	3		1		4		5	2	8				13	3		15	5		2		101
BLUE-WINGED TEAL	BWTE							2		2																						4
CANADA GOOSE	CANG	6	3	2	5	8	8	13	2										14	9		12	20	6		25		2			3	6	144
CASSINS VIREO	CAVI								1																							1
CHESTNUT-BACKED CHICKADEE	CBCH													1									2						1		1		5
CEDAR WAXWING	CEDW							2	6	13	8	14	4	12	6	8	14	10	9	16	8	10	8	10	4	9	12					183
CHIPPING SPARROW	CHSP												1																			1
CINNAMON TEAL	CITE					2	1		1		1																					5
CLIFF SWALLOW	CLSW										2	1				1																4
COOPER'S HAWK	COHA	1	1				1			1						1	1			1		1			1	1			1				11
COMMON MERGANSER	COME		3	1	4		1					1	5																			15
COMMON NIGHTHAWK	CONI											1																					1
COMMON RAVEN	CORA										2				2								1		2		1	2			1	11

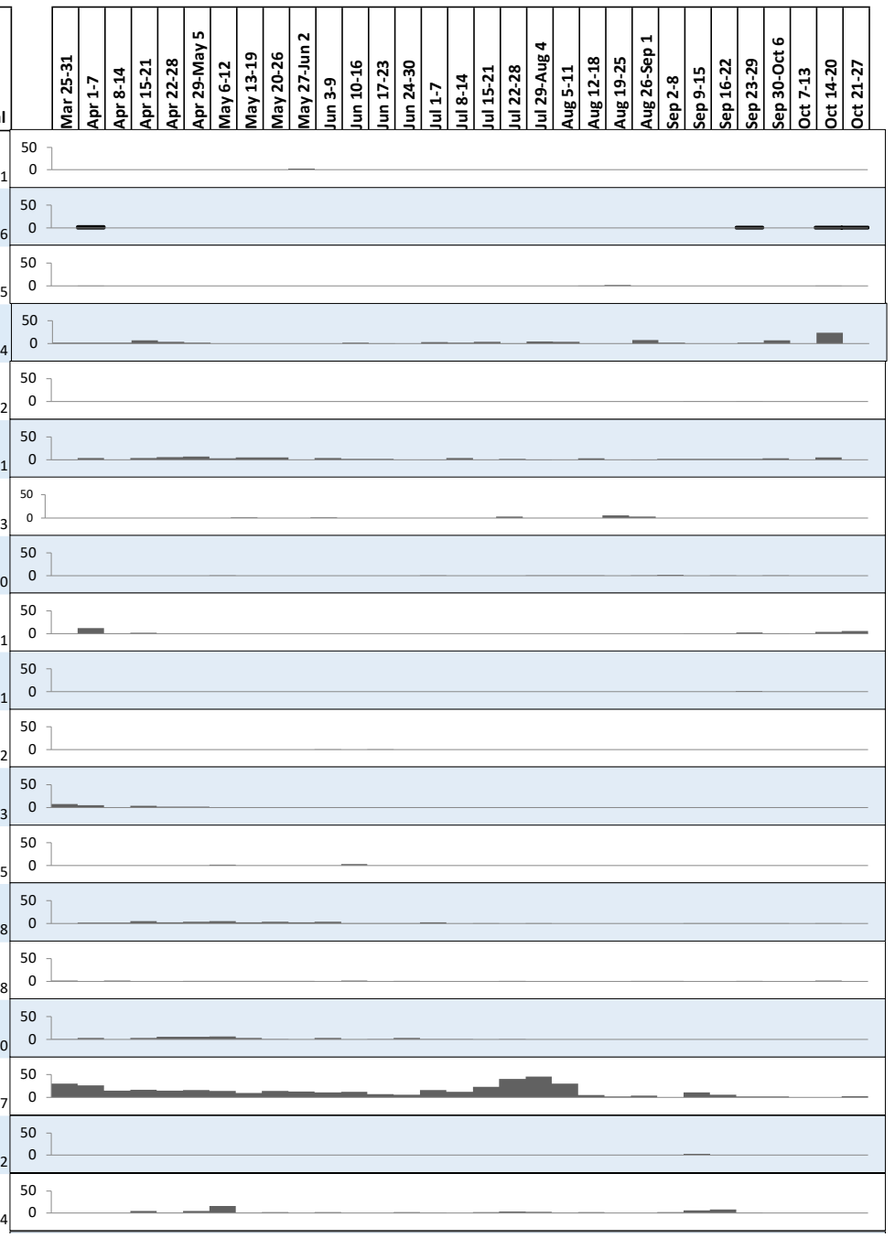
Species	AOU	Mar 25-31	Apr 1-7	Apr 8-14	Apr 15-21	Apr 22-28	Apr 29-May 5	May 6-12	May 13-19	May 20-26	May 27-Jun 2	Jun 3-9	Jun 10-16	Jun 17-23	Jun 24-30	Jul 1-7	Jul 8-14	Jul 15-21	Jul 22-28	Jul 29-Aug 4	Aug 5-11	Aug 12-18	Aug 19-25	Aug 26-Sep 1	Sep 2-8	Sep 9-15	Sep 16-22	Sep 23-29	Sep 30-Oct 6	Oct 7-13	Oct 14-20	Oct 21-27	Total
COMMON YELLOWTHROAT	COYE		1	0	13	12	19	23	7	12	7	11	7	14	10	21	27	28	18	8	7	4	2	14		8	3	3	1				280
DOUBLE-CRESTED CORMORANT	DCCO						1																										1
DOWNY WOODPECKER	DOWO		2					1	2		1	1			1	1			1	2				1		1	2	1	1		1	1	20
EASTERN KINGBIRD	EAKI									1	1	3	5	1	2	2	3	7	10	7	5	7	1										55
EURASIAN COLLARED-DOVE	ECDO							2					2																				4
EUROPEAN STARLING	EUST	10	9		6	1	7	15	3	7		8	2	10	100	15	5	20	5	33	9	40						1		8			314
EVENING GROSBEAK	EVGR																				1												1
FOX SPARROW	FOSP				2																						1	6	3	5	4		21
GADWALL	GADW	12	16	2	9	6	10	15	3	4	2	3	1	1		2									5			10			5		106
GREAT BLUE HERON	GBHE		1		3		2	2	1	1			1	1		2	1		2	1		2		2						1	1		24
GOLDEN-CROWNED KINGLET	GCKI		1	1																				1			3	5	1	6	4		22
GOLDEN-CROWNED SPARROW	GCSP	3			14	9	2	3																			5	1	3	2	3	8		53
GRAY FLYCATCHER	GRFL										1																							1
GREEN HERON	GRHE											2			1		1					1		1										6
GREATER YELLOWLEGS	GRYE	1				1																												2
GLAUCOUS-WINGED GULL	GWGU		3				2		2	1			2						1			8		4		1	2	1	2			3		32
HAMMOND'S FLYCATCHER	HAFL					3								1														1						5
HAIRY WOODPECKER	HAWO	1													1			1					1	1		1	1			1			8



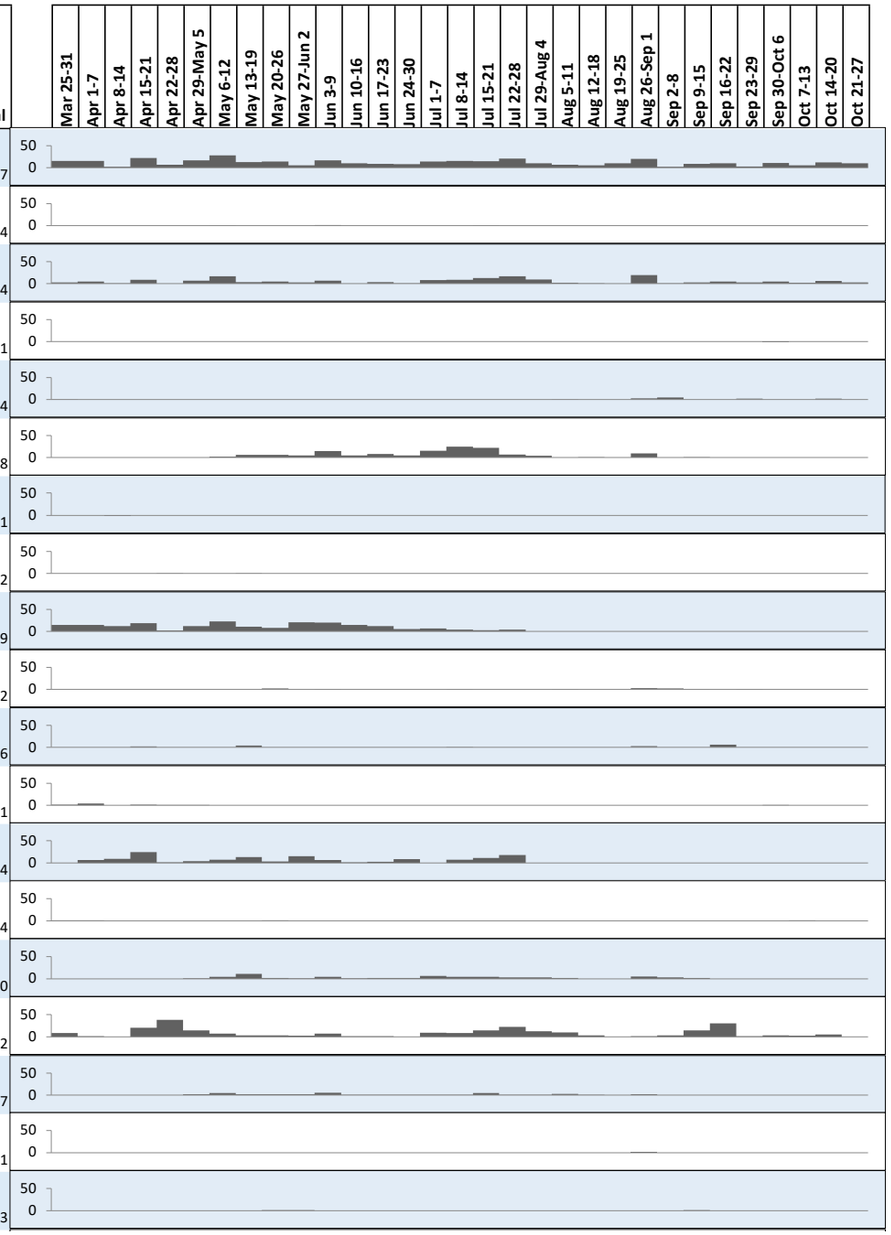
Species	AOU	Mar 25-31	Apr 1-7	Apr 8-14	Apr 15-21	Apr 22-28	Apr 29-May 5	May 6-12	May 13-19	May 20-26	May 27-Jun 2	Jun 3-9	Jun 10-16	Jun 17-23	Jun 24-30	Jul 1-7	Jul 8-14	Jul 15-21	Jul 22-28	Jul 29-Aug 4	Aug 5-11	Aug 12-18	Aug 19-25	Aug 26-Sep 1	Sep 2-8	Sep 9-15	Sep 16-22	Sep 23-29	Sep 30-Oct 6	Oct 7-13	Oct 14-20	Oct 21-27	Total
HERMIT THRUSH	HETH		1																													1
HOUSE FINCH	HOFI		1		2								2	1	4	5		3	3		3			4	1	1	1	3	2		1		37
HORNED GREBE	HOGR																												1				1
HOODED MERGANSER	HOME	2	5		5	2	1	3		1	1		1	1				1	1	1	2	1			1	2	1		1			2	35
KILLDEER	KILL					1		1					1																				3
LAZULI BUNTING	LAZB							1		1	1	1		1	1	4	1	1	1														13
LESSER SCAUP	LESC																													1			1
LINCOLN'S SPARROW	LISP				2	4	2	1															1	4	1	2	7	2					26
MALLARD	MALL	10	17	3		6	15	24	6	5	3	5	2	2	4	14	9	13	12	6	11	7	2		3	2	1	1	1	2	22	4	212
MARSH WREN	MAWR	6	4	2	4	2	2	4	1			4	2	2	5	8	3	2			1			2	1	1		1	2		1		60
MACGILLIVRAY'S WARBLER	MGWA																	1															1
MOURNING DOVE	MODO							3				1			3	1		2	1		1												12
NORTHERN FLICKER	NOFL	4	7		4	2	6	4	3	4	3	5	2		1	4	3	5	11	6	3	2		1	2	6	4	1	5	2	6	3	109
NORTHERN HARRIER	NOHA																				1					2							3
NORTHERN ROUGH-WINGED SWALLOW	NRWS			3	9	5	4	14	6	5	19	15	4	2	2	9	7	9	12	8	6	9											148
NORTHERN SHOVELER	NSHO						4																										4
NORTHERN SHRIKE	NSHR	1																															1
ORANGE-CROWNED WARBLER	OCWA				7	7	2	4	4			2			2	1	2			1			3	17	1	7		6			1		67
OREGON JUNCO	ORJU		1		6								1															6		3	3	8	28



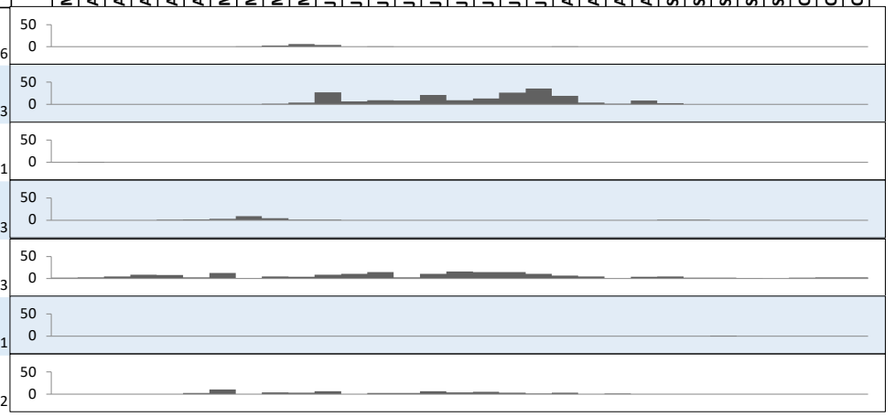
Species	AOU	Mar 25-31	Apr 1-7	Apr 8-14	Apr 15-21	Apr 22-28	Apr 29-May 5	May 6-12	May 13-19	May 20-26	May 27-Jun 2	Jun 3-9	Jun 10-16	Jun 17-23	Jun 24-30	Jul 1-7	Jul 8-14	Jul 15-21	Jul 22-28	Jul 29-Aug 4	Aug 5-11	Aug 12-18	Aug 19-25	Aug 26-Sep 1	Sep 2-8	Sep 9-15	Sep 16-22	Sep 23-29	Sep 30-Oct 6	Oct 7-13	Oct 14-20	Oct 21-27	Total
OLIVE-SIDED FLYCATCHER	OSFL										1																					1
PACIFIC WREN	PAWR		3																								1			1	1	6
PIED-BILLED GREBE	PBGR		1																			1	2							1		5
PINE SISKIN	PISI	2	2	2	7	4	2						2	1		3	2	4	1	5	4			8	2			2	7	24		84
PILEATED WOODPECKER	PIWO																								1		1					2
PURPLE FINCH	PUFI	1	4		4	6	7	3	5	5		4	2	2		1	4		2	1		3		1	2	2	2	2	3	5		71
PURPLE MARTIN	PUMA								1			1							3				5	3								13
RED-BREASTED NUTHATCH	RBNU							1								1				1	1	1		1	2		1		1			10
RUBY-CROWNED KINGLET	RCKI		12	1	2																					1	1	3	1	4	6	31
RED CROSSBILL	RECR																											1				1
RED-EYED VIREO	REVI											1		1																		2
RING-NECKED DUCK	RNDU	8	5	1	4	2	2		1																							23
ROCK PIGEON	ROPI							2					3																			5
RING-NECKED PHEASANT	RPHE		2	2	5	3	4	5	3	4	3	4	1	1	1	3		1		1						1	1	1	1	1		48
RED-TAILED HAWK	RTHA	2		2			1	1	1	1	1		2		1				1					1	1			1		2		18
RUFOUS HUMMINGBIRD	RUHU	1	3		3	6	6	7	3	1		3		1	3	1	1		1													40
RED-WINGED BLACKBIRD	RWBL	30	26	15	17	15	16	14	10	14	13	11	12	7	6	16	12	23	40	45	30	5	2	4		11	6	2	2		3	407
SANDHILL CRANE	SACR																									2						2
SAVANNAH SPARROW	SAVS				5	1	5	16	1	2		2			2	1		2	4	3	1	2			2	6	8	1				64



Species	AOU	Mar 25-31	Apr 1-7	Apr 8-14	Apr 15-21	Apr 22-28	Apr 29-May 5	May 6-12	May 13-19	May 20-26	May 27-Jun 2	Jun 3-9	Jun 10-16	Jun 17-23	Jun 24-30	Jul 1-7	Jul 8-14	Jul 15-21	Jul 22-28	Jul 29-Aug 4	Aug 5-11	Aug 12-18	Aug 19-25	Aug 26-Sep 1	Sep 2-8	Sep 9-15	Sep 16-22	Sep 23-29	Sep 30-Oct 6	Oct 7-13	Oct 14-20	Oct 21-27	Total
SONG SPARROW	SOSP	16	16	2	22	7	17	28	13	14	6	17	10	9	8	14	16	15	21	10	7	6	10	20	2	9	10	3	11	6	12	10	367
SPOTTED SANDPIPER	SPSA							1				2						1															4
SPOTTED TOWHEE	SPTO	3	5	1	9		7	17	4	5	3	7		4	1	8	9	13	17	10	2	1		20	1	3	5	3	5	2	6	3	174
SHARP-SHINNED HAWK	SSHA																												1				1
STELLER'S JAY	STJA	1																			1			3	5			2			2		14
SWAINSON'S THRUSH	SWTH							2	6	6	5	15	5	8	5	16	25	22	7	4		1		10		1							138
TOWNSEND'S SOLITAIRE	TOSO			1																													1
TOWNSEND'S WARBLER	TOWA					1			1																								2
TREE SWALLOW	TRES	15	15	12	19	2	12	23	11	8	21	20	15	12	6	7	4	3	4														209
TURKEY VULTURE	TUVU									2		1					1				1			3	2	1		1					12
VAUX'S SWIFT	VASW				2				4								1							3			6						16
VARIED THRUSH	VATH	2	4		2	1	1																						1				11
VIOLET-GREEN SWALLOW	VGSW		6	9	24	1	4	7	13	3	15	6	1	2	8		7	11	17														134
VIRGINIA RAIL	VIRA	1	1							1																				1			4
WARBLING VIREO	WAVI						1	4	11	2	1	4	1	2	2	6	4	4	3	3	2			5	3	2							60
WHITE-CROWNED SPARROW	WCSP	8	1		20	38	14	7	3	3	2	7	1	1		9	8	14	22	12	10	3		1	3	14	30	1	3	2	5		242
WESTERN FLYCATCHER	WEFL						2	5	2	2	2	6	1	1	1	1	1	5	1	1	3	1		2									37
WESTERN KINGBIRD	WEKI																							1									1
WESTERN TANAGER	WETA									1	1															1							3



Species	AOU	Mar 25-31	Apr 1-7	Apr 8-14	Apr 15-21	Apr 22-28	Apr 29-May 5	May 6-12	May 13-19	May 20-26	May 27-Jun 2	Jun 3-9	Jun 10-16	Jun 17-23	Jun 24-30	Jul 1-7	Jul 8-14	Jul 15-21	Jul 22-28	Jul 29-Aug 4	Aug 5-11	Aug 12-18	Aug 19-25	Aug 26-Sep 1	Sep 2-8	Sep 9-15	Sep 16-22	Sep 23-29	Sep 30-Oct 6	Oct 7-13	Oct 14-20	Oct 21-27	Total
WESTERN WOOD-PEWEE	WEWP								1	3	6	4		1							1											16
WILLOW FLYCATCHER	WIFL									1	4	27	6	9	8	21	9	13	26	35	19	4	1	8	2							193
WILSON'S SNIPE	WISN		1																													1
WILSON'S WARBLER	WIWA					1	2	3	9	4	1	1												1	1							23
WOOD DUCK	WODU	2	3	5	9	8	3	13	1	5	4	9	11	15	3	11	16	15	15	11	7	5		4	5	2	2	1		2	3	3	193
WHITE-THROATED SPARROW	WTSP																										1						1
YELLOW WARBLER	YEWA						2	10		4	3	6		2	2	6	4	5	3	1	3		1										52



Appendix M. Weekly observations of non-captured birds during banding sessions in 2024 at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station.

Species Name	AOU Code	Apr 8-14	Apr 15-21	Apr 22-28	Apr 29-May 5	May 6-12	May 13-19	May 20-26	May 27-Jun 2	Jun 3-9	Jun 10-16	Jun 17-23	Jun 24-30	Jul 1-7	Jul 8-14	Jul 15-21	Jul 22-28	Jul 29-Aug 4	Aug 5-11	Aug 12-18	Aug 19-25	Aug 26-Sep 1	Sep 2-8	Sep 9-15	Sep 16-22	Sep 23-29	Sep 30-Oct 6	Oct 7-13	Oct 14-20	Oct 21-27	Oct 28-Nov 3	# of weeks detected
AMERICAN BITTERN	AMBI			-	X	X			X				X								-											4
AMERICAN CROW	AMCR	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X		X	X	27
AMERICAN GOLDFINCH	AMGO	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X		X	X	27
AMERICAN PIPIT	AMPI			-																	-					X						1
AMERICAN ROBIN	AMRO	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X		X	X	27
ANNA'S HUMMINGBIRD	ANHU	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X		X		26
BALD EAGLE	BAEA	X	X	-	X	X	X			X	X			X		X	X	X	X	X	-	X			X		X	X		X	X	19
BAND-TAILED PIGEON	BTPI	X		-	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	-	X										17
BARN SWALLOW	BARS			-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X		X							19
BARN-OWL	BNOW			-					X			X				X					-											3
BELTED KINGFISHER	BEKI	X		-	X				X	X				X	X	X		X	X	X	-	X	X	X	X	X	X	X		X	X	19
BEWICK'S WREN	BEWR	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X		X	X	27
BLACK SWIFT	BLSW			-									X								-											1
BLACK-CAPPED CHICKADEE	BCCH	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X		X		26
BLACK-HEADED GROSBEAK	BHGR			-		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X			X							17
BLACK-THROATED GRAY WARBLER	BTYW			-					X								X				-											2
BROWN CREEPER	BRCR			-									X								-											1
BROWN-HEADED COWBIRD	BHCO	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	-											17
BUFFLEHEAD	BUFF	X		-	X																-											2
BULLOCK'S ORIOLE	BUOR			-												X	X		X	X	-											4
BUSHTIT	BUSH	X	X	-	X	X	X					X			X		X	X	X	X	-	X	X		X	X	X			X	X	18
CACKLING GOOSE	CACG			-																	-							X		X		2
CANADA GOOSE	CANG	X	X	-	X	X	X	X	X	X	X	X	X				X	X	X	X	-	X	X	X	X	X	X			X	X	23
CASSINS VIREO	CAVI			-																	-				X							1
CEDAR WAXWING	CEDW			-			X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X					X	X	20
CHESTNUT-BACKED CHICKADEE	CBCH			-											X	X				X	-			X								4
CHIPPING SPARROW	CHSP			-		X				X											-											2
CINNAMON TEAL	CITE			-		X	X														-											2
CLIFF SWALLOW	CLSW			-																	-	X										1
COMMON NIGHTHAWK	CONI			-						X											-											1
COMMON RAVEN	CORA	X	X	-	X	X	X	X		X			X				X	X	X	X	-	X	X		X	X	X	X		X	X	20
COMMON YELLOWTHROAT	COYE	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X					24
COOPER'S HAWK	COHA	X		-	X	X				X								X	X	X	-	X	X				X			X	X	12
DARK-EYED JUNCO	DEJU	X		-	X	X	X						X		X	X					-				X	X	X			X		11
DOWNY WOODPECKER	DOWO	X	X	-	X		X	X	X		X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X				X	23
EASTERN KINGBIRD	EAKI			-						X	X	X	X	X	X	X	X	X	X	X	-											11
EURASIAN COLLARED-DOVE	ECDO		X	-		X	X			X		X					X				-											6

EUROPEAN STARLING	EUST		X	-	X		X						X	X			X	X	X		-								X	9
EVENING GROSBEAK	EVGR			-																X	-	X	X				X			X	5
FOX SPARROW	FOSP	X		-																	-				X	X	X	X		X		6
GADWALL	GADW	X		-																	-				X							2
GLAUCOUS-WINGED GULL	GWGU	X	X	-	X	X	X		X	X	X						X	X	X		-	X	X	X	X	X	X	X		X	X	20
GOLDEN-CROWNED KINGLET	GCKI	X		-		X															-				X	X		X		X	X	7
GOLDEN-CROWNED SPARROW	GCSP			-	X																-				X					X		3
GREAT BLUE HERON	GBHE		X	-	X	X				X	X		X	X	X	X			X	X	-				X					X		13
GREEN HERON	GRHE			-						X			X								-											2
HAIRY WOODPECKER	HAWO	X	X	-	X		X						X						X	X	-	X				X	X	X				11
HAMMOND'S FLYCATCHER	HAFL			-								X									-											1
HERMIT THRUSH	HETH		X	-	X																-											2
HOODED MERGANSER	HOME			-										X							-				X						X	3
HOUSE FINCH	HOFI	X	X	-	X		X		X	X	X	X	X	X	X	X	X	X	X	X	-	X	X		X	X	X					21
KILLDEER	KILL		X	-	X	X	X			X								X		X	-											7
LAZULI BUNTING	LAZB			-						X	X	X	X	X	X	X			X		-											8
LESSER YELLOWLEGS	LEYE			-															X		-											1
LINCOLN'S SPARROW	LISP	X		-	X	X															-	X	X	X	X	X	X					9
MACGILLIVRAY'S WARBLER	MGWA			-							X								X		-											2
MALLARD	MALL	X	X	-	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	-	X		X	X	X				X	X	23
MARSH WREN	MAWR		X	-		X	X		X	X	X	X	X	X	X	X		X		X	-	X		X		X	X			X	X	19
MERLIN	MERL			-										X					X	X	-				X							4
MOURNING DOVE	MODO	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X										19
NORTHERN FLICKER	NOFL	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X		X	X	27
NORTHERN HARRIER	NOHA			-																	-		X	X	X							3
NORTHERN ROUGH-WINGED SWALLOW	NRWS			-		X		X	X	X	X	X	X	X	X		X	X	X	X	-	X										14
ORANGE-CROWNED WARBLER	OCWA	X	X	-	X	X	X	X	X	X	X	X	X	X		X		X	X	X	-	X	X	X	X	X	X	X				23
OSPREY	OSPR			-		X			X	X				X					X		-											5
PACIFIC WREN	PAWR			-	X																-					X				X		3
PEREGRINE FALCON	PEFA			-													X				-											1
PIED-BILLED GREBE	PBGR			-																	-									X	X	2
PILEATED WOODPECKER	PIWO			-																X	-				X	X						3
PINE SISKIN	PISI	X	X	-	X	X	X	X				X	X	X	X	X	X	X	X	X	-	X	X		X	X	X	X		X	X	23
PURPLE FINCH	PUFI	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X			X		25
PURPLE MARTIN	PUMA			-		X	X					X	X						X	X	-	X										7
RED CROSSBILL	RECR			-									X			X					-					X						3
RED-BREASTED NUTHATCH	RBNU			-													X		X	X	-	X	X			X	X	X				8
RED-BREASTED SAPSUCKER	RBSA			-																	-				X							1
RED-EYED VIREO	REVI			-										X						X	-	X			X							4
RED-TAILED HAWK	RTHA	X	X	-	X	X	X	X	X	X	X	X	X	X	X					X	-	X	X	X	X	X	X			X		21
RED-WINGED BLACKBIRD	RWBL	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X		X	X	27
RING-NECKED PHEASANT	RPHE	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X		X	X	X	X		X	X	26
ROCK PIGEON	ROPI			-		X															-											1

RUBY-CROWNED KINGLET	RCKI	X	X	-	X														X	-				X	X				X	X	8
RUFOUS HUMMINGBIRD	RUHU	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-											18
SAVANNAH SPARROW	SAVS	X	X	-	X			X	X	X	X	X	X	X	X	X	X	X	X	-	X				X						17
SHARP-SHINNED HAWK	SSHA			-																-		X							X		2
SONG SPARROW	SOSP	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X	27
SORA	SORA			-					X	X											-				X				X		4
SPOTTED TOWHEE	SPTO	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X	27
STELLER'S JAY	STJA	X		-										X							-	X	X		X	X	X	X		X		9
SWAINSON'S THRUSH	SWTH			-			X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X								17
TOWNSEND'S WARBLER	TOWA			-			X														-											1
TREE SWALLOW	TRES	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X										19
TURKEY VULTURE	TUVU			-		X	X			X	X		X		X	X			X	X	-	X			X	X		X				13
VARIED THRUSH	VATH	X	X	-	X																-						X		X			5
VAUX'S SWIFT	VASW			-				X				X	X						X	X	-	X	X		X							8
VIOLET-GREEN SWALLOW	VGSW			-		X			X	X	X		X	X	X	X	X	X	X	X	-											12
WARBLING VIREO	WAVI			-		X	X	X	X	X	X	X	X	X		X		X	X	X	-	X	X	X	X							17
WESTERN FLYCATCHER (PREVIOUSLY PSFL)	WEFL			-	X	X			X	X	X	X	X	X	X	X	X	X	X	X	-											14
WESTERN TANAGER	WETA			-			X	X	X								X		X	X	-	X	X		X							9
WESTERN WOOD-PEWEE	WEWP			-				X		X		X	X		X					X	-											6
WHITE-CROWNED SPARROW	WCSP		X	-	X	X	X		X										X	X		-	X				X					9
WHITE-THROATED SPARROW	WTSP		X	-																	-				X							2
WILLOW FLYCATCHER	WIFL			-				X	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X							17
WILSON'S SNIPE	WISN			-	X																-											1
WILSON'S WARBLER	WIWA			-	X	X	X	X	X		X				X					X	-			X								9
WOOD DUCK	WODU		X	-	X	X	X	X		X	X	X	X	X	X	X		X	X	X	-	X	X	X	X	X	X			X		22
YELLOW WARBLER	YEWA			-		X	X	X	X	X	X		X	X			X	X	X	X	-	X										13
YELLOW-RUMPED WARBLER	YRWA	X	X	-	X	X	X	X												X	-	X	X	X	X	X	X	X		X		15

***note that banding was not conducted during the following weeks for 2024: Apr 22-28, Aug 19-25, and Oct 14-20.**

Appendix N. Species detected at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station in 2024 that have federal or provincial designations.

English Name	Scientific Name	Species Code	BC Status	COSEWIC	SARA, Schedule 1
American Bittern	*Botaurus lentiginosus*	AMBI	Blue	Not Assessed	Not Assessed
Band-tailed Pigeon	*Patagioenas fasciata*	BTPI	Blue	Special Concern	Special Concern
Barn Owl	*Tyto alba*	BNOW	Blue	Threatened	Threatened
Barn Swallow	*Hirundo rustica*	BASW	Yellow	Special Concern	Threatened
Black Swift	*Cypseloides niger*	BLSW	Blue	Endangered	Endangered
Common Nighthawk	*Chordeiles minor*	CONI	Blue	Special Concern	Special Concern
Double-crested Cormorant	*Nannopterum auritum*	DCCO	Blue	Not at Risk	Not Assessed
Gray Flycatcher	*Empidonax wrightii*	GRFL	Blue	Not at Risk	Not Assessed
Great Blue Heron, fannini subspecies	*Ardea herodias fannini*	GBHE-FA	Blue	Special Concern	Special Concern
Green Heron	*Butorides virescens*	GRHE	Blue	Not Assessed	Not Assessed
Killdeer	*Charadrius vociferus*	KILL	Blue	Not Assessed	Not Assessed
Lesser Yellowlegs	*Tringa flavipes*	LEYE	Blue	Threatened	Not Assessed
Northern Saw-whet Owl, brooksi subspecies	*Aegolius acadicus brooksi*	NSWO	Blue	Threatened	Threatened
Peregrine Falcon, anatum subspecies	*Falco peregrinus anatum*	PEFA-AN	Red	Not At Risk	Not Assessed
Peregrine Falcon, pealei subspecies	*Falco peregrinus pealei*	PEFA-PE	Blue	Special Concern	Special Concern
Purple Martin	*Progne subis*	PUMA	Blue	Not Assessed	Not Assessed

[1] **BC Status** - each species is assigned to the Red, Blue or Yellow list based on their conservation status rank, a code that identifies the level of concern about their risk which is determined by the Conservation Data Centre (CDC).

- **Red List** - any species or ecosystem that is at risk of being lost (extirpated, endangered or threatened).
- **Blue List** - Any species or ecosystem that is of special concern.
- **Yellow List** - Any species or ecosystem that is at the least risk of being lost (not all are included in the table above).

[2] **COSEWIC** - Committee on the Status of Endangered Wildlife in Canada identifies and evaluates threatened species and assesses their conservation status then provides advice and recommendations to the federal government on the addition of species to the List of Species at Risk.

- **Extinct** - species that no longer exists.

- **Extirpated** - species that no longer exists in the wild in Canada, but exists elsewhere
- **Endangered** - species is facing imminent extirpation or extinction.
- **Threatened** - species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.
- **Special Concern** - species that may become threatened or endangered because of a combination of biological characteristics and identified threats.
- **Not At Risk** - species that has been evaluated and found to be not at risk of extinction given circumstances (not all are included in the table above).

[3] SARA, Schedule 1 - The Species at Risk Act established Schedule 1 as the official federal list of wildlife species at risk. Once listed, the measures to protect and recover a listed wildlife species are implemented.

- **Endangered** - species is facing imminent extirpation or extinction.
- **Threatened** - species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.
- **Special Concern** - species that may become threatened or endangered because of a combination of biological characteristics and identified threats.

Appendix O. Breeding status of birds observed during the breeding season at ƛ̓éxətəm (tla-hut-um) Regional Park Banding Station in 2024.

Birds were either captured at the banding station, were detected during banding sessions but not captured, or were detected during weekly surveys. C = confirmed breeder, P = probable breeder. Birds not displaying breeding characteristics not included. See Appendix E for further detail.

Species	AOU	Captured	Non-Captured	Survey	Highest Documented Breeding Status
American Crow	AMCR	Y		Y	Cf
American Goldfinch	AMGO	Y	Y	Y	Pct
American Robin	AMRO	Y	Y	Y	Cle
Anna's Hummingbird	ANHU	Y	Y	Y	Cl
Barn Swallow	BARS		Y	Y	Cmn
Black-capped Chickadee	BCCH	Y	Y	Y	Cle
Bewick's Wren	BEWR	Y	Y	Y	Cle
Brown-headed Cowbird	BHCO	Y	Y	Y	Cl
Black-headed Grosbeak	BHGR	Y	Y	Y	Cle
Brown Creeper	BRCR	Y	Y	Y	Cl
Black-throated Gray Warbler	BTYW	Y	Y		Pt
Bullock's Oriole	BUOR	Y	Y	Y	Cle
Bushtit	BUSH	Y	Y	Y	Cl
Chestnut-backed Chickadee	CBCH		Y	Y	Pt
Cedar Waxwing	CEDW	Y	Y	Y	Cle
Chipping Sparrow	CHSP	Y	Y	Y	Cl
Common Yellow-throat	COYE	Y	Y	Y	Cle
Downy Woodpecker	DOWO	Y	Y	Y	Cle
Eastern Kingbird	EAKI		Y	Y	Cmn
European Starling	EUST		Y	Y	Cn
Hammond's Flycatcher	HAFL		Y	Y	Pt
House Finch	HOFI	Y	Y	Y	Cle
House Wren	HOWR	Y			Cl
Killdeer	KILL		Y	Y	Pt
Lazuli Bunting	LAZB	Y	Y	Y	Cle
Mallard	MALL		Y	Y	Cn
Marsh Wren	MAWR		Y	Y	Pt
MacGillivray's Warbler	MGWA	Y	Y	Y	Pt
Mourning Dove	MODO		Y	Y	Pt
Northern Flicker	NOFL	Y	Y	Y	Ce
Orange-crowned Warbler	OCWA	Y	Y	Y	Cle
Pine Siskin	PISI	Y	Y	Y	Cle
Purple Finch	PUFI	Y	Y	Y	Cle
Red-breasted Nuthatch	RBNU		Y	Y	Pt

Red-eyed Vireo	REVI	Y	Y	Y	Pt
Ring-necked Pheasant	RPHE		Y	Y	Cn
Rufous Hummingbird	RUHU	Y	Y	Y	Cle
Red-winged Blackbird	RWBL		Y	Y	Pct
Savannah Sparrow	SAVS	Y	Y	Y	Ppt
Song Sparrow	SOSP	Y	Y	Y	Cle
Spotted Towhee	SPTO	Y	Y	Y	Cle
Swainson’s Thrush	SWTH	Y	Y	Y	Cle
Tree Swallow	TRES		Y	Y	Cn
Warbling Vireo	WAVI	Y	Y	Y	Cl
White-crowned Sparrow	WCSP	Y	Y	Y	Cl
Western Flycatcher	WEFL	Y	Y	Y	Cle
Western Wood-Pewee	WEWP	Y	Y	Y	Pt
Willow Flycatcher	WIFL	Y	Y	Y	Cle
Wilson's Warbler	WIWA	Y	Y	Y	Cl
Wood Duck	WODU		Y	Y	Cn
Yellow Warbler	YEWA	Y	Y	Y	Pt
Yellow-rumped Warbler	YRWA	Y			Cl

Appendix P. Protocol for checking nest boxes.

General protocol:

1. Before approaching the nest box, watch briefly to see if the female is visiting the nest with material. That way you can avoid disturbing her if possible.
2. Approach nests with care. Avoid leaving tracks that can direct predators to nests. Nest predators are everywhere and many are smart enough to watch you. Be careful that predators such as cats, crows, and jays are not following you. Minimize damaging or trampling vegetation that could emphasize a nest box.
3. Before opening the box, scratch or tap the sides a few times to encourage female to leave if she is inside, then tap again when open to allow the parent to slip away before you stare directly into the box. If a sitting bird does not leave on its own, do not force it off the nest. In this case, you will need to come back later.
4. Make visits brief, quick, and very quiet. Nest visits should last no longer than one minute. Assess the nest stage, count eggs, age nestlings and then leave the immediate area to record your data. Record information on the data sheets as thoroughly as possible.
5. If contents are hard to see in the box, use a small mirror to get a better view. Do not handle birds or eggs. Eggs can be easily cracked or small nestlings injured. Small nestlings are remarkably helpless and may not be able to crawl back into the nest cup if displaced, even inside of a nest box. Remember, if you can't get an exact count or age, it's okay. Safety of the birds should be your top priority!
6. Use different routes for approaching and leaving the nest site. Don't leave a dead-end trail - whenever possible, take a different route away from the nest site than the route you took to reach it. Walking to the nest and back along the same path leaves a dead-end trail that can lead predators directly to the nest.

Things to note:

1. Because we are performing box checks minimal times throughout the season some of the following may be unavoidable. However, in general you should AVOID visiting nests under the following conditions:
    - **Do not check in the early morning.** Most birds lay their eggs in the morning so plan on visiting nests in the later morning or afternoon. Also, most adults will temporarily leave the nest when you are near, and eggs and young nestlings can become cold quickly if left alone in the morning.
    - **Avoid nests during the first few days of incubation.** If necessary, observe nests from a distance and approach only when the female leaves the nest.
    - **Avoid nests during bad weather.** If it is cold, damp, or rainy, postpone checking nests until another day. Checking nests during this time can be very stressful for birds.
    - **Do not check nests at or after dusk**, when females may be returning to the nest for the night.
    - **Do not approach nests when young are close to fledging.** When the young are disturbed during this stage, they may leave the nest prematurely (Before they are fully feathered and ready to fledge). Young that fledge prematurely usually do not stay in the nest despite

attempts to return them, and their survival rates away from or outside the nest are low. When young birds are fully feathered and very alert, only observe the nest from a distance.

2. If premature fledging occurs:
    - gather the birds quickly and replace them gently but firmly in the nest cup, the smallest on top, and covered with a hand or tissue.
    - Withdraw the cover smoothly after giving time for the nestlings to settle. This is most successful if you can keep yourself out of sight.
    - If they leave the nest again, it's best to let them be and allow the parents to round up the young themselves. The adult birds will continue to care for young that fledge prematurely.

3. Abandonment:
    - Do not assume a nest is abandoned just because you don't see or hear an adult bird in the vicinity, even for long periods of time. The eggs of most birds will remain viable for up to two weeks after being laid even before they are incubated, so as a rule of thumb, you should wait at least one month after the expected hatch date before concluding that a nest is abandoned.
    - It is illegal to remove any materials from an active nest.
    - If you have a nest with eggs and no parents, verify whether the nest is indeed abandoned – wait at least one month before cleaning out box. Box cleaning will generally occur in September, well after the nesting season.

Appendix Q. Number of nest boxes monitored, nesting attempts and success rate for each species and each route at the VARC bluebird nest box monitoring site in Merritt, BC in 2024.

Route	Total # of Boxes	Boxes Not Used	Mammal	Nest Attempts											Total Nesting Attempts
				Unknown	European Starling	House Sparrow	White-breasted Nuthatch	Black-capped Chickadee	Mountain Chickadee	House Wren	Violet-green Swallow	Tree Swallow	Mountain Bluebird	Western Bluebird	
Aspen Grove	29	8										6	16		22
Coldwater Road 1	26	13		1						4		7	1		13
Coldwater Road 2	25	5		1					2	10		5	5		23
Coldwater Road 3	16	5		1					4	3		3			11
Coldwater Road 4	11		3	1				2	1	1		3			8
Coldwater Road 5	17	9		1					2			4		4	11
Coldwater Road 6	15	7		2								2	1	4	9
Douglas Lake 1	30	4			1							5	26		32
Douglas Lake 2	18	2		1								3	16		20
Fairgrounds	18			4		3				4	1	3	2	4	21
Festival Site 1	19	4		3			1		1	7		1	3		16
Festival Site 2	20	7							1	3		2	6	1	13
Kane Valley 1	31	7		2						5		14	5		26
Kane Valley 2	20	3								3		12	3		18
Kane Valley 3	20	4	1							5		4	9		18
Kane Valley 4	20	2		1						2		5	11		19
Kane Valley 5	17	2								1		6	9		16
Kane Valley 6	25	4		2						9		8	3		22
Nicola Lake 1	10	5	2	1								3			4
Nicola Lake 2	17	1	2							5		9	1		15
Nicola SX Ranch	19	1								3		10	5		18

Old Highway 1	24	2								6		11	10		27
Old Highway 2	19	2		2						7		4	8		21
Tenting Area	19	10	1							3		2	3		8
TOTAL	**485**	**107**	**9**	**23**	**1**	**3**	**1**	**2**	**11**	**81**	**1**	**131**	**143**	**13**	**411**
# Successful Nests*		**NA**	**NA**	**0**	**1**	**0**	**1**	**0**	**3**	**13**	**0**	**52**	**94**	**13**	**177**
Nest Success Rate**		**NA**	**NA**	**0%**	**100%**	**0%**	**100%**	**0%**	**27%**	**16%**	**0%**	**40%**	**66%**	**100%**	**43%**

*A successful nest is one that has fledged at least one young.

**Success rate is based on either documented or presumed fledging. A nest is presumed to have fledged young if the last documented age of the nestlings was 13 days or older. Note – in some cases, nest success rate may be an underestimation due to limited monitoring/low frequency of box checks.

Appendix R. 2024 recovery records of rehabilitated raptors banded at O.W.L. facility in Delta, B.C.

Species	Band Number	Release Date	Release Location	Recovery Date	Recovery Location	How Recovered	Condition
American Barn Owl	194725775	7/18/2023	Delta, BC	1/28/2024	Delta, BC	Killed or caught by a predator other than a cat	Dead
Bald Eagle	109803966	10/30/2024	Burnaby, BC	11/3/2024	Surrey, BC	Found dead	Dead
Bald Eagle	109803645	3/19/2022	Delta, BC	7/9/2024	Delta, BC	Found dead	Dead
Bald Eagle	109802661	3/16/2022	Delta, BC	2/8/2024	Pasley Island, BC	Caught due to: injury	Dead
Bald Eagle	82901957	10/3/2020	Vancouver, BC	6/8/2024	Delta, BC	Caught due to: injury	Dead
Bald Eagle	82901959	7/29/2014	Delta, BC	5/30/2024	Delta, BC	Caught due to: injury	Dead
Bald Eagle	109802452	9/30/2018	Langley Twp, BC	5/9/2024	Delta, BC	Caught due to: injury	Alive - released
Bald Eagle	82901716	8/25/2020	Burnaby, BC	5/22/2024	Delta, BC	Caught due to: injury	Alive - released
Bald Eagle	109803644	10/26/2023	Surrey, BC	8/19/2024	Delta, BC	Found dead: band with skeleton or bone only	Alive - released
Bald Eagle	109802425	4/26/2024	Burnaby, BC	2/15/2024	Burnaby, BC	Saw or photographed federal band while bird was free	Alive - in captivity, unknown if released
Bald Eagle	109803179	4/26/2024	Abbotsford, BC	2/15/2024	Chilliwack, BC	Saw or photographed federal band while bird was free	Alive - in captivity, unknown if released
Bald Eagle	82901745	8/22/2019	Vancouver, BC	2/20/2024	Delta, BC	Saw or photographed federal band while bird was free	Alive - in captivity, unknown if released

Bald Eagle	70900356	11/24/2022	Delta, BC	4/27/2024	Delta, BC	Caught due to striking: radio, TV, high tension wires/towers, or ceilometers.	Alive - in captivity, unknown if released
Bald Eagle	109802509	7/28/2017	Delta, BC	4/8/2024	North Vancouver, BC	Caught due to striking: radio, TV, high tension wires/towers, or ceilometers.	Alive - unknown
Barred Owl	195728819	10/26/2023	Vancouver	4/1/2024	Squamish, BC	Found dead	Dead
Barred Owl	195728789	1/12/2023	Port Coquitlam	6/12/2024	Port Coquitlam, BC	Found dead	Dead
Barred Owl	195728841	3/1/2024	Powell River, BC	4/30/2024	Powell River, BC	Caught due to striking: stationary object other than wires or towers	Dead
Barred Owl	195728885	2/17/2023	Maple Ridge, BC	12/11/2024	Abbotsford, BC	Caught uninjured bird by hand	Dead
Barred Owl	195728794	3/1/2024	Vancouver, BC	3/6/2024	D'Arcy, BC	Hit by motor vehicle or found dead or injured on road	Dead
Barred Owl	195728868	10/30/2024	Whistler, BC	8/16/2024	Whistler, BC	Hit by motor vehicle or found dead or injured on road	Alive - unknown
Barred Owl	196703534	7/26/2024	Vancouver, BC	9/10/2024	Burnaby, BC	Hit by motor vehicle or found dead or injured on road	Alive - unknown
Cooper's Hawk	111515379	8/30/2021	Burnaby, BC	2/3/2024	Burnaby, BC	Caught due to striking: stationary object other than wires or towers	Dead
Great Horned Owl	196703536	6/10/2024	Penticton, BC	9/23/2024	Penticton, BC	Found dead	Dead
Great Horned Owl	108801480	5/20/2023	Hedley, BC	6/30/2024	Hedley, BC	Found dead	Dead

Osprey	108801496	8/23/2024	Vancouver, BC	10/6/2024	Bryant, WA, USA	Found dead	Dead
Red-tailed Hawk	195728852	3/22/2024	Vancouver, BC	11/28/2024	Vancouver, BC	Found dead	Dead
Red-tailed Hawk	195728847	3/1/2024	Monte Creek, BC	4/7/2024	Westwold, BC	Found dead	Dead
Sharp-shinned Hawk	178325676	11/23/2023	Surrey, BC	3/4/2024	Surrey, BC	Caught due to striking: stationary object other than wires or towers	Dead
Sharp-shinned Hawk	160392968	3/22/2024	Vancouver, BC	4/14/2024	Vancouver, BC	Hit by motor vehicle or found dead or injured on road	Dead