DATA REPORT

Bird Monitoring and Banding Project

at Buttertubs West Marsh, Nanaimo, BC

2024

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1. Introduction

In the summer of 2012, the City of Nanaimo and Ducks Unlimited Canada jointly acquired the 27-hectare Buttertubs West Marsh property. This property, which is located west of the Buttertubs Marsh Conservation Area and east of the Nanaimo Parkway (**Figure 1**), encompasses a mixture of ecosystem types, including marsh and shallow water, riparian areas, upland forest, and old-field habitats. Altogether, the Buttertubs West Marsh and adjacent Buttertubs Marsh represent approximately 53 hectares of productive parkland habitat with significant ecological value in an otherwise fragmented urban landscape (Lepczyk and Warren, 2012). These green spaces can provide important breeding, stopover, and wintering habitats for various bird species (NABCI, 2019).

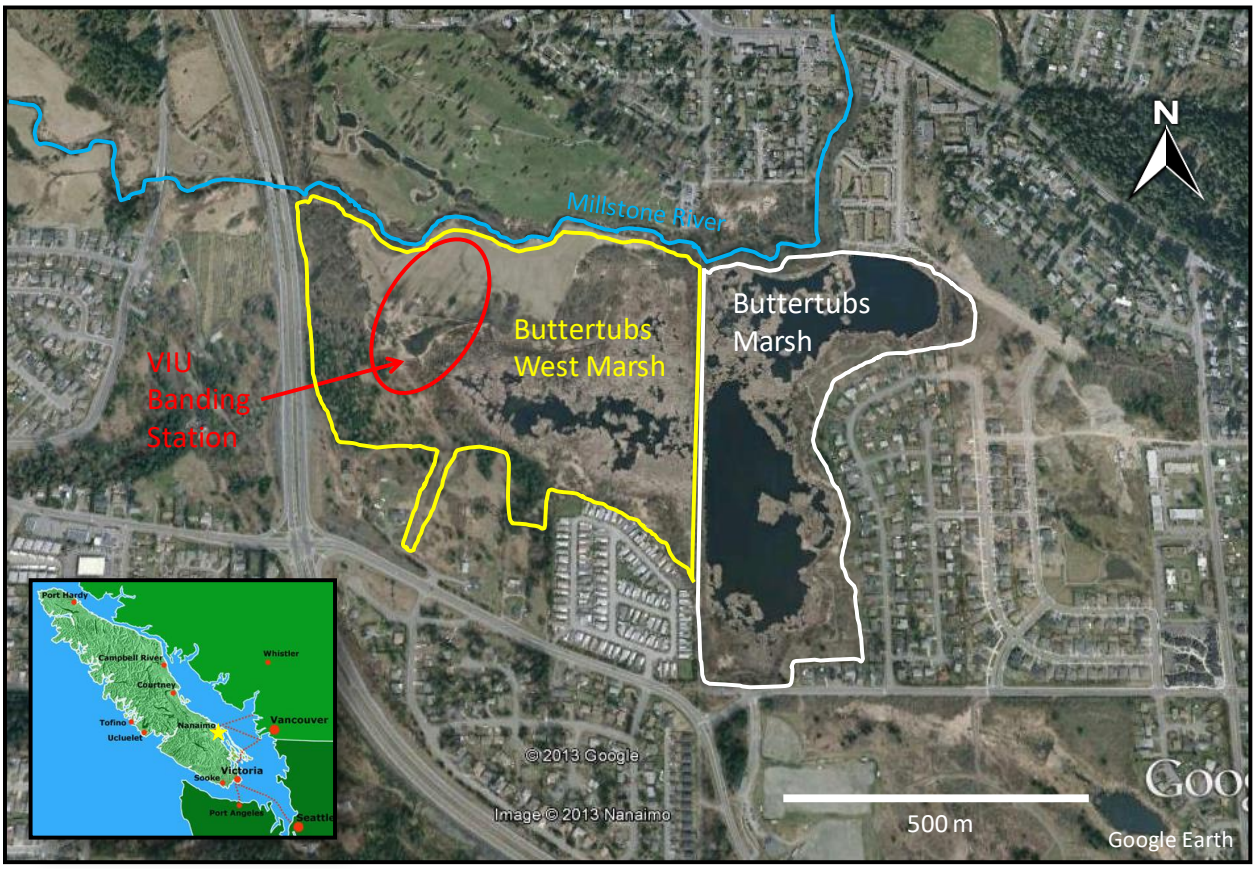

Figure 1. Aerial photograph of the Buttertubs West Marsh in Nanaimo, BC, including the location of the Vancouver Island University (VIU) bird monitoring and banding project.

Since 2013, Vancouver Island University (VIU) has operated a bird monitoring and banding project at Buttertubs West Marsh, with overall objectives to:

- monitor migrant and resident birds to contribute to regional and continent-wide efforts to monitor changes in population levels of these species;

- provide practical educational and training opportunities for VIU students and community volunteers; and,
- conduct public demonstrations where people of all ages can learn about bird identification, ecology, evolution, and conservation.

This project was conducted in partnership with the City of Nanaimo, Ducks Unlimited Canada, and The Nature Trust of BC.

This report summarizes the activities and results of this project during 2024. Project activities are described in the sections below and included:

- songbird monitoring and banding; and,
- swallow nest box monitoring.

Summaries of volunteer effort / training and public demonstration / education are also included.

2. Songbird Monitoring and Banding

2.1. Methods

The general approach used for songbird monitoring and banding included a combination of two activities: bird banding and incidental observations.

2.1.1. Songbird Banding

Songbird banding activities were conducted in accordance with Canadian Wildlife Service Bird Banding Office Scientific Permit No. 10885, 10885B and 10885D, and following procedures and guidance established in the VIU Bird Monitoring and Banding Manual (Demers, 2024a), the North American Banding Council (NABC, 2001a,b), and the Institute for Bird Populations (IBP, 2012).

Between March and October 2024, 20 mist nets were installed for use at Buttertubs West Marsh. Each mist net consisted of a 12 m long by 2.6 m high panel, made of polyester yarn, with 30-mm mesh size. The location of these nets (unchanged since 2016) was stratified among the habitat types present at the site (**Figure 2**). Ten nets (nets no. 1-10) were located in old-field habitat dominated by open expanses of reed canarygrass (*Phalaris arundinacea*) and shrub / tree patches consisting of hardhack (*Spiraea douglasii*) and willows (*Salix* sp.). Five nets (nets no. 11-15) were located in upland forest habitat consisting of Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), English oak (*Quercus robur*), and a shrubby understory consisting of thimbleberry (*Rubus parviflorus*), salmonberry (*R. spectabilis*), ocean spray (*Holodiscus discolor*), hardhack, and Himalayan blackberry (*R. armeniacus*). Five nets (nets no. R1-R5) were located in riparian habitat along the Millstone River consisting of Nootka rose (*Rosa nutkana*), hardhack, salmonberry, common hawthorn (*Crataegus monogyna*), and Himalayan blackberry.

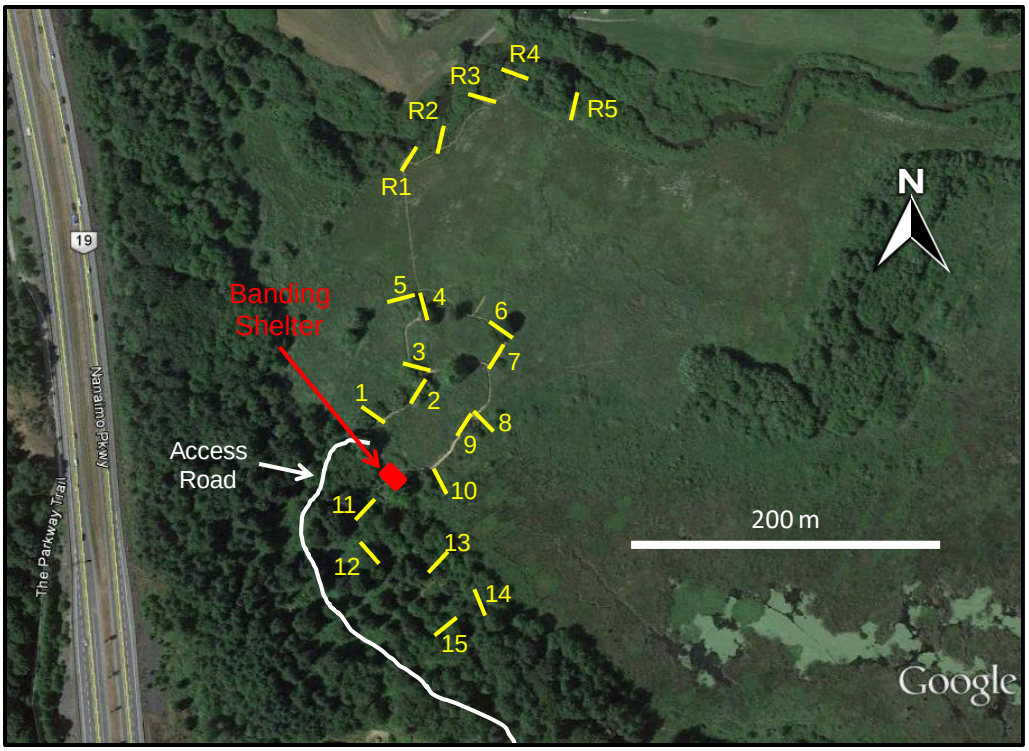

Figure 2. Locations of mist nets and banding shelter used for songbird banding at Buttertubs West Marsh during 2024.

Bird banding activities were conducted one day most of weeks between March 28 and October 29, 2024. During each banding day, nets were operated from 30 minutes before sunrise and for a period of up to 6 hours (i.e., until 5.5 hours after sunrise). Nets were checked every 15-20 minutes.

Each captured bird was extracted from the net and transferred into a cloth bag until further processing at the banding shelter. The banding process for most birds typically involved the following steps: species identification, band application (if unbanded), age and sex determination, fat score, biometrics (wing chord, tail length, weight), and photography (if applicable). Most birds were processed within about 1-2 minutes and then released.

In 2024, the VIU Bird Banding project participated in the following projects:

- Sex Determination in Bushtits (*Psaltriparus minimus*), is an undergraduate research project by VIU Biology student Chelsey Watts. This project aims to determine whether eye colour is linked to age only or to sex as an individual ages. Feathers from 20 individual Bushtits were collected for genetic sexing to definitively determine the links between sex and eye colour in Bushtits (view an article about this project).

- The Bird Genoscape Project (BGP), coordinated by researchers at Colorado State University, is an effort to map the population-specific migratory routes of 100 species of migratory songbirds by utilizing genomics. To help contribute to this project, feathers from

up to 10 individuals were collected from the following 19 target species: American Goldfinch (*Spinus tristis*), American Robin (*Turdus migratorius*), Black-headed Grosbeak (*Pheucticus melanocephalus*), Brown Creeper (*Certhia americana*), Chipping Sparrow (*Spizella passerina*), Dark-eyed Junco (*Junco hyemalis*), Fox Sparrow (*Passerella iliaca*), Golden-crowned Kinglet (*Regulus satrapa*), Lincoln's Sparrow (*Melospiza lincolnii*), MacGillivray's Warbler (*Geothlypis tolmiei*), Orange-crowned Warbler (*Leiothlypis celata*), Pine Siskin (*Spinus pinus*), Ruby-crowned Kinglet (*Corthylio calendula*), Song Sparrow (*Melospiza melodia*), Spotted Towhee (*Pipilo maculatus*), Warbling Vireo (*Vireo gilvus*), White-crowned Sparrow (*Zonotrichia leucophrys*), White-throated Sparrow (*Zonotrichia albicollis*), and Yellow-rumped Warbler (*Setophaga coronata*). For each individual, two rectrices (tail feathers) were sampled: one central (r1) and one outer (r6) rectrix. Feathers from each bird were placed in BGP-provided pre-printed envelope and filled out with the species name, band number, date, location, age, sex, breeding condition (as determined by brood patch or cloacal protuberance), and whether the bird was a recapture. Feather samples were shipped to the BGP at the end of the year.

- The Songbirds as Pollinators project (SaP), coordinated by researchers at Colorado State University (CSU), is an effort to explore the relationships between North American songbirds and flowering plants. To help contribute to this project, pollen swabs from up to 30 individuals were collected from the following 12 target species: Anna's Hummingbird (*Calypte anna*), Bushtit, Common Yellowthroat (*Geothlypis trichas*), Golden-crowned Kinglet, MacGillivray's Warbler, Orange-crowned Warbler, Ruby-crowned Kinglet, Rufous Hummingbird (*Selasphorus rufus*), Warbling Vireo, Wilson's Warbler (*Cardellina pusilla*), Yellow Warbler (*Setophaga petechia*), and Yellow-rumped Warbler. For each individual, a sterile swab was used to swab the face and bill for pollen. The swab from each bird was placed in a pre-labelled tube, placed in a pre-printed envelope, and filled out with the species name, band number, date, location, age, sex, breeding condition (as determined by brood patch or cloacal protuberance), and whether the presence/absence of visible pollen. Swab samples were shipped to CSU at the end of the year.

- The Birds, Ticks, and Climate Change: a Citizen Science Surveillance Toolkit project, coordinated by researchers at the BC Centre for Disease Control (BCCDC), is an effort to identify ticks carried by birds and their pathogen, and to develop a surveillance program for bird banding stations. To help contribute to this project, individual birds were examined for the presence of ticks. When encountered, ticks were removed and stored in labelled vials with 95% ethanol. Ticks were subsequently identified through the eTick program (https://www.etick.ca/) and screened for pathogens by the BCCDC. Ticks were collected from 15 individuals from the following 9 species: Common Yellowthroat, Dark-eyed Junco, Fox Sparrow, Golden-crowned Sparrow (*Zonotrichia atricapilla*), Hermit Thrush (*Catharus guttatus*), House Wren (*Troglodytes aedon*), Lincoln's Sparrow, Orange-crowned Warbler, and Wilson's Warbler.

2.1.2. Incidental Observations

During bird banding days, all birds detected by sight and sound (other than those captured in mist nets) were counted and recorded as incidental observations. These observations were especially

important to account for species that were not targeted by mist netting operations (e.g., waterfowl, raptors, etc.). The combination of banding totals (number of birds captured) and incidental observations provided an estimate of the number of species and individuals present at the site.

2.2. Results

2.2.1. Songbird banding

Songbird banding activities were conducted during 28 days between March 28 and October 29, 2024, with a total mist netting effort of 3,186 hours (average: 113.8 net hours / day) (**Table 1**). A total of 1,550 birds were caught from 47 species. Of these, 1,164 birds were banded, and 386 birds (24.9%) were recaptures of previously banded birds. An additional 60 birds were captured and released unbanded (primarily hummingbirds). The average capture rate in 2024 was 48.7 birds / 100 net-hours.

Table 1. Mist net capture statistics at Buttertubs West Marsh during 2020-2024.

Parameter	Value				
	2020	**2021**	**2022**	**2023**	**2024**
Capture effort (net-hours)	2,981	3,776	3,461	3,621	**3,186**
Average daily effort (net-hours / day)	76.4	94.4	108.2	116.8	**113.8**
Number of birds banded	1,105	1,120	1,305	1,256	**1,164**
Number of recaptures	406	488	454	464	**386**
Total number of birds captured	1,511	1,608	1,759	1,720	**1,550**
Recapture rate (%)	26.9	30.3	25.8	27.0	**24.9**
Number of species	53	50	51	55	**47**
Capture rate (birds per 100 net-hours)	50.7	42.6	50.8	47.5	**48.7**

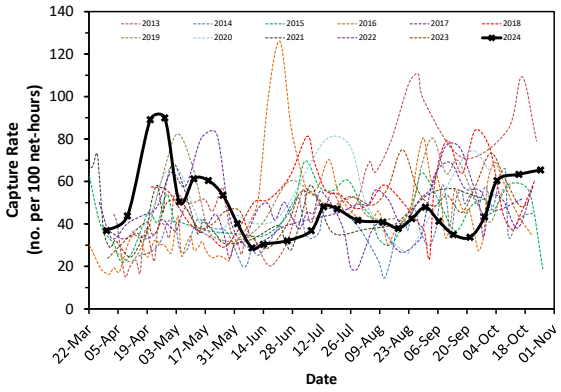

Figure 3. Weekly moving average of capture rate in mist nets at Buttertubs West Marsh during 2013-2024.

The total capture effort deployed in 2024 (3,186 net-hours) was the second lowest in the last 5 years (**Table 1**). Capture rate in 2024 (48.7 birds per 100 net-hours) was slightly higher that the average of the last 5 years. The total number of species captured in 2024 (47 species) was the lowest compared to the last few years (47-55 species in 2020-2024).

Compared to previous years, capture rates were higher than average during April-May, but below average during June and September (**Figure 3**). The highest number of captures in the history of this banding project (171 individuals) was recorded on April 24, 2024. Yellow-rumped Warbler was by far the most captured species on that day (66), along with Orange-crowned Warbler (29) and Lincoln's Sparrow (26).

Table 2. Capture statistics by net at Buttertubs West Marsh during 2024.

Net Number	Number Banded	Number Recaptured	Total Number Captured	Net Hours	Capture Rate (Birds / 100 Net hours)
1	59	28	87	159.7	54.5
2	45	16	61	156.3	39.0
3	33	11	44	159.7	27.6
4	28	20	48	159.7	30.1
5	27	7	34	159.7	21.3
6	28	10	38	159.7	23.8
7	65	23	88	159.7	55.1
8	100	20	120	159.7	75.2
9	66	21	87	159.7	54.5
10	68	33	101	155.7	64.9
11	14	19	33	159.7	20.7
12	37	24	61	159.7	38.2
13	29	9	38	159.7	23.8
14	34	25	59	159.7	37.0
15	28	16	44	159.7	27.6
R1	112	29	141	159.7	88.3
R2	167	34	201	159.7	125.9
R3	64	13	77	159.7	48.2
R4	81	15	96	159.7	60.1
R5	79	13	92	159.7	57.6
Totals	**1,164**	**386**	**1,550**	**3,186**	**48.7**

The capture rate of mist nets varied across the project site (**Table 2**). Overall, capture rate was the highest for net R2 located in the riparian habitat. This pattern was generally consistent with previous years.

Overall, Common Yellowthroat was the most captured species and represented 9.1% of all birds caught during 2024 (**Table 3**). Bushtit and American Robin were the second and third most common species, and they accounted for 7.4% and 7.0% of all birds caught, respectively. Most species listed in **Table 3** are local breeders at Buttertubs Marsh, except for Lincoln's Sparrow and Ruby-crowned Kinglet. **Tables A.1** and **A.2** in Appendix provide a complete summary of all species captured during 2024. Photos of some of the birds captured in 2024 are shown in **Photos B.1** in Appendix.

Table 3. Fifteen most common species captured in mist nets at Buttertubs West Marsh during 2024.

Common Name	Number Banded	Number Recaptured	Total Number Captured
Common Yellowthroat	85	56	141
Bushtit	76	39	115
Orange-crowned Warbler	95	13	108
American Robin	73	27	100
Song Sparrow	45	42	87
Spotted Towhee	52	31	83
Yellow-rumped Warbler	80		80
Chestnut-backed Chickadee	33	43	76
Lincoln's Sparrow	74	1	75
Yellow Warbler	57	16	73
Swainson's Thrush	38	34	72
Bewick's Wren	20	31	51
Ruby-crowned Kinglet	49	1	50
Purple Finch	44	3	47
Dark-eyed Junco	44	3	47

There were changes in the rankings for the top 10 species captured during 2024 (**Table 4**). Common Yellowthroat reclaimed top rank as the most commonly caught species. There was an increase in ranking for Bushtit, Orange-crowned Warbler and Yellow-rumped Warbler, and a decrease in ranking for Song Sparrow compared to previous years. The large rise in ranking for Yellow-rumped Warbler was mainly due to a high capture event on April 24, 2024 (66 of the 80 captures in 2024). For the second year in a row, a rare male Anna's x Rufous Hummingbird hybrid was captured on June 12, 2024. No new species was captured at Buttertubs West Marsh in 2024.

The total number of species captured at Buttertubs West Marsh since the beginning of the project in 2013 remains at 81 species.

Table 4. Number captured and rank (in parentheses) of the ten species most captured in mist nets at Buttertubs West Marsh during 2020-2024.

Common Name	2020	2021	2022	2023	2024
Common Yellowthroat	206 (1)	147 (2)	177 (2)	200 (1)	141 (1)
Bushtit	72 (10)	63 (11)	67 (10)	113 (5)	115 (2)
Orange-crowned Warbler	75 (8)	101 (4)	81 (8)	75 (8)	108 (3)
American Robin	92 (4)	90 (6)	125 (4)	148 (2)	100 (4)
Song Sparrow	122 (2)	153 (1)	142 (3)	142 (3)	87 (5)
Spotted Towhee	76 (7)	65 (10)	84 (7)	132 (4)	83 (6)
Yellow-rumped Warbler	11 (28)	25 (20)	29 (17)	39 (15)	80 (7)
Chestnut-backed Chickadee	59 (11)	76 (9)	91 (5)	83 (6)	76 (8)
Lincoln's Sparrow	74 (9)	109 (3)	199 (1)	47 (14)	75 (9)
Yellow Warbler	98 (3)	88 (7)	67 (10)	59 (10)	73 (10)

The age composition of birds captured varied between seasons and reflected the recruitment of young birds (hatch-year birds) to the population and changes in age assignment associated with the annual moult that occurs after the breeding season (**Table 5**). Second-year birds (hatched in 2023) were the dominant age group between March and June, while hatch-year birds (hatched in 2024) were the dominant age group between July and October. Overall, 41.5% of birds banded were birds hatched in 2024. This percentage was similar to previous years.

Birds store fat as a readily accessible source of energy, especially during migration. As expected, the proportion of birds that displayed any visible fat (i.e., fat score >0) was highest during spring (April-May) and fall migration (September-October) (**Table 6**). Overall, most birds banded (73.3%) did not display any visible fat (fat score = 0).

The 386 recapture events recorded in 2024 involved 262 banded birds (**Table 7**), of which 33 individuals were banded in 2013-2021, and 37, 72, and 120 individuals were originally banded in 2022, 2023 and 2024, respectively. Overall, 0.2% of individuals banded in 2013-2021 were recaptured in 2024, 2.5% of individuals banded in 2022 were recaptured in 2024, 4.2% of individuals banded in 2023 were recaptured in 2024, and 8.6% of individuals banded in 2024 were recaptured in 2024. These percentages provide crude estimates of between- and within-year survival and site fidelity, although they do not account for individuals which may have been at the site in 2024 but were not recaptured.

Table 5. Age structure of birds banded at Buttertubs West Marsh during 2024.

Month	Hatch Year (HY)	Second Year (SY)	After Hatch Year (AHY)	After Second Year (ASY)	Other Ages	Total
March		14		2		16
April		151	15	62	1	229
May	9	136	16	67		228
June	14	22	13	7	1	57
July	99	21	28	5		153
August	144	4	14		6	168
September	102		21		3	126
October	115		48		24	187
TOTAL	483	348	155	143	35	1,164

Table 6. Fat score of birds banded at Buttertubs West Marsh during 2024.

Month	0	1-2	≥3	Total
March	14	1	1	16
April	104	61	57	222
May	133	41	49	223
June	48	7	1	56
July	142	11		153
August	150	10	2	162
September	98	12	9	119
October	144	34	8	186
TOTAL	833	177	127	1,137

Most recapture events involved birds that were recaptured only once during 2024. However, 135 individuals have been recaptured more than once since the beginning of the project, and at least 38 individuals were recaptured 5 or more times. Some of these frequently recaptured and older individuals are listed in **Table 8**. The oldest recaptured birds were a Downy Woodpecker and a Spotted Towhee, which were approximately 8 years old when last recaptured. A male Common Yellowthroat was recaptured for the 30th time since it was originally banded as a second-year individual in 2019.

Table 7. Number and percentage of individuals recaptured in 2024 which were originally banded in 2021 or before, 2022, 2023 or 2024 for ten most commonly recaptured species.

Species	Banded in 2021 or before		Banded in 2022		Banded in 2023		Banded in 2024	
	No.	%	No.	%	No.	%	No.	%
Common Yellowthroat	5	0.3	5	5.1	6	4.8	11	12.9
Chestnut-backed Chickadee	3	0.6	3	6.8	15	27.8	14	35.9
Song Sparrow	3	0.3	5	7.1	3	4.0	11	24.4
Bushtit	0	0.0	2	4.8	6	8.5	22	28.9
Swainson's Thrush	1	0.3	1	2.5	9	20.0	5	13.2
Bewick's Wren	0	0.0	0	0.0	3	10.3	10	41.7
Spotted Towhee	3	0.4	4	5.6	4	4.6	9	15.8
American Robin	5	0.5	4	3.9	5	4.1	3	3.7
Yellow Warbler	2	0.4	1	2.0	2	4.4	5	8.8
Orange-crowned Warbler	0	0.0	1	1.4	0	0.0	6	6.3
All Species	33	0.2	37	2.5	72	4.2	120	8.6

Table 8. List of selected individuals recaptured in 2024, which were originally banded at Buttertubs West Marsh at least 6 years earlier.

Band Number	Species	Sex	Number of Times Recaptured Since Banded	Date Banded	Date of Last Recapture	Estimated Age
2741-85827	DOWO	Male	2	Jun. 14, 2017	Apr. 2, 2024	≥8
2561-31863	SPTO	Female	3	Aug. 18, 2016	May 15, 2024	8
2810-46232	COYE	Female	9	Aug. 29, 2018	May 15, 2024	≥7
1290-16478	CBCH	Unknown	8	Sep. 20, 2018	Oct. 1, 2024	≥7
1352-03834	AMRO	Male	8	Jun. 14, 2017	Jun. 16, 2024	7
2771-59209	BHCO	Female	6	Aug. 5, 2019	May 29, 2024	≥6
1290-16579	COYE	Male	30	Apr. 24, 2019	Sep. 26, 2024	6
2771-59217	SWTH	Male	25	May 23, 2019	Jun. 5, 2024	6
2771-59132	SOSP	Male	15	Aug. 25, 2018	Jun. 12, 2024	6
2810-46139	YEWA	Female	6	Jul. 25, 2018	May 15, 2024	6
2531-27795	FOSP	Unknown	1	Sep. 20, 2018	Oct. 29, 2024	6

2.2.2. Overall Species Presence / Absence

Banding totals (number of birds captured) and incidental observations were compiled in the online eBird database (ebird.org). eBird is a public database of bird observations providing scientists, researchers, and amateur naturalists with real-time data about bird distribution and abundance. The eBird database can be queried to obtain detailed accounts of species presence / absence and abundance for a given site.

A total of 92 species were observed at Buttertubs West Marsh during 2024 (**Table A.3** in Appendix). No new species was observed in 2024. A total of 143 species have been observed at Buttertubs West Marsh since the beginning of this project in 2013.

3. Swallow Nest Box Monitoring

3.1. Methods

In 2024, the nest boxes in the old-field habitat at Buttertubs West Marsh were consolidated by removing those that had been rarely used in recent years and/or those located in areas of reed canary grass which were difficult to monitor. Thirty nest boxes were available and monitored for use by swallow species in 2024 (**Figure 4**). Each nest box was installed approximately 1.5 m above ground and secured to a 2.4-m length of studded T-post. For each nest box, one of the side walls could be opened to allow for examination of its content. Nest boxes are cleaned out each year after the nesting season.

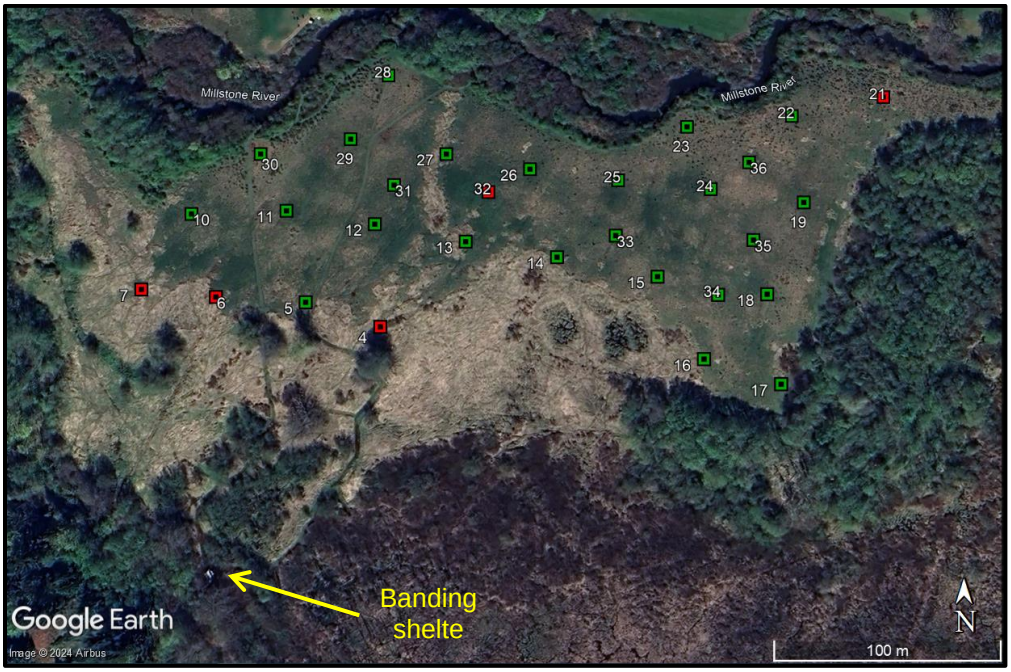

Figure 4. Locations of the 30 swallow nest boxes at Buttertubs West Marsh during 2024. Green and red squares indicate whether eggs were deposited in the nest box or not, respectively.

Nest box monitoring followed the procedures outlined in the VIU Swallow Nest Box Monitoring Manual (Demers, 2024b). Nest boxes were monitored every 3-5 days between April 27 and August 4, 2024. Nest boxes were examined for signs of nest building, amount and composition of nesting material, presence and number of eggs, and presence and number of nestlings. Nestlings were banded and weighed when they were approximately 12 days of age. In addition, adult females were captured during the nestling period by setting a trap door in their nest box. Each adult was identified, banded (if unbanded), assessed for age, sex, fat score and biometrics (wing chord, tail length, weight), and released.

3.2. Results

Twenty-five of the 30 nest boxes were occupied in 2024 and had signs of nest building activities (**Table 9**). Most boxes were occupied by Tree Swallows (*Tachycineta bicolor*) although one box was occupied by Bewick's Wren (*Thryomanes bewickii*).

Clutch sizes for Tree Swallows ranged from 2-7 eggs with an average of 5.5 eggs per clutch (**Table 10**), which was slightly above average compared to previous years. Four nest boxes were the site of repeated nesting attempts, one of which involved the same female successfully fledging young birds during the first and second nests. This is only the second time that re-nesting by the same female has been observed at this location.

Unfortunately, there were predation events by black bear (*Ursus americanus*) at five next boxes (no. 10, 26, 27, 31, and 34). In each case, the nest box was found partially broken with much of the contents spread on the ground nearby. Two boxes were predated during the incubation stage (boxes 10 and 31), and three boxes were predated during the nestling phase (boxes 26, 27, and 34). Remains of an adult female including the banded leg was found at box 27. Overall, these predation events likely resulted the loss of 11 eggs (7.1% of total), 17 nestlings (16.3% of total), and 1 adult female.

Twenty-seven individual adult females were captured. Only one male was captured in 2024 due to the significantly longer time required to capture males. Of the 27 adult female Tree Swallows captured, 12 individuals had nested at Buttertubs West Marsh in 2023, 7 individuals had nested in 2022, and 3 individuals had nested in 2021. One female born at Buttertubs West Marsh in 2018 returned to nest for next 6 consecutive years, although this is the female that suffered the bear predation in 2024. Overall, four females and one male who nested at Buttertubs West Marsh in 2024 were hatched at the same location.

Out of 154 Tree Swallow eggs laid, 104 eggs hatched (hatching success: 68%), 82 nestlings were banded around day 12 (nestling survival to day 12: 79%), and 62 young birds fledged (nestling survival to fledging: 60%) (**Tables 9** and **10**). Fledging success in 2024 was near the average since 2013. The average fledging rate for the entire nest box colony was 2.2 young per nesting pair.

Table 9. Results of nest box monitoring at Buttertubs West Marsh during 2024. Nest boxes no. 19, 24, 25, and 26 received two clutches (see text). TRES = Tree Swallow, BEWR = Bewick's Wren, DNH = Did not hatch; F = Female; M = Male; N = Nestlings.

Nest Box	Nest Building	Species	Number of Eggs	Complete Clutch Date	Mean Hatch Date	Number Fledged	Individuals Banded / Processed
4	No						
5	Yes	TRES	5	Jun. 7	Jun. 21	5	F, N
6	No						
7	No						
10	Yes	TRES	6	May 16	DNH	0	F
11	Yes	TRES	5	May 12	May 26	4	F, N
12	Yes	TRES	7	May 11	May 25	5	F, N
13	Yes	TRES	5	May 19	Jun. 2	2	F, M, N
14	Yes	TRES	6	May 11	May 25	4	F, N
15	Yes	TRES	6	May 9	May 23	6	F, N
16	Yes	TRES	2	---	DNH	0	F
17	Yes	BEWR	5	Apr. 25	May 9	4	F, N
18	Yes	TRES	5	May 17	DNH	0	F
19	Yes	TRES TRES	Clutch 1: 6 Clutch 2: 4	May 3 Jun. 28	May 17 Jul. 12	6 3	F, N F, N
21	No						
22	Yes	TRES	6	May 10	DNH	0	F
23	Yes	TRES	6	May 22	Jun. 5	5	F, N
24	Yes	TRES TRES	Clutch 1: 6 Clutch 2: 7	May 21 Jun. 25	DNH Jul. 9	0 0	F F
25	Yes	TRES TRES	Clutch 1: 6 Clutch 2: 4	May 9 Jun. 19	May 23 Jul. 3	0 2	F, N F, N
26	Yes	TRES TRES	Clutch 1: 6 Clutch 2: 4	May 3 Jun. 15	May 17 Jul. 29	0 4	F, N N
27	Yes	TRES	6	May 8	May 22	0	F
28	Yes	TRES	6	May 10	May 24	5	F, N
29	Yes	TRES	6	May 6	May 20	0	F
30	Yes	TRES	4	Jun. 19	Jul. 3	4	F, N
31	Yes	TRES	5	May 18	DNH	0	F
32							
33	Yes	TRES	6	May 11	May 25	0	F
34	Yes	TRES	7	May 11	May 25	0	F, N
35	Yes	TRES	6	May 10	May 24	2	F, N
36	Yes	TRES	6	May 13	May 27	5	F, N
Total			159			66	

Table 10. Summary of Tree Swallow nesting productivity at Buttertubs West Marsh during 2020-2024.

Parameter	2020	2021	2022	2023	2024
Number of boxes	36	36	36	36	**30**
Number of boxes with eggs (% of boxes with eggs)	29 (81%)	27 (75%)	20 (56%)	24 (67%)	**25 (83%)**
Number of eggs laid	193	194	131	138	**154**
Mean clutch size (range)	5.1 (2-7)	5.1 (3-7)	5.7 (2-7)	5.3 (3-6)	**5.5 (2-7)**
Number of eggs hatched (% eggs hatched)	148 (77%)	119 (61%)	116 (89%)	120 (87%)	**104 (68%)**
Number of nestlings banded (% nestlings banded)	92 (62%)	88 (74%)	115 (99%)	97 (81%)	**82 (79%)**
Number fledged (% nestlings fledged)	76 (51%)	50 (42%)	102 (88%)	83 (69%)	**62 (60%)**
Fledging rate (young per pair)	2.0	1.3	4.4	3.2	**2.2**

4. Volunteer Effort and Training

As stated above, one of the main objectives of this project is to provide practical educational and training opportunities for Vancouver Island University students and community volunteers. Indeed, this project is only made possible with the participation of many dedicated volunteers. The tasks accomplished by volunteers included, but were not limited to:

- Site preparation and maintenance – vegetation clearing, grass cutting and trimming, footpath maintenance and improvements, net installation and removal, net maintenance.
- Bird monitoring – incidental observations, census.
- Songbird banding – net extraction, bird banding and processing, photography, data scribing, data entry.
- Swallow nest box monitoring – nest box building and installation, monitoring of nest box contents, banding, and processing of nestlings and adults, photography, data scribing.
- Training and public education – training of project volunteers and bird banders, providing public education for guests and visitors.

A total of 59 volunteers (the most since the start of the project) dedicated 2,819 hours to this project during 2024 (**Table 11**). Volunteers included students, graduates, and employees of Vancouver Island University, as well as members of the community. Volunteers are recognized by name in the Acknowledgements section of this report.

Table 11. Number of volunteers and hours volunteered for the bird monitoring and banding project at Buttertubs West Marsh during 2024.

Volunteer Grouping	Number of Volunteers	Hours on Project
VIU students	35	1,699
VIU graduates	8	156
VIU employees	2	306
Community volunteers	14	658
TOTAL	59	2,819

Volunteer training was overseen by Dr. Eric Demers, with assistance from many experienced banders. Volunteers received training in bird banding and monitoring activities and contributed to the processing of birds captured as part of this project (**Table 12**).

5. Public Demonstrations and Education

Public demonstrations and education are also main objectives of this project. This is achieved through public presentations about the project, through guided on-site visits by individual guests and groups, and off-site public demonstrations. The following public demonstrations and education events were conducted in 2024:

- Demonstration and training for 27 students (Buttertubs West Marsh, VIU Nanaimo Campus): VIU RMOT 275 - Wildlife Techniques (Sep. 23; Oct. 4, 7, 15).
- Demonstration for 21 students (Buttertubs West Marsh): VIU BIOL 325 - Ornithology (Sep. 26).
- Public demonstration and presentations: VIU Science & Technology Lecture Series (Mar. 20); Science & Technology Preview Day (Mar. 23); Home School Group (Sep. 10); VIU Fest (Oct. 5).
- Guest lectures for BIOL 202 - Ecology (Mar. 6) and FRST 235 - Forest Ecology II: Ecosystems & Management (Oct. 6).

Social media plays a large part in public outreach and education of this project. Project news, results and photos are shared on the project website (http://wordpress.viu.ca/viubirdbanding/) and Facebook page (https://www.facebook.com/VIUBandingStation). This allows online followers to not only learn about the project, but to also gain insight on banding procedures, species identification, bird behaviour, and more.

Table 12. Volunteers (by bander code) who participated in the processing of birds captured as part of the bird monitoring and banding project at Buttertubs West Marsh during 2024. The numbers listed include birds processed as part of regular bird banding and swallow nest box monitoring.

Bander Code	Number of Birds Processed		
	Banded	Recaptures	Total
ALBA	4	3	7
ALBO	61	11	72
ALUN	1		1
ANHA	1		1
ANKE	93	19	112
BELA	8		8
BEWA	43	15	58
BLAW	58	21	79
CALO	19	10	29
CHWA	146	35	181
DALA	49	12	61
DAST	1	2	3
DAWH		1	1
ELHI	46	31	77
ELTA		1	1
EMRI	7	7	14
EMWA	3		3
EMWH	10	1	11
ERDE	55	17	72
GRDO	17	6	23
GRLE	73	22	95
HAVI	8	12	20
HEBI	1		1
HEHO	110	38	148
HIKI	3	3	6
ISLO	19	8	27
ISVI	6	2	8
JOBL	8	1	9
JOKW	3	4	7
KADO	6	2	8
KADY	1		1
KASR	4	1	5
KEPO	6		6
KESJ	1	3	4
KIDI	11	4	15
LISI	1		1
LISU	23	7	30
MADP	22	5	27
MOWA	3	2	5
NOKU	1	1	2
OLFO	24	8	32
PECU	67	23	90
RYHA	25	7	32
SADE	36	9	45
SAHU	2	1	3
SASP	19	4	23
SHMA	1		1
SOPA	9	1	10
TAHU	24	3	27
TAKI	9	4	13
ULBU	72	27	99
VISU	43	13	56
TOTAL	1,263	407	1,670

6. Acknowledgements

This project would not be possible without a dedicated group of volunteers, contributors, and partners (any omission is unintended): A. Badger, H. Biemond, J. Bliss, A. Boudreau, R. Bucksteg-Neuhoff, P. Curtis, M. De Zubiría, E. Demers, S. Detillieux, K. Dixon, G. Dodd, K. Douglas, M. Du Plessis, K. Dyke, E. Eustis, O. Fournier, R. Hardisty, A. Harris, F. Henrichsen, E. Hillbrecht, H. Holmes, S. Hunt, T. Hunt, S. Iwasawa, R. Karande, A. Kennedy, H. Kimura, T. King, N. Kumada, J. Kwon, D. Lacasse, B. Laforge, B. Lawson, G. Le, I. Loberiza, C. Louden, A. McClintock, J. Meier, S. Panozzo, K. Porteous, E. Richardson, S. Ruiters, S. Simard-Provencal, L. Singh, K. Sjolie, D. Strickland, L. Surry, V. Surry, E. Taheri, A. Unger, H. Van Vliet, I. Vilchis, H. Visty, M. Wallace, E. Wallace-Tarry, B. Walton, C. Watts, K. Wetten, E. Wharin, and D. Whitson.

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8. Appendix

Table A.1. List of all species captured in mist nets at Buttertubs West Marsh during 2024. Subspecies or morphs are included in parentheses where applicable.

Common Name	Number banded	Number recaptured	Total number captured
Common Yellowthroat	85	56	141
Bushtit	76	39	115
Orange-crowned Warbler	95	13	108
American Robin	73	27	100
Song Sparrow	45	42	87
Spotted Towhee	52	31	83
Chestnut-backed Chickadee	33	43	76
Lincoln's Sparrow	74	1	75
Yellow Warbler	57	16	73
Swainson's Thrush	38	34	72
Bewick's Wren	20	31	51
Ruby-crowned Kinglet	49	1	50
Purple Finch	44	3	47
Oregon Junco	44	3	47
Myrtle Warbler	43		43
Savannah Sparrow	31	2	33
Willow Flycatcher	27	4	31
Fox Sparrow	22	5	27
Audubon's Warbler	27		27
Hermit Thrush	20	1	21
House Finch	19		19
Golden-crowned Sparrow	18		18
Wilson's Warbler	17		17
Cedar Waxwing	15	2	17
Black-headed Grosbeak	9	7	16
Brown-headed Cowbird	10	5	15
Pacific-slope Flycatcher	14		14
Marsh Wren	10	4	14
Golden-crowned Kinglet	13	1	14
Downy Woodpecker	8	5	13
MacGillivray's Warbler	10	1	11
Warbling Vireo	10	1	11
Unknown Yellow-rumped Warbler	10		10
American Goldfinch	9		9
Tree Swallow	3	5	8
Red-winged Blackbird	7	1	8
Brown Creeper	6	2	8
Pine Siskin	4		4
Puget Sound White-crowned Sparrow	3		3
Pacific Wren	3		3
House Wren	2		2
White-throated Sparrow	2		2
Red-breasted Sapsucker	1		1
Wilson's Snipe	1		1
Northern Rough-winged Swallow	1		1
Chipping Sparrow	1		1
Red-shafted Flicker	1		1
Varied Thrush	1		1
Red-breasted Nuthatch	1		1
Northern Shrike	1		1
TOTAL	1,164	386	1,550

Table A.2. Number of all species captured during each day of mist netting at Buttertubs West Marsh during 2024.

Date	Wilson's Snipe	Red-breasted Sapsucker	Downy Woodpecker	Red-shafted Flicker	Willow Flycatcher	Warbling Vireo	Chestnut-backed Chickadee	Tree Swallow	Northern Rough-winged Swallow	Bushtit	Ruby-crowned Kinglet	Golden-crowned Kinglet	Red-breasted Nuthatch	Brown Creeper	Pacific Wren	Pacific-slope Flycatcher	Marsh Wren	Bewick' s Wren	Varied Thrush	Swainson' s Thrush	Hermit Thrush	American Robin	Cedar Waxwing	House Wren	House Finch	Purple Finch	Pine Siskin	American Goldfinch	Chipping Sparrow	Fox Sparrow	Dark-eyed Junco	White-crowned Sparrow	Golden-crowned Sparrow	White-throated Sparrow	Savannah Sparrow	Song Sparrow	Lincoln' s Sparrow	Spotted Towhee	Red-winged Blackbird	Brown-headed Cowbird	Orange-crowned Warbler	MacGillivray' s Warbler	Common Yellowthroat	Yellow Warbler	Yellow-rumped Warbler	Wilson' s Warbler	Black-headed Grosbeak	Total
Mar. 28							2				5	3						2	1			4								1	2					4		1										25
Apr. 02			2				4			3	11						1	1				4							4	5		1		1		4		7			1						49
Apr. 17							2	1		2	7	1		1				3			1	3							6			1				2	10	2			9		3		2			56
Apr. 24							5			1	4			2				2			6	2		1		2			1	2		5		3	1	26	3			29		10		66			171
May 01	1		2					1			1							1			8	3			4							4		2	1	3	2		1	10	1	7		3	3		58
May 08			1		1	2	1											1			2	7	1	1			2					4		2	2	6		1	3	8	2	9	3		4		63
May 15					1		1								1					5	1	4										2		16	2	1	1	1	3	12		3	20		5	5	84
May 22				1										1	2			4		4		6			2	2		3					1		2		2	1	1	3		7	15		2	2	61
May 29								2	1						2					8		8	3			3		1						1	3		1		1	3	1	1	17		1	1	58
Jun. 05		1			1	1	1			1								1		4		4	5												3					1		3	3			1	29
Jun. 12				1		2	2			3					1			1		5		4				1		1		1					1			5	1	1	1	3	3			3	40
Jun. 16				1	2	1				5							1	1		2		3				1				1					3				1	3	1	4	1			2	33
Jul. 05				2		1				4					6			1		3		7	1		6	1									2		3			1	1	3	1			1	44
Jul. 09			1			1				2								3		2		2			1			3	1						9		4			2	2		4					37
Jul. 17			2	1		6				13					1	2		6		8			3		3										7		3			1	4	1	9				1	71
Jul. 22				1						2					1					6		2	2		1	1		1							6		4			1	1		11	1		1		42

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Table A.2. (continued)

Date	Wilson's Snipe	Red-breasted Sapsucker	Downy Woodpecker	Red-shafted Flicker	Willow Flycatcher	Warbling Vireo	Chestnut-backed Chickadee	Tree Swallow	Northern Rough-winged Swallow	Bushtit	Ruby-crowned Kinglet	Golden-crowned Kinglet	Red-breasted Nuthatch	Brown Creeper	Pacific Wren	Pacific-slope Flycatcher	Marsh Wren	Bewick' s Wren	Varied Thrush	Swainson' s Thrush	Hermit Thrush	American Robin	Cedar Waxwing	House Wren	House Finch	Purple Finch	Pine Siskin	American Goldfinch	Chipping Sparrow	Fox Sparrow	Dark-eyed Junco	White-crowned Sparrow	Golden-crowned Sparrow	White-throated Sparrow	Savannah Sparrow	Song Sparrow	Lincoln' s Sparrow	Spotted Towhee	Red-winged Blackbird	Brown-headed Cowbird	Orange-crowned Warbler	MacGillivray' s Warbler	Common Yellowthroat	Yellow Warbler	Yellow-rumped Warbler	Wilson' s Warbler	Black-headed Grosbeak	Total
Aug. 06			1		3		2			6				1		2	3		4			5	1		1	5									1	4		3				3	11	2				58
Aug. 15					6	4								1		1	2		3			1			4	1										5					1		11					40
Aug. 21					14		1											3		7		1			1	7									1	3		5			1		7					51
Aug. 28			1		1					8			1			1	3		4							8						1				2	9			1		10			1		51
Sep. 03			1			2	10			10		1				2	2		5			1				4				1				1	3	4			4		12	1				64
Sep. 10			1				5									1	1		1			1				3										3	6			2		6	5				35
Sep. 17			1	1			3			10		1		1		1	1		1			1				3			1		1		1	3	2	5	2		7		3					49
Sep. 26										1		1			1							5				1				2	1			2	2	2			2		2		2			24
Oct. 01							5			14											2	4				1			2						4		7			1			1	1			42
Oct. 08							13			20	4	1						3			1	6							2						2	2	8			1		2		6			71
Oct. 22							9			2	14	3		1	1		1	3				8	1						5	14			1		3	1	12									79
Oct. 29							1			8	4	3			1		1	3				4				1			5	19					2		13									65
Total	1	1	13	1	31	11	76	8	1	115	50	14	1	8	3	14	14	51	1	72	21	100	17	2	19	47	4	9	1	27	47	3	18	2	33	87	75	83	8	15	108	11	141	73	80	17	16	1,550

Table A.3. List of all species observed at Buttertubs West Marsh during 2024 based on a combination of banding totals and incidental observations. Green rectangles indicate that a species was observed during a given time period. The size of the green rectangles represents the proportion of surveys for which a species was detected. Areas in gray checkerboard indicate that no data are available. Data compiled in and extracted from eBird database.

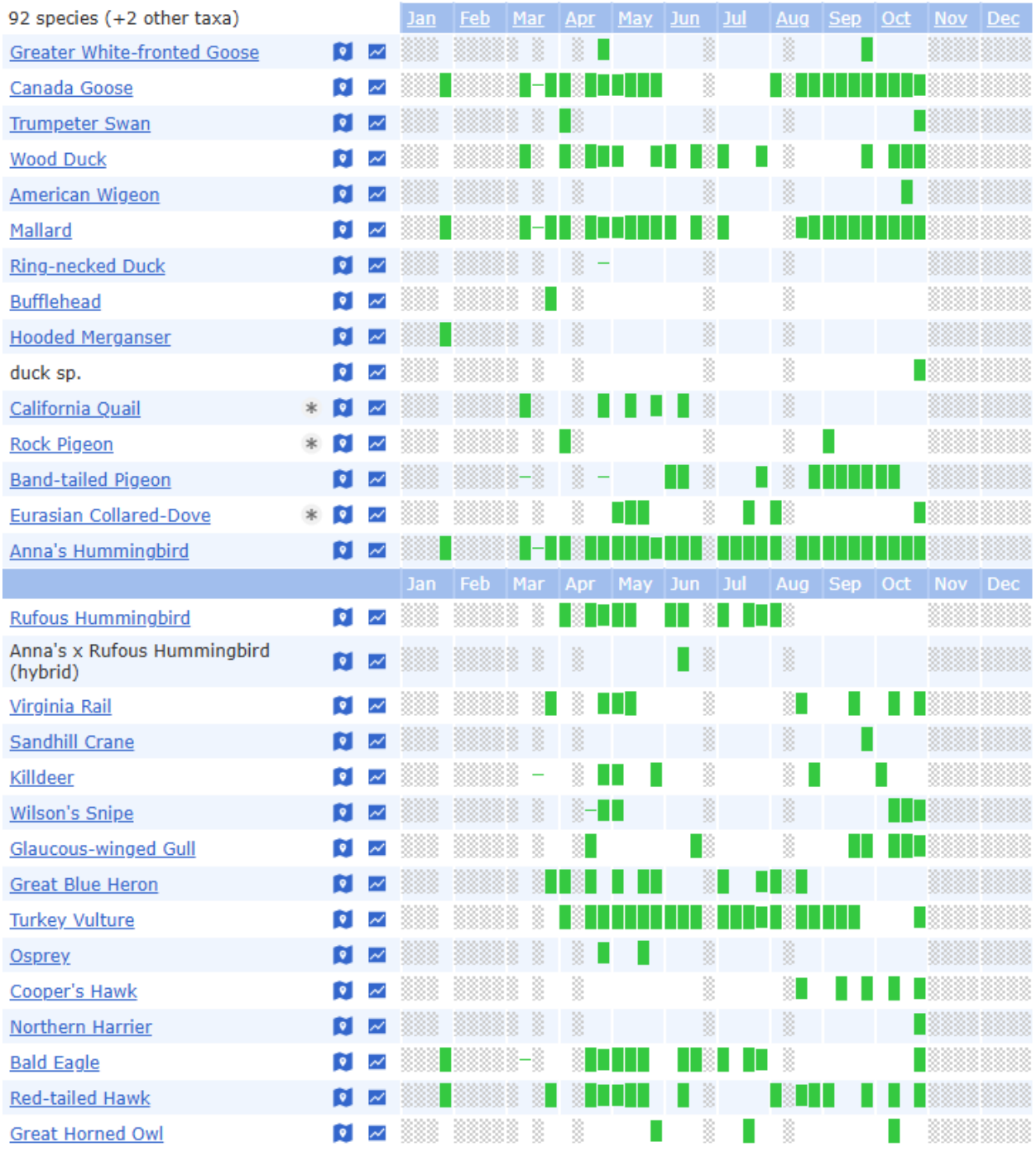

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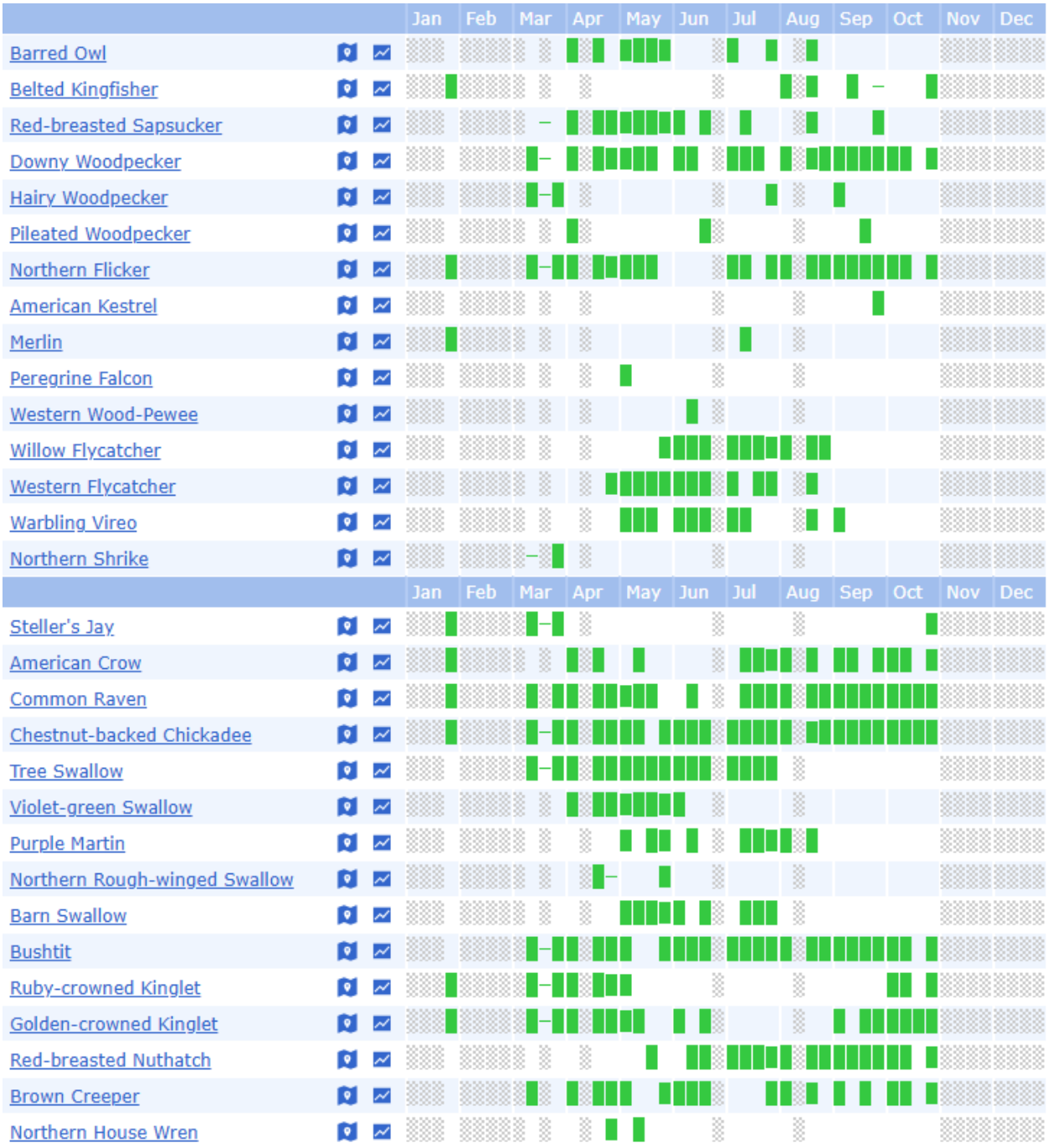
Table A.3. (continued)



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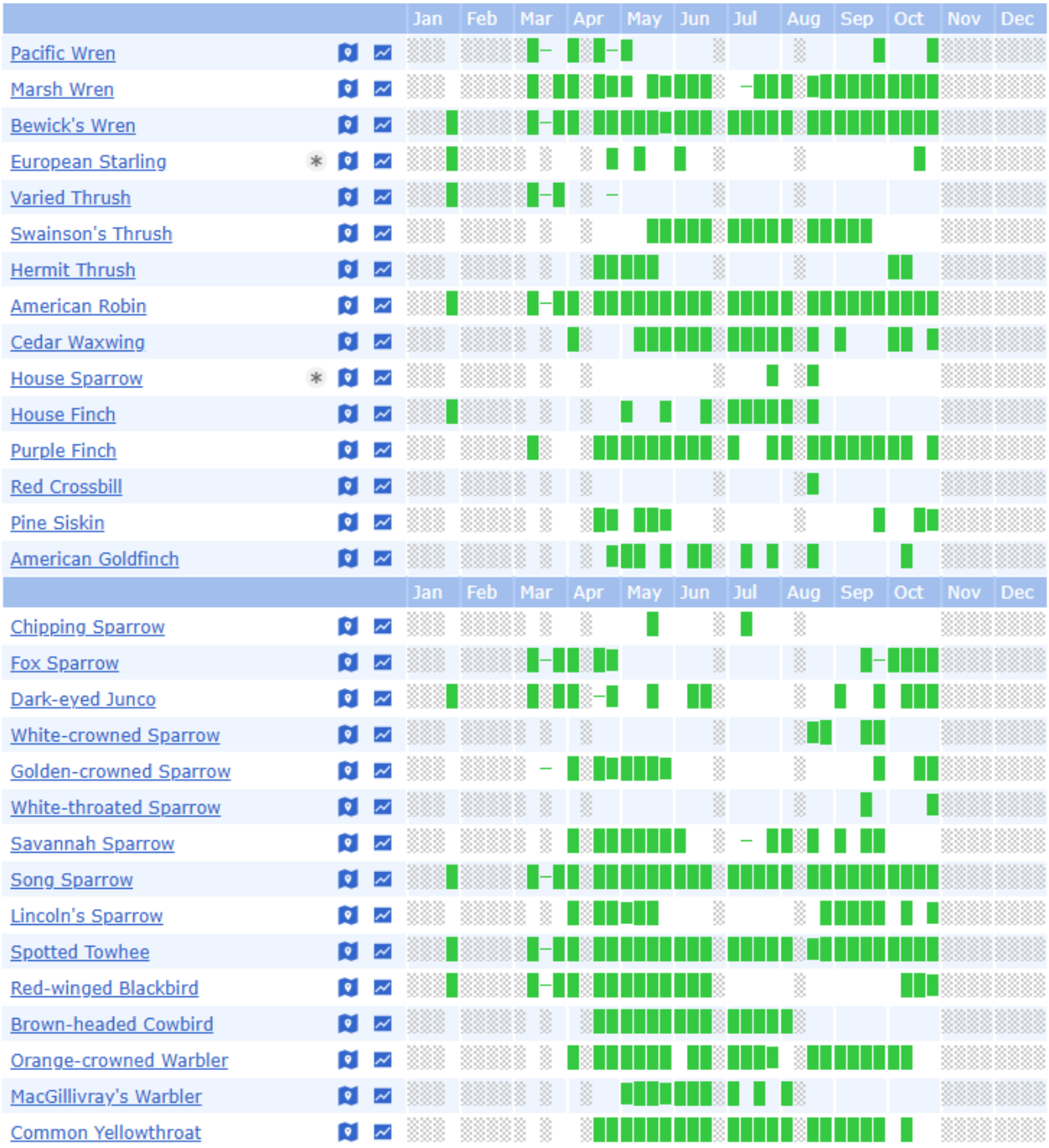

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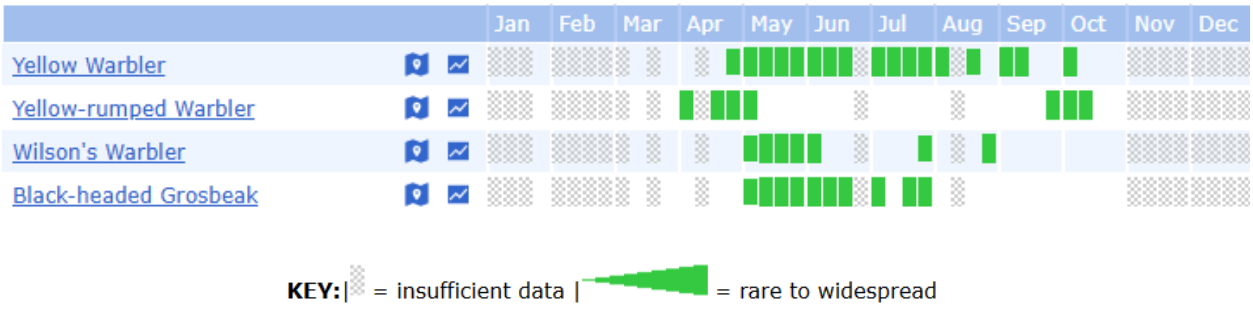

Photos B.1. Sample photographs for the VIU Bird Monitoring and Banding Project at Buttertubs West Marsh during 2024. Photos courtesy of E. Demers, S. Detilleux, and C. Watts.