APPENDIX N
STANTEC BREEDING BIRD SURVEY PROGRAM

Breeding Bird Survey Program for Proposed Wind Project near Bear Lake, Nova Scotia

Final Report

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BREEDING BIRD SURVEY PROGRAM FOR PROPOSED WIND PROJECT NEAR BEAR LAKE, NOVA SCOTIA

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1.0 INTRODUCTION

Nova Scotia Power Incorporated (NSPI) is the Proponent for the proposed Bear Lake Wind Project near Upper Vaughan, Nova Scotia (the Project). The Project consists of the construction and operation of approximately 14 to 19 wind turbines, in the range of 4.5 to 6 MW, for a total project capacity of up to 89 MW.

The Project Boundary shown on Figure 1 (in red) refers to the area within which the turbines will be located. A wider Assessment Area (Figure 1; in black) indicates the area within which additional surveys were conducted. In some cases, survey locations are outside the Project Boundary and Assessment Areas where earlier study area boundaries were used.

In 2021 and 2022, Stantec completed a variety of bird surveys in the vicinity of the proposed Project. This report presents the results of breeding bird surveys completed in 2022. The primary objective of these surveys was to characterize the composition and abundance of the breeding bird communities in the study area, including possible Species at Risk (SAR) and Species of Conservation Concern (SOCC) in June and July.

Species at Risk (SAR) are herein defined as those species listed as being either *endangered, threatened, vulnerable*, or of *special concern* under the Nova Scotia *Endangered Species Act* (NS ESA), the federal *Species at Risk Act* (SARA) and/or by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Species of Conservation Concern (SOCC) are those species that do not meet the above definition of SAR, but are listed as S1, S2, or S3 in Nova Scotia by the Atlantic Canada Conservation Data Centre (AC CDC; Table 1.1).

Table 1.1 AC CDC Status Ranks

S-Rank/ Qualifier	Description
S1	Critically Imperiled - Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences). May be especially vulnerable to extirpation.
S2	Imperiled - Imperiled in the province because of rarity due to very restricted range, very few populations (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.
S3	Vulnerable - Vulnerable in the province due to a restricted range, relatively few populations.
S4	Apparently Secure - Uncommon but not rare; some cause for long-term concern due to declines or other factors (80+ occurrences).
S5	Secure - Common, widespread, and abundant in the province.
S#S#	A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community
?	Inexact or Uncertain - Denotes inexact or uncertain numeric rank.
SNR	Unranked - Provincial conservation status not yet assessed.
SU	Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

Table 1.1 AC CDC Status Ranks

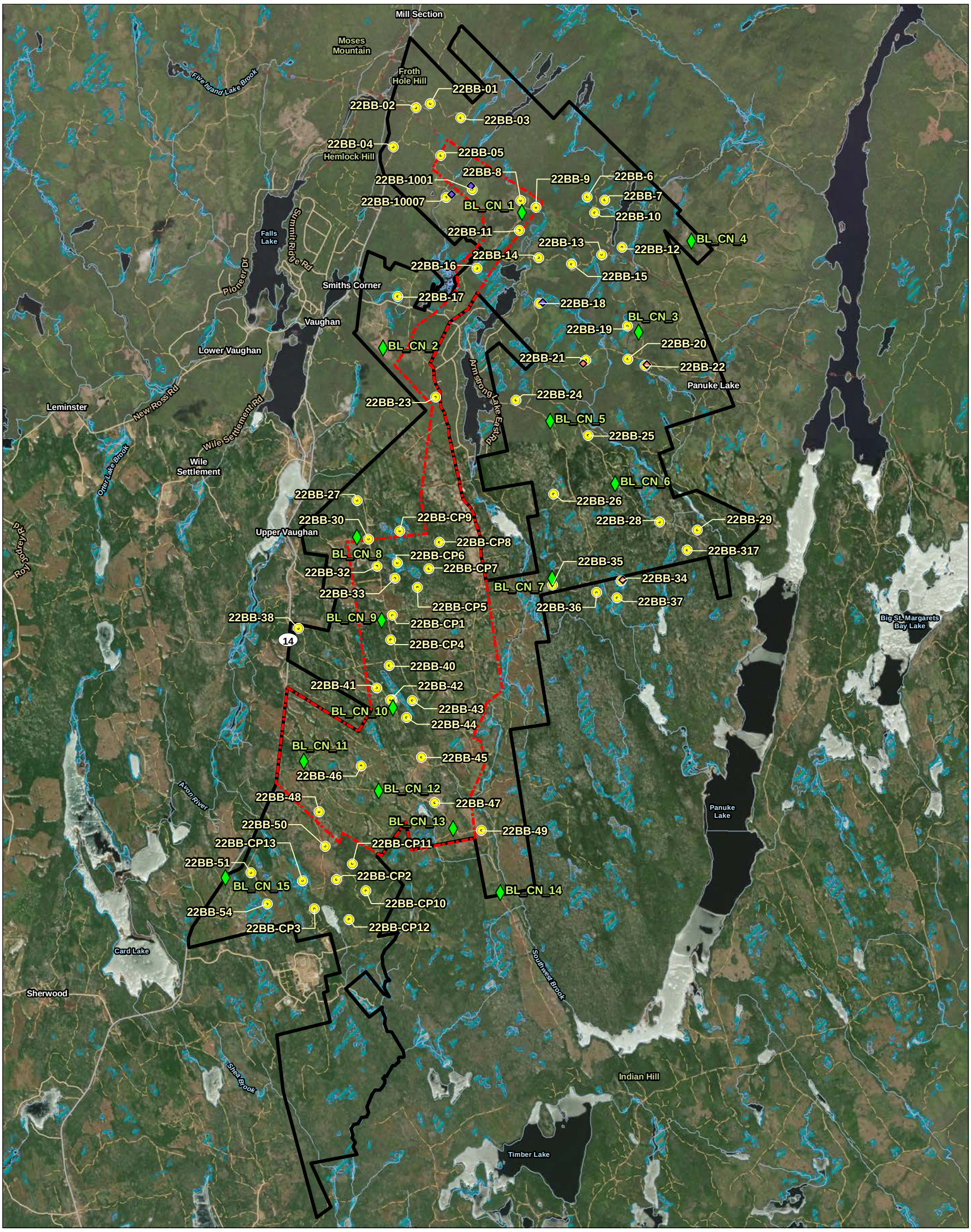
S-Rank/ Qualifier	Description
SNA	Not Applicable - A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
B	Breeding - Conservation status refers to the breeding population of the species in the province
N	Nonbreeding - Conservation status refers to the non-breeding population of the species in the province.
M	Migrant - Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the province.
Reference: AC CDC 2023	

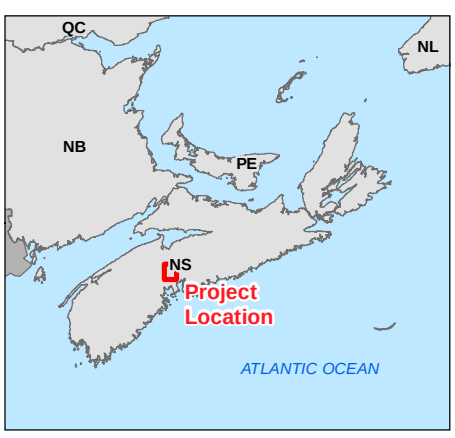
The Project is situated in the Western Ecoregion of Nova Scotia. Most of the Assessment Area and Project Boundary lie within the South Mountain Ecodistrict, with southern parts of the Project Boundary within the LaHave Drumlins Ecodistrict. The southern portion of the Assessment Area overlaps the St. Margaret's Bay Ecodistrict.

The Western Ecoregion is characterized by a milder climate than the rest of Nova Scotia, in part due to prevailing westerly winds which direct warmer temperatures inland from the Gulf of Maine. Overall, the region has early springs, warm summers, and milder winters. Most of the Project Boundary is within the South Mountain Ecodistrict within the Western Ecoregion. This Ecodistrict is characterized as a rugged upland of pine and spruce dominated forests with abundant lakes, rivers, and wetlands. The forests have been strongly influenced by several factors including a long history of forest harvesting and wildfires. Eastern white pine (*Pinus strobus*) is a typical component of most stands along with northern red oak (*Quercus rubra*; Nova Scotia Department of Natural Resources (NSDNR) 2017). Red spruce (*Picea rubens*), eastern white pine, and eastern hemlock (*Tsuga canadensis)* occupy most slope positions with moderately to well drained soils, and balsam fir (*Abies balsamea*) is often present in all stands at some stage of development.

The LaHave Drumlins Ecodistrict is also dominated by coniferous forest, with tolerant hardwoods on the upper slopes of drumlins and well drained hills. Drumlins or drumlin-like landforms which make up 46% of the Ecodistrict provide conditions for development of a late successional Acadian Forest of red spruce, eastern hemlock, eastern white pine, and yellow birch (*Betula alleghaniensis*). Sugar maple (*Acer saccharum*), northern red oak and American beech (*Fagus grandifolia*) are found in lower lying areas.

The St. Margaret's Bay Ecodistrict contains soils very similar to those of the South Mountain Ecodistrict, but a cooler climate and higher humidity and soil moisture changes the forest composition. Much of this Ecodistrict is covered with stands of Acadian softwood forests of red spruce with eastern hemlock, eastern white pine, and yellow birch. Shrub layers are composed primarily of advanced regeneration of overstory species such as balsam fir and red maple (NSDNR 2017).





Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Government of NS, Client, Stantec
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- Common Nighthawk Point Count Location
- Breeding Bird Point Count Location

Species at Risk

- Canada Warbler
- Olive-sided Flycatcher

- Project Boundary, February 2023
- Assessment Area, February 2023

- Arterial Road
- Local Road
- Resource Road / Trail
- Transmission Line
- Watercourse
- Wetland (NSE)
- Wetland (NHN)
- Waterbody

0 1,000 2,000 metres

(At original document size of 11x17)
1:80,000

N

Stantec

Project Location
Nuttby Mountain
Nova Scotia

Prepared on 2023-03-02

Client/Project
121417191_020a
Nova Scotia Power Inc.
NSPI Wind EA Support Services

Figure No.
1

Title
Breeding Bird Point Count Locations: Bear Lake

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2.0 METHODS

The breeding bird communities in the area are represented by two broad groups: species which are most detectible during crepuscular periods (dusk and dawn; crepuscular species), and those which are most detectible during the day (diurnal species). To gather data on birds within each group, two types of surveys were completed.

2.1 NIGHTJAR SURVEYS

Common nighthawk (*Chordeiles minor*) and Eastern whip-poor-will (*Antrostomus vociferus*) are nightjar species and both are federally listed as SAR. These species are most detectible in the evening or pre-dawn hours. Surveys targeting crepuscular species were completed 1-2 days before the full moon beginning 30 minutes prior to sunset on July 11 and July 12. Survey stations were established a minimum of 1 km apart in habitat suitable for breeding. Surveys began with 6 minutes of silent listening, as per the CWS Canadian Nightjar Survey Protocol (2020). Surveys were completed in good environmental conditions with low to moderate winds and no precipitation.

2.2 BREEDING BIRD POINT COUNTS

To assess species composition and relative abundance of diurnal breeding birds in the study area, a survey program was completed in a variety of habitats in June 2022. Given the wide variety of land cover types which could potentially provide suitable habitat for breeding bird species, and the patchy mosaic of habitats available in the study area, the survey approach applied representative sampling across land cover types which were considered to have potential to provide suitable habitat for breeding birds, including SAR and SOCC.

Sixty-six early morning point count locations were allocated among various land cover types (Table 2.1), accounting for site accessibility. Early morning survey stations were established with a minimum distance of 250 m between points, and 100 m from edges of other land cover types, where possible.

Table 2.1 Land Cover Types Sampled During Breeding Bird Surveys in 2022

Land Cover Type	Number of Point Counts Completed	Area of Land Cover Type Within the Project Boundary (km^2)
Forested		
Old Hardwood	2	0.006
Old Mixedwood	3	0.728
Old Softwood	10	2.334
Mature Hardwood	6	0.869
Mature Mixedwood	6	1.361
Mature Softwood	10	3.342
Young Hardwood	1	0.001

Table 2.1 Land Cover Types Sampled During Breeding Bird Surveys in 2022

Land Cover Type	Number of Point Counts Completed	Area of Land Cover Type Within the Project Boundary (km^2)
Young Mixedwood	3	0.601
Young Softwood	3	0.602
Clearcut	12	13.804
Unclassified Forest	0	0.003
Wetland		
Bog/Fen	3	0.099
Swamp	7	0.532
Unclassified Wetland	1	0.016
Other		
Anthropogenic	0	0.107
Open Water	0	0.028
Total	**66**	**24.432**

Point count locations were each visited once in June 2022, and a ten-minute point count was completed at each of the 66 locations. Survey methods were based on a modified fixed-radius point count sampling procedure (Bibby et al. 2000). All detected birds were recorded, but birds recorded more than 100 m from the observer (outside the 100 m count circle), were considered incidental. Morning point count survey days began near dawn, continued until approximately 10:00 am, and were completed under suitable environmental conditions (light winds and light to no precipitation) (Table 2.2).

Table 2.2 Summary of Environmental Conditions During 2022 Breeding Bird Point Count Surveys

Survey Date	Temperature and Cloud Cover	Beaufort Wind Speed and Precipitation
June 21, 2022	10-14ºC, 90-100% cloud cover	0-3 Beaufort wind, no precipitation to fog
June 22, 2022	9-12ºC, 50-100% cloud cover	0-2 Beaufort wind, no precipitation to drizzle
June 23, 2022	10-18ºC, 0-100% cloud cover	0-3 Beaufort wind, no precipitation
June 25, 2022	15-19ºC, 10-60% cloud cover	0-3 Beaufort wind, no precipitation
June 26, 2022	15-20ºC, 10-40% cloud cover	0-3 Beaufort wind, no precipitation

Data collected during each point count included time and date of survey, environmental conditions, and other relevant information (e.g., habitat, bird behaviour). Breeding evidence for each species was assessed using the methodology described in the Maritimes Breeding Bird Atlas (Birds Canada 2022).

3.0 RESULTS

3.1 NIGHTJAR SURVEY RESULTS

Nine common nighthawks were observed during the surveys completed on July 11 and July 12, 2022. One of these was observed incidentally prior to the start of the survey. These birds were observed at nine of the fifteen nightjar survey locations: stations BLCONI2, BLCONI3, BLCONI4, BLCONI5, BLCONI7, BLCONI8, BLCONI9, BLCONI12, and BLCONI13 (Table 3.1). All of the observations were of calling individuals, except for the male at BLCONI2 which was performing wing booms. No eastern whip-poor-will were recorded during the nightjar surveys.

Table 3.1 Nightjar Survey Data

Survey Date	Station ID	Location	Species Recorded
July 11, 2022	BLCONI6	In Assessment Area	-
July 11, 2022	BLCONI3	In Assessment Area	common nighthawk
July 11, 2022	BLCONI4	In Assessment Area	common nighthawk
July 11, 2022	BLCONI5	In Assessment Area	common nighthawk
July 11, 2022	BLCONI7	In Assessment Area	common nighthawk
July 11, 2022	BLCONI2	In Assessment Area	common nighthawk
July 12, 2022	BLCONI14	In Assessment Area	-
July 12, 2022	BLCONI13	In Project Boundary	common nighthawk
July 12, 2022	BLCONI12	In Project Boundary	common nighthawk
July 12, 2022	BLCONI11	In Project Boundary	-
July 12, 2022	BLCONI15	Outside Assessment Area	-
July 12, 2022	BLCONI9	In Project Boundary	common nighthawk
July 12, 2022	BLCONI8	In Assessment Area	common nighthawk
July 12, 2022	BLCONI10	In Project Boundary	-
July 12, 2022	BLCONI1	In Project Boundary	-

3.2 BREEDING BIRD POINT COUNT RESULTS

Sixty-six point counts were completed over five days on June 21, 22, 23, 25, and 26, 2022. Including incidentally encountered birds, sixty-five species were identified, including two exotic/domestic species (helmeted guineafowl (*Numida meleagris*) and domestic chicken (*Gallus gallus domesticus*)) (Table 3.2). Incidental observations added four wild species to the list, including American woodcock (*Scolopax minor*), barred owl (*Strix varia*), Eastern wood-pewee (*Contopus virens*) and osprey (*Pandion haliaetus*).

Relative abundance was calculated, excluding incidental observations, for each observed species. Relative abundance is a measure of the proportion of each when compared with the total number of birds observed, expressed as a percentage of the birds observed (Table 3.2). All species records are presented in Table A.1 in Appendix A along with their population status ranks.

Table 3.2 Species Diversity and Relative Abundance – 2022 Breeding Bird Point Count Surveys

Common Name	Scientific Name	Number Observed	Relative Abundance[1] (%)
ruffed grouse	*Bonasa umbellus*	2	0.32
mourning dove	*Zenaida macroura*	5	0.80
chimney swift	*Chaetura pelagica*	2	0.32
ruby-throated hummingbird	*Archilochus colubris*	6	0.96
red-tailed hawk	*Buteo jamaicensis*	1	0.16
yellow-bellied sapsucker	*Sphyrapicus varius*	12	1.93
black-backed woodpecker	*Picoides arcticus*	1	0.16
downy woodpecker	*Dryobates pubescens*	4	0.64
hairy woodpecker	*Dryobates villosus*	5	0.80
northern flicker	*Colaptes auratus*	7	1.12
pileated woodpecker	*Dryocopus pileatus*	1	0.16
olive-sided flycatcher	*Contopus cooperi*	2	0.32
yellow-bellied flycatcher	*Empidonax flaviventris*	10	1.61
alder flycatcher	*Empidonax alnorum*	13	2.09
least flycatcher	*Empidonax minimus*	2	0.32
blue-headed vireo	*Vireo solitarius*	20	3.21
red-eyed vireo	*Vireo olivaceus*	15	2.41
Canada jay	*Perisoreus canadensis*	1	0.16
blue jay	*Cyanocitta cristata*	11	1.77
American crow	*Corvus brachyrhynchos*	3	0.48
common raven	*Corvus corax*	4	0.64
black-capped chickadee	*Poecile atricapillus*	21	3.37
boreal chickadee	*Poecile hudsonicus*	2	0.32
red-breasted nuthatch	*Sitta canadensis*	13	2.09
white-breasted nuthatch	*Sitta carolinensis*	1	0.16
brown creeper	*Certhia americana*	4	0.64
winter wren	*Troglodytes hiemalis*	8	1.28
golden-crowned kinglet	*Regulus satrapa*	18	2.89
ruby-crowned kinglet	*Regulus calendula*	2	0.32
Swainson’s thrush	*Catharus ustulatus*	4	0.64
hermit thrush	*Catharus guttatus*	38	6.10
American robin	*Turdus migratorius*	10	1.61
cedar waxwing	*Bombycilla cedrorum*	8	1.28
purple finch	*Haemorhous purpureus*	7	1.12
red crossbill	*Loxia curvirostra*	13	2.09
white-winged crossbill	*Loxia leucoptera*	1	0.16

Table 3.2 Species Diversity and Relative Abundance – 2022 Breeding Bird Point Count Surveys

Common Name	Scientific Name	Number Observed	Relative Abundance[1] (%)
American goldfinch	*Spinus tristis*	8	1.28
dark-eyed junco	*Junco hyemalis*	39	6.26
white-throated sparrow	*Zonotrichia albicollis*	21	3.37
song sparrow	*Melospiza melodia*	3	0.48
swamp sparrow	*Melospiza georgiana*	2	0.32
common grackle	*Quiscalus quiscula*	6	0.96
ovenbird	*Seiurus aurocapilla*	55	8.83
northern waterthrush	*Parkesia noveboracensis*	1	0.16
black-and-white warbler	*Mniotilta varia*	19	3.05
Nashville warbler	*Leiothlypis ruficapilla*	9	1.44
common yellowthroat	*Geothlypis trichas*	39	6.26
American redstart	*Setophaga ruticilla*	6	0.96
northern parula	*Setophaga americana*	17	2.73
magnolia warbler	*Setophaga magnolia*	13	2.09
bay-breasted warbler	*Setophaga castanea*	3	0.48
blackburnian warbler	*Setophaga fusca*	9	1.44
yellow warbler	*Setophaga petechia*	2	0.32
chestnut-sided warbler	*Setophaga pensylvanica*	6	0.96
black-throated blue warbler	*Setophaga caerulescens*	14	2.25
palm warbler	*Setophaga palmarum*	18	2.89
yellow-rumped warbler	*Setophaga coronata*	29	4.65
black-throated green warbler	*Setophaga virens*	24	3.85
Canada warbler	*Cardellina canadensis*	3	0.48

Notes:
[1] Number observed/total observed

The most abundant species observed during the surveys were ovenbird (*Seiurus aurocapilla*; 55 individuals, 8.83% relative abundance), dark-eyed junco (*Junco hyemalis*; 39 individuals, 6.26% relative abundance), and common yellowthroat (*Geothlypis trichas*; 39 individuals, 6.26% relative abundance). All three species were assessed as “probable” breeders.

Four SAR were identified during the breeding bird point count surveys: chimney swift (*Chaetura pelagica*); Canada warbler (*Cardellina canadensis*); eastern wood-pewee (*Contopus virens*); and olive-sided flycatcher (*Contopus cooperi*). Two SOCC were identified: Canada jay (*Perisoreus canadensis*), and boreal chickadee (*Poecile hudsonicus*).

Species richness is defined as the number of different species recorded within a given habitat type excluding incidental observations. This was calculated for each of the habitat types sampled (Table 3.3). Level of survey effort varied between habitat types; therefore, species richness is not directly comparable between habitats. Due to the fragmented habitat in the study area, species were at times recorded in a different habitat type than the location of the observer. In calculating species richness and average abundance per survey, birds that were observed incidentally, including those recorded as fly-bys, were excluded as there was no evidence that they were using the habitat type over which they were seen.

Table 3.3 Habitat Types Sampled During Field Surveys and Species Richness

Land Classification Type	Breeding Bird Point Counts Completed	Area within Project Boundary (km^2)	Species Richness (# species)	Average Abundance Per Survey
Forested				
Old Hardwood	2	0.006	10	6.5
Old Mixedwood	3	0.728	19	10.0
Old Softwood	10	2.334	32	8.3
Mature Hardwood	6	0.869	25	7.8
Mature Mixedwood	6	1.361	28	9.7
Mature Softwood	10	3.342	37	9.2
Young Hardwood	1	0.001	5	6.0
Young Mixedwood	3	0.601	16	13.0
Young Softwood	3	0.602	19	10.0
Wetland				
Bog/Fen	3	0.099	23	12.3
Swamp	7	0.532	29	9.9
Unclassified Wetland	1	0.016	2	7.0
Other				
Clearcut	12	13.804	37	10.0

The habitat types with the highest species richness were clearcut, mature softwood, and old softwood. These habitat types also represented a large part of the available habitat and had a proportionally higher number of point counts completed.

Average abundance per survey values were calculated for each habitat type to provide a more comparable estimate of bird abundance in each habitat type. The highest average abundance per survey values were obtained in the bog/fen (12.3 individuals per survey on average), young mixedwood (13.0 individuals per survey on average), and old mixedwood and young softwood (10.0 individuals per survey on average each).

3.3 SPECIES AT RISK AND SPECIES OF CONSERVATION CONCERN

Two SOCC and five SAR were identified during the two surveys. The species and rankings are presented in Table 3.4 below. SAR are discussed further below.

Table 3.4 SAR and SOCC Recorded During Breeding Bird Surveys in 2022

Common Name	Scientific Name	SARA Status	COSEWIC Status	NS ESA Rank	AC CDC Rank
common nighthawk	*Chordeiles minor*	Threatened	Special Concern	Threatened	S3B
chimney swift	*Chaetura pelagica*	Threatened	Threatened	Endangered	S2S3B,S1M
olive-sided flycatcher	*Contopus cooperi*	Threatened	Special Concern	Threatened	S3B
eastern wood-pewee	*Contopus virens*	Special Concern	Special Concern	Vulnerable	S3S4B
Canada jay	*Perisoreus canadensis*	-	-	-	S3
boreal Chickadee	*Poecile hudsonicus*	-	-	-	S3
Canada warbler	*Cardellina canadensis*	Threatened	Special Concern	Endangered	S3B

The common nighthawk is listed as *threatened* under Schedule 1 of the SARA and *threatened* under the NS ESA. In Canada, the common nighthawk occurs in all the provinces and territories, except for Nunavut. They are commonly found throughout the maritime provinces. The common nighthawk breeds in a wide range of open, vegetation-free habitats, including dunes, beaches, grasslands, pastures, recent clear-cuts, marshes, lakeshores, and riverbanks (Government of Canada 2022). Critical habitat has not yet been identified for this species.

The chimney swift is a small cigar-shaped swift listed as *threatened* under Schedule 1 of the SARA and *endangered* under the NS ESA. This species breeds mainly in eastern North America and spends most of the day in flight feeding on aerial insects. Nests were historically made in the trunks of large hollow trees, however due to the land clearing associated with colonization and the subsequent reduction in number of large hollow trees, chimney swifts moved to nesting predominantly in urban areas (chimneys of houses) (Government of Canada 2022). Critical habitat has not been established for this species.

The olive-sided flycatcher is a medium-sized passerine listed as *threatened* under Schedule 1 of the SARA and *threatened* under the NS ESA. This species breeds throughout much of forested Canada and is most often associated with forest openings containing tall trees or snags for perching (Government of Canada 2022). Generally, preferred forest habitat is either coniferous or mixed coniferous. Suitable habitat often occurs near wetland areas. Critical habitat has not yet been established for this species.

The eastern wood-pewee is listed as *special concern* under Schedule 1 of the SARA and *vulnerable* under the NS ESA. In Canada, they can be found breeding from southeastern Saskatchewan to the Maritime Provinces. The preferred habitat of the eastern wood-pewee is the mid-canopy layer of deciduous and mixed forests located near forest edges and clearings (Government of Canada 2022). Critical habitat has not been identified for this species.

The Canada warbler is listed as *threatened* under Schedule 1 of the SARA and *endangered* under the NS ESA. During the breeding season, 85% of the global breeding population can be found in Canada. This species breeds across the southeastern parts of the country and can be found in every province and territory, with the exceptions of Newfoundland and Labrador, and Nunavut. They can primarily be found nesting in areas with wet, mixed deciduous-coniferous forest that include a well-developed shrub layer (Government of Canada 2022). Critical habitat has not yet been identified for this species.

3.4 INCIDENTAL WILDLIFE OBSERVATIONS

Incidental observations of wildlife species were made during the June breeding bird surveys, and a variety of wildlife species were noted. The following species were either observed directly or indirectly (e.g., scat, tracks).

Mammals

- white-tailed deer (*Odocoileus virginianus*)
- American black bear (*Ursus americanus*)
- North American porcupine (*Erethizon dorsatum*)

Herpetiles

- green frog (*Lithobates clamitans*)
- snapping turtle (*Chelydra serpentina*)

Except for snapping turtle each of the mammal and herpetile species above are common and considered secure in Nova Scotia.

The snapping turtle is Canada's largest freshwater turtle and is listed as *special concern* under Schedule 1 of the SARA and *vulnerable* under the NS ESA. This species is present across most of southern Canada and inhabits slow-moving water with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays or river edges and slow streams, or areas combining several of these wetland habitats (Government of Canada 2022). Critical habitat has not been designated for this species.

4.0 SUMMARY

Breeding bird surveys identified 64 species of birds during the June/July breeding bird period in 2022. Five of these species are SAR and two are SOCC. The SAR include common nighthawk, chimney swift, olive-sided flycatcher, eastern wood pewee, and Canada warbler. The SOCC include Canada jay and boreal chickadee.

Overall, the observed species are typical of the area, and can potentially breed within the habitats found in the Assessment Area.

Habitats where the terrestrial breeding bird community was most concentrated and diverse coincide with clearcut and mature to old softwood stands. These habitat types represent a proportionally large amount of the total habitat available in the Project Boundary, and thus more point counts were conducted in these habitats.

5.0 CLOSURE

The information presented in this report represents the best technical judgment of Stantec based on information provided by NSPI and the data obtained from the work. Conclusions are based on site conditions observed by Stantec at the time the work was performed at the specific survey locations and cannot be extrapolated to other areas around these locations.

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APPENDIX A

2022 Breeding Bird Data

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BB-19	44.840646, -64.154091	6/21/2022	10:27	11	None	90%	'12 - 19	None	magnolia warbler	1	Singing	Possible	90.37	No
22BB-19	44.840646, -64.154091	6/21/2022	10:27	11	None	90%	'12 - 19	None	red-tailed hawk	1	Flyover Singing/Calling	Possible	59.17	No
22BB-22	44.833524, -64.149511	6/21/2022	10:04	11	None	90%	'12 - 19	Slight	chestnut-sided warbler	1	Singing	Possible	83.59	No
22BB-19	44.840646, -64.154091	6/21/2022	10:27	11	None	90%	'12 - 19	None	alder flycatcher	1	Singing	Possible	85.92	No
22BB-20	44.834657, -64.153851	6/21/2022	9:44	11	None	90%	'6 - 11	Slight	common grackle	1	Calling	Possible	16.02	No
22BB-19	44.840646, -64.154091	6/21/2022	10:27	11	None	90%	'12 - 19	None	white-throated sparrow	1	Singing	Possible	82.38	No
22BB-22	44.833524, -64.149511	6/21/2022	10:04	11	None	90%	'12 - 19	Slight	dark-eyed junco	1	Singing	Probable	75.46	No
22BB-19	44.840646, -64.154091	6/21/2022	10:27	11	None	90%	'12 - 19	None	black-throated green warbler	1	Singing	Possible	65.2	No
22BB-19	44.840646, -64.154091	6/21/2022	10:27	11	None	90%	'12 - 19	None	dark-eyed junco	1	Singing	Probable	80.07	No
22BB-20	44.834657, -64.153851	6/21/2022	9:44	11	None	90%	'6 - 11	Slight	cedar waxwing	2	Calling	Possible	23.67	No
22BB-19	44.840646, -64.154091	6/21/2022	10:27	11	None	90%	'12 - 19	None	American goldfinch	2	Flyover Singing/Calling	Possible	48.41	No
22BB-19	44.840646, -64.154091	6/21/2022	10:27	11	None	90%	'12 - 19	None	ovenbird	1	Singing	Probable	126.11	Yes
22BB-22	44.833524, -64.149511	6/21/2022	10:04	11	None	90%	'12 - 19	Slight	chestnut-sided warbler	1	Singing	Possible	95	No
22BB-14	44.852622, -64.176791	6/21/2022	6:29	10	Fog	100%	'6 - 11	Slight	ovenbird	1	Singing	Probable	32.16	No
22BB-20	44.834657, -64.153851	6/21/2022	9:44	11	None	90%	'6 - 11	Slight	black-capped chickadee	1	Singing	Possible	40.14	No
22BB-22	44.833524, -64.149511	6/21/2022	10:04	11	None	90%	'12 - 19	Slight	yellow-rumped warbler	1	Singing	Possible	116.87	Yes
22BB-14	44.852622, -64.176791	6/21/2022	6:29	10	Fog	100%	'6 - 11	Slight	red-breasted nuthatch	1	Calling	Possible	78.51	No
22BB-20	44.834657, -64.153851	6/21/2022	9:44	11	None	90%	'6 - 11	Slight	ovenbird	1	Singing	Probable	84.43	No
22BB-14	44.852622, -64.176791	6/21/2022	6:29	10	Fog	100%	'6 - 11	Slight	common yellowthroat	1	Singing	Probable	88.41	No
22BB-14	44.852622, -64.176791	6/21/2022	6:29	10	Fog	100%	'6 - 11	Slight	white-throated sparrow	1	Calling	Possible	94.9	No
22BB-20	44.834657, -64.153851	6/21/2022	9:44	11	None	90%	'6 - 11	Slight	common yellowthroat	1	Singing	Probable	94.57	No
22BB-14	44.852622, -64.176791	6/21/2022	6:29	10	Fog	100%	'6 - 11	Slight	black-capped chickadee	1	Calling	Possible	87.19	No
22BB-22	44.833524, -64.149511	6/21/2022	10:04	11	None	90%	'12 - 19	Slight	golden-crowned kinglet	1	Singing	Possible	82.62	No
22BB-22	44.833524, -64.149511	6/21/2022	10:04	11	None	90%	'12 - 19	Slight	Canada warbler	1	Singing	Probable	46.02	No
22BB-22	44.833524, -64.149511	6/21/2022	10:04	11	None	90%	'12 - 19	Slight	black-capped chickadee	1	Singing	Possible	111.2	Yes
22BB-20	44.834657, -64.153851	6/21/2022	9:44	11	None	90%	'6 - 11	Slight	American robin	1	Singing	Possible	71.13	No
22BB-20	44.834657, -64.153851	6/21/2022	9:44	11	None	90%	'6 - 11	Slight	hermit thrush	1	Singing	Confirmed	84.16	No
22BB-14	44.852622, -64.176791	6/21/2022	6:29	10	Fog	100%	'6 - 11	Slight	common yellowthroat	1	Singing	Probable	130.65	Yes
22BB-14	44.852622, -64.176791	6/21/2022	6:29	10	Fog	100%	'6 - 11	Slight	ovenbird	1	Singing	Probable	73.93	No
22BB-19	44.840646, -64.154091	6/21/2022	10:27	11	None	90%	'12 - 19	None	common yellowthroat	1	Singing	Probable	66.46	No
22BB-20	44.834657, -64.153851	6/21/2022	9:44	11	None	90%	'6 - 11	Slight	black-throated green warbler	1	Singing	Possible	76.76	No
22BB-22	44.833524, -64.149511	6/21/2022	10:04	11	None	90%	'12 - 19	Slight	black-capped chickadee	1	Singing	Possible	119.55	Yes
22BB-22	44.833524, -64.149511	6/21/2022	10:04	11	None	90%	'12 - 19	Slight	dark-eyed junco	1	Visual and Singing/Calling	Probable	83.26	No
22BB-20	44.834657, -64.153851	6/21/2022	9:44	11	None	90%	'6 - 11	Slight	dark-eyed junco	1	Singing	Probable	53.66	No
22BB-19	44.840646, -64.154091	6/21/2022	10:27	11	None	90%	'12 - 19	None	palm warbler	1	Singing	Probable	88.1	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BB-22	44.833524, -64.149511	6/21/2022	10:04	11	None	90%	'12 - 19	Slight	alder flycatcher	1	Singing	Possible	27.21	No
22BB-14	44.852622, -64.176791	6/21/2022	6:29	10	Fog	100%	'6 - 11	Slight	palm warbler	1	Singing	Probable	71.09	No
22BB-19	44.840646, -64.154091	6/21/2022	10:27	11	None	90%	'12 - 19	None	chestnut-sided warbler	1	Singing	Possible	51.17	No
22BB-22	44.833524, -64.149511	6/21/2022	10:04	11	None	90%	'12 - 19	Slight	yellow warbler	1	Singing	Possible	89.65	No
22BB-14	44.852622, -64.176791	6/21/2022	6:29	10	Fog	100%	'6 - 11	Slight	common yellowthroat	1	Singing	Probable	95.37	No
22BB-22	44.833524, -64.149511	6/21/2022	10:04	11	None	90%	'12 - 19	Slight	common grackle	1	Visual and Singing/Calling	Possible	50.28	No
22BB-20	44.834657, -64.153851	6/21/2022	9:44	11	None	90%	'6 - 11	Slight	white-throated sparrow	1	Calling	Possible	33.03	No
22BB-14	44.852622, -64.176791	6/21/2022	6:29	10	Fog	100%	'6 - 11	Slight	white-breasted nuthatch	1	Calling	Possible	59.02	No
22BB-13	44.853384, -64.160870	6/21/2022	7:19	10	None	100%	'6 - 11	Slight	ovenbird	1	Singing	Probable	85.02	No
22BB-7	44.863187, -64.160245	6/21/2022	8:54	11	None	100%	'6 - 11	Slight	ovenbird	1	Singing	Probable	84.4	No
22BB-15	44.851623, -64.168441	6/21/2022	6:51	10	Drizzle	100%	'6 - 11	Slight	ovenbird	1	Singing	Probable	32.39	No
22BB-15	44.851623, -64.168441	6/21/2022	6:51	10	Drizzle	100%	'6 - 11	Slight	black-and-white warbler	1	Singing	Confirmed	53.96	No
22BB-7	44.863187, -64.160245	6/21/2022	8:54	11	None	100%	'6 - 11	Slight	black-throated green warbler	1	Singing	Possible	75.05	No
22BB-12	44.854784, -64.155738	6/21/2022	7:40	10	None	100%	'6 - 11	None	golden-crowned kinglet	1	Calling	Possible	53.97	No
22BB-15	44.851623, -64.168441	6/21/2022	6:51	10	Drizzle	100%	'6 - 11	Slight	black-and-white warbler	1	Singing	Confirmed	93.21	No
22BB-13	44.853384, -64.160870	6/21/2022	7:19	10	None	100%	'6 - 11	Slight	white-throated sparrow	1	Singing	Possible	113.5	Yes
22BB-15	44.851623, -64.168441	6/21/2022	6:51	10	Drizzle	100%	'6 - 11	Slight	hermit thrush	1	Singing	Confirmed	88.67	No
22BB-7	44.863187, -64.160245	6/21/2022	8:54	11	None	100%	'6 - 11	Slight	hermit thrush	1	Calling	Confirmed	56.11	No
22BB-7	44.863187, -64.160245	6/21/2022	8:54	11	None	100%	'6 - 11	Slight	blue jay	1	Calling	Possible	86.57	No
22BB-21	44.834335, -64.164526	6/21/2022	9:24	10	None	100%	'6 - 11	Slight	Canada warbler	1	Singing	Probable	84.75	No
22BB-15	44.851623, -64.168441	6/21/2022	6:51	10	Drizzle	100%	'6 - 11	Slight	black-throated green warbler	1	Singing	Possible	62.52	No
22BB-12	44.854784, -64.155738	6/21/2022	7:40	10	None	100%	'6 - 11	None	dark-eyed junco	1	Singing	Probable	86.35	No
22BB-12	44.854784, -64.155738	6/21/2022	7:40	10	None	100%	'6 - 11	None	dark-eyed junco	1	Singing	Probable	86.55	No
22BB-12	44.854784, -64.155738	6/21/2022	7:40	10	None	100%	'6 - 11	None	hermit thrush	1	Calling	Confirmed	17.08	No
22BB-21	44.834335, -64.164526	6/21/2022	9:24	10	None	100%	'6 - 11	Slight	American robin	1	Calling	Possible	104.3	Yes
22BB-13	44.853384, -64.160870	6/21/2022	7:19	10	None	100%	'6 - 11	Slight	blue-headed vireo	1	Singing	Possible	83.66	No
22BB-15	44.851623, -64.168441	6/21/2022	6:51	10	Drizzle	100%	'6 - 11	Slight	hermit thrush	1	Singing	Confirmed	122.85	Yes
22BB-21	44.834335, -64.164526	6/21/2022	9:24	10	None	100%	'6 - 11	Slight	ovenbird	1	Singing	Probable	73.84	No
22BB-21	44.834335, -64.164526	6/21/2022	9:24	10	None	100%	'6 - 11	Slight	common grackle	1	Flyover Singing/Calling	Possible	87.6	No
22BB-7	44.863187, -64.160245	6/21/2022	8:54	11	None	100%	'6 - 11	Slight	black-and-white warbler	1	Singing	Confirmed	68.19	No
22BB-15	44.851623, -64.168441	6/21/2022	6:51	10	Drizzle	100%	'6 - 11	Slight	northern parula	1	Singing	Possible	74.86	No
22BB-13	44.853384, -64.160870	6/21/2022	7:19	10	None	100%	'6 - 11	Slight	purple finch	1	Singing	Possible	58.61	No
22BB-21	44.834335, -64.164526	6/21/2022	9:24	10	None	100%	'6 - 11	Slight	black-throated green warbler	1	Singing	Possible	54.6	No
22BB-15	44.851623, -64.168441	6/21/2022	6:51	10	Drizzle	100%	'6 - 11	Slight	ovenbird	1	Singing	Probable	83.78	No
22BB-21	44.834335, -64.164526	6/21/2022	9:24	10	None	100%	'6 - 11	Slight	downy woodpecker	1	Calling	Possible	91.09	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BB-21	44.834335, -64.164526	6/21/2022	9:24	10	None	100%	'6 - 11	Slight	common yellowthroat	1	Singing	Probable	112.75	Yes
22BB-13	44.853384, -64.160870	6/21/2022	7:19	10	None	100%	'6 - 11	Slight	yellow-bellied flycatcher	1	Singing	Possible	22.88	No
22BB-13	44.853384, -64.160870	6/21/2022	7:19	10	None	100%	'6 - 11	Slight	golden-crowned kinglet	1	Singing	Possible	29.34	No
22BB-13	44.853384, -64.160870	6/21/2022	7:19	10	None	100%	'6 - 11	Slight	black-capped chickadee	1	Calling	Possible	30.33	No
22BB-15	44.851623, -64.168441	6/21/2022	6:51	10	Drizzle	100%	'6 - 11	Slight	winter wren	1	Singing	Possible	94.45	No
22BB-15	44.851623, -64.168441	6/21/2022	6:51	10	Drizzle	100%	'6 - 11	Slight	ruby-throated hummingbird	1	Visual	Possible	3.1	No
22BB-12	44.854784, -64.155738	6/21/2022	7:40	10	None	100%	'6 - 11	None	yellow-rumped warbler	1	Singing	Possible	61.3	No
22BB-7	44.863187, -64.160245	6/21/2022	8:54	11	None	100%	'6 - 11	Slight	alder flycatcher	1	Singing	Possible	36.66	No
22BB-15	44.851623, -64.168441	6/21/2022	6:51	10	Drizzle	100%	'6 - 11	Slight	northern parula	1	Singing	Possible	28.89	No
22BB-15	44.851623, -64.168441	6/21/2022	6:51	10	Drizzle	100%	'6 - 11	Slight	yellow-rumped warbler	1	Singing	Possible	45.02	No
22BB-7	44.863187, -64.160245	6/21/2022	8:54	11	None	100%	'6 - 11	Slight	dark-eyed junco	1	Singing	Probable	48.57	No
22BB-21	44.834335, -64.164526	6/21/2022	9:24	10	None	100%	'6 - 11	Slight	ovenbird	1	Singing	Probable	53.31	No
22BB-7	44.863187, -64.160245	6/21/2022	8:54	11	None	100%	'6 - 11	Slight	hermit thrush	1	Calling	Confirmed	86.4	No
22BB-21	44.834335, -64.164526	6/21/2022	9:24	10	None	100%	'6 - 11	Slight	magnolia warbler	1	Singing	Possible	46.24	No
22BB-12	44.854784, -64.155738	6/21/2022	7:40	10	None	100%	'6 - 11	None	black-capped chickadee	1	Calling	Possible	40.9	No
22BB-7	44.863187, -64.160245	6/21/2022	8:54	11	None	100%	'6 - 11	Slight	yellow-rumped warbler	1	Singing	Possible	84.37	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	common yellowthroat	1	Singing	Probable	59.04	No
22BB-7	44.863187, -64.160245	6/21/2022	8:54	11	None	100%	'6 - 11	Slight	yellow-rumped warbler	1	Singing	Possible	84.37	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	common yellowthroat	1	Singing	Probable	59.04	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	American goldfinch	1	Flyover Singing/Calling	Possible	35.76	No
22BB-6	44.863686, -64.164699	6/21/2022	8:31	11	None	100%	'6 - 11	Slight	mourning dove	1	Singing	Possible	65.95	No
22BB-10	44.860919, -64.162764	6/21/2022	8:07	11	None	100%	'2 - 5	Slight	American goldfinch	1	Calling	Possible	54.51	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	palm warbler	1	Singing	Probable	52.64	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	palm warbler	1	Calling	Probable	9.09	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	olive-sided flycatcher	1	Singing	Possible	64.68	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	dark-eyed junco	1	Singing	Probable	76.4	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	white-throated sparrow	1	Singing	Possible	82.25	No
22BB-10	44.860919, -64.162764	6/21/2022	8:07	11	None	100%	'2 - 5	Slight	hermit thrush	1	Singing	Confirmed	92.83	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	ovenbird	1	Singing	Probable	90.34	No
22BB-6	44.863686, -64.164699	6/21/2022	8:31	11	None	100%	'6 - 11	Slight	ovenbird	1	Singing	Probable	56.2	No
22BB-10	44.860919, -64.162764	6/21/2022	8:07	11	None	100%	'2 - 5	Slight	hermit thrush	1	Singing	Confirmed	80.66	No
22BB-10	44.860919, -64.162764	6/21/2022	8:07	11	None	100%	'2 - 5	Slight	black-throated green warbler	1	Singing	Possible	51.59	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	white-throated sparrow	1	Singing	Possible	120.58	Yes
22BB-6	44.863686, -64.164699	6/21/2022	8:31	11	None	100%	'6 - 11	Slight	dark-eyed junco	1	Singing	Probable	94.33	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	blue jay	1	Flyover Singing/Calling	Possible	64.5	No
22BB-6	44.863686, -64.164699	6/21/2022	8:31	11	None	100%	'6 - 11	Slight	blue-headed vireo	1	Singing	Possible	90.51	No
22BB-6	44.863686, -64.164699	6/21/2022	8:31	11	None	100%	'6 - 11	Slight	yellow-bellied sapsucker	1	Calling	Confirmed	48.84	No

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Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BB-10	44.860919, -64.162764	6/21/2022	8:07	11	None	100%	'2 - 5	Slight	dark-eyed junco	1	Singing	Probable	19.86	No
22BB-10	44.860919, -64.162764	6/21/2022	8:07	11	None	100%	'2 - 5	Slight	black-capped chickadee	4	Calling	Possible	43.49	No
22BB-6	44.863686, -64.164699	6/21/2022	8:31	11	None	100%	'6 - 11	Slight	black-throated blue warbler	1	Singing	Possible	52.1	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	black-and-white warbler	1	Singing	Confirmed	96.66	No
22BB-10	44.860919, -64.162764	6/21/2022	8:07	11	None	100%	'2 - 5	Slight	yellow-rumped warbler	1	Singing	Possible	56.82	No
22BB-10	44.860919, -64.162764	6/21/2022	8:07	11	None	100%	'2 - 5	Slight	American crow	1	Calling	Possible	86.86	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	white-throated sparrow	1	Singing	Possible	84.77	No
22BB-6	44.863686, -64.164699	6/21/2022	8:31	11	None	100%	'6 - 11	Slight	black-throated green warbler	1	Singing	Possible	103.13	Yes
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	ovenbird	1	Singing	Probable	111.01	Yes
22BB-6	44.863686, -64.164699	6/21/2022	8:31	11	None	100%	'6 - 11	Slight	black-throated green warbler	1	Singing	Possible	53.81	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	magnolia warbler	1	Singing	Possible	92.96	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	hermit thrush	1	Singing	Confirmed	118.81	Yes
22BB-10	44.860919, -64.162764	6/21/2022	8:07	11	None	100%	'2 - 5	Slight	blue-headed vireo	1	Singing	Possible	67.97	No
22BB-6	44.863686, -64.164699	6/21/2022	8:31	11	None	100%	'6 - 11	Slight	purple finch	1	Singing	Possible	59.24	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	yellow-rumped warbler	1	Singing	Possible	82.89	No
22BB-18	44.844506, -64.176406	6/21/2022	6:09	10	Fog	100%	'2 - 5	None	common yellowthroat	1	Singing	Probable	66.01	No
22BB-50	44.746220, -64.228554	6/22/2022	7:43	10	None	60%	'2 - 5	None	blue jay	1	Calling	Possible	71.39	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	alder flycatcher	1	Singing	Possible	76.94	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	American redstart	1	Singing	Possible	62.55	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	northern flicker	1	Visual and Singing/Calling	Possible	34.65	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	white-throated sparrow	1	Singing	Possible	87.26	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	ovenbird	1	Singing	Probable	84.45	No
22BB-50	44.746220, -64.228554	6/22/2022	7:43	10	None	60%	'2 - 5	None	red-eyed vireo	1	Singing	Possible	69.58	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	red-eyed vireo	1	Singing	Possible	73.1	No
22BB-50	44.746220, -64.228554	6/22/2022	7:43	10	None	60%	'2 - 5	None	blue jay	1	Calling	Possible	66.42	No
22BB-50	44.746220, -64.228554	6/22/2022	7:43	10	None	60%	'2 - 5	None	ovenbird	1	Singing	Probable	64.98	No
22BB-50	44.746220, -64.228554	6/22/2022	7:43	10	None	60%	'2 - 5	None	hermit thrush	1	Visual	Confirmed	7.96	No
22BB-50	44.746220, -64.228554	6/22/2022	7:43	10	None	60%	'2 - 5	None	black-throated green warbler	1	Singing	Possible	55.93	No
22BB-50	44.746220, -64.228554	6/22/2022	7:43	10	None	60%	'2 - 5	None	red-eyed vireo	1	Singing	Possible	17.64	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	yellow-bellied flycatcher	1	Singing	Possible	15.55	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	hairy woodpecker	1	Calling	Possible	83.9	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	chestnut-sided warbler	1	Singing	Possible	63.09	No
22BB-50	44.746220, -64.228554	6/22/2022	7:43	10	None	60%	'2 - 5	None	red-eyed vireo	1	Singing	Possible	85.35	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	ovenbird	1	Singing	Probable	70.69	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	winter wren	1	Singing	Possible	86.69	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	yellow-rumped warbler	1	Singing	Possible	70.98	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	American robin	1	Calling	Possible	43.97	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	song sparrow	1	Singing	Possible	23.69	No
22BB-45	44.762548, -64.204585	6/22/2022	8:33	10	None	80%	'6 - 11	None	yellow warbler	1	Singing	Possible	28.12	No
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	red-breasted nuthatch	1	Singing	Possible	38.88	No
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	hermit thrush	1	Singing	Confirmed	131.29	Yes
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	common raven	1	Singing	Possible	86.74	No
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	common grackle	3	Flyover Singing/Calling	Possible	83.18	No
22BB-47	44.754372, -64.201049	6/22/2022	8:54	11	None	70%	'6 - 11	None	black-throated green warbler	1	Singing	Possible	43.05	No
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	common yellowthroat	1	Singing	Probable	94.61	No
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	yellow-rumped warbler	1	Singing	Possible	131.26	Yes
22BB-38	44.785347, -64.236106	6/22/2022	9:49	11	None	70%	'2 - 5	Slight	American redstart	1	Singing	Possible	77.89	No
22BB-47	44.754372, -64.201049	6/22/2022	8:54	11	None	70%	'6 - 11	None	white-throated sparrow	1	Singing	Possible	95.3	No
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	purple finch	1	Singing	Possible	80.22	No
22BB-47	44.754372, -64.201049	6/22/2022	8:54	11	None	70%	'6 - 11	None	common yellowthroat	1	Singing	Probable	56.05	No
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	common yellowthroat	1	Singing	Probable	70.32	No
22BB-47	44.754372, -64.201049	6/22/2022	8:54	11	None	70%	'6 - 11	None	ovenbird	1	Singing	Probable	87.41	No
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	Nashville warbler	1	Singing	Possible	74.89	No
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	northern flicker	1	Visual and Singing/Calling	Possible	18.08	No
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	common yellowthroat	1	Visual and Singing/Calling	Probable	5.84	No
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	yellow-bellied flycatcher	1	Singing	Possible	30.55	No
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	Nashville warbler	1	Singing	Possible	70.65	No
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	hermit thrush	1	Singing	Confirmed	110.08	Yes
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	dark-eyed junco	1	Singing	Probable	78.06	No
22BB-38	44.785347, -64.236106	6/22/2022	9:49	11	None	70%	'2 - 5	Slight	ruby-throated hummingbird	1	Visual and Singing/Calling	Possible	21.28	No
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	red-breasted nuthatch	1	Calling	Possible	113.37	Yes
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	common yellowthroat	1	Singing	Probable	96.28	No
22BB-47	44.754372, -64.201049	6/22/2022	8:54	11	None	70%	'6 - 11	None	ovenbird	1	Singing	Probable	87.73	No
22BB-47	44.754372, -64.201049	6/22/2022	8:54	11	None	70%	'6 - 11	None	American robin	1	Singing	Possible	64.31	No
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	white-throated sparrow	1	Singing	Possible	82.06	No
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	alder flycatcher	1	Singing	Possible	24.79	No
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	swamp sparrow	1	Visual and Singing/Calling	Possible	22.47	No
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	blue-headed vireo	1	Singing	Possible	86.59	No
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	alder flycatcher	1	Singing	Possible	45.67	No
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	ovenbird	1	Singing	Probable	124.16	Yes

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BB-47	44.754372, -64.201049	6/22/2022	8:54	11	None	70%	'6 - 11	None	blue jay	1	Visual	Possible	14.76	No
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	ovenbird	1	Singing	Probable	116.84	Yes
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	common yellowthroat	1	Singing	Probable	23.92	No
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	common yellowthroat	1	Singing	Probable	36.1	No
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	red-breasted nuthatch	2	Calling	Possible	48.93	No
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	golden-crowned kinglet	2	Calling	Possible	80.79	No
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	white-throated sparrow	1	Singing	Possible	110.77	Yes
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	white-throated sparrow	1	Singing	Possible	91.3	No
22BB-38	44.785347, -64.236106	6/22/2022	9:49	11	None	70%	'2 - 5	Slight	ovenbird	1	Singing	Probable	44.83	No
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	black-throated green warbler	1	Singing	Possible	94.19	No
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	common raven	1	Flyover Singing/Calling	Possible	45.73	No
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	ovenbird	1	Singing	Probable	93.78	No
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	yellow-rumped warbler	1	Singing	Possible	80.13	No
22BB-47	44.754372, -64.201049	6/22/2022	8:54	11	None	70%	'6 - 11	None	dark-eyed junco	1	Singing	Probable	73.23	No
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	black-capped chickadee	1	Singing	Possible	110.47	Yes
22BB-38	44.785347, -64.236106	6/22/2022	9:49	11	None	70%	'2 - 5	Slight	northern parula	1	Singing	Possible	72.4	No
22BB-46	44.760766, -64.219797	6/22/2022	8:09	10	None	80%	'2 - 5	None	yellow-rumped warbler	1	Singing	Possible	39.09	No
22BB-38	44.785347, -64.236106	6/22/2022	9:49	11	None	70%	'2 - 5	Slight	red-eyed vireo	1	Singing	Possible	80.25	No
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	black-and-white warbler	1	Singing	Confirmed	71.61	No
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	hermit thrush	1	Singing	Confirmed	134.32	Yes
22BB-49	44.749495, -64.189116	6/22/2022	9:18	11	Drizzle	80%	'6 - 11	None	white-throated sparrow	1	Singing	Possible	95.29	No
22BB-38	44.785347, -64.236106	6/22/2022	9:49	11	None	70%	'2 - 5	Slight	black-throated blue warbler	1	Singing	Possible	48.13	No
22BB-54	44.735748, -64.242899	6/22/2022	6:23	10	None	50%	'2 - 5	None	dark-eyed junco	1	Singing	Probable	74.78	No
22BB-51	44.741263, -64.247190	6/22/2022	6:51	10	None	70%	'2 - 5	None	American robin	1	Singing	Possible	94.18	No
22BB-48	44.752455, -64.230191	6/22/2022	7:22	10	None	60%	'2 - 5	None	American goldfinch	1	Flyover Singing/Calling	Possible	33.96	No
22BB-48	44.752455, -64.230191	6/22/2022	7:22	10	None	60%	'2 - 5	None	hermit thrush	1	Calling	Confirmed	68.27	No
22BB-48	44.752455, -64.230191	6/22/2022	7:22	10	None	60%	'2 - 5	None	American robin	1	Calling	Possible	34.05	No
22BB-48	44.752455, -64.230191	6/22/2022	7:22	10	None	60%	'2 - 5	None	red-eyed vireo	1	Singing	Possible	75.49	No
22BB-51	44.741263, -64.247190	6/22/2022	6:51	10	None	70%	'2 - 5	None	ovenbird	1	Singing	Probable	82.37	No
22BB-48	44.752455, -64.230191	6/22/2022	7:22	10	None	60%	'2 - 5	None	ovenbird	1	Singing	Probable	60.04	No
22BB-51	44.741263, -64.247190	6/22/2022	6:51	10	None	70%	'2 - 5	None	chestnut-sided warbler	1	Singing	Possible	66.6	No
22BB-48	44.752455, -64.230191	6/22/2022	7:22	10	None	60%	'2 - 5	None	alder flycatcher	1	Singing	Possible	101.61	Yes
22BB-51	44.741263, -64.247190	6/22/2022	6:51	10	None	70%	'2 - 5	None	American robin	1	Visual	Possible	7.12	No
22BB-51	44.741263, -64.247190	6/22/2022	6:51	10	None	70%	'2 - 5	None	alder flycatcher	1	Singing	Possible	86.08	No
22BB-48	44.752455, -64.230191	6/22/2022	7:22	10	None	60%	'2 - 5	None	American redstart	1	Singing	Possible	59.84	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BB-48	44.752455, -64.230191	6/22/2022	7:22	10	None	60%	'2 - 5	None	cedar waxwing	1	Calling	Possible	33.46	No
22BB-51	44.741263, -64.247190	6/22/2022	6:51	10	None	70%	'2 - 5	None	black-and-white warbler	1	Singing	Confirmed	40.96	No
22BB-51	44.741263, -64.247190	6/22/2022	6:51	10	None	70%	'2 - 5	None	black-throated green warbler	1	Singing	Possible	54.41	No
22BB-48	44.752455, -64.230191	6/22/2022	7:22	10	None	60%	'2 - 5	None	ovenbird	1	Singing	Probable	96.24	No
22BB-51	44.741263, -64.247190	6/22/2022	6:51	10	None	70%	'2 - 5	None	hermit thrush	1	Singing	Confirmed	81.86	No
22BB-51	44.741263, -64.247190	6/22/2022	6:51	10	None	70%	'2 - 5	None	common raven	1	Calling	Possible	127.56	Yes
22BB-48	44.752455, -64.230191	6/22/2022	7:22	10	None	60%	'2 - 5	None	Nashville warbler	1	Singing	Possible	30.74	No
22BB-51	44.741263, -64.247190	6/22/2022	6:51	10	None	70%	'2 - 5	None	yellow-rumped warbler	1	Singing	Possible	43.95	No
22BB-51	44.741263, -64.247190	6/22/2022	6:51	10	None	70%	'2 - 5	None	common yellowthroat	1	Singing	Probable	108.51	Yes
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	yellow-rumped warbler	1	Singing	Possible	23.24	No
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	American crow	2	Calling	Possible	79.86	No
22BB-24	44.826968, -64.181980	6/23/2022	8:26	11	None	100%	'2 - 5	Slight	black-and-white warbler	1	Singing	Confirmed	70.36	No
22BB-24	44.826968, -64.181980	6/23/2022	8:26	11	None	100%	'2 - 5	Slight	ovenbird	1	Singing	Probable	64.26	No
22BB-24	44.826968, -64.181980	6/23/2022	8:26	11	None	100%	'2 - 5	Slight	black-and-white warbler	1	Singing	Confirmed	55.55	No
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	ovenbird	1	Singing	Probable	63.08	No
22BB-17	44.845305, -64.212258	6/23/2022	8:55	11	None	100%	'<2	None	yellow-rumped warbler	1	Singing	Possible	108.98	Yes
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	black-throated blue warbler	1	Singing	Possible	55.98	No
22BB-17	44.845305, -64.212258	6/23/2022	8:55	11	None	100%	'<2	None	black-capped chickadee	1	Singing	Possible	108.24	Yes
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	helmeted guineafowl	3	Calling	Possible	119.24	Yes
22BB-17	44.845305, -64.212258	6/23/2022	8:55	11	None	100%	'<2	None	ovenbird	1	Singing	Probable	87.85	No
22BB-17	44.845305, -64.212258	6/23/2022	8:55	11	None	100%	'<2	None	red-eyed vireo	1	Singing	Possible	64.99	No
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	domestic chicken	1	Singing	Possible	100.77	Yes
22BB-17	44.845305, -64.212258	6/23/2022	8:55	11	None	100%	'<2	None	northern parula	1	Singing	Possible	47.48	No
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	common yellowthroat	1	Singing	Probable	69.72	No
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	hermit thrush	1	Singing	Confirmed	79.61	No
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	red-breasted nuthatch	1	Calling	Possible	80.1	No
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	palm warbler	1	Singing	Probable	87.22	No
22BB-24	44.826968, -64.181980	6/23/2022	8:26	11	None	100%	'2 - 5	Slight	red crossbill	11	Flyover Singing/Calling	Possible	17.35	No
22BB-17	44.845305, -64.212258	6/23/2022	8:55	11	None	100%	'<2	None	northern parula	1	Singing	Possible	81.49	No
22BB-24	44.826968, -64.181980	6/23/2022	8:26	11	None	100%	'2 - 5	Slight	purple finch	1	Singing	Possible	48.33	No
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	dark-eyed junco	1	Singing	Probable	94.36	No
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	black-capped chickadee	1	Visual and Singing/Calling	Possible	12.43	No
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	hermit thrush	1	Calling	Confirmed	86.59	No
22BB-17	44.845305, -64.212258	6/23/2022	8:55	11	None	100%	'<2	None	dark-eyed junco	1	Singing	Probable	92.08	No
22BB-24	44.826968, -64.181980	6/23/2022	8:26	11	None	100%	'2 - 5	Slight	dark-eyed junco	1	Singing	Probable	82.74	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	black-throated green warbler	1	Singing	Possible	39.35	No
22BB-24	44.826968, -64.181980	6/23/2022	8:26	11	None	100%	'2 - 5	Slight	golden-crowned kinglet	1	Singing	Possible	11.12	No
22BB-17	44.845305, -64.212258	6/23/2022	8:55	11	None	100%	'<2	None	hermit thrush	1	Singing	Confirmed	82.51	No
22BB-23	44.827298, -64.202289	6/23/2022	9:17	12	None	70%	'6 - 11	None	black-capped chickadee	1	Singing	Possible	51.38	No
22BB-24	44.826968, -64.181980	6/23/2022	8:26	11	None	100%	'2 - 5	Slight	yellow-rumped warbler	1	Singing	Possible	70.41	No
22BB-17	44.845305, -64.212258	6/23/2022	8:55	11	None	100%	'<2	None	alder flycatcher	1	Singing	Possible	48.47	No
22BB-25	44.820808, -64.163611	6/23/2022	8:51	11	None	80%	'6 - 11	Slight	Blackburnian warbler	2	Visual and Singing/Calling	Possible	7.42	No
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	common raven	1	Calling	Possible	85.76	No
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	common grackle	1	Calling	Possible	116.65	Yes
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	ruby-throated hummingbird	1	Flyover Visual and Singing/Calling	Possible	19.4	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	hermit thrush	1	Calling	Confirmed	85.48	No
22BB-25	44.820808, -64.163611	6/23/2022	8:51	11	None	80%	'6 - 11	Slight	magnolia warbler	1	Singing	Possible	62.94	No
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	dark-eyed junco	1	Calling	Probable	17.64	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	song sparrow	1	Singing	Possible	68.44	No
22BB-25	44.820808, -64.163611	6/23/2022	8:51	11	None	80%	'6 - 11	Slight	ovenbird	1	Singing	Probable	84.75	No
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	ovenbird	1	Singing	Probable	66.03	No
22BB-25	44.820808, -64.163611	6/23/2022	8:51	11	None	80%	'6 - 11	Slight	black-throated green warbler	1	Singing	Possible	73.35	No
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	white-throated sparrow	1	Singing	Possible	138.59	Yes
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	American robin	1	Singing	Possible	41.31	No
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	black-and-white warbler	1	Singing	Confirmed	72.28	No
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	blue-headed vireo	1	Singing	Possible	70.29	No
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	yellow-bellied sapsucker	1	Calling	Confirmed	89.34	No
22BB-25	44.820808, -64.163611	6/23/2022	8:51	11	None	80%	'6 - 11	Slight	red-breasted nuthatch	1	Singing	Possible	36.92	No
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	common yellowthroat	1	Singing	Probable	91.6	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	hermit thrush	1	Singing	Confirmed	86.91	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	ruby-throated hummingbird	1	Visual and Singing/Calling	Possible	20.78	No
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	black-capped chickadee	1	Singing	Possible	118.94	Yes
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	red-breasted nuthatch	1	Singing	Possible	49.17	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	dark-eyed junco	1	Calling	Probable	54.83	No
22BB-25	44.820808, -64.163611	6/23/2022	8:51	11	None	80%	'6 - 11	Slight	chestnut-sided warbler	1	Singing	Possible	32.98	No
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	ovenbird	1	Singing	Probable	82.13	No
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	dark-eyed junco	1	Singing	Probable	41.35	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	ovenbird	1	Singing	Probable	54.85	No
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	purple finch	1	Flyover Singing/Calling	Possible	87.23	No
22BB-25	44.820808, -64.163611	6/23/2022	8:51	11	None	80%	'6 - 11	Slight	black-and-white warbler	1	Singing	Confirmed	80.19	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	northern parula	1	Singing	Possible	75.3	No
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	blue-headed vireo	1	Singing	Possible	76.99	No
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	black-and-white warbler	1	Singing	Confirmed	19.14	No
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	northern waterthrush	1	Singing	Possible	108.77	Yes
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	common yellowthroat	1	Visual and Singing/Calling	Probable	14.01	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	dark-eyed junco	1	Singing	Probable	72.06	No
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	blue jay	1	Calling	Possible	92.68	No
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	white-throated sparrow	1	Singing	Possible	129.53	Yes
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	northern waterthrush	1	Singing	Possible	15.53	No
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	ovenbird	1	Singing	Probable	88.41	No
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	brown creeper	1	Singing	Possible	55.82	No
22BB-25	44.820808, -64.163611	6/23/2022	8:51	11	None	80%	'6 - 11	Slight	black-throated green warbler	1	Singing	Possible	30.56	No
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	black-and-white warbler	1	Singing	Confirmed	42.93	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	blue-headed vireo	1	Singing	Possible	72.91	No
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	northern flicker	1	Calling	Possible	75.29	No
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	winter wren	1	Singing	Possible	65.81	No
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	hermit thrush	1	Singing	Confirmed	107.53	Yes
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	northern parula	1	Singing	Possible	95.49	No
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	dark-eyed junco	1	Singing	Probable	29.32	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	dark-eyed junco	1	Singing	Probable	60.54	No
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	dark-eyed junco	1	Singing	Probable	55.48	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	alder flycatcher	1	Singing	Possible	17.81	No
22BB-25	44.820808, -64.163611	6/23/2022	8:51	11	None	80%	'6 - 11	Slight	black-capped chickadee	1	Singing	Possible	84.55	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	yellow-bellied sapsucker	1	Singing	Confirmed	90.25	No
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	yellow-rumped warbler	1	Singing	Possible	56.2	No
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	common yellowthroat	1	Singing	Probable	93.61	No
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	alder flycatcher	1	Singing	Possible	58.5	No
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	black-throated blue warbler	1	Singing	Possible	92.8	No
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	song sparrow	1	Calling	Possible	43.63	No
22BB-11	44.857522, -64.181738	6/23/2022	9:52	11	None	100%	'2 - 5	None	hermit thrush	1	Singing	Confirmed	87.54	No
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	hairy woodpecker	1	Visual and Singing/Calling	Possible	23.42	No
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	hermit thrush	1	Singing	Confirmed	77.26	No
22BB-25	44.820808, -64.163611	6/23/2022	8:51	11	None	80%	'6 - 11	Slight	Nashville warbler	1	Singing	Possible	44.63	No
22BB-8	44.862917, -64.181555	6/23/2022	7:48	11	None	100%	'2 - 5	None	dark-eyed junco	1	Singing	Probable	40.15	No
22BB-25	44.820808, -64.163611	6/23/2022	8:51	11	None	80%	'6 - 11	Slight	winter wren	1	Singing	Possible	68.93	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BB-25	44.820808, -64.163611	6/23/2022	8:51	11	None	80%	'6 - 11	Slight	dark-eyed junco	1	Singing	Probable	69.22	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	common yellowthroat	1	Singing	Probable	72.46	No
22BB-16	44.850611, -64.192323	6/23/2022	9:24	10	None	100%	'2 - 5	None	winter wren	1	Singing	Possible	88.7	No
22BB-9	44.861737, -64.177637	6/23/2022	7:17	11	None	100%	'2 - 5	None	black-backed woodpecker	1	Calling	Possible	81.26	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	olive-sided flycatcher	1	Singing	Possible	125.03	Yes
22bb33	44.794654, -64.211913	6/22/2022	11:02	10	None	100%	'6 - 11	Medium	northern parula	1	Singing	Possible	90.38	No
22bb1001	44.864730, -64.193857	6/23/2022	12:55	18	None	0%	'12 - 19	None	cedar waxwing	1	Flyover Singing/Calling	Possible	48.91	No
22bb32	44.796749, -64.216501	6/22/2022	10:33	9	None	100%	'6 - 11	None	black-capped chickadee	1	Calling	Possible	39.87	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	ovenbird	1	Singing	Probable	92.46	No
22bb32	44.796749, -64.216501	6/22/2022	10:33	9	None	100%	'6 - 11	None	ovenbird	1	Singing	Probable	87.97	No
22bb30	44.801608, -64.218732	6/22/2022	10:07	9	None	100%	'2 - 5	None	ovenbird	1	Visual	Probable	34.32	No
22bb33	44.794654, -64.211913	6/22/2022	11:02	10	None	100%	'6 - 11	Medium	red-eyed vireo	1	Singing	Possible	40.77	No
22bb32	44.796749, -64.216501	6/22/2022	10:33	9	None	100%	'6 - 11	None	blue-headed vireo	1	Singing	Possible	58.09	No
22bb1001	44.864730, -64.193857	6/23/2022	12:55	18	None	0%	'12 - 19	None	blue-headed vireo	1	Singing	Possible	67.15	No
22bb33	44.794654, -64.211913	6/22/2022	11:02	10	None	100%	'6 - 11	Medium	hermit thrush	1	Singing	Confirmed	134.84	Yes
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	common yellowthroat	1	Singing	Probable	69.46	No
22bb32	44.796749, -64.216501	6/22/2022	10:33	9	None	100%	'6 - 11	None	yellow-rumped warbler	1	Singing	Possible	84.68	No
22bb1001	44.864730, -64.193857	6/23/2022	12:55	18	None	0%	'12 - 19	None	common yellowthroat	1	Singing	Probable	79.31	No
22bb32	44.796749, -64.216501	6/22/2022	10:33	9	None	100%	'6 - 11	None	hermit thrush	1	Calling	Confirmed	41.08	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	white-throated sparrow	1	Singing	Possible	53.5	No
22bb1001	44.864730, -64.193857	6/23/2022	12:55	18	None	0%	'12 - 19	None	olive-sided flycatcher	1	Calling	Possible	81.68	No
22bb33	44.794654, -64.211913	6/22/2022	11:02	10	None	100%	'6 - 11	Medium	ovenbird	1	Singing	Probable	50.7	No
22bb30	44.801608, -64.218732	6/22/2022	10:07	9	None	100%	'2 - 5	None	northern parula	1	Singing	Possible	80.08	No
22bb32	44.796749, -64.216501	6/22/2022	10:33	9	None	100%	'6 - 11	None	blue jay	1	Calling	Possible	19.63	No
22bb30	44.801608, -64.218732	6/22/2022	10:07	9	None	100%	'2 - 5	None	ovenbird	1	Singing	Probable	93.21	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	black-and-white warbler	1	Singing	Confirmed	58.43	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	American goldfinch	1	Calling	Possible	38.89	No
22bb1001	44.864730, -64.193857	6/23/2022	12:55	18	None	0%	'12 - 19	None	hermit thrush	1	Singing	Confirmed	76.15	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	downy woodpecker	1	Calling	Possible	48.19	No
22bb1001	44.864730, -64.193857	6/23/2022	12:55	18	None	0%	'12 - 19	None	alder flycatcher	1	Calling	Possible	39.89	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	ruby-throated hummingbird	1	Visual	Possible	4.89	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	black-capped chickadee	1	Visual and Singing/Calling	Possible	43.62	No
22bb30	44.801608, -64.218732	6/22/2022	10:07	9	None	100%	'2 - 5	None	American redstart	1	Visual	Possible	17.68	No
22bb32	44.796749, -64.216501	6/22/2022	10:33	9	None	100%	'6 - 11	None	golden-crowned kinglet	1	Calling	Possible	46.29	No
22bb33	44.794654, -64.211913	6/22/2022	11:02	10	None	100%	'6 - 11	Medium	hermit thrush	1	Singing	Confirmed	93.18	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22bb1001	44.864730, -64.193857	6/23/2022	12:55	18	None	0%	'12 - 19	None	white-throated sparrow	1	Singing	Possible	77.94	No
22bb33	44.794654, -64.211913	6/22/2022	11:02	10	None	100%	'6 - 11	Medium	ovenbird	1	Singing	Probable	87.94	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	red-breasted nuthatch	1	Singing	Possible	115.06	Yes
22bb1001	44.864730, -64.193857	6/23/2022	12:55	18	None	0%	'12 - 19	None	ruby-throated hummingbird	1	Calling	Possible	23.29	No
22bb32	44.796749, -64.216501	6/22/2022	10:33	9	None	100%	'6 - 11	None	red-eyed vireo	1	Calling	Possible	24.28	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	white-throated sparrow	1	Singing	Possible	85.53	No
22bb30	44.801608, -64.218732	6/22/2022	10:07	9	None	100%	'2 - 5	None	blue jay	1	Calling	Possible	98.95	No
22bb30	44.801608, -64.218732	6/22/2022	10:07	9	None	100%	'2 - 5	None	black-throated green warbler	1	Singing	Possible	94.97	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	blue jay	1	Calling	Possible	98.87	No
22bb1001	44.864730, -64.193857	6/23/2022	12:55	18	None	0%	'12 - 19	None	least flycatcher	1	Singing	Possible	67.35	No
22bb32	44.796749, -64.216501	6/22/2022	10:33	9	None	100%	'6 - 11	None	Swainson's thrush	1	Calling	Possible	87.39	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	black-capped chickadee	1	Singing	Possible	41.12	No
22bb1001	44.864730, -64.193857	6/23/2022	12:55	18	None	0%	'12 - 19	None	dark-eyed junco	1	Singing	Probable	37.58	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	hermit thrush	1	Flyover Singing/Calling	Confirmed	28.77	No
22bb33	44.794654, -64.211913	6/22/2022	11:02	10	None	100%	'6 - 11	Medium	American goldfinch	1	Flyover Singing/Calling	Possible	46.41	No
22bb30	44.801608, -64.218732	6/22/2022	10:07	9	None	100%	'2 - 5	None	ovenbird	1	Visual and Singing/Calling	Probable	11	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	white-throated sparrow	1	Visual	Possible	34.68	No
22bb32	44.796749, -64.216501	6/22/2022	10:33	9	None	100%	'6 - 11	None	black-throated green warbler	1	Singing	Possible	86.47	No
22bb30	44.801608, -64.218732	6/22/2022	10:07	9	None	100%	'2 - 5	None	black-throated blue warbler	2	Visual	Possible	16.29	No
22bb10007	44.863253, -64.200434	6/23/2022	12:32	18	None	10%	'12 - 19	None	northern flicker	1	Calling	Possible	40.36	No
22bb1001	44.864730, -64.193857	6/23/2022	12:55	18	None	0%	'12 - 19	None	common yellowthroat	1	Singing	Probable	58.62	No
22bb03	44.877624, -64.197009	6/23/2022	10:36	15	None	100%	'<2	None	northern flicker	1	Singing	Possible	78.59	No
22bb03	44.877624, -64.197009	6/23/2022	10:36	15	None	100%	'<2	None	red-eyed vireo	1	Singing	Possible	42.5	No
22bb41	44.774840, -64.216121	6/22/2022	11:56	11	None	100%	'6 - 11	None	ovenbird	1	Singing	Probable	84.39	No
22bb05	44.870830, -64.201917	6/23/2022	11:42	17	None	50%	'12 - 19	None	downy woodpecker	1	Calling	Possible	49.97	No
22bb01	44.880116, -64.204792	6/23/2022	10:04	15	None	100%	'<2	Slight	ruffed grouse	1	Visual and Singing/Calling	Possible	5.59	No
22bb41	44.774840, -64.216121	6/22/2022	11:56	11	None	100%	'6 - 11	None	northern flicker	1	Calling	Possible	69.95	No
22bb05	44.870830, -64.201917	6/23/2022	11:42	17	None	50%	'12 - 19	None	hairy woodpecker	1	Calling	Possible	49.42	No
22bb40	44.778892, -64.212990	6/22/2022	11:33	11	None	100%	'2 - 5	Slight	Blackburnian warbler	1	Singing	Possible	58.46	No
22bb01	44.880116, -64.204792	6/23/2022	10:04	15	None	100%	'<2	Slight	white-throated sparrow	1	Singing	Possible	93.16	No
22bb05	44.870830, -64.201917	6/23/2022	11:42	17	None	50%	'12 - 19	None	black-throated blue warbler	1	Visual and Singing/Calling	Possible	10.53	No
22bb03	44.877624, -64.197009	6/23/2022	10:36	15	None	100%	'<2	None	cedar waxwing	1	Singing	Possible	36.64	No
22bb41	44.774840, -64.216121	6/22/2022	11:56	11	None	100%	'6 - 11	None	common yellowthroat	1	Singing	Probable	88.18	No
22bb05	44.870830, -64.201917	6/23/2022	11:42	17	None	50%	'12 - 19	None	ovenbird	1	Singing	Probable	82.25	No
22bb40	44.778892, -64.212990	6/22/2022	11:33	11	None	100%	'2 - 5	Slight	golden-crowned kinglet	1	Calling	Possible	33.99	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22bb05	44.870830, -64.201917	6/23/2022	11:42	17	None	50%	'12 - 19	None	yellow-bellied flycatcher	1	Singing	Possible	32.44	No
22bb40	44.778892, -64.212990	6/22/2022	11:33	11	None	100%	'2 - 5	Slight	mourning dove	1	Singing	Possible	98.85	No
22bb41	44.774840, -64.216121	6/22/2022	11:56	11	None	100%	'6 - 11	None	dark-eyed junco	1	Singing	Probable	76.53	No
22bb01	44.880116, -64.204792	6/23/2022	10:04	15	None	100%	'<2	Slight	ovenbird	1	Singing	Probable	55.06	No
22bb03	44.877624, -64.197009	6/23/2022	10:36	15	None	100%	'<2	None	red-eyed vireo	1	Singing	Possible	85.06	No
22bb05	44.870830, -64.201917	6/23/2022	11:42	17	None	50%	'12 - 19	None	red-eyed vireo	1	Singing	Possible	88.02	No
22bb41	44.774840, -64.216121	6/22/2022	11:56	11	None	100%	'6 - 11	None	yellow-bellied sapsucker	1	Drumming	Confirmed	93.07	No
22bb01	44.880116, -64.204792	6/23/2022	10:04	15	None	100%	'<2	Slight	palm warbler	1	Singing	Probable	84.02	No
22bb05	44.870830, -64.201917	6/23/2022	11:42	17	None	50%	'12 - 19	None	ovenbird	1	Singing	Probable	86.66	No
22bb41	44.774840, -64.216121	6/22/2022	11:56	11	None	100%	'6 - 11	None	osprey	1	Visual and Singing/Calling	Possible	107.4	Yes
22bb03	44.877624, -64.197009	6/23/2022	10:36	15	None	100%	'<2	None	black-throated green warbler	1	Singing	Possible	67.88	No
22bb05	44.870830, -64.201917	6/23/2022	11:42	17	None	50%	'12 - 19	None	mourning dove	1	Singing	Possible	119.27	Yes
22bb01	44.880116, -64.204792	6/23/2022	10:04	15	None	100%	'<2	Slight	yellow-bellied sapsucker	1	Drumming	Confirmed	89.84	No
22bb03	44.877624, -64.197009	6/23/2022	10:36	15	None	100%	'<2	None	American redstart	1	Singing	Possible	24.99	No
22bb03	44.877624, -64.197009	6/23/2022	10:36	15	None	100%	'<2	None	least flycatcher	1	Singing	Possible	68.57	No
22bb41	44.774840, -64.216121	6/22/2022	11:56	11	None	100%	'6 - 11	None	black-capped chickadee	1	Calling	Possible	36.59	No
22bb41	44.774840, -64.216121	6/22/2022	11:56	11	None	100%	'6 - 11	None	white-throated sparrow	1	Singing	Possible	89.26	No
22bb05	44.870830, -64.201917	6/23/2022	11:42	17	None	50%	'12 - 19	None	northern flicker	1	Calling	Possible	33.48	No
22bb05	44.870830, -64.201917	6/23/2022	11:42	17	None	50%	'12 - 19	None	northern parula	1	Singing	Possible	80.54	No
22bb41	44.774840, -64.216121	6/22/2022	11:56	11	None	100%	'6 - 11	None	hermit thrush	1	Singing	Confirmed	61.26	No
22bb40	44.778892, -64.212990	6/22/2022	11:33	11	None	100%	'2 - 5	Slight	dark-eyed junco	1	Singing	Probable	96.06	No
22bb01	44.880116, -64.204792	6/23/2022	10:04	15	None	100%	'<2	Slight	ruffed grouse	1	Visual and Singing/Calling	Possible	18.74	No
22bb01	44.880116, -64.204792	6/23/2022	10:04	15	None	100%	'<2	Slight	hermit thrush	1	Singing	Confirmed	55.39	No
22bb03	44.877624, -64.197009	6/23/2022	10:36	15	None	100%	'<2	None	ovenbird	1	Singing	Probable	66.72	No
22bb41	44.774840, -64.216121	6/22/2022	11:56	11	None	100%	'6 - 11	None	palm warbler	1	Singing	Probable	32.12	No
22bb41	44.774840, -64.216121	6/22/2022	11:56	11	None	100%	'6 - 11	None	common yellowthroat	1	Singing	Probable	39.6	No
22bb05	44.870830, -64.201917	6/23/2022	11:42	17	None	50%	'12 - 19	None	yellow-bellied flycatcher	1	Calling	Possible	57.09	No
22bb04	44.872229, -64.213925	6/23/2022	9:12	14	None	100%	'<2	Slight	yellow-bellied sapsucker	1	Calling	Confirmed	36.27	No
22bb02	44.879307, -64.208402	6/23/2022	9:40	15	None	100%	'<2	None	ovenbird	1	Singing	Probable	37.3	No
22bb04	44.872229, -64.213925	6/23/2022	9:12	14	None	100%	'<2	Slight	yellow-bellied sapsucker	1	Drumming	Confirmed	88.72	No
22bb43	44.772710, -64.207069	6/22/2022	14:00	12	None	100%	'6 - 11	Slight	black-throated green warbler	1	Singing	Possible	37.3	No
22bb04	44.872229, -64.213925	6/23/2022	9:12	14	None	100%	'<2	Slight	yellow-bellied sapsucker	1	Drumming	Confirmed	109.48	Yes
22bb44	44.769622, -64.208453	6/22/2022	12:51	11	None	90%	'2 - 5	None	magnolia warbler	1	Singing	Possible	24.75	No
22bb02	44.879307, -64.208402	6/23/2022	9:40	15	None	100%	'<2	None	black-and-white warbler	1	Singing	Confirmed	45.36	No
22bb44	44.769622, -64.208453	6/22/2022	12:51	11	None	90%	'2 - 5	None	yellow-rumped warbler	1	Singing	Possible	80.63	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22bb44	44.769622, -64.208453	6/22/2022	12:51	11	None	90%	'2 - 5	None	yellow-rumped warbler	1	Singing	Possible	95.67	No
22bb04	44.872229, -64.213925	6/23/2022	9:12	14	None	100%	'<2	Slight	black-and-white warbler	1	Singing	Confirmed	41.61	No
22bb02	44.879307, -64.208402	6/23/2022	9:40	15	None	100%	'<2	None	ovenbird	1	Singing	Probable	65.96	No
22bb43	44.772710, -64.207069	6/22/2022	14:00	12	None	100%	'6 - 11	Slight	yellow-rumped warbler	1	Singing	Possible	46.63	No
22bb04	44.872229, -64.213925	6/23/2022	9:12	14	None	100%	'<2	Slight	American robin	1	Calling	Possible	42.5	No
22bb43	44.772710, -64.207069	6/22/2022	14:00	12	None	100%	'6 - 11	Slight	golden-crowned kinglet	2	Visual and Singing/Calling	Possible	20.76	No
22bb02	44.879307, -64.208402	6/23/2022	9:40	15	None	100%	'<2	None	ovenbird	1	Singing	Probable	89.07	No
22bb44	44.769622, -64.208453	6/22/2022	12:51	11	None	90%	'2 - 5	None	black-and-white warbler	1	Singing	Confirmed	47.61	No
22bb04	44.872229, -64.213925	6/23/2022	9:12	14	None	100%	'<2	Slight	red-eyed vireo	1	Singing	Possible	79.39	No
22bb04	44.872229, -64.213925	6/23/2022	9:12	14	None	100%	'<2	Slight	ovenbird	1	Singing	Probable	74.25	No
22bb04	44.872229, -64.213925	6/23/2022	9:12	14	None	100%	'<2	Slight	black-throated green warbler	1	Singing	Possible	124.28	Yes
22bb02	44.879307, -64.208402	6/23/2022	9:40	15	None	100%	'<2	None	hermit thrush	1	Calling	Confirmed	51.76	No
22bb42	44.772787, -64.212190	6/22/2022	12:15	11	Light Rain	100%	'2 - 5	Medium	black-throated blue warbler	1	Singing	Possible	51.74	No
22bb44	44.769622, -64.208453	6/22/2022	12:51	11	None	90%	'2 - 5	None	common yellowthroat	1	Singing	Probable	89.69	No
22bb42	44.772787, -64.212190	6/22/2022	12:15	11	Light Rain	100%	'2 - 5	Medium	yellow-bellied sapsucker	1	Drumming	Confirmed	90.38	No
22bb04	44.872229, -64.213925	6/23/2022	9:12	14	None	100%	'<2	Slight	American robin	1	Singing	Possible	33.11	No
22bb44	44.769622, -64.208453	6/22/2022	12:51	11	None	90%	'2 - 5	None	blue jay	1	Visual and Singing/Calling	Possible	35.39	No
22bb43	44.772710, -64.207069	6/22/2022	14:00	12	None	100%	'6 - 11	Slight	yellow-rumped warbler	1	Singing	Possible	92.2	No
22bb44	44.769622, -64.208453	6/22/2022	12:51	11	None	90%	'2 - 5	None	boreal chickadee	1	Calling	Possible	75.11	No
22bb42	44.772787, -64.212190	6/22/2022	12:15	11	Light Rain	100%	'2 - 5	Medium	northern parula	1	Visual and Singing/Calling	Possible	21.85	No
22bb34	44.794730, -64.154785	6/21/2022	10:52	12	None	100%	'2 - 5	None	dark-eyed junco	1	Singing	Probable	99.67	No
22bb37	44.791713, -64.155729	6/21/2022	10:22	127	None	100%	'2 - 5	None	common yellowthroat	1	Singing	Probable	96.74	No
22bb34	44.794730, -64.154785	6/21/2022	10:52	12	None	100%	'2 - 5	None	common yellowthroat	1	Visual	Probable	10.32	No
22bb26	44.810219, -64.172116	6/21/2022	12:26	12	None	100%	'12 - 19	None	northern parula	1	Singing	Possible	50.14	No
22bb37	44.791713, -64.155729	6/21/2022	10:22	127	None	100%	'2 - 5	None	ruby-crowned kinglet	1	Singing	Possible	62.34	No
22bb37	44.791713, -64.155729	6/21/2022	10:22	127	None	100%	'2 - 5	None	blue-headed vireo	1	Calling	Possible	20.92	No
22bb37	44.791713, -64.155729	6/21/2022	10:22	127	None	100%	'2 - 5	None	yellow-rumped warbler	1	Singing	Possible	94.76	No
22bb26	44.810219, -64.172116	6/21/2022	12:26	12	None	100%	'12 - 19	None	black-throated blue warbler	1	Singing	Possible	19.32	No
22bb34	44.794730, -64.154785	6/21/2022	10:52	12	None	100%	'2 - 5	None	hermit thrush	1	Calling	Confirmed	82.61	No
22bb36	44.792633, -64.160918	6/21/2022	9:16	11	None	100%	'<2	None	northern parula	1	Singing	Possible	80.41	No
22bb42	44.772728, -64.212560	6/22/2022	13:20	12	None	90%	'2 - 5	Slight	northern parula	1	Singing	Possible	83.07	No
22bb36	44.792633, -64.160918	6/21/2022	9:16	11	None	100%	'<2	None	ruby-crowned kinglet	1	Singing	Possible	83.64	No
22bb26	44.810219, -64.172116	6/21/2022	12:26	12	None	100%	'12 - 19	None	downy woodpecker	1	Drumming	Possible	62.34	No
22bb37	44.791713, -64.155729	6/21/2022	10:22	127	None	100%	'2 - 5	None	magnolia warbler	1	Singing	Possible	51	No
22bb42	44.772728, -64.212560	6/22/2022	13:20	12	None	90%	'2 - 5	Slight	pileated woodpecker	1	Drumming	Possible	89.21	No

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Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22bb37	44.791713, -64.155729	6/21/2022	10:22	127	None	100%	'2 - 5	None	blue-headed vireo	1	Singing	Possible	31.89	No
22bb42	44.772728, -64.212560	6/22/2022	13:20	12	None	90%	'2 - 5	Slight	yellow-bellied sapsucker	1	Drumming	Confirmed	48.41	No
22bb26	44.810219, -64.172116	6/21/2022	12:26	12	None	100%	'12 - 19	None	common yellowthroat	1	Singing	Probable	58.87	No
22bb36	44.792633, -64.160918	6/21/2022	9:16	11	None	100%	'<2	None	magnolia warbler	1	Singing	Possible	93.05	No
22bb42	44.772728, -64.212560	6/22/2022	13:20	12	None	90%	'2 - 5	Slight	yellow-bellied sapsucker	1	Drumming	Confirmed	91.79	No
22bb36	44.792633, -64.160918	6/21/2022	9:16	11	None	100%	'<2	None	yellow-rumped warbler	1	Singing	Possible	62.74	No
22bb37	44.791713, -64.155729	6/21/2022	10:22	127	None	100%	'2 - 5	None	common yellowthroat	1	Visual and Singing/Calling	Probable	22.5	No
22bb37	44.791713, -64.155729	6/21/2022	10:22	127	None	100%	'2 - 5	None	magnolia warbler	1	Singing	Possible	109.92	Yes
22bb36	44.792633, -64.160918	6/21/2022	9:16	11	None	100%	'<2	None	common yellowthroat	1	Singing	Probable	91.72	No
22bb36	44.792633, -64.160918	6/21/2022	9:16	11	None	100%	'<2	None	black-throated green warbler	1	Singing	Possible	32.21	No
22bb36	44.792633, -64.160918	6/21/2022	9:16	11	None	100%	'<2	None	yellow-bellied flycatcher	1	Singing	Possible	42.36	No
22bb34	44.794730, -64.154785	6/21/2022	10:52	12	None	100%	'2 - 5	None	yellow-bellied flycatcher	1	Singing	Possible	81.5	No
22bb34	44.794730, -64.154785	6/21/2022	10:52	12	None	100%	'2 - 5	None	yellow-rumped warbler	1	Singing	Possible	73.5	No
22bb37	44.791713, -64.155729	6/21/2022	10:22	127	None	100%	'2 - 5	None	dark-eyed junco	1	Calling	Probable	32.04	No
22bb34	44.794730, -64.154785	6/21/2022	10:52	12	None	100%	'2 - 5	None	Canada warbler	1	Singing	Probable	40.42	No
22bb26	44.810219, -64.172116	6/21/2022	12:26	12	None	100%	'12 - 19	None	ovenbird	1	Singing	Probable	93.37	No
22bb36	44.792633, -64.160918	6/21/2022	9:16	11	None	100%	'<2	None	hermit thrush	1	Calling	Confirmed	67.63	No
22bb42	44.772728, -64.212560	6/22/2022	13:20	12	None	90%	'2 - 5	Slight	hermit thrush	1	Calling	Confirmed	93.67	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	black-capped chickadee	1	Visual	Possible	9.42	No
22bb29	44.804108, -64.135690	6/21/2022	13:17	12	None	100%	'12 - 19	None	black-throated green warbler	1	Singing	Possible	88.29	No
22bb27	44.808533, -64.221816	6/22/2022	9:40	9	None	100%	'<2	None	Nashville warbler	1	Singing	Possible	96.79	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	ovenbird	1	Singing	Probable	87.91	No
22bb28	44.805463, -64.145216	6/21/2022	14:14	14	None	100%	'12 - 19	None	white-throated sparrow	1	Singing	Possible	85.71	No
22bb27	44.808533, -64.221816	6/22/2022	9:40	9	None	100%	'<2	None	mourning dove	1	Singing	Possible	75.98	No
22bb29	44.804108, -64.135690	6/21/2022	13:17	12	None	100%	'12 - 19	None	Swainson's thrush	1	Singing	Possible	105.77	Yes
22bb35	44.793859, -64.172076	6/21/2022	11:47	12	None	100%	'<2	None	boreal chickadee	1	Calling	Possible	68.12	No
22bb35	44.793859, -64.172076	6/21/2022	11:47	12	None	100%	'<2	None	Blackburnian warbler	1	Singing	Possible	44.47	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	golden-crowned kinglet	1	Singing	Possible	41.32	No
22bb35	44.793859, -64.172076	6/21/2022	11:47	12	None	100%	'<2	None	dark-eyed junco	2	Visual and Singing/Calling	Probable	36.66	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	yellow-bellied flycatcher	1	Singing	Possible	85.17	No
22bb35	44.793859, -64.172076	6/21/2022	11:47	12	None	100%	'<2	None	blue-headed vireo	1	Singing	Possible	90.88	No
22bb27	44.808533, -64.221816	6/22/2022	9:40	9	None	100%	'<2	None	golden-crowned kinglet	1	Calling	Possible	79.34	No
22bb28	44.805463, -64.145216	6/21/2022	14:14	14	None	100%	'12 - 19	None	dark-eyed junco	1	Singing	Probable	82.81	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	hermit thrush	1	Singing	Confirmed	95.11	No
22bb29	44.804108, -64.135690	6/21/2022	13:17	12	None	100%	'12 - 19	None	golden-crowned kinglet	1	Singing	Possible	40.51	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22bb35	44.793859, -64.172076	6/21/2022	11:47	12	None	100%	'<2	None	yellow-bellied sapsucker	1	Calling	Confirmed	43.62	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	blue-headed vireo	1	Singing	Possible	56.98	No
22bb27	44.808533, -64.221816	6/22/2022	9:40	9	None	100%	'<2	None	yellow-rumped warbler	1	Singing	Possible	42.63	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	dark-eyed junco	1	Singing	Probable	105.74	Yes
22bb28	44.805463, -64.145216	6/21/2022	14:14	14	None	100%	'12 - 19	None	white-throated sparrow	1	Singing	Possible	95.64	No
22bb29	44.804108, -64.135690	6/21/2022	13:17	12	None	100%	'12 - 19	None	Nashville warbler	1	Singing	Possible	86.18	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	northern parula	1	Singing	Possible	76.3	No
22bb28	44.805463, -64.145216	6/21/2022	14:14	14	None	100%	'12 - 19	None	magnolia warbler	1	Singing	Possible	96.6	No
22bb29	44.804108, -64.135690	6/21/2022	13:17	12	None	100%	'12 - 19	None	magnolia warbler	1	Singing	Possible	71.39	No
22bb35	44.793859, -64.172076	6/21/2022	11:47	12	None	100%	'<2	None	winter wren	1	Singing	Possible	41.02	No
22bb35	44.793859, -64.172076	6/21/2022	11:47	12	None	100%	'<2	None	white-winged crossbill	1	Flyover Singing/Calling	Possible	61.24	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	magnolia warbler	1	Singing	Possible	45.65	No
22bb29	44.804108, -64.135690	6/21/2022	13:17	12	None	100%	'12 - 19	None	ovenbird	1	Singing	Probable	58.93	No
22bb27	44.808533, -64.221816	6/22/2022	9:40	9	None	100%	'<2	None	common yellowthroat	1	Visual	Probable	14.36	No
22bb28	44.805463, -64.145216	6/21/2022	14:14	14	None	100%	'12 - 19	None	alder flycatcher	1	Singing	Possible	58.04	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	blue jay	1	Calling	Possible	131.66	Yes
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	hermit thrush	1	Singing	Confirmed	91.46	No
22bb28	44.805463, -64.145216	6/21/2022	14:14	14	None	100%	'12 - 19	None	palm warbler	1	Singing	Probable	34.17	No
22bb28	44.805463, -64.145216	6/21/2022	14:14	14	None	100%	'12 - 19	None	palm warbler	1	Visual and Singing/Calling	Probable	15.64	No
22bb29	44.804108, -64.135690	6/21/2022	13:17	12	None	100%	'12 - 19	None	Swainson's thrush	1	Singing	Possible	95.18	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	black-capped chickadee	1	Visual	Possible	5.94	No
22bb29	44.804108, -64.135690	6/21/2022	13:17	12	None	100%	'12 - 19	None	yellow-bellied sapsucker	1	Calling	Confirmed	42.86	No
22bb35	44.793859, -64.172076	6/21/2022	11:47	12	None	100%	'<2	None	ovenbird	1	Singing	Probable	101.54	Yes
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	dark-eyed junco	1	Singing	Probable	90.91	No
22bb27	44.808533, -64.221816	6/22/2022	9:40	9	None	100%	'<2	None	winter wren	1	Singing	Possible	97.89	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	common yellowthroat	1	Singing	Probable	83.99	No
22bb28	44.805463, -64.145216	6/21/2022	14:14	14	None	100%	'12 - 19	None	common yellowthroat	1	Singing	Probable	74.42	No
22bb28	44.805463, -64.145216	6/21/2022	14:14	14	None	100%	'12 - 19	None	blue-headed vireo	1	Singing	Possible	97.99	No
22bb35	44.793859, -64.172076	6/21/2022	11:47	12	None	100%	'<2	None	black-capped chickadee	1	Visual and Singing/Calling	Possible	15.34	No
22bb317	44.800447, -64.138203	6/21/2022	13:42	12	None	100%	'6 - 11	None	winter wren	1	Singing	Possible	94.13	No
Incidental	44.747093 -64.229897	6/22/2022	10:28	-	-	-	-	None	black-and-white warbler	2	Adult carrying food	Confirmed	n/a	Yes
Incidental	44.793245 -64.215161	6/22/2022	10:25	-	-	-	-	None	olive-sided flycatcher	1	Singing	Possible	n/a	Yes
Incidental	44.794965 -64.172019	6/21/2022	11:36	-	-	-	-	None	yellow-bellied sapsucker	1	Nest with young	Confirmed	n/a	Yes
Incidental	44.844747 -64.179208	6/21/2022	8:54	-	-	-	-	None	olive-sided flycatcher	1	Singing	Possible	n/a	Yes
Incidental	44.850659 -64.192854	6/23/2022	9:06	-	-	-	-	None	black-throated blue warbler	1	Singing	Possible	n/a	Yes

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Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
Incidental	44.853191 -64.162242	6/21/2022	9:39	-	-	-	-	None	Canada warbler	1	Singing	Probable	n/a	Yes
Incidental	44.864872 -64.200332	6/23/2022	11:57	-	-	-	-	None	common grackle	4	No indication Breeding	Possible	n/a	Yes
Incidental	44.865457 -64.202951	6/23/2022	11:49	-	-	-	-	None	swamp sparrow	1	Singing	Possible	n/a	Yes
Incidental	44.865458 -64.202951	6/23/2022	11:47	-	-	-	-	None	alder flycatcher	1	Singing	Possible	n/a	Yes
Incidental	44.865458 -64.202951	6/23/2022	11:48	-	-	-	-	None	song sparrow	1	Singing	Possible	n/a	Yes
Incidental	44.872401 -64.213461	6/23/2022	13:34	-	-	-	-	None	eastern wood-peewee	1	Singing	Possible	n/a	Yes
Incidental	44.879359 -64.202031	6/23/2022	9:55	-	-	-	-	None	American redstart	1	Singing	Possible	n/a	Yes
Incidental	44.879546 -64.202163	6/23/2022	9:54	-	-	-	-	None	cedar waxwing	1	Singing	Possible	n/a	Yes
22BBCP5	44.793061 -64.206222	6/25/2022	6:53	-	-	-	-	-	ovenbird	1	Singing	Probable	60	No
22BBCP5	44.793061 -64.206222	6/25/2022	6:53	-	-	-	-	-	dark-eyed junco	1	Flyover Singing/Calling	Probable	30	No
22BBCP5	44.793061 -64.206222	6/25/2022	6:53	-	-	-	-	-	mourning dove	1	Singing	Possible	101	Yes
22BBCP5	44.793061 -64.206222	6/25/2022	6:53	-	-	-	-	-	hermit thrush	1	Calling	Confirmed	40	No
22BBCP5	44.793061 -64.206222	6/25/2022	6:53	-	-	-	-	-	purple finch	1	Singing	Possible	150	Yes
22BBCP5	44.793061 -64.206222	6/25/2022	6:53	-	-	-	-	-	hermit thrush	1	Singing	Confirmed	150	Yes
22BBCP5	44.793061 -64.206222	6/25/2022	6:53	-	-	-	-	-	yellow-rumped warbler	1	Singing	Possible	10	No
22BBCP5	44.793061 -64.206222	6/25/2022	6:53	-	-	-	-	-	common yellowthroat	1	Singing	Probable	49	No
22BBCP5	44.793061 -64.206222	6/25/2022	6:53	-	-	-	-	-	barred owl	1	Singing	Possible	500	Yes
22BBCP5	44.793061 -64.206222	6/25/2022	6:53	-	-	-	-	-	mourning dove	1	Calling	Possible	150	Yes
Incidental	n/a	6/25/2022	-	-	-	-	-	-	black-throated blue warbler	1	Singing	Possible	n/a	Yes
Incidental	n/a	6/25/2022	-	-	-	-	-	-	Nashville warbler	1	Singing	Possible	n/a	Yes
22BBCP7	44.796463 -64.203403	6/25/2022	7:36	-	-	-	-	-	common yellowthroat	1	Singing	Probable	40	No
22BBCP7	44.796463 -64.203403	6/25/2022	7:36	-	-	-	-	-	palm warbler	1	Singing	Probable	60	No
22BBCP7	44.796463 -64.203403	6/25/2022	7:36	-	-	-	-	-	ovenbird	1	Singing	Probable	101	Yes
22BBCP7	44.796463 -64.203403	6/25/2022	7:36	-	-	-	-	-	palm warbler	1	Singing	Possible	75	No
22BBCP7	44.796463 -64.203403	6/25/2022	7:36	-	-	-	-	-	blue jay	1	Calling	Possible	100	No
22BBCP7	44.796463 -64.203403	6/25/2022	7:36	-	-	-	-	-	black-throated blue warbler	1	Singing	Possible	40	No
22BBCP7	44.796463 -64.203403	6/25/2022	7:36	-	-	-	-	-	blue-headed vireo	1	Singing	Possible	75	No
22BBCP7	44.796463 -64.203403	6/25/2022	7:36	-	-	-	-	-	ovenbird	1	Singing	Probable	75	No
22BBCP7	44.796463 -64.203403	6/25/2022	7:36	-	-	-	-	-	mourning dove	1	Calling	Possible	125	Yes
22BBCP8	44.801235 -64.200866	6/25/2022	8:14	-	-	-	-	-	bay-breasted warbler	1	Singing	Possible	25	No
22BBCP8	44.801235 -64.200866	6/25/2022	8:14	-	-	-	-	-	ovenbird	1	Singing	Probable	101	Yes
22BBCP8	44.801235 -64.200866	6/25/2022	8:14	-	-	-	-	-	blue-headed vireo	1	Singing	Possible	60	No
22BBCP8	44.801235 -64.200866	6/25/2022	8:14	-	-	-	-	-	hermit thrush	1	Calling	Confirmed	30	No
22BBCP8	44.801235 -64.200866	6/25/2022	8:14	-	-	-	-	-	dark-eyed junco	1	Calling	Probable	20	No
22BBCP8	44.801235 -64.200866	6/25/2022	8:14	-	-	-	-	-	ovenbird	1	Agitated	Probable	10	No

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22BBCP8	44.801235 -64.200866	6/25/2022	8:14	-	-	-	-	-	yellow-rumped warbler	1	Singing	Possible	25	No
22BBCP8	44.801235 -64.200866	6/25/2022	8:14	-	-	-	-	-	red-breasted nuthatch	1	Calling	Possible	60	No
22BBCP8	44.801235 -64.200866	6/25/2022	8:14	-	-	-	-	-	blue-headed vireo	1	Calling	Possible	10	No
Incidental	na	6/25/2022	-	-	-	-	-	-	Blackburnian warbler	1	Singing	Possible	n/a	Yes
Incidental	na	6/25/2022	-	-	-	-	-	-	black-throated green warbler	1	Singing	Possible	n/a	Yes
Incidental	na	6/25/2022	-	-	-	-	-	-	Nashville warbler	1	Singing	Possible	n/a	Yes
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	dark-eyed junco	1	Singing	Probable	20	No
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	blue-headed vireo	1	Singing	Possible	150	Yes
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	common yellowthroat	1	Singing	Probable	20	No
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	purple finch	1	Calling	Possible	50	No
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	hermit thrush	1	Calling	Confirmed	50	No
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	yellow-rumped warbler	1	Calling	Possible	20	No
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	palm warbler	1	Agitated	Probable	10	No
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	golden-crowned kinglet	1	Singing	Possible	25	No
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	white-throated sparrow	1	Singing	Possible	150	Yes
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	Nashville warbler	1	Singing	Possible	30	No
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	common yellowthroat	1	Singing	Probable	30	No
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	Nashville warbler	1	Singing	Possible	30	No
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	common yellowthroat	1	Singing	Probable	30	No
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	hermit thrush	1	Singing	Confirmed	101	Yes
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	winter wren	1	Singing	Possible	250	Yes
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	palm warbler	1	Agitated	Probable	10	No
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	mourning dove	1	Calling	Possible	101	Yes
22BBCP9	44.803158 -64.210862	6/25/2022	8:49	-	-	-	-	-	Nashville warbler	1	Singing	Possible	101	Yes
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	Canada warbler	1	Agitated	Probable	101	Yes
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	chimney swift	1	Calling	Possible	0	No
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	yellow-bellied flycatcher	1	Singing	Possible	75	No
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	white-throated sparrow	1	Singing	Possible	101	Yes
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	palm warbler	1	Singing	Probable	50	No
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	blue-headed vireo	1	Singing	Possible	101	Yes
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	red-breasted nuthatch	1	Calling	Possible	75	No
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	magnolia warbler	1	Singing	Possible	75	No
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	American robin	1	Calling	Possible	75	No
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	black-capped chickadee	1	Singing	Possible	101	Yes
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	hermit thrush	1	Singing	Confirmed	50	No
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	black-throated green warbler	1	Singing	Possible	101	Yes
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	yellow-rumped warbler	1	Singing	Possible	101	Yes

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22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	white-throated sparrow	1	Singing	Possible	25	No
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	blue jay	1	Calling	Possible	101	Yes
22BBCP6	44.797408 -64.211371	6/25/2022	9:16	-	-	-	-	-	palm warbler	1	Singing	Probable	25	No
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	mourning dove	1	Singing	Possible	100	No
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	common yellowthroat	1	Agitated	Probable	0	No
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	common yellowthroat	1	Singing	Probable	50	No
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	hermit thrush	1	Singing	Confirmed	200	Yes
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	common yellowthroat	1	Singing	Probable	125	Yes
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	white-throated sparrow	1	Singing	Possible	50	No
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	black-and-white warbler	1	Singing	Confirmed	50	No
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	white-throated sparrow	1	Calling	Possible	50	No
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	palm warbler	1	Singing	Probable	50	No
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	white-throated sparrow	1	Singing	Possible	150	Yes
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	American crow	1	Calling	Possible	500	Yes
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	cedar waxwing	1	Calling	Possible	50	No
22BBCP1	44.787964 -64.212446	6/25/2022	9:43	-	-	-	-	-	northern flicker	1	Calling	Possible	300	Yes
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	white-throated sparrow	1	Singing	Possible	101	Yes
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	Blackburnian warbler	1	Singing	Possible	60	No
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	red-breasted nuthatch	1	Calling	Possible	50	No
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	yellow-rumped warbler	1	Singing	Possible	75	No
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	cedar waxwing	1	Calling	Possible	50	No
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	mourning dove	1	Habitat	Possible	25	No
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	black-throated blue warbler	1	Singing	Possible	50	No
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	hairy woodpecker	1	Calling	Possible	50	No
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	black-throated green warbler	1	Calling	Possible	25	No
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	black-capped chickadee	1	Habitat	Possible	50	No
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	golden-crowned kinglet	1	Singing	Possible	50	No
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	ovenbird	1	Singing	Probable	101	Yes
22BBCP4	44.783512 -64.212797	6/25/2022	9:58	-	-	-	-	-	common yellowthroat	1	Singing	Probable	101	Yes
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	Swainson's thrush	1	Singing	Possible	25	No
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	black-throated green warbler	1	Singing	Possible	60	No
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	ovenbird	1	Singing	Probable	50	No
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	ovenbird	1	Singing	Probable	99	No
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	common raven	1	Calling	Possible	99	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	black-throated blue warbler	1	Singing	Possible	50	No
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	northern parula	1	Singing	Possible	75	No
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	red-eyed vireo	1	Singing	Possible	50	No
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	ovenbird	1	Singing	Probable	75	No
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	brown creeper	1	Singing	Possible	75	No
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	red-eyed vireo	1	Singing	Possible	99	No
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	white-throated sparrow	1	Singing	Possible	101	Yes
22BBCP2	44.740285 -64.225603	6/26/2022	6:59	-	-	-	-	-	Swainson's thrush	1	Habitat	Possible	150	Yes
22BBCP11	44.743118 -64.221603	6/26/2022	7:27	-	-	-	-	-	ovenbird	1	Singing	Probable	50	No
22BBCP11	44.743118 -64.221603	6/26/2022	7:27	-	-	-	-	-	ovenbird	1	Singing	Probable	125	Yes
22BBCP11	44.743118 -64.221603	6/26/2022	7:27	-	-	-	-	-	hermit thrush	1	Calling	Confirmed	25	No
22BBCP11	44.743118 -64.221603	6/26/2022	7:27	-	-	-	-	-	golden-crowned kinglet	1	Singing	Possible	50	No
22BBCP11	44.743118 -64.221603	6/26/2022	7:27	-	-	-	-	-	red-breasted nuthatch	1	Calling	Possible	75	No
22BBCP11	44.743118 -64.221603	6/26/2022	7:27	-	-	-	-	-	common yellowthroat	1	Singing	Probable	150	Yes
22BBCP11	44.743118 -64.221603	6/26/2022	7:27	-	-	-	-	-	Swainson's thrush	1	Singing	Possible	150	Yes
22BBCP11	44.743118 -64.221603	6/26/2022	7:27	-	-	-	-	-	purple finch	1	Calling	Possible	50	No
22BBCP11	44.743118 -64.221603	6/26/2022	7:27	-	-	-	-	-	black-throated green warbler	1	Habitat	Possible	50	No
22BBCP11	44.743118 -64.221603	6/26/2022	7:27	-	-	-	-	-	Blackburnian warbler	1	Habitat	Possible	50	No
22BBCP11	44.743118 -64.221603	6/26/2022	7:27	-	-	-	-	-	red crossbill	1	Calling	Possible	75	No
Incidental	n/a	6/26/2022	-	-	-	-	-	-	bay-breasted warbler	1	Singing	Possible	n/a	Yes
Incidental	n/a	6/26/2022	-	-	-	-	-	-	magnolia warbler	1	Singing	Possible	n/a	Yes
Incidental	n/a	6/26/2022	-	-	-	-	-	-	blue-headed vireo	1	Singing	Possible	n/a	Yes
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	red crossbill	1	Singing	Possible	50	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	blue-headed vireo	1	Singing	Possible	25	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	blue-headed vireo	1	Singing	Possible	75	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	palm warbler	1	Agitated	Probable	0	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	magnolia warbler	1	Singing	Possible	40	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	hermit thrush	1	Singing	Confirmed	75	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	dark-eyed junco	1	Singing	Probable	25	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	Swainson's thrush	1	Singing	Possible	25	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	hairy woodpecker	1	Flyover Singing/Calling	Possible	25	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	Swainson's thrush	1	Calling	Possible	150	Yes
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	Canada jay	1	Calling	Possible	101	Yes
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	palm warbler	1	Singing	Probable	75	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	yellow-rumped warbler	1	Singing	Possible	75	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	golden-crowned kinglet	1	Singing	Possible	25	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	Blackburnian warbler	1	Singing	Possible	75	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	brown creeper	1	Habitat	Possible	40	No
22BBCP10	44.73835 -64.218047	6/26/2022	8:00	-	-	-	-	-	Nashville warbler	1	Habitat	Possible	75	No
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	black-throated green warbler	1	Singing	Possible	60	No
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	Swainson's thrush	1	Singing	Possible	101	Yes
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	white-throated sparrow	1	Singing	Possible	150	Yes
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	bay-breasted warbler	1	Singing	Possible	25	No
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	blue-headed vireo	1	Singing	Possible	75	No
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	American crow	1	Calling	Possible	250	Yes
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	black-throated blue warbler	1	Singing	Possible	40	No
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	northern parula	1	Singing	Possible	60	No
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	black-throated green warbler	1	Singing	Possible	101	Yes
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	common raven	1	Calling	Possible	101	Yes
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	hermit thrush	1	Calling	Confirmed	75	No
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	yellow-rumped warbler	1	Singing	Possible	50	No
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	black-throated blue warbler	1	Singing	Possible	101	Yes
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	black-capped chickadee	1	Calling	Possible	50	No
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	Blackburnian warbler	1	Singing	Possible	75	No
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	brown creeper	1	Calling	Possible	75	No
22BBCP12	44.733102 -64.222294	6/26/2022	8:38	-	-	-	-	-	golden-crowned kinglet	1	Singing	Possible	50	No
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	American goldfinch	1	Flyover Singing/Calling	Possible	0	No
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	Nashville warbler	1	Singing	Possible	75	No
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	magnolia warbler	1	Singing	Possible	50	No
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	yellow-bellied flycatcher	1	Singing	Possible	50	No
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	black-throated blue warbler	1	Singing	Possible	50	No
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	hermit thrush	1	Singing	Confirmed	40	No
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	black-capped chickadee	1	Calling	Possible	60	No
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	red-breasted nuthatch	1	Calling	Possible	40	No
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	American crow	1	Calling	Possible	250	Yes
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	common raven	1	Calling	Possible	150	Yes
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	blue jay	1	Calling	Possible	150	Yes
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	Blackburnian warbler	1	Singing	Possible	40	No
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	yellow-rumped warbler	1	Singing	Possible	25	No
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	northern flicker	1	Calling	Possible	150	Yes

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	winter wren	1	Singing	Possible	125	Yes
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	blue-headed vireo	1	Singing	Possible	150	Yes
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	Swainson's thrush	1	Singing	Possible	150	Yes
22BBCP3	44.735014 -64.230989	6/26/2022	9:14	-	-	-	-	-	ruby-crowned kinglet	1	Singing	Possible	150	Yes
Incidental	n/a	6/26/2022	-	-	-	-	-	-	hermit thrush	4	Nest with eggs	Confirmed	n/a	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	Canada jay	1	Flyover Singing/Calling	Possible	0	No
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	alder flycatcher	1	Calling	Possible	50	No
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	winter wren	1	Singing	Possible	125	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	Swainson's thrush	1	Singing	Possible	150	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	red-breasted nuthatch	1	Calling	Possible	75	No
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	yellow-rumped warbler	1	Singing	Possible	50	No
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	swamp sparrow	1	Singing	Possible	50	No
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	common yellowthroat	1	Singing	Probable	75	No
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	white-throated sparrow	1	Singing	Possible	150	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	blue-headed vireo	1	Singing	Possible	101	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	red-eyed vireo	1	Singing	Possible	150	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	black-and-white warbler	1	Singing	Confirmed	50	No
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	black-and-white warbler	1	Singing	Confirmed	40	No
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	Canada warbler	1	Singing	Probable	101	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	dark-eyed junco	1	Agitated	Probable	25	No
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	hermit thrush	1	Singing	Confirmed	60	No
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	black-throated green warbler	1	Singing	Possible	101	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	cedar waxwing	1	Calling	Possible	60	No
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	blue-headed vireo	1	Singing	Possible	150	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	ruby-crowned kinglet	1	Singing	Possible	150	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	white-throated sparrow	1	Singing	Possible	150	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	hermit thrush	1	Singing	Confirmed	125	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	common raven	1	Calling	Possible	250	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	northern flicker	1	Calling	Possible	150	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	palm warbler	1	Singing	Probable	101	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	common yellowthroat	1	Singing	Probable	101	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	Swainson's thrush	1	Singing	Possible	101	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	purple finch	1	Singing	Possible	150	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	magnolia warbler	1	Singing	Possible	125	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	American redstart	1	Singing	Possible	75	No

Table A.1 Breeding Bird Survey Data

Survey Location ID	Survey Location Coordinate	Survey Date	Survey Start Time	Temperature (°C)	Precipitation	Cloud Cover (%)	Wind Speed (km/h)	Ambient Noise	Species	Abundance	Behaviour	Species highest breeding status	Detection Distance (m)	Incidental observation (yes/no)
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	Canada warbler	1	Singing	Probable	150	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	Nashville warbler	1	Singing	Possible	101	Yes
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	chimney swift	1	Calling	Possible	0	No
22BBCP13	44.739977 -64.234128	6/26/2022	9:49	-	-	-	-	-	bay-breasted warbler	1	Habitat	Possible	60	No
Incidental	n/a	6/26/2022	-	-	-	-	-	-	American woodcock	1	Habitat	Possible	n/a	Yes

APPENDIX O
STANTEC OVERWINTERING BIRD AND NOCTURNAL OWL SURVEY PROGRAMS

Overwintering Bird and Nocturnal Owl Survey Programs for Proposed Wind Project near Bear Lake, Nova Scotia

Final Report

March 15, 2023

Prepared for:

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1223 Lower Water St
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1.0 INTRODUCTION

Nova Scotia Power Incorporated (NSPI) is the Proponent for the proposed Bear Lake Wind Project, near Upper Vaughan, Nova Scotia, (the Project). The Project consists of the construction and operation of approximately 14 to 19 wind turbines, in the range of 4.5 to 6 MW, for a total project capacity of up to 89 MW.

The Project Boundary shown on Figure 1 (in red) refers to the area within which the turbines will be located. A wider Assessment Area (Figure 1; in black) indicates the area within which additional surveys were conducted. In some cases, survey locations are outside the Project Boundary and Assessment Areas where earlier study area boundaries were used.

In 2021 and 2022, Stantec completed a variety of bird surveys in the vicinity of the proposed Project. This report presents the results of two of the surveys: the overwintering and nocturnal owl surveys. The primary objective of these surveys was to characterize the composition and abundance of the bird communities in the study area including possible Species at Risk (SAR) and Species of Conservation Concern (SOCC) during winter and early spring of 2021 and 2022 (December through March).

Species at Risk (SAR) are herein defined as those species listed as being either *endangered, threatened, vulnerable*, or of *special concern* under the Nova Scotia *Endangered Species Act* (NS ESA), the federal *Species at Risk Act* (SARA) and/or by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Species of Conservation Concern (SOCC) are those species that do not meet the above definition of SAR, but are listed as S1, S2, or S3 in Nova Scotia by the Atlantic Canada Conservation Data Centre (AC CDC; Table 1.1).

Table 1.1 AC CDC Status Ranks

S-Rank/ Qualifier	Description
S1	Critically Imperiled - Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences). May be especially vulnerable to extirpation.
S2	Imperiled - Imperiled in the province because of rarity due to very restricted range, very few populations (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.
S3	Vulnerable - Vulnerable in the province due to a restricted range, relatively few populations.
S4	Apparently Secure - Uncommon but not rare; some cause for long-term concern due to declines or other factors (80+ occurrences).
S5	Secure - Common, widespread, and abundant in the province.
S#S#	A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community
?	Inexact or Uncertain - Denotes inexact or uncertain numeric rank.
SNR	Unranked - Provincial conservation status not yet assessed.
SU	Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

Table 1.1 AC CDC Status Ranks

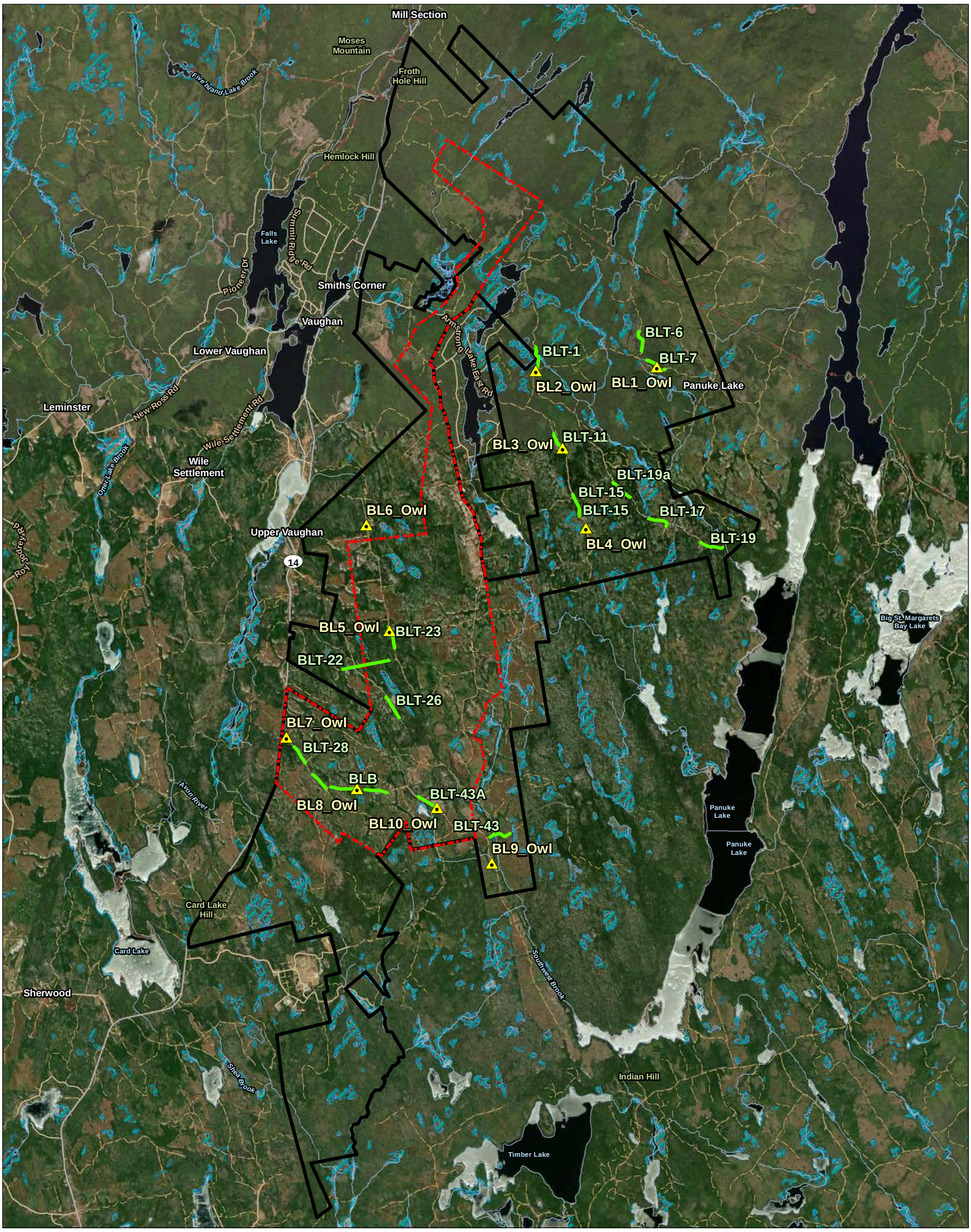
S-Rank/ Qualifier	Description
SNA	Not Applicable - A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
B	Breeding - Conservation status refers to the breeding population of the species in the province
N	Nonbreeding - Conservation status refers to the non-breeding population of the species in the province.
M	Migrant - Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the province.
Reference: AC CDC 2023	

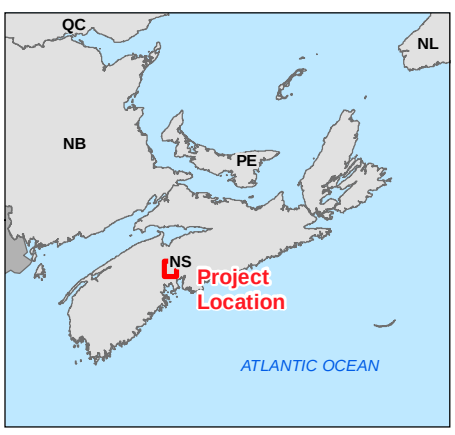
The Project is situated in the Western Ecoregion of Nova Scotia. Most of the Assessment Area and Project Boundary lie within the South Mountain Ecodistrict, with southern parts of the Project Boundary within the LaHave Drumlins Ecodistrict. The southern portion of the Assessment Area overlaps the St. Margaret's Bay Ecodistrict.

The Western Ecoregion is characterized by a milder climate than the rest of Nova Scotia, in part due to prevailing westerly winds which direct warmer temperatures inland from the Gulf of Maine. Overall, the region has early springs, warm summers, and milder winters. Most of the Project Boundary is within the South Mountain Ecodistrict within the Western Ecoregion. This Ecodistrict is characterized as a rugged upland of pine and spruce dominated forests with abundant lakes, rivers, and wetlands. The forests have been strongly influenced by several factors including a long history of forest harvesting and wildfires. Eastern white pine (*Pinus strobus*) is a typical component of most stands along with northern red oak (*Quercus rubra*; Nova Scotia Department of Natural Resources (NSDNR) 2017). Red spruce (*Picea rubens*), eastern white pine, and eastern hemlock (*Tsuga canadensis)* occupy most slope positions with moderately to well drained soils, and balsam fir (*Abies balsamea*) is often present in all stands at some stage of development.

The LaHave Drumlins Ecodistrict is also dominated by coniferous forest, with tolerant hardwoods on the upper slopes of drumlins and well drained hills. Drumlins or drumlin-like landforms which make up 46% of the Ecodistrict provide conditions for development of a late successional Acadian Forest of red spruce, eastern hemlock, eastern white pine, and yellow birch (*Betula alleghaniensis*). Sugar maple (*Acer saccharum*), northern red oak and American beech (*Fagus grandifolia*) are found in lower lying areas.

The St. Margaret's Bay Ecodistrict contains soils very similar to those of the South Mountain Ecodistrict, but a cooler climate and higher humidity and soil moisture changes the forest composition. Much of this Ecodistrict is covered with stands of Acadian softwood forests of red spruce with eastern hemlock, eastern white pine, and yellow birch. Shrub layers are composed primarily of advanced regeneration of overstory species such as balsam fir and red maple (NSDNR 2017).





- Owl Survey Location
- Winter Survey Transect
- Project Boundary, February 2023
- Assessment Area, February 2023
- Arterial Road
- Local Road
- Resource Road / Trail
- Transmission Line
- Watercourse
- Wetland (NSE)
- Wetland (NHN)
- Waterbody

0 1,000 2,000 metres

(At original document size of 11x17)
1:80,000

N

Stantec

Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Government of NS, Client, Stantec
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Project Location
Nuttby Mountain
Nova Scotia

Prepared on 2023-02-23

Client/Project
121417191_012a
Nova Scotia Power Inc.
NSPI Wind EA Support Services

Figure No.
1

Title
Survey Locations for Overwintering Bird and Nocturnal Owl Surveys: Bear Lake

2.0 METHODS

2.1 OVERWINTERING SURVEYS

Overwintering bird surveys were conducted to assess the species composition and relative abundance of bird species in the area during the winter months. Transects surveyed during the migration monitoring program that were accessible during winter conditions (Figure 1 and Table 2.1) were surveyed using a line-transect survey method to quantify overwintering species in the area based on the methods described in EC and CWS (2007). The subset of transects that were accessible over the winter varied from month to month due to changing snow depths. In total, 25 transect locations were surveyed over the course of the program, including eight variations of the existing transects which were altered or expanded due to winter accessibility. Accessible transects were visited once monthly from December through March, and birds detected through visual or auditory cues along each 500 metre (m) long transect were recorded.

Table 2.1 Completed Overwintering Bird Surveys

Date	Transects Completed
December 13, 2021	BLT1, BLT11, BLT15, BLT17, BLT19, BLT6, BLT7
December 21, 2021	BLT22, BLT23, BLT26, BLT28, BLT32, BLT37, BLT43
January 11, 2022	BLT1, BLT11, BLT15, BLT17, BLT19a, BLT6, BLT7
January 13, 2022	BLT22, BLT23, BLT26, BLT28, BLT32, BLT37, BLT43
February 10, 2022	BLT1
February 11, 2022	BLT22, BLT23, BLT28, BLT32, BLT37
March 23, 2002	BLT1, BLT11, BLT15, BLT17, BLT19, BLT6, BLT7
March 24, 2022	BLT22, BLT23, BLT26, BLT28, BLT32, BLT37, BLT43

Habitat types crossed by the transects vary along the length of each transect and include a representative sample of habitats. Sampled habitat types include softwood, hardwood and mixed wood stands of young to mature/old age, regenerating clearcuts, and various wetland habitats including treed swamps.

Birds detected either visually or through auditory cues were documented, and information on the species, number of individuals, distance from the transect, behaviour, flight height, and direction of travel were recorded. Surveys were conducted under suitable environmental conditions, including light winds, no precipitation, and good visibility.

A complete survey of all transects took two survey days per month, and in total 57 transect surveys were completed over a total of 8 survey days.

2.2 NOCTURNAL OWL SURVEYS

Nocturnal owl surveys were conducted within various habitats in April 2022 to assess the species composition and relative abundance of nocturnal owls. The survey approach applied representative sampling across the land cover types in the study area which were considered to have potential to provide suitable habitat for nocturnal owls. The survey method followed that outlined by the Nova Scotia Nocturnal Owl Survey Guide for Volunteers (Birds Canada 2019).

Ten survey stops situated in locations accessible by vehicle and spaced a minimum of 1.6 kilometres (km) apart, were visited once in April 2022 (Figure 1). Surveys began approximately one-half hour after sunset under suitable environmental conditions, including light winds and little to no precipitation. The Nova Scotia Nocturnal Owl Survey broadcast recording, which lasts approximately 9.5 minutes, was played at each survey location, and any owls or other nocturnal bird species encountered either by visual or auditory cues were recorded. Incidental observations of calling amphibians were also recorded.

3.0 RESULTS

3.1 OVERWINTERING SURVEYS

Forty-eight surveys of 500 m long transects were conducted over eight survey days in winter and early spring of 2021/22. Transect surveys were conducted monthly from December through March. In total, 167 observations of 360 individual birds representing 19 species were made (Table 3.1, Table A.1 in Appendix A). Observations included 13 passerines, three woodpeckers, one raptor, one owl, and one waterfowl species. Overall, the bird species noted during the overwintering surveys were expected for this environment and are typical of the habitat types found in the area.

Table 3.1 Bird Species Observed During 2021/22 Overwintering Surveys

Common Name	Scientific Name	SARA Status (Schedule 1)	COSEWIC Status	NS ESA Status	AC CDC Rank	Number Observed
Canada goose	*Branta canadensis*	-	-	-	SUB, S4N, S5M	2
red-tailed hawk	*Buteo jamaicensis*	-	Not at Risk	-	S5	1
barred owl	*Strix varia*	-	-	-	S5	1
downy woodpecker	*Dryobates pubescens*	-	-	-	S5	2
hairy woodpecker	*Dryobates villosus*	-	-	-	S5	4
pileated woodpecker	*Dryocopus pileatus*	-	-	-	S5	2
Canada jay	*Perisoreus canadensis*	-	-	-	S3	2
blue jay	*Cyanocitta cristata*	-	-	-	S5	11

Table 3.1 Bird Species Observed During 2021/22 Overwintering Surveys

Common Name	Scientific Name	SARA Status (Schedule 1)	COSEWIC Status	NS ESA Status	AC CDC Rank	Number Observed
American crow	*Corvus brachyrhynchos*	-	-	-	S5	21
common raven	*Corvus corax*	-	-	-	S5	14
black-capped chickadee	*Poecile atricapillus*	-	-	-	S5	146
red-breasted nuthatch	*Sitta canadensis*	-	-	-	S4S5	38
golden-crowned kinglet	*Regulus satrapa*	-	-	-	S5	8
American robin	*Turdus migratorius*	-	-	-	S5B, S3N	2
purple finch	*Haemorhous purpureus*	-	-	-	S4S5B, S3S4N, S5M	7
red crossbill	*Loxia curvirostra*	-	-	-	S3S4	9
white-winged crossbill	*Loxia leucoptera*	-	-	-	S4S5	20
American goldfinch	*Spinus tristis*	-	-	-	S5	39
dark-eyed junco	*Junco hyemalis*	-	-	-	S4S5	20

The most abundant species observed included black-capped chickadee (*Poecile atricapillus*; 146 individuals), American goldfinch (*Spinus tristis;* 39 individuals), and red-breasted nuthatch (*Sitta canadensis;* 38 individuals). The most frequently recorded species were black-capped chickadee (146 records), red-breasted nuthatch (24 records), and dark-eyed junco (*Junco hyemalis;* 18 records).

None of the birds observed during the overwintering surveys are considered SAR, and one is a SOCC (Canada jay, *Perisoreus canadensis*). Canada jay is listed as S3 by the AC CDC. A pair of Canada jays were observed flying over transect BLT-37 on March 24, 2022. BLT-37 is within the Project Boundary.

3.2 NOCTURNAL OWL SURVEYS

Nocturnal owl surveys were conducted at 10 locations between 20:52 on April 25, 2022, and 00:19 on April 26, 2022. Seven individual owls, representing two species, barred owl (*Strix varia*) and northern saw-whet owl (*Aegolius acadicus*), were observed during these surveys (Table 3.2, Table A.2, Appendix A).

Neither of the species observed are considered SAR or SOCC. During the surveys, incidental observations of herpetile species were made. Both spring peeper (*Pseudacris crucifer*) and wood frog (*Lithobates sylvaticus*) were noted calling during the course of the surveys.

Table 3.2 Owls Observed During 2022 Nocturnal Owl Surveys

Survey Date	Survey Station ID	Location	Species Recorded
April 25/26, 2022	BL1_OWL	In Assessment Area	barred owl (*Strix varia*)
	BL2_OWL	In Assessment Area	-
	BL3_OWL	In Assessment Area	-
	BL4_OWL	In Assessment Area	-
	BL5_OWL	In Project Boundary	barred owl (*Strix varia*)
	BL6_OWL	In Assessment Area	northern saw-whet owl (*Aegolius acadicus*)*
	BL7_OWL	In Project Boundary	northern saw-whet owl (*Aegolius acadicus*)*
	BL8_OWL	In Project Boundary	northern saw-whet owl (*Aegolius acadicus*)*
	BL9_OWL	In Assessment Area	northern saw-whet owl (*Aegolius acadicus*)*
	BL10_OWL	In Project Boundary	northern saw-whet owl (*Aegolius acadicus*)*
* First heard at BL9_OWL, but also presumed heard at four other survey stations			

4.0 SUMMARY

The overwintering surveys, conducted between December 13, 2021, and March 24, 2022, identified the presence of 19 species of birds, including one SOCC (Canada jay). The nocturnal owl surveys conducted on April 25/26, 2022, identified two owl species (barred owl and northern saw-whet owl) potentially breeding near the proposed Project.

5.0 CLOSURE

The information presented in this report represents the best technical judgment of Stantec based on information provided by NSPI and the data obtained from the work. Conclusions are based on site conditions observed by Stantec at the time the work was performed at the specific survey locations and cannot be extrapolated to other areas around these locations.

6.0 REFERENCES

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NSDNR (Nova Scotia Department of Natural Resources). 2017. Ecological Land Classification for Nova Scotia. Prepared by P. Neily, S. Basquill, E. Quigley and K. Keys. Available online: https://novascotia.ca/natr/forestry/ecological/pdf/Ecological-Land-Classification-guide.pdf. Last accessed: October 25, 2022.

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APPENDIX A

Bird Survey Data

Table A.1 Overwintering Bird Survey Data

Date	Site	Transect	Location	Time	Common Name	Scientific name	#	Distance (m)	Behaviour	Height[1]	Direction of Travel	Comments
12/13/2021	Bear Lake	BLT11	In Assessment Area	8:53	purple finch	*Haemorhous purpureus*	2	100	Flyover	Low	West	
12/13/2021	Bear Lake	BLT15	In Assessment Area	9:14	American goldfinch	*Spinus tristis*	12	2	Foraging	Low	Local Movement	
12/13/2021	Bear Lake	BLT15	In Assessment Area	9:19	black-capped chickadee	*Poecile atricapillus*	5	5	Foraging	Low	Local Movement	
12/13/2021	Bear Lake	BLT15	In Assessment Area	9:19	red-breasted nuthatch	*Sitta canadensis*	2	5	Foraging	Low	Local Movement	
12/13/2021	Bear Lake	BLT1	In Assessment Area	9:41	hairy woodpecker	*Dryobates villosus*	1	30	Foraging	Low	Local Movement	
12/13/2021	Bear Lake	BLT1	In Assessment Area	9:43	red-breasted nuthatch	*Sitta canadensis*	1	20	Calling	Low	Local Movement	
12/13/2021	Bear Lake	BLT1	In Assessment Area	9:48	American goldfinch	*Spinus tristis*	1	100	Foraging	Low	Local Movement	
12/13/2021	Bear Lake	BLT6	In Assessment Area	10:08	black-capped chickadee	*Poecile atricapillus*	1	0	Flyover	Low	East	
12/13/2021	Bear Lake	BLT7	In Assessment Area	10:34	ruffed grouse	*Bonasa umbellus*	1	2	Foraging	Low	Local Movement	
12/13/2021	Bear Lake	BLT17	In Assessment Area	11:05	black-capped chickadee	*Poecile atricapillus*	1	20	Calling	Low	Local Movement	
12/13/2021	Bear Lake	BLT17	In Assessment Area	11:06	red-breasted nuthatch	*Sitta canadensis*	1	50	Calling	Low	Local Movement	
12/13/2021	Bear Lake	BLT17	In Assessment Area	11:06	black-capped chickadee	*Poecile atricapillus*	3	0	Flyover	Low	South	
12/13/2021	Bear Lake	BLT17	In Assessment Area	11:10	golden-crowned kinglet	*Regulus satrapa*	1	20	Calling	Low	Local Movement	
12/13/2021	Bear Lake	BLT17	In Assessment Area	11:11	white-winged crossbill	*Loxia leucoptera*	5	0	Flyover	Medium	South	
12/13/2021	Bear Lake	BLT17	In Assessment Area	11:15	American goldfinch	*Spinus tristis*	1	100	Flyover	Medium	Northeast	
12/13/2021	Bear Lake	BLT19	In Assessment Area	11:32	American goldfinch	*Spinus tristis*	3	100	Flyover	Medium	South	
12/13/2021	Bear Lake	BLT19	In Assessment Area	11:36	red crossbill	*Loxia curvirostra*	2	100	Flyover	Medium	West	
12/13/2021	Bear Lake	BLT19	In Assessment Area	11:36	American goldfinch	*Spinus tristis*	3	5	Foraging	Low	Local Movement	
12/20/2021	Bear Lake	BLT26	In Project Boundary	8:35	No Birds Observed	*n/a*	0	n/a	n/a	n/a	n/a	no birds
12/20/2021	Bear Lake	BLT22	In Project Boundary	9:15	golden-crowned kinglet	*Regulus satrapa*	2	5	Foraging	Low	Local Movement	
12/20/2021	Bear Lake	BLT22	In Project Boundary	9:17	black-capped chickadee	*Poecile atricapillus*	1	50	Foraging	Low	Local Movement	
12/20/2021	Bear Lake	BLT23	In Project Boundary	9:47	ruffed grouse	*Bonasa umbellus*	1	5	Foraging	Low	Local Movement	
12/20/2021	Bear Lake	BLT28	In Project Boundary	10:21	pileated woodpecker	*Dryocopus pileatus*	1	300	Flyover	n/a	n/a	
12/20/2021	Bear Lake	BLT32	In Project Boundary	10:52	common raven	*Corvus corax*	1	400	Flyover	n/a	n/a	
12/20/2021	Bear Lake	BLT37	In Project Boundary	11:00	No Birds Observed	*n/a*	0	n/a	n/a	n/a	n/a	no birds
12/20/2021	Bear Lake	BLT43	In Assessment Area	11:57	white-winged crossbill	*Loxia leucoptera*	1	100	Foraging	Low	Local Movement	
12/20/2021	Bear Lake	BLT43	In Assessment Area	12:00	black-capped chickadee	*Poecile atricapillus*	4	10	Foraging	Low	Local Movement	
1/11/2022	Bear Lake	BLT11	In Assessment Area	8:55	common raven	*Corvus corax*	1	0	Flyover	Low	South	
1/11/2022	Bear Lake	BLT11	In Assessment Area	8:59	golden-crowned kinglet	*Regulus satrapa*	1	15	Foraging	Low	Local Movement	
1/11/2022	Bear Lake	BLT15	In Assessment Area	9:20	red-breasted nuthatch	*Sitta canadensis*	1	200	Calling	Low	Local Movement	
1/11/2022	Bear Lake	BLT15	In Assessment Area	9:24	red-breasted nuthatch	*Sitta canadensis*	2	0	Foraging	Low	Local Movement	
1/11/2022	Bear Lake	BLT15	In Assessment Area	9:28	downy woodpecker	*Dryobates pubescens*	1	20	Foraging	Low	Local Movement	
1/11/2022	Bear Lake	BLT15	In Assessment Area	9:25	red-breasted nuthatch	*Sitta canadensis*	1	20	Foraging	Low	Local Movement	
1/11/2022	Bear Lake	BLT1	In Assessment Area	9:58	black-capped chickadee	*Poecile atricapillus*	16	0	Foraging	Low	Local Movement	
1/11/2022	Bear Lake	BLT1	In Assessment Area	9:58	white-winged crossbill	*Loxia leucoptera*	1	20	Foraging	Low	Local Movement	
1/11/2022	Bear Lake	BLT1	In Assessment Area	10:02	American goldfinch	*Spinus tristis*	2	50	Foraging	Low	Local Movement	

Table A.1 Overwintering Bird Survey Data

Date	Site	Transect	Location	Time	Common Name	Scientific name	#	Distance (m)	Behaviour	Height[1]	Direction of Travel	Comments
1/11/2022	Bear Lake	BLT1	In Assessment Area	10:07	American goldfinch	*Spinus tristis*	8	0	Foraging	Low	Local Movement	
1/11/2022	Bear Lake	BLT1	In Assessment Area	10:08	No Birds Observed	*n/a*	1	50	Calling	Low	Local Movement	
1/11/2022	Bear Lake	BLT6	In Assessment Area	n/a	No Birds Observed	*n/a*	0	n/a	n/a	n/a	n/a	no birds
1/11/2022	Bear Lake	BLT7	In Assessment Area	n/a	No Birds Observed	*n/a*	0	n/a	n/a	n/a	n/a	no birds
1/11/2022	Bear Lake	BLT19a	In Assessment Area	11:50	black-capped chickadee	*Poecile atricapillus*	2	20	Foraging	Low	Local Movement	
1/11/2022	Bear Lake	BLT17	In Assessment Area	n/a	No Birds Observed	*n/a*	0	n/a	n/a	n/a	n/a	no birds
1/13/2022	Bear Lake	BLT-26	In Project Boundary	9:11	common raven	*Corvus corax*	1	500	Calling	n/a	n/a	
1/13/2022	Bear Lake	BLT22	In Project Boundary	9:52	hairy woodpecker	*Dryobates villosus*	1	100	Calling	Low	Local Movement	
1/13/2022	Bear Lake	BLT22	In Project Boundary	9:53	common raven	*Corvus corax*	1	500	Calling	n/a	n/a	
1/13/2022	Bear Lake	BLT22	In Project Boundary	9:59	ruffed grouse	*Bonasa umbellus*	1	0	Foraging	Low	Local Movement	
1/13/2022	Bear Lake	BLT22	In Project Boundary	10:06	white-winged crossbill	*Loxia leucoptera*	11	15	Foraging	Low	Local Movement	
1/13/2022	Bear Lake	BLT22	In Project Boundary	10:06	red-breasted nuthatch	*Sitta canadensis*	2	15	Foraging	Low	Local Movement	
1/13/2022	Bear Lake	BLT22	In Project Boundary	10:12	black-capped chickadee	*Poecile atricapillus*	4	50	Foraging	Low	Local Movement	
1/13/2022	Bear Lake	BLT23	In Project Boundary	10:25	red-breasted nuthatch	*Sitta canadensis*	1	70	Calling	Low	Local Movement	
1/13/2022	Bear Lake	BLT23	In Project Boundary	10:31	ruffed grouse	*Bonasa umbellus*	1	0	Foraging	Low	Local Movement	
1/13/2022	Bear Lake	BLT23	In Project Boundary	10:37	ruffed grouse	*Bonasa umbellus*	1	5	Foraging	Low	Local Movement	
1/13/2022	Bear Lake	BLT28	In Project Boundary	11:09	common raven	*Corvus corax*	1	200	Calling	Low	Local Movement	
1/13/2022	Bear Lake	BLT28	In Project Boundary	11:09	American crow	*Corvus brachyrhynchos*	2	400	Calling	Medium	Southwest	
1/13/2022	Bear Lake	BLT28	In Project Boundary	11:09	black-capped chickadee	*Poecile atricapillus*	1	50	Calling	Low	Local Movement	
1/13/2022	Bear Lake	BLT28	In Project Boundary	11:13	black-capped chickadee	*Poecile atricapillus*	1	100	Calling	Low	Local Movement	
1/13/2022	Bear Lake	BLT28	In Project Boundary	11:19	golden-crowned kinglet	*Regulus satrapa*	3	50	Calling	Low	Local Movement	
1/13/2022	Bear Lake	BLT32	In Project Boundary	11:41	ruffed grouse	*Bonasa umbellus*	1	0	Foraging	Low	Local Movement	
1/13/2022	Bear Lake	BLT32	In Project Boundary	11:45	red-breasted nuthatch	*Sitta canadensis*	1	100	Calling	Low	Local Movement	
1/13/2022	Bear Lake	BLT32	In Project Boundary	11:48	American crow	*Corvus brachyrhynchos*	1	500	Calling	n/a	n/a	
1/13/2022	Bear Lake	BLT37	In Project Boundary	12:12	pileated woodpecker	*Dryocopus pileatus*	1	300	Calling	Low	Local Movement	
1/13/2022	Bear Lake	BLT43	In Project Boundary	n/a	No Birds Observed	*n/a*	0	n/a	n/a	n/a	n/a	no birds
2/10/2022	Bear Lake	BLT1	In Assessment Area	9:19	blue jay	*Cyanocitta cristata*	1	50	Calling	Low	Local Movement	
2/10/2022	Bear Lake	BLT1	In Assessment Area	9:24	American crow	*Corvus brachyrhynchos*	1	400	Calling	n/a	n/a	
2/10/2022	Bear Lake	BLT1	In Assessment Area	9:24	black-capped chickadee	*Poecile atricapillus*	8	20	Foraging	Low	Local Movement	
2/10/2022	Bear Lake	BLT1	In Assessment Area	9:24	red-breasted nuthatch	*Sitta canadensis*	2	20	Foraging	Low	Local Movement	
2/10/2022	Bear Lake	BLT1	In Assessment Area	9:46	American crow	*Corvus brachyrhynchos*	1	500	Calling	n/a	n/a	
2/10/2022	Bear Lake	BLT1	In Assessment Area	9:55	red crossbill	*Loxia curvirostra*	3	100	Foraging	Low	Local Movement	
2/10/2022	Bear Lake	BLT1	In Assessment Area	9:55	red-breasted nuthatch	*Sitta canadensis*	1	50	Foraging	Low	Local Movement	
2/10/2022	Bear Lake	BLT1	In Assessment Area	9:57	red-breasted nuthatch	*Sitta canadensis*	2	10	Foraging	Low	Local Movement	
2/10/2022	Bear Lake	BLT1	In Assessment Area	10:28	black-capped chickadee	*Poecile atricapillus*	4	0	Flyover	Low	North	
2/10/2022	Bear Lake	BLT1	In Assessment Area	10:42	red-breasted nuthatch	*Sitta canadensis*	1	5	Foraging	Low	Local Movement	

Table A.1 Overwintering Bird Survey Data

Date	Site	Transect	Location	Time	Common Name	Scientific name	#	Distance (m)	Behaviour	Height[1]	Direction of Travel	Comments
2/10/2022	Bear Lake	BLT1	In Assessment Area	10:42	common raven	*Corvus corax*	1	400	Calling	n/a	n/a	
2/10/2022	Bear Lake	BLT1	In Assessment Area	10:48	black-capped chickadee	*Poecile atricapillus*	4	0	Foraging	Low	Local Movement	
2/10/2022	Bear Lake	BLT1	In Assessment Area	10:48	red-breasted nuthatch	*Sitta canadensis*	2	0	Foraging	Low	Local Movement	
2/10/2022	Bear Lake	BLT1	In Assessment Area	11:14	black-capped chickadee	*Poecile atricapillus*	12	0	Foraging	Low	Local Movement	
2/10/2022	Bear Lake	BLT1	In Assessment Area	11:14	red-breasted nuthatch	*Sitta canadensis*	2	0	Foraging	Low	Local Movement	
2/10/2022	Bear Lake	BLT1	In Assessment Area	11:14	golden-crowned kinglet	*Regulus satrapa*	1	5	Foraging	Low	Local Movement	
2/10/2022	Bear Lake	BLT1	In Assessment Area	11:30	black-capped chickadee	*Poecile atricapillus*	8	0	Foraging	Low	Local Movement	
2/10/2022	Bear Lake	BLT1	In Assessment Area	11:35	red-breasted nuthatch	*Sitta canadensis*	1	150	Calling	Low	Local Movement	
2/11/2022	Bear Lake	BLT22	In Project Boundary	9:30	blue jay	*Cyanocitta cristata*	2	300	Calling	Low	Local Movement	
2/11/2022	Bear Lake	BLT22	In Project Boundary	9:36	blue jay	*Cyanocitta cristata*	1	250	Calling	Low	Local Movement	
2/11/2022	Bear Lake	BLT22	In Project Boundary	9:39	American crow	*Corvus brachyrhynchos*	2	300	Calling	Medium	West	
2/11/2022	Bear Lake	BLT22	In Project Boundary	9:41	black-capped chickadee	*Poecile atricapillus*	1	5	Foraging	Low	Local Movement	
2/11/2022	Bear Lake	BLT22	In Project Boundary	9:45	Purple finch	*Haemorhous purpureus*	2	2	Flyover	Medium	South	
2/11/2022	Bear Lake	Incidental		9:58	white-winged crossbill	*Loxia leucoptera*	2	0	Flyover	Medium	North	
2/11/2022	Bear Lake	Incidental		10:03	American crow	*Corvus brachyrhynchos*	2	300	Calling	n/a	n/a	
2/11/2022	Bear Lake	Incidental		10:06	black-capped chickadee	*Poecile atricapillus*	1	200	Calling	Low	Local Movement	
2/11/2022	Bear Lake	Incidental		10:10	black-capped chickadee	*Poecile atricapillus*	7	0	Foraging	Low	Local Movement	
2/11/2022	Bear Lake	Incidental		10:10	red-breasted nuthatch	*Sitta canadensis*	4	0	Foraging	Low	Local Movement	
2/11/2022	Bear Lake	Incidental		10:16	red crossbill	*Loxia curvirostra*	1	0	Flyover	Medium	South	
2/11/2022	Bear Lake	Incidental		10:22	American goldfinch	*Spinus tristis*	8	0	Flyover	Low	Local Movement	
2/11/2022	Bear Lake	BLT23	In Project Boundary	10:35	black-capped chickadee	*Poecile atricapillus*	6	0	Foraging	Low	Local Movement	
2/11/2022	Bear Lake	BLT23	In Project Boundary	10:35	red-breasted nuthatch	*Sitta canadensis*	1	0	Foraging	Low	Local Movement	
2/11/2022	Bear Lake	BLT23	In Project Boundary	10:36	American goldfinch	*Spinus tristis*	1	0	Flyover	Low	West	
2/11/2022	Bear Lake	BLT23	In Project Boundary	10:36	red crossbill	*Loxia curvirostra*	1	0	Flyover	Medium	East	
2/11/2022	Bear Lake	BLT23	In Project Boundary	10:39	common raven	*Corvus corax*	1	200	Calling	n/a	n/a	
2/11/2022	Bear Lake	BLT23	In Project Boundary	10:39	red-breasted nuthatch	*Sitta canadensis*	1	100	Calling	Low	Local Movement	
2/11/2022	Bear Lake	BLT23	In Project Boundary	10:39	American crow	*Corvus brachyrhynchos*	1	300	Calling	n/a	n/a	
2/11/2022	Bear Lake	BLT23	In Project Boundary	10:43	barred owl	*Strix varia*	1	20	Flyover	Low	East	
2/11/2022	Bear Lake	BLT23	In Project Boundary	10:56	ruffed grouse	*Bonasa umbellus*	1	10	Flyover	Low	Local Movement	
2/11/2022	Bear Lake	BLT28	In Project Boundary	12:08	American crow	*Corvus brachyrhynchos*	1	400	Calling	n/a	n/a	
2/11/2022	Bear Lake	BLT32	In Project Boundary	n/a	No Birds Observed	*n/a*	0	n/a	n/a	n/a	n/a	no birds
2/11/2022	Bear Lake	BLT37	In Project Boundary	13:12	red crossbill	*Loxia curvirostra*	2	0	Flyover	Medium	Northeast	
3/23/2022	Bear Lake	BLT1	In Assessment Area	8:24	dark-eyed junco	*Junco hyemalis*	1	10	Calling	Low	Local Movement	counter singing
3/23/2022	Bear Lake	BLT1	In Assessment Area	8:24	dark-eyed junco	*Junco hyemalis*	1	50	Calling	Low	Local Movement	counter singing
3/23/2022	Bear Lake	BLT11	In Assessment Area	8:42	dark-eyed junco	*Junco hyemalis*	2	15	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT11	In Assessment Area	8:43	purple finch	*Haemorhous purpureus*	1	200	Calling	Low	Local Movement	

Table A.1 Overwintering Bird Survey Data

Date	Site	Transect	Location	Time	Common Name	Scientific name	#	Distance (m)	Behaviour	Height[1]	Direction of Travel	Comments
3/23/2022	Bear Lake	BLT11	In Assessment Area	8:48	American crow	*Corvus brachyrhynchos*	4	300	Flyover	Low	Northwest	
3/23/2022	Bear Lake	BLT11	In Assessment Area	8:48	red-breasted nuthatch	*Sitta canadensis*	1	100	Calling	Low	Local Movement	
3/23/2022	Bear Lake	BLT11	In Assessment Area	8:51	dark-eyed junco	*Junco hyemalis*	1	10	Calling	Low	Local Movement	
3/23/2022	Bear Lake	BLT15	In Assessment Area	9:12	dark-eyed junco	*Junco hyemalis*	1	0	Flyover	Low	Local Movement	
3/23/2022	Bear Lake	BLT15	In Assessment Area	9:13	black-capped chickadee	*Poecile atricapillus*	4	30	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT15	In Assessment Area	9:18	ruffed grouse	*Bonasa umbellus*	1	0	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT15	In Assessment Area	9:22	dark-eyed junco	*Junco hyemalis*	2	100	Calling	Low	Local Movement	
3/23/2022	Bear Lake	BLT1	In Assessment Area	9:35	dark-eyed junco	*Junco hyemalis*	1	5	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT1	In Assessment Area	9:39	dark-eyed junco	*Junco hyemalis*	1	15	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT1	In Assessment Area	9:44	black-capped chickadee	*Poecile atricapillus*	3	30	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT1	In Assessment Area	9:49	black-capped chickadee	*Poecile atricapillus*	5	15	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT6	In Assessment Area	10:10	ruffed grouse	*Bonasa umbellus*	1	15	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT6	In Assessment Area	10:17	black-capped chickadee	*Poecile atricapillus*	4	30	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT6	In Assessment Area	10:21	black-capped chickadee	*Poecile atricapillus*	3	0	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT7	In Assessment Area	10:44	black-capped chickadee	*Poecile atricapillus*	8	20	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT7	In Assessment Area	10:50	black-capped chickadee	*Poecile atricapillus*	2	0	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT7	In Assessment Area	10:50	red-breasted nuthatch	*Sitta canadensis*	4	30	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT7	In Assessment Area	10:50	purple finch	*Haemorhous purpureus*	1	10	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT7	In Assessment Area	10:57	black-capped chickadee	*Poecile atricapillus*	2	30	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT7	In Assessment Area	10:58	black-capped chickadee	*Poecile atricapillus*	2	50	Calling	Low	Local Movement	
3/23/2022	Bear Lake	BLT19	In Assessment Area	11:32	black-capped chickadee	*Poecile atricapillus*	2	5	Foraging	Low	Local Movement	
3/23/2022	Bear Lake	BLT17	In Assessment Area	11:55	common raven	*Corvus corax*	2	0	Flyover	Low	Local Movement	
3/23/2022	Bear Lake	BLT17	In Assessment Area	11:55	common raven	*Corvus corax*	1	300	Calling	n/a	n/a	
3/24/2022	Bear Lake	BLT26	In Project Boundary	8:38	American crow	*Corvus brachyrhynchos*	2	400	Calling	n/a	n/a	
3/24/2022	Bear Lake	BLT26	In Project Boundary	8:40	downy woodpecker	*Dryobates pubescens*	1	300	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT26	In Project Boundary	8:45	Canada goose	*Branta canadensis*	2	50	Flyover	Medium	North	
3/24/2022	Bear Lake	BLT26	In Project Boundary	8:47	black-capped chickadee	*Poecile atricapillus*	8	50	Foraging	Low	Local Movement	
3/24/2022	Bear Lake	BLT26	In Project Boundary	8:47	dark-eyed junco	*Junco hyemalis*	1	100	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT26	In Project Boundary	8:53	dark-eyed junco	*Junco hyemalis*	1	100	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT26	In Project Boundary	8:54	hairy woodpecker	*Dryobates villosus*	1	150	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:14	dark-eyed junco	*Junco hyemalis*	1	100	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:14	American crow	*Corvus brachyrhynchos*	1	250	Calling	n/a	n/a	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:14	blue jay	*Cyanocitta cristata*	1	200	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:14	hairy woodpecker	*Dryobates villosus*	1	200	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:14	red-breasted nuthatch	*Sitta canadensis*	1	200	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:17	dark-eyed junco	*Junco hyemalis*	1	100	Calling	Low	Local Movement	

Table A.1 Overwintering Bird Survey Data

Date	Site	Transect	Location	Time	Common Name	Scientific name	#	Distance (m)	Behaviour	Height[1]	Direction of Travel	Comments
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:20	dark-eyed junco	*Junco hyemalis*	1	200	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:21	black-capped chickadee	*Poecile atricapillus*	2	5	Foraging	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:21	American robin	*Turdus migratorius*	1	200	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:25	black-capped chickadee	*Poecile atricapillus*	2	100	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:29	blue jay	*Cyanocitta cristata*	3	150	Foraging	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:31	dark-eyed junco	*Junco hyemalis*	1	200	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:33	black-capped chickadee	*Poecile atricapillus*	1	5	Foraging	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:36	dark-eyed junco	*Junco hyemalis*	1	200	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:36	blue jay	*Cyanocitta cristata*	1	300	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT22	In Project Boundary	9:37	black-capped chickadee	*Poecile atricapillus*	1	200	Foraging	Low	Local Movement	
3/24/2022	Bear Lake	BLT23	In Project Boundary	9:57	black-capped chickadee	*Poecile atricapillus*	3	5	Foraging	Low	Local Movement	
3/24/2022	Bear Lake	BLT23	In Project Boundary	9:57	red-breasted nuthatch	*Sitta canadensis*	2	5	Foraging	Low	Local Movement	
3/24/2022	Bear Lake	BLT23	In Project Boundary	9:57	dark-eyed junco	*Junco hyemalis*	1	5	Foraging	Low	Local Movement	
3/24/2022	Bear Lake	BLT23	In Project Boundary	9:57	American robin	*Turdus migratorius*	1	100	Foraging	Medium	South	
3/24/2022	Bear Lake	BLT23	In Project Boundary	10:02	ruffed grouse	*Bonasa umbellus*	1	15	Foraging	Low	Local Movement	
3/24/2022	Bear Lake	BLT28	In Project Boundary	10:27	red-tailed hawk	*Buteo jamaicensis*	1	200	Flyover	Medium	Local Movement	
3/24/2022	Bear Lake	BLT28	In Project Boundary	10:30	purple finch	*Haemorhous purpureus*	1	200	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT28	In Project Boundary	10:30	common raven	*Corvus corax*	1	400	Calling	n/a	n/a	
3/24/2022	Bear Lake	BLT28	In Project Boundary	10:33	blue jay	*Cyanocitta cristata*	1	0	Flyover	Low	Local Movement	
3/24/2022	Bear Lake	BLT28	In Project Boundary	10:41	black-capped chickadee	*Poecile atricapillus*	2	50	Foraging	Low	Local Movement	
3/24/2022	Bear Lake	BLT32	In Project Boundary	10:55	black-capped chickadee	*Poecile atricapillus*	2	150	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT32	In Project Boundary	10:57	American crow	*Corvus brachyrhynchos*	2	300	Flyover	n/a	n/a	
3/24/2022	Bear Lake	BLT32	In Project Boundary	10:58	red-breasted nuthatch	*Sitta canadensis*	1	200	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT32	In Project Boundary	11:02	dark-eyed junco	*Junco hyemalis*	1	0	Foraging	Low	Local Movement	
3/24/2022	Bear Lake	BLT37	In Project Boundary	11:29	common raven	*Corvus corax*	1	500	Calling	n/a	n/a	
3/24/2022	Bear Lake	BLT37	In Project Boundary	11:31	American crow	*Corvus brachyrhynchos*	1	500	Calling	n/a	n/a	
3/24/2022	Bear Lake	BLT-37	In Project Boundary	11:33	Canada Jay	*Perisoreus canadensis*	2	0	Flyover	Low	Local Movement	
3/24/2022	Bear Lake	BLT43	In Project Boundary	12:08	common raven	*Corvus corax*	2	400	Calling	n/a	n/a	
3/24/2022	Bear Lake	BLT43	In Project Boundary	12:08	blue jay	*Cyanocitta cristata*	1	200	Calling	Low	Local Movement	
3/24/2022	Bear Lake	BLT43	In Project Boundary	12:09	dark-eyed junco	*Junco hyemalis*	1	200	Calling	Low	Local Movement	

[1] Low: 10-60 m, Medium: 60-120 m, High: 120 m and above.

Table A.2 Nocturnal Owl Survey Data

Date	Start Time	Site	Station	Location	Temperature (ºC)	Cloud (%)	Wind (Beaufort)	Precipitation	Ambient Noise	Common Name	Scientific Name	Distance (m)	Comment
25-Apr-22	23:24	Bear Lake	BL1_OWL	In Assessment Area	7	40	1	None	Light	Barred owl	*Strix varia*	n/a	Spring peepers calling
25-Apr-22	23:46	Bear Lake	BL2_OWL	In Assessment Area	7	40	1	None	Light	None		n/a	Spring peepers calling
26-Apr-22	0:19	Bear Lake	BL3_OWL	In Assessment Area	7	40	1	None	None	None		n/a	
26-Apr-22	0:04	Bear Lake	BL4_OWL	In Assessment Area	7	40	1	None	None	None		n/a	
25-Apr-22	22:39	Bear Lake	BL5_OWL	In Project Boundary	7	40	1	None	Light	Barred owl	*Strix varia*	5	Multiple flyovers, calling
25-Apr-22	22:15	Bear Lake	BL6_OWL	In Assessment Area	7	40	1	None	Light	Northern saw-whet owl	*Aegolius acadicus*	300	
25-Apr-22	21:47	Bear Lake	BL7_OWL	In Project Boundary	7	40	1	None	Light	Northern saw-whet owl	*Aegolius acadicus*	200	
25-Apr-22	21:34	Bear Lake	BL8_OWL	In Project Boundary	7	40	1	None	Moderate	Northern saw-whet owl	*Aegolius acadicus*	300	
25-Apr-22	20:52	Bear Lake	BL9_OWL	In Assessment Area	7	40	1	None	Moderate	Northern saw-whet owl	*Aegolius acadicus*	200	
25-Apr-22	21:08	Bear Lake	BL10_OWL	In Project Boundary	7	40	1	None	Light	Northern saw-whet owl	*Aegolius acadicus*	100	

APPENDIX P
STANTEC NOCTURNAL MIGRATION RADAR AND AVIAN ACOUSTIC SURVEY

Nocturnal Migration Radar and Avian Acoustic Survey for Proposed Wind Site Near Bear Lake, Nova Scotia

May 10, 2023

Prepared for:

Nova Scotia Power Inc.
1223 Lower Water St
Halifax, NS B3J 3S8

Prepared by:

Stantec Consulting Ltd.
30 Park Drive
Topsham, ME 04086

File: 121417191

NOCTURNAL MIGRATION RADAR AND AVIAN ACOUSTIC SURVEY FOR PROPOSED WIND SITE NEAR BEAR LAKE, NOVA SCOTIA

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Prepared by Laura Berube
(signature)

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Reviewed by
(signature)

Bob Roy

Approved by _____
(signature)

Wayne Tucker

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1.0 INTRODUCTION

1.1 PROJECT BACKGROUND

Nova Scotia Power Incorporated (NSPI) is the Proponent for the proposed Bear Lake Wind Project near Upper Vaughan, Nova Scotia (the Project). The Project consists of the construction and operation of approximately 14 to 19 wind turbines, in the range of 4.5 to 6 MW, for a total project capacity of up to 89 MW.

The Nova Scotia Policy Division, Environmental Assessment Branch recommends that avian assessments apply standard protocols for bird monitoring specified for a given “Category” of project (NSPD 2021). Project categories are defined by Environment and Climate Change Canada (ECCC) and the Canadian Wildlife Service (CWS) (Environment Canada 2007). Updated guidance (Environment Canada 2018, 2022) indicates that any project with proposed wind turbines with heights greater than 150 meters are categorized as having Very High site sensitivity, which automatically classifies a project with turbines of this height as Category 4. According to Environment Canada guidance documents dated 2007, 2018, and 2022, Category 4 projects are strongly encouraged to conduct a nighttime radar survey of bird migration activity. As currently planned, the Project meets Category 4 categorization and requires nocturnal radar surveys. CWS guidance documents also recommend that avian migration acoustic surveys be conducted to supplement radar surveys.

To satisfy recommendations from the Nova Scotia Department of Natural Resources and Renewables (NS DNRR) and Environment Canada, Nova Scotia Power retained Stantec Consulting Services Inc. (Stantec) to undertake nocturnal radar and avian acoustic surveys during spring and fall 2022 migration. Surveys were designed to document the abundance, flight patterns, and flight altitudes of nocturnally migrating birds for the Project and to provide insight into the species migrating over the Project on nights when radar sampling occurred.

1.2 PROJECT BOUNDARY DESCRIPTION

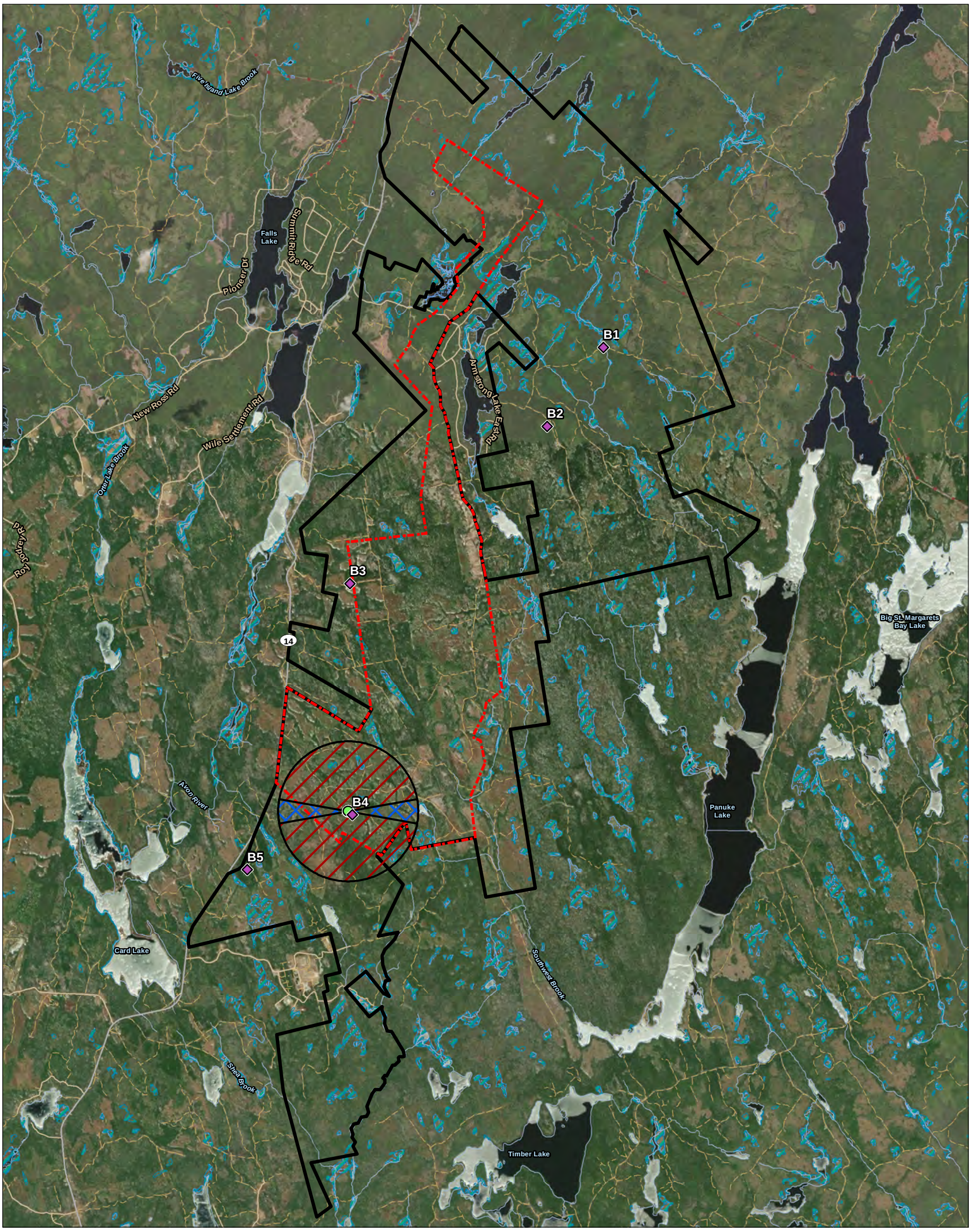
This Project Boundary consists of an irregularly shaped parcel of land totaling approximately 95 hectares (ha) (Figure 1.1). It is situated in the Western Ecoregion of Nova Scotia. The Western Ecoregion is characterized by a milder climate than the rest of Nova Scotia, in part due to prevailing westerly winds which direct warmer temperatures inland from the Gulf of Maine. Overall, the region has early springs, warm summers, and milder winters.

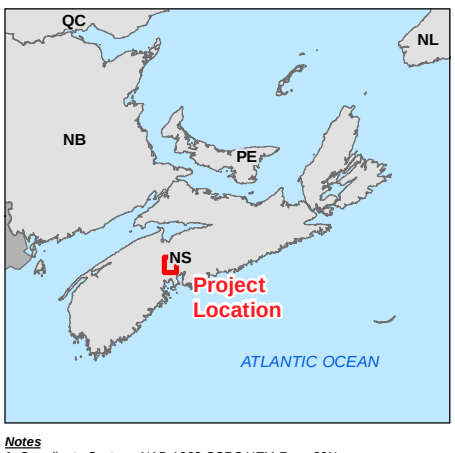
Most of the Project Boundary lies within the South Mountain Ecodistrict, with southern parts of the Project Boundary within the LaHave Drumlins and St. Margaret’s Bay Ecodistricts. The South Mountains Ecodistrict is characterized as a rugged upland of pine and spruce-dominated forests with abundant lakes, rivers, and wetlands. The forests have been strongly influenced by several factors including a long history of forest harvesting and wildfires. White pine (*Pinus strobus*) is a typical component of most stands along with red oak (*Quercus rubra*) (NS DNRR 2017). Red spruce (*Picea rubens*), white pine, and eastern

hemlock (*Tsuga canadensis)* occupy most slope positions with moderately to well drained soils, and balsam fir (*Abies balsamea*) is often present in all stands at some stage of development.

The LaHave Drumlins ecodistrict is also dominated by coniferous forest, with tolerant hardwoods on the upper slopes of drumlins and well drained hills. Drumlins or drumlin-like landforms which make up 46% of the Ecodistrict provide conditions for development of a late successional Acadian Forest of red spruce, eastern hemlock, white pine, and yellow birch (*Betula alleghaniensis*). Sugar maple (*Acer saccharum*), red oak and American beech (*Fagus grandifolia*) are found in lower lying areas.

The St. Margaret's Bay ecodistrict contains soils very similar to those South Mountain ecodistrict, but a cooler climate and higher humidity and soil moisture changes the forest composition. Much of the ecodistrict is covered with stands of Acadian softwood forests of red spruce with eastern hemlock, white pine, and yellow birch. Shrub layers are composed primarily of advanced regeneration of overstory species such as balsam fir and red maple (*Acer rubrum*) (NS DNRR 2017).





- Avian ARU Location
- Radar Location
- Horizontal Radar Detection
- Vertical Radar Sweep
- Project Boundary, February 2023
- Assessment Area, February 2023

- Arterial Road
- Local Road
- Resource Road / Trail
- Transmission Line
- Watercourse
- Wetland (NSE)
- Wetland (NHN)
- Waterbody

0 1,000 2,000 metres

(At original document size of 11x17)
1:80,000

N

Stantec

Project Location
Nuttby Mountain
Nova Scotia

Prepared on 2023-03-06

Client/Project
121417191_026a
Nova Scotia Power Inc.
NSPI Wind EA Support Services

Figure No.
1.1

Title
Radar and Avian ARU Survey Locations: Bear Lake Project Boundary

Notes
1. Coordinate System: NAD 1983 CSRS UTM Zone 20N
2. Data Sources: Government of NS, Client, Stantec
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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2.0 METHODS

2.1 NOCTURNAL RADAR SURVEY

X-band marine surveillance radar, similar to that described by Cooper et al. (1991), was used for data collection. The radar unit was deployed within the southern portion of the Project, based on the Project Boundary at the time (April 2022), at an elevation approximately 240 meters (m) above sea level (Photo 2.1).

Photo 2.1 Radar Installment for the Proposed Wind Site near Bear Lake, Nova Scotia

The radar has a peak power output of 12 kilowatts (kW) and tracks small animals, including birds, bats, and even insects, based on settings selected for the radar functions. Insects are identifiable based on flight speed. However, radar cannot readily distinguish between different types of animals that are detected flying faster than an insect and therefore cannot reliably or consistently differentiate among avian species, or birds from bats. Consequently, animals observed on the radar screen (not including insects) are identified as 'targets'. The targets tracked by the radar are likely birds migrating at night or bats migrating and feeding throughout the night.

The radar has an 'echo trail' function that captures past echoes of flight trails, enabling determination of flight speed and direction. During operation, the radar's echo trail was set to 30 seconds. If these flight trails were sufficiently erratic, indicative of the flight pattern of a bat during feeding behavior, such targets were classified as a potential bat.

Objects on the ground detected by the radar cause returns on the radar screen (echoes) that appear as blotches known as ground clutter. Large amounts of ground clutter reduce the ability of the radar to track birds and bats flying over those areas. The radar was equipped with a two m waveguide antenna, deployed approximately five m above ground to improve the amount of airspace sampled and to reduce ground clutter interference. The antenna has a vertical beam width of 20° (10° above and below horizontal) and was operated with a horizontal range of 1.4 km to improve detection of small targets (Figure 2.1). When radar is operated at greater ranges, larger birds are detected but the echoes of small birds are reduced in size and restricted to a smaller portion of the radar screen, thus limiting the ability to observe the movement pattern of individual targets.

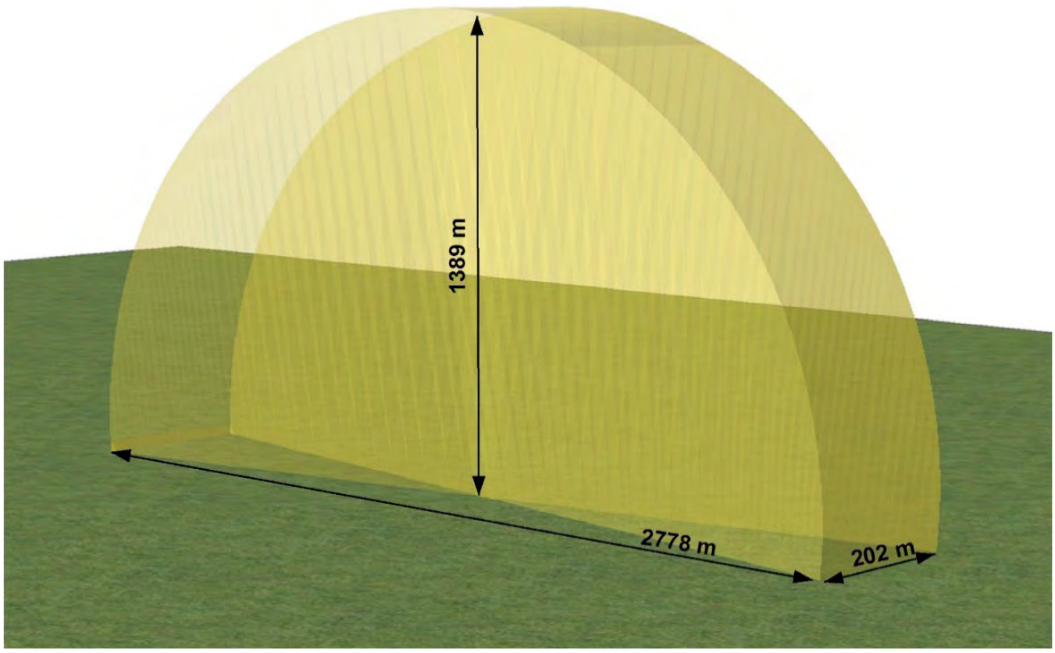

Figure 2.1 Detection Range of the Radar in Vertical Mode

Survey nights were selected based on weather forecast predictions. Because the anti-rain function of the radar must be turned down to detect small birds and bats, surveys could not be undertaken during active rainfall. Nights expected to be optimal for radar migration surveys (nights with no precipitation) were targeted for survey. Conversely, nights with intermittent precipitation, strong winds, and/or unusually high or low temperatures were sampled at a lower frequency than optimal nights.

The radar operated continuously during nighttime hours (sunset to sunrise) on survey nights, between mid-April and late May for spring migration, and between mid-August and late-October for fall migration. The radar was operated in two modes (surveillance [horizontal] mode and vertical mode) throughout each night in the spring and fall. In surveillance mode (horizontal mode), the antenna spins horizontally to survey the airspace around the radar and detects the number of targets and their flight direction as they pass through the radar's detection area. By analyzing the echo trail for each target, flight direction and flight speed was determined. In vertical mode, the radar unit is tilted 90° to vertically survey the airspace above the radar (Harmata et al. 1999). In vertical mode, target echoes do not provide direction or speed data but do provide information on the altitude of targets passing through the vertical radar beam. The radar operated in both modes (surveillance [horizontal] and vertical mode) during each survey hour, resulting in 30 minutes each of horizontal and vertical data collection. Videos produced by the radar were recorded and archived for subsequent analysis. Although the radar records three-dimensional space, it is translated by the radar screen into a two-dimensional representation. For this reason, ground clutter, if not reduced with proper site configuration, can cause targets to be obscured from view. Figure 2.2 provides an example radar view of the surrounding airspace and targets as depicted on the video files.

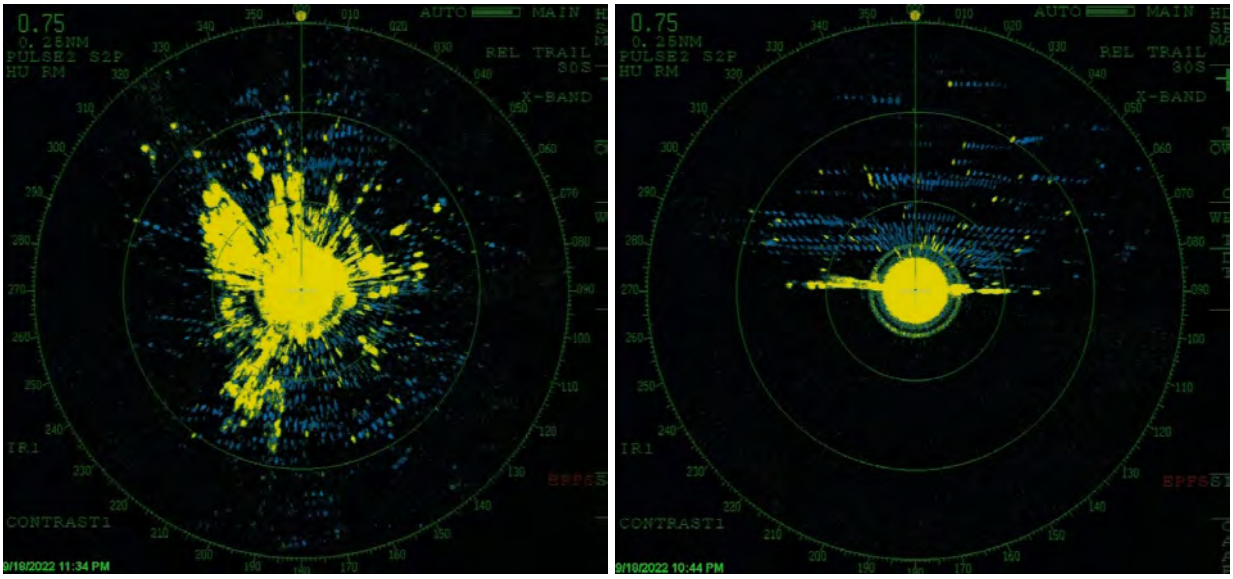

Figure 2.2 Example Radar Files for the Project in Horizontal (left) and Vertical (right) Mode

For each hour of radar operation, six 1-minute horizontal video samples and six 1-minute vertical video samples were randomly selected for visual analysis. For those hours with less than 60 minutes sampled (due to rain, equipment failure, or less than 60 minutes of nighttime), proportionally less but no fewer than three samples were selected. The videos were visually reviewed to identify and select targets (migrants) and their flight paths, resulting in location, flight height, and flight direction data for each target. Data were summarized using programs and macros designed by Stantec. Horizontal video samples were used to calculate mean hourly, nightly, and seasonal passage rates, as well as nightly and seasonal mean flight direction. Vertical video samples were used to calculate mean hourly, nightly, seasonal flight heights, and percent of targets flying below the potentially minimum and maximum turbine heights that may be utilized at the Project (180 m and 200 m, respectively).

To evaluate the distribution and representativeness of the site-specific radar data we compared our nightly sampling distribution to regional nocturnal migration radar maps. BirdCast migration forecast maps, created by the Cornell Lab of Ornithology (Dokter 2022), show the intensity of predicted nocturnal bird migration as detected by the United Sates (U.S.) weather surveillance radar network. These BirdCast migration forecast maps show the intensity of nightly migration with brighter colors indicating a higher migration traffic rate. The scale of migration intensity is continuous and is qualitatively categorized visually from no migration to low, medium, and high migration rates as the colors get brighter. There are two weather radar stations in Maine (Caribou and Gray), and these are the two stations nearest the Project (BirdCast does not incorporate weather radar stations from Canada), with the Caribou station approximately 376 km northwest of the Project and the Gray station approximately 491 km west-southwest. We compiled BirdCast migration forecast maps for every night of the spring migration period (approximately April 15 to May 31, 2022) and fall migration period (approximately August 10 to October 31, 2022). A single BirdCast forecast map image from approximately 3.5 hours after the eastern time zone sunset was collected for each night of each migration season.

Based on the color in the BirdCast migration forecast maps, we categorized the traffic rate (qualitative levels of none, low, low/medium, medium, medium/high, or high activity) for each night of the spring and fall seasons for the region using the forecast map signature around the Caribou station.. On nights when the Caribou station was not operating, data from the Gray station were used to categorize the nightly migration activity for Maine. Once the BirdCast migration forecast maps were analyzed, these were compared with the nights of on-site surveys for the Project. BirdCast migration forecast maps from the remaining nights of the migration season (i.e., nights when radar data was not collected for the Project) were also summarized to identify the proportion of nights with low and heavy migration from the entire season that was sampled for the Project. Additionally, we compared results at the Project to publicly available nocturnal radar surveys with comparable survey methodology, all occurring in Maine.

Wind speeds and wind direction were collected in 10-minute increments from the South Canoe Wind Farm substation, which averaged data across the wind farm from instrumentation located at nacelle height (~90 meters above ground level) on all turbines. The South Canoe Wind Farm is located approximately 12 km northwest of the Project. Temperature data were not available from the South Canoe Wind Farm. We instead downloaded hourly temperature data from the Emergency Weather Station #2 located approximately 18 km west of the Project, made publicly available by Environment and

Climate Change Canada. We calculated nightly averages for weather data for each survey night to compare weather parameters among survey nights with radar results.

2.2 AVIAN ACOUSTIC SURVEY

Stantec deployed five Wildlife Acoustics Song Meter SM4 avian acoustic recording units (ARUs) on trees approximately 2 m above ground level throughout the Project Boundary (Figure 1.1; Photo 2.2). The ARUs were deployed to acoustically monitor avian activity from approximately sunset to sunrise while spring and fall nocturnal radar sampling occurred at the Project. Each ARU was equipped with an omnidirectional microphone to sample the airspace around the microphone. With the detectors deployed near ground level, there is an inherent recording bias that birds vocalizing nearest the ARU microphones at ground level are more likely to be recorded than birds vocalizing further away from the microphones.

Photo 2.2 Example ARU setup at the proposed Wind Site near Bear Lake, Nova Scotia

The ARUs were powered by D-cell alkaline batteries which were periodically changed by Stantec personnel. The ARUs were programmed using the Wildlife Acoustics SM4 Configurator software tool, programmed with a gain of 16 decibels (dB), no high-pass filter, 24 kilohertz (kHz) sampling rate, 1-hour maximum duration per file. Recorded data were saved as compressed .wav files on high-capacity SD cards inside the units.

Stantec downloaded data files from the data cards within the ARUs once during each survey period and at the end of each survey period. We segregated the files that were recorded during the nights when the radar was operating for further analysis and removed any files that were recorded outside of those sample nights from any further analysis. For those files recorded during the nights that the radar was operated, we converted these files from their compressed form into full spectrum .wav files. The data were processed using Cornell Lab's BirdNET acoustic identification program (available online at https://birdnet.cornell.edu/?trk=public_post-text). This tool is an artificial neural network designed to identify bird vocalizations. This application provides a highly accurate characterization of the bird species present within acoustic recordings of avian activity. This is particularly useful for vocalizations that occur in relatively low numbers. These less commonly occurring calls can be difficult to find using only traditional analysis methods because a low volume of a specific set of similar vocalizations may not be apparent when contained within a data set of several million signals of interest (SOIs). Recorded call files are defined as SOI's, not bird vocalizations, because non-bird audio recordings (e.g., equipment noise, splashing or dropping water, etc.) may also meet the processing parameters and would be included in the initial analysis results. BirdNET provides suggested species identifications, including less commonly observed species, resulting in more accurate results. The software is programmed to include all SOI's with durations from 0.05 seconds (s) to 3 s and with frequency levels between 250 Hertz (Hz) and 12,000 Hz. Once the preliminary analysis was complete, a Stantec biologist experienced with the analysis of acoustic avian calls reviewed the SOI's and verified each species group when possible and non-bird vocalizations when present.

Vocalizations were manually reviewed for accuracy using a combination of active listening to vocalizations and a visual comparison to the spectrograms of species that could potentially occur in the Project Boundary. SOIs that made it through the initial identification but were not determined to be bird vocalizations through qualitative review were removed from the dataset. Spectrograms of known or likely occurring species were obtained from the Macaulay Library at the Cornell Laboratory of Ornithology at https://www.macaulaylibrary.org.

BirdNET provides a ranking to each SOI identified during automated classification. The ranking ranges from 0.1 to 1.0, providing a measurement of how likely an SOI is to be the species that the application identifies the vocalization to be. Below a ranking of approximately 0.3, species' classifications typically become less accurate and reliable so a lower limit mask of 0.3 was used to remove false positive identifications from the dataset.

Once the initial analysis and species identifications were completed, a second Stantec biologist conducted a quality assurance/quality control review of the analyzed dataset. This quality review included an audio and visual review of a subset of call files for each identified species in the dataset, including those call files with the highest (near 1.0) and lowest (0.3) confidence rankings attributed by BirdNET. For species with a relatively low number of calls (less than 15 call files recorded), 90 to 100 percent of files were reviewed. For bird species recorded relatively frequently (i.e., 30 to 150 call files, sometimes many thousands), the review included approximately 10 to 20 percent of call files. For bird species of conservation concern (i.e., i.e., Canada Warbler or Eastern Wood-Pewee), 100 percent of files were reviewed.

Results of the acoustic monitoring were summarized by species, and all species were combined to determine temporal trends. We also discuss any Species at Risk (SAR) and Species of Conservation Concern (SOCC), detected during surveys. SAR are here defined as those species listed as Extirpated, Endangered, Threatened, or Special Concern by the federal *Species at Risk Act* (SARA), the Nova Scotia *Endangered Species Act* (NSESA), or by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC assesses and designates the status of species and recommends this designation for legal protection under *SARA*. SOCC are species not listed or protected by any legislation, but are considered rare in Nova Scotia, or their populations may not be considered sustainable. SOCC are here defined to include species that are not SAR, but are ranked S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) in Nova Scotia by the Atlantic Canada Conservation Data Centre (AC CDC) (AC CDC 2022).

3.0 RESULTS

3.1 NOCTURNAL RADAR SURVEY

Spring Surveys

The radar was operated during 20 nights between April 17 and May 30, 2022 (Appendix A Table 1). Due to an equipment failure, horizontal data were collected for only 19 of those 20 survey nights. Therefore, passage rates and flight directions of targets were collected for only 19 nights. Flight height data, derived from the radar operating in vertical mode, were collected successfully for all 20 nights surveyed.

Nightly mean passage rates ranged from 4 ± 2[1] targets per kilometer per hour (t/km/hr) on May 15 to 284 ± 61 t/km/h on May 3. The mean nightly passage rate for the survey period was 93 ± 9 t/km/hr (Figure 3.1; Appendix A Table 2). Individual hourly passage rates varied among nights and throughout the season, ranging from 0 t/km/hr during multiple survey hours throughout the survey period to 596 t/km/hr during hour 3 on May 3 (Appendix A Table 2). For the entire season, passage rates increased after sunset, peaked 3 hours after sunset and then declined until sunrise (Figure 3.2). Of the 4,141 targets identified during spring radar analysis, 42 (1%) flew with enough of an erratic flight pattern that they were classified as potential bat targets. Mean flight direction of spring nocturnal migrants was 85° ± 81°, east-northeast (Figure 3.3; Appendix A Table 3).

Average nightly temperatures for nights surveyed during the spring survey period ranged from 0°C to 17°C and average nightly wind speeds ranged from 4 m/s to 11 m/s (Appendix A Table 1). The night with the lowest passage rate (May 15) had an average nightly temperature of 8 °C and an average nightly wind speed of 7 m/s from the northeast (Appendix A Table 1). The night with the highest passage rate (May 3) had a low nightly temperature of 1°C and an average nightly wind speed of 8 m/s from the southeast (Appendix A Table 1).

[1] ± refers to standard error of the mean

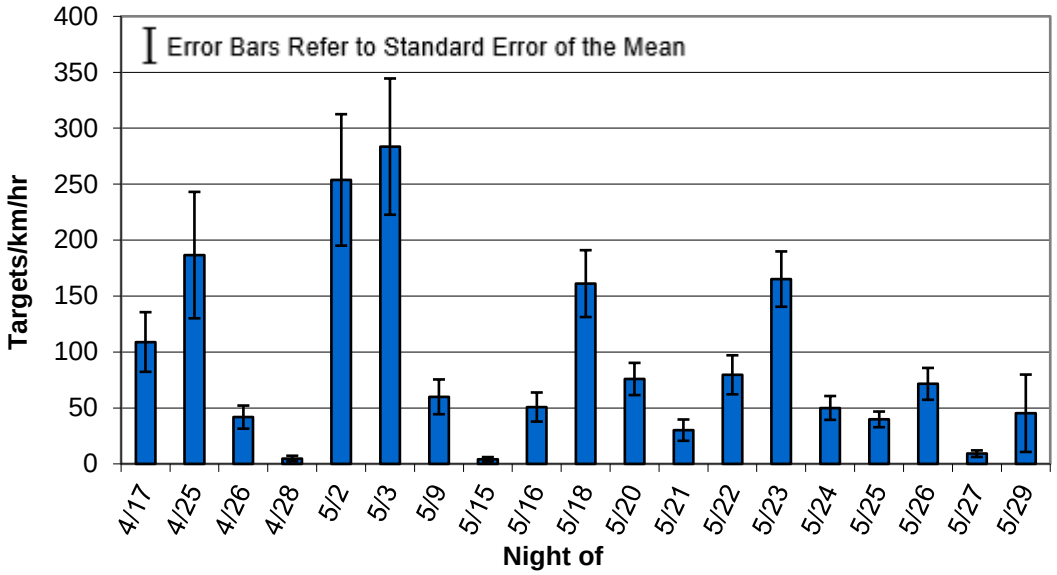

Figure 3.1 Nightly Passage Rates During Spring 2022 Nocturnal Radar Surveys

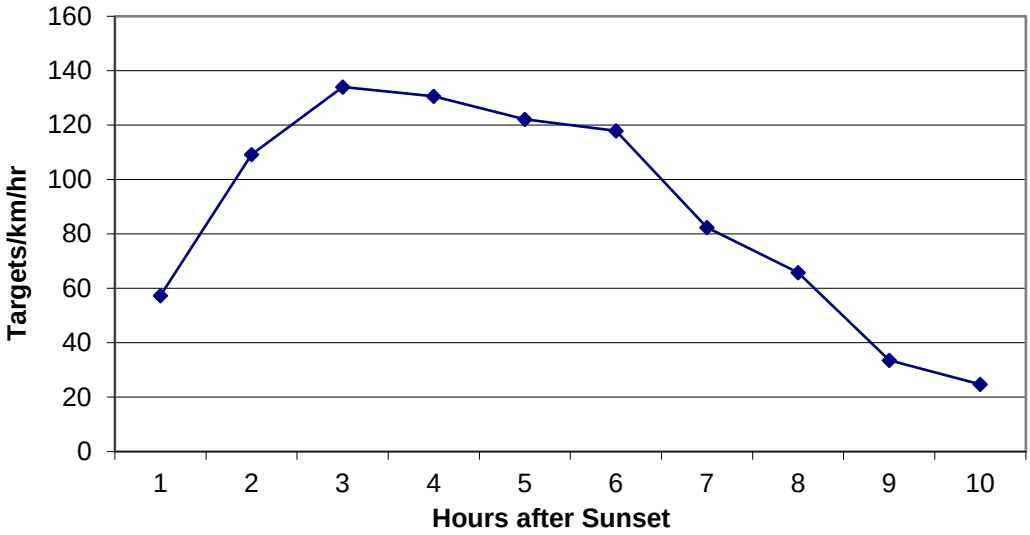

Figure 3.2 Hourly Passage Rates for the Season During Spring 2022 Nocturnal Radar Surveys

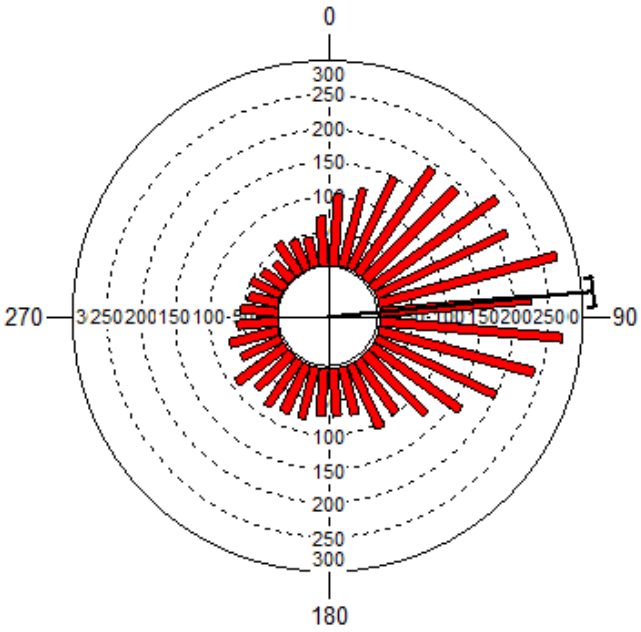

Figure 3.3 Mean Flight Direction During Spring 2022 Nocturnal Radar Surveys

The seasonal mean flight height of targets was 317 ± 3 m above the radar site. The mean nightly flight height ranged from 177 ± 16 m on May 9 to 482 ± 14 m on May 2 (Figure 3.4; Appendix A Table 4). In Figure 3.4 the seasonal mean is indicated by the green line; the nightly means are indicated by the blue squares, and error bars refer to standard error of the mean. The percent of targets observed flying below 180 m and 200 m was 38% and 42% for the season, respectively, and varied nightly from 15% and 19% on May 16 to 75% for both potential turbine heights on April 28 (Figure 3.5; Appendix A Table 4). For the season, mean hourly flight heights were variable throughout the night but were lowest at 1 hour after sunset (Figure 3.6).

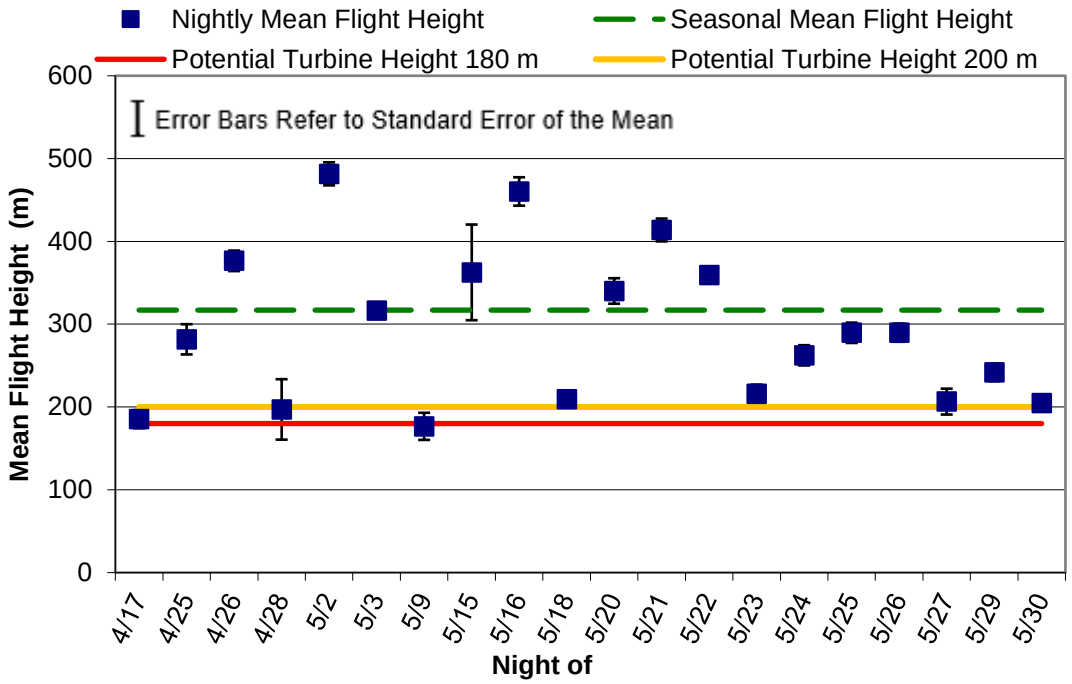

Figure 3.4 Seasonal Mean and Nightly Mean Flight Height of Targets During Spring 2022 Nocturnal Radar Surveys

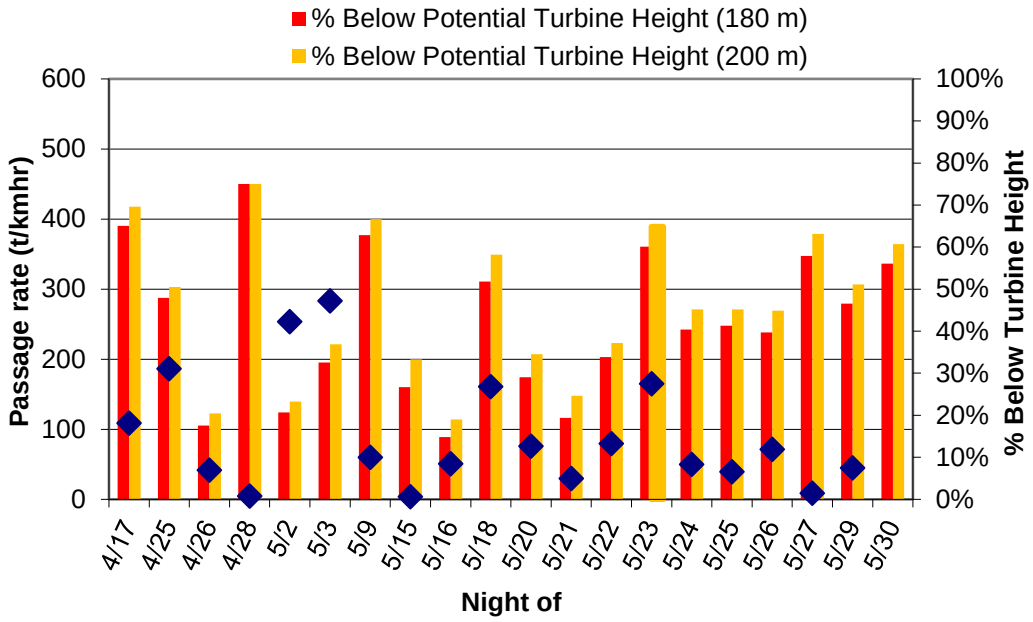

Figure 3.5 Percent of Targets Observed Flying Below Two Potential Turbine Heights During Spring 2022 Nocturnal Radar Surveys

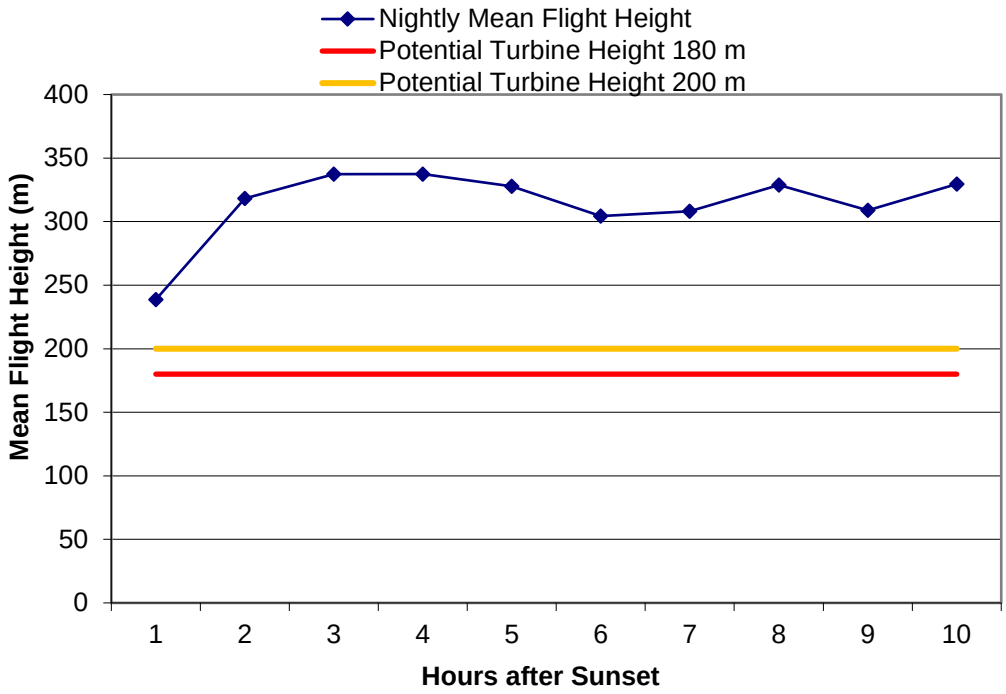

Figure 3.6 Hourly Target Flight Height Distribution During Spring 2022 Nocturnal Radar Surveys

Figure 3.7 shows the distribution of individual nightly flight heights of targets. The yellow boxes depict the middle 50% of targets. The error bars depict the statistical outliers, or 25% of targets above and below the middle 50% of targets. The horizontal line within each box represents the nightly median flight height value.

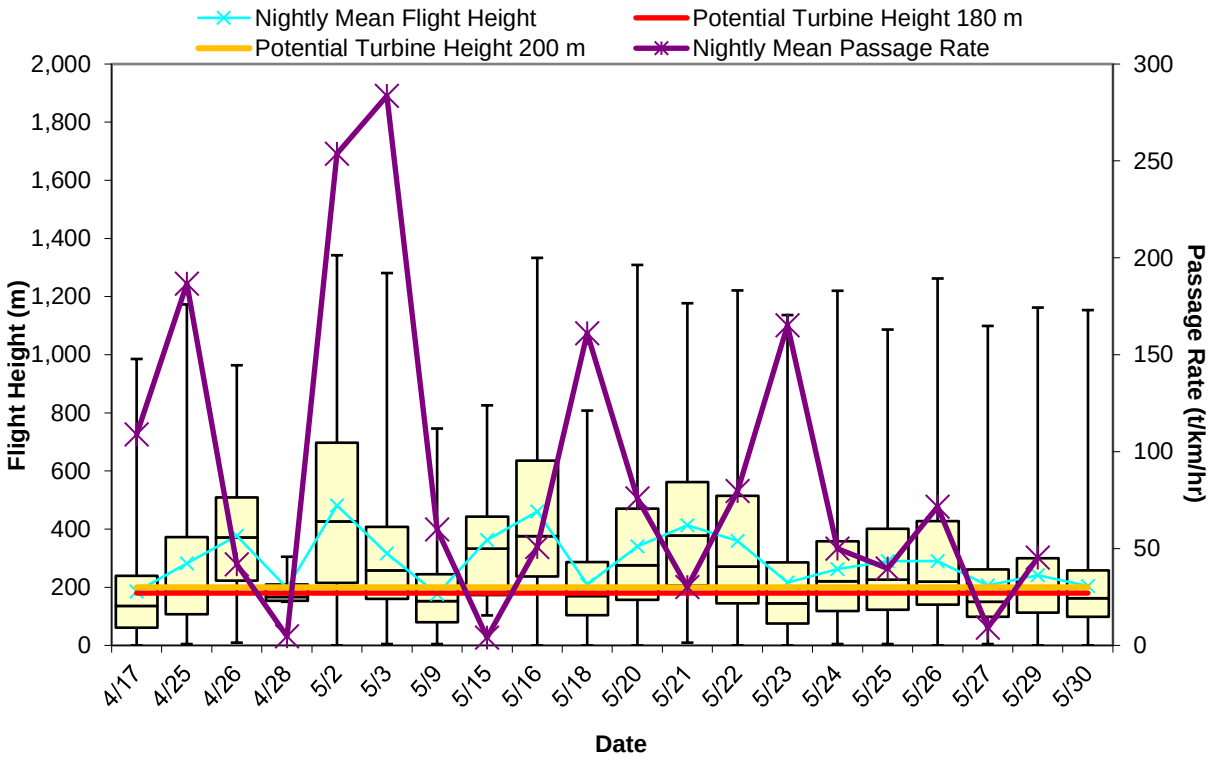

Figure 3.7 Flight Height Whisker Plot Depicting the Vertical Distribution of Targets for Each Survey Night During Spring 2022 Nocturnal Radar Surveys

There were 47 nights of BirdCast migration forecast maps analyzed for the spring migration period from the nearest site to the Project with available BirdCast migration forecast maps (Caribou, Maine). Observable migration activity occurred on 25 of those nights and no observable migration activity occurred on 22 nights. There were four nights of low migration, 11 nights of low/medium migration, four nights of medium migration, and six nights of medium/high migration. No nights had a high level of migration from the Maine station according to the BirdCast migration rate scale. In general, the nights of on-site radar sampling at the Project occurred on nights with various migration rates and generally in proportion to how those nights occurred over the entire migration season in Maine (Table 3.1).

Table 3.1 Summary of BirdCast and On-site Radar Data Collection During Spring 2022

Migration Rate Category	Number of Nights with BirdCast data	Proportion of Full Season	Number of nights in on-site radar data set	Proportion of on-site radar data set
None	22	47%	5	26%
Low	4	9%	3	16%
Low/Medium	11	23%	7	37%
Medium	4	9%	1	5%
Medium/High	6	13%	3	16%
High	0	0%	0	0%

Fall Surveys

The radar was operational for 30 nights between August 20 and October 28, 2022 (Appendix A Table 5). Nightly mean passage rates ranged from 71 ± 17 t/km/hr on October 25 to 2,225 ± 361 t/km/h on September 18. The mean nightly passage rate for the survey period based was 607 ± 34 t/km/hr (Figure 3.8; Appendix A Table 6). Individual hourly passage rates varied among nights and throughout the season, ranging from 0 t/km/hr during multiple survey hours throughout the survey period to 3,943 t/km/hr during hour 5 on September 18 (Appendix A Table 6). For the entire season, passage rates increased after sunset, peaked two and three hours after sunset, then declined until sunrise (Figure 3.9). Of the 57,914 targets identified during radar analysis, 1,042 (2%) flew with enough of an erratic flight pattern that we identified them as possible bat targets. Mean flight direction of fall nocturnal migrants was 262° ± 73°, west-southwest (Figure 3.10; Appendix A Table 7).

Average nightly temperatures for nights surveyed during the fall survey period ranged from -2°C to 20°C and average nightly wind speeds ranged from 3 m/s to 12 m/s (Appendix A Table 5). The night with the lowest passage rate (October 25) had an above average nightly temperature of 15°C and a low nightly wind speed of 4 m/s from the northwest (Appendix A Table 5). The night with the highest passage rate (September 18) had an average nightly temperature of 9°C and a low nightly wind speed of 4 m/s from the north (Appendix A Table 5).

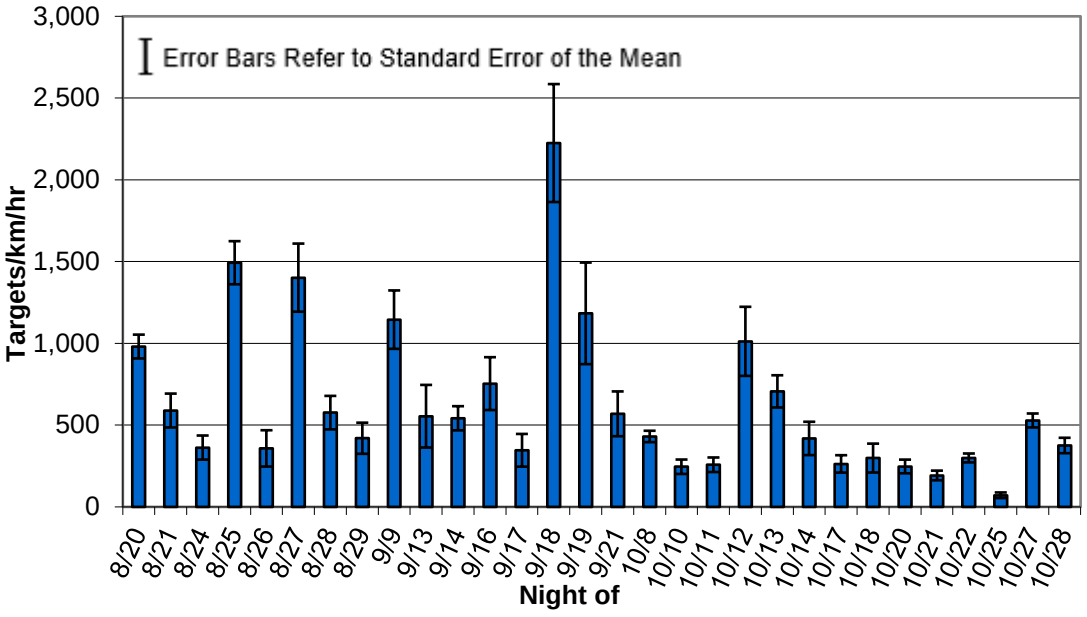

Figure 3.8 Nightly Passage Rates During Fall 2022 Nocturnal Radar Surveys

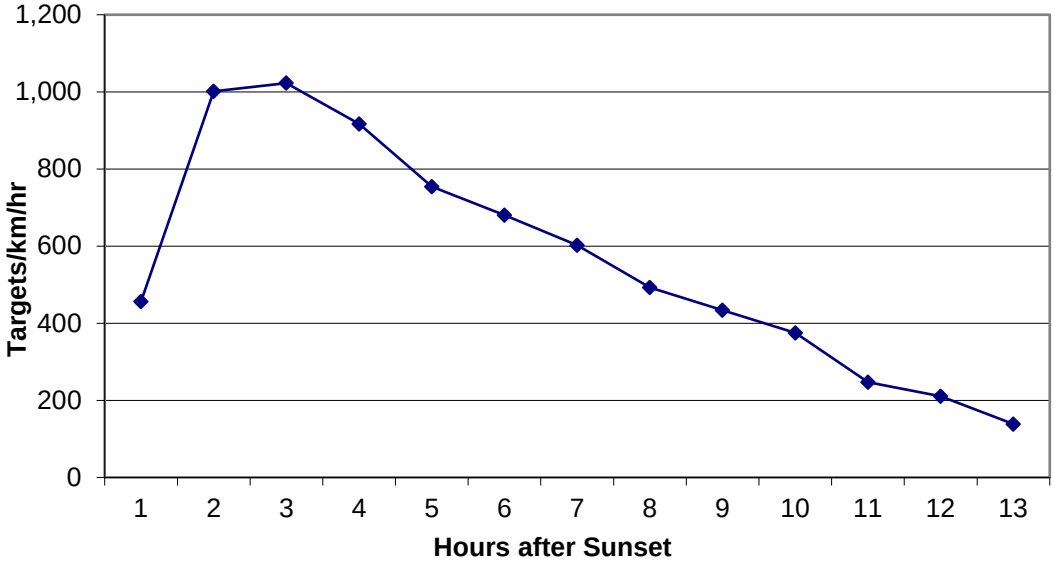

Figure 3.9 Hourly Passage Rates for the Season During Fall 2022 Nocturnal Radar Surveys

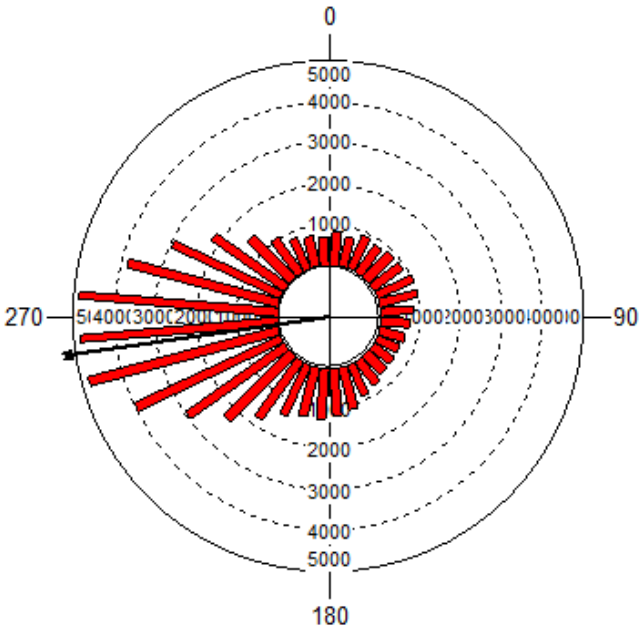

Figure 3.10 Mean Flight Direction During Fall 2022 Nocturnal Radar Surveys

The seasonal mean flight height of targets was 380 ± 1 m above the radar site. The mean nightly flight height ranged from 153 ± 6 m on October 14 to 621 ± 7 m on October 28 (Figure 3.11; Appendix A Table 8). In Figure 3.11 the seasonal mean is indicated by the green line; the nightly means are indicated by the blue squares, and error bars refer to standard error of the mean. The percent of targets observed flying below 180 m and 200 m was 27% and 31% for the season, respectively, and varied nightly from 15% and 17% on October 28 to 69% and 73% on October 14 (Figure 3.12; Appendix A Table 8). For the season, mean hourly flight heights were variable throughout the night but were lowest at 1 hour and 13 hours after sunset (Figure 3.13).

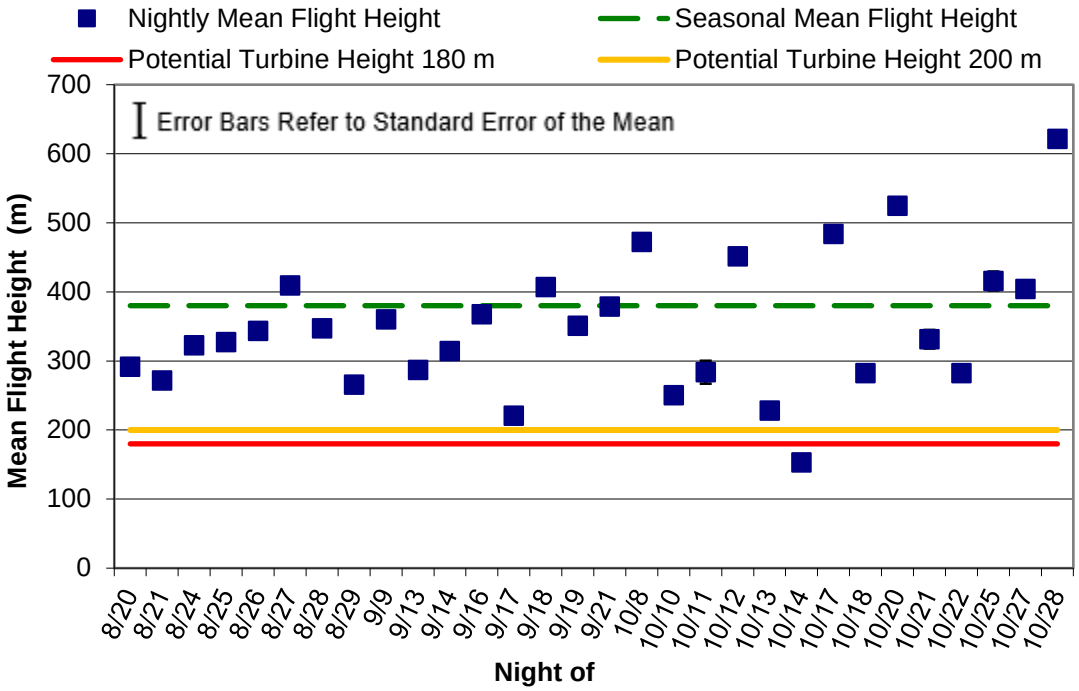

Figure 3.11 Seasonal Mean and Nightly Mean Flight Height of Targets During Fall 2022 Nocturnal Radar Surveys

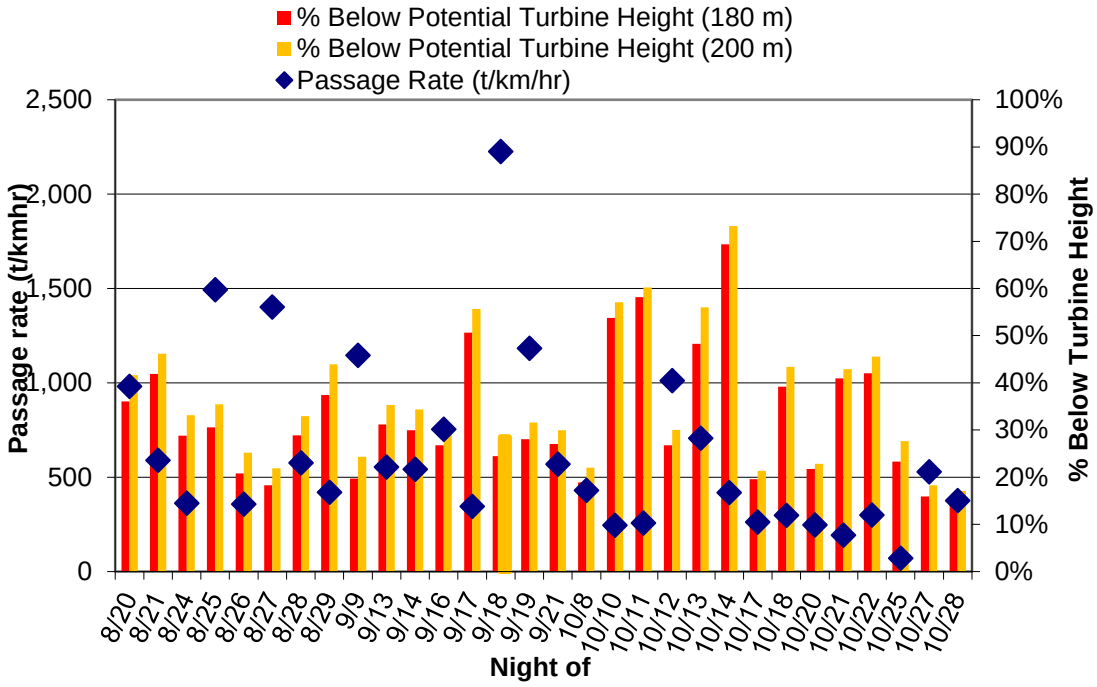

Figure 3.12 Percent of Targets Observed Flying Below Two Potential Turbine Heights During Fall 2022 Nocturnal Radar Surveys

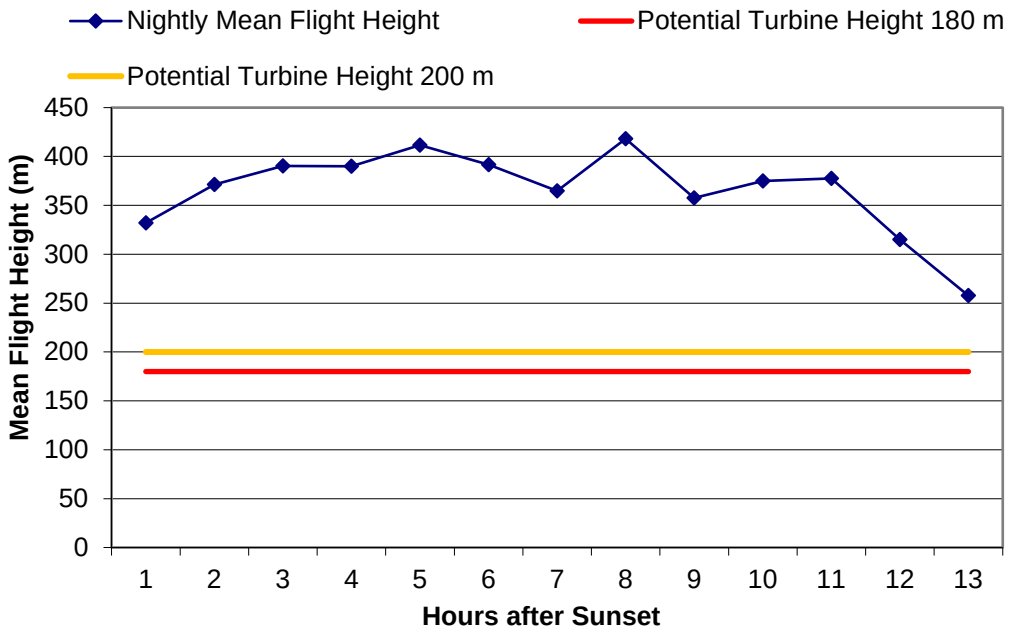

Figure 3.13 Hourly Target Flight Height Distribution During Fall 2022 Nocturnal Radar Surveys

Figure 3.14 shows the distribution of individual nightly flight heights of targets. The yellow boxes depict the middle 50% of targets. The error bars depict the statistical outliers, or 25% of targets above and below the middle 50% of targets. The horizontal line within each box represents the nightly median flight height value.

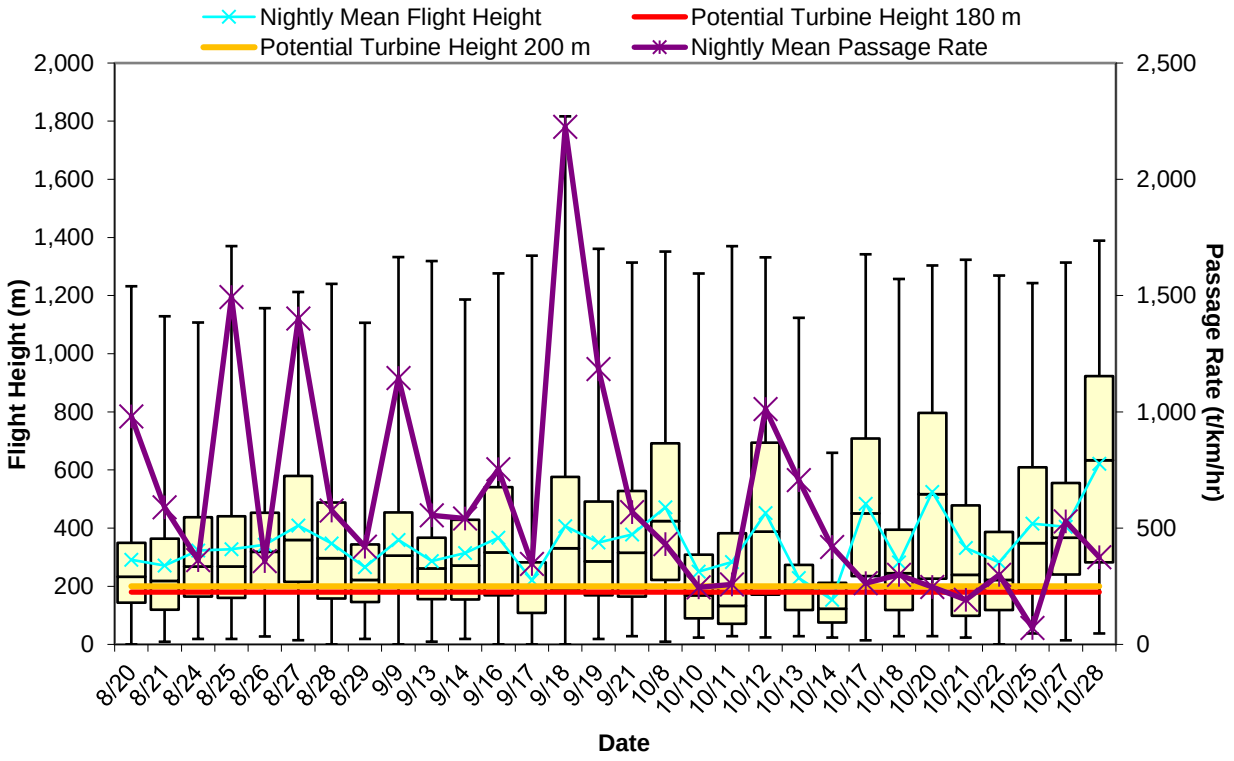

Figure 3.14 Flight Height Whisker Plot Depicting the Vertical Distribution of Targets for Each Survey Night During Fall 2022 Nocturnal Radar Surveys

There were 83 nights of BirdCast migration forecast maps analyzed for the fall migration period from the nearest site to the Project with available BirdCast migration forecast maps (Caribou, Maine). Observable migration activity occurred on 50 of those nights, with 33 nights of no observable migration. There were 11 nights of low migration, 20 nights of low/medium migration, nine nights of medium migration, eight nights of medium/high migration, and two nights of high migration. In general, the nights of sampling with on-site radar at the Project occurred on nights with various migration rates and generally in proportion to how those nights occurred over the entire migration season in Maine, with the exception that we did not collect on-site radar data on either of the two nights with high migration activity predicted by BirdCast (Table 3.2).

Table 3.2 Summary of BirdCast and On-site Radar Data Collection During Fall 2022

Migration Rate Category	Number of Nights with BirdCast data	Proportion of Full Season	Number of nights in on-site radar data set	Proportion of on-site radar data set
None	33	40%	13	43%
Low	11	13%	4	13%
Low/Medium	20	24%	7	23%
Medium	9	11%	4	13%
Medium/High	8	10%	2	7%
High	2	2%	0	0%

3.2 AVIAN ACOUSTIC SURVEY

Spring Surveys

Overall, 75,035 vocalizations were identified as bird vocalizations in the spring and 74,892 (99.8%) of those were identified to species. A total of 77 species were identified, including waterfowl, raptors, gamebirds, shorebirds, and landbirds (Appendix B Table 1). Of these, 20 species are year-round residents, and the remaining 57 species are migrants (some of which also breed in the area while others do not). The most frequently recorded species was a migrant, breeding species: Hermit Thrush, representing 36% of recorded vocalizations (n = 26,769). Other commonly recorded species included resident species: Northern Saw-whet Owl (n = 13,822; 18%), and migrant/breeding species: American Woodcock (n = 6,347; 8%).

Of the 77 species identified in spring acoustic surveys, 6 were SAR and 7 were SOCC. SAR included Canada Warbler (n = 109), Chimney Swift (n = 1), Common Nighthawk (n = 347), Eastern Wood-Pewee (n = 2), Evening Grosbeak (n = 1), and Rusty Blackbird (n = 3), all of which individually constituted less than 1% of total recorded vocalizations. The 109 Canada Warbler vocalizations were recorded among 4 of the 5 ARUs (no recording from ARU B1) from early/mid to late May and the 347 Common Nighthawk vocalizations were recorded among all 5 ARUs from mid to late May. SOCC included Boreal Chickadee (n = 68; <1% of total vocalizations), Boreal Owl (n = 6; <1%), Canada Jay (n = 58; <1%), Common Goldeneye (n = 5; <1%), Killdeer (n = 8; <1%), Red-breasted Nuthatch (n = 2,231; 3%), and Rose-breasted Grosbeak (n = 10; <1%).

Total vocalizations of all species are graphed against time after sunset in Figure 3.15. The average number of vocalizations per hour was greatest at sunset and during hours 8 and 9 after sunset, dropping off drastically afterwards. Timing of vocalizations was also mapped for individual species; these graphs are presented in Appendix B. Most species, besides owls which are nocturnal and Common Loon, which can be more vocal at night, show hourly trends similar to the overall data. That is, the majority of acoustic activity documented occurred at or just after sunset and in the in the two hours before sunrise.

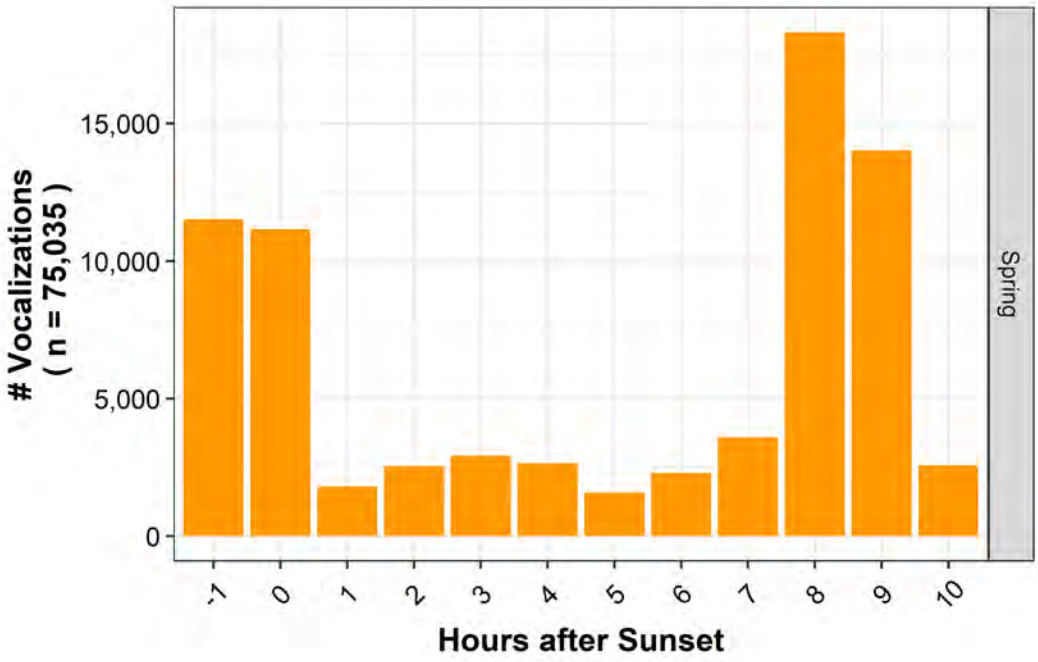

Figure 3.15 Total Number of Vocalizations by Hour after Sunset During Spring 2022 Avian Acoustic Surveys

The number of vocalizations per detector-night were graphed by night of survey to look for seasonal trends within the spring survey period and among the nights that these two survey techniques were used simultaneously (Figure 3.16). In this case, a 'detector-night' represents any night that any individual detector was operating successfully. The number value along the horizontal axis (above the date) in Figure 3.16 represents the number of detector-nights available for analysis for each night of survey. For example, on April 25, 4 of the 5 detectors operated successfully and combined recorded 7,090 vocalizations, equating to a rate of 1,773 vocalizations per detector-night (7,090 divided by 4). Note that detectors did not operate on April 17. These results, which include all species, show variability in vocalization detection rates across the survey period with overall peaks in recorded vocalizations on April 25 and May 24.

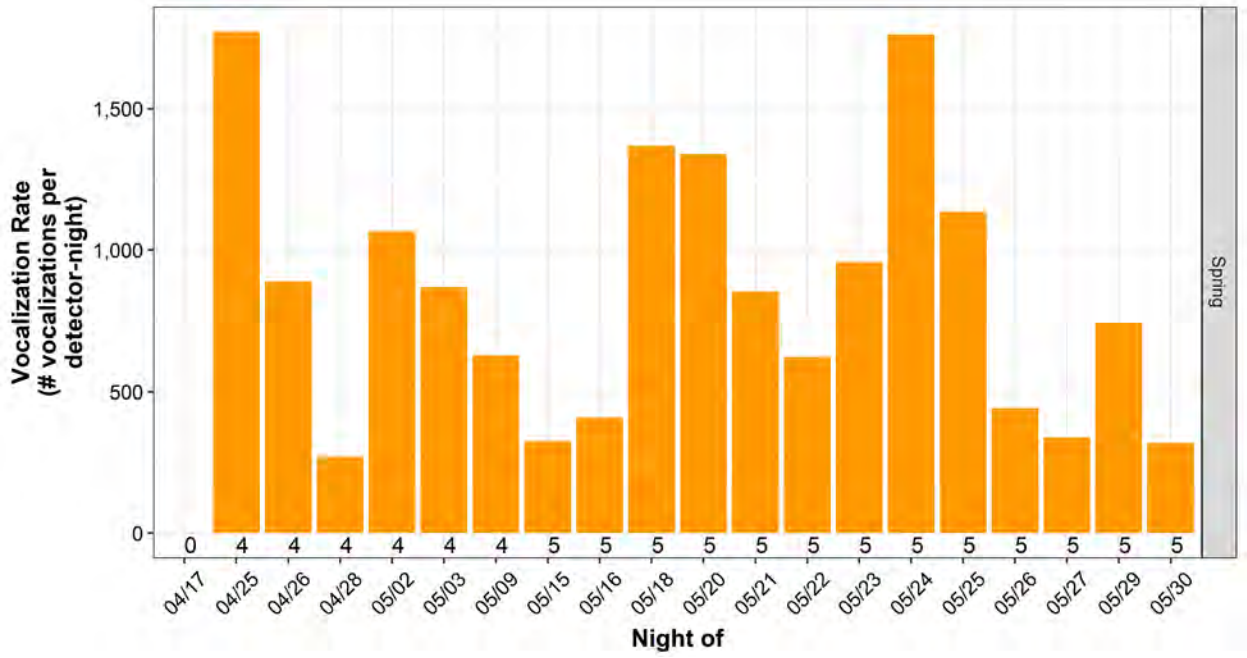

Figure 3.16 Vocalizations per Detector-night by Date During Spring 2022 Avian Acoustic Surveys

Vocalization results by date are shown for each species in Appendix B. These data indicate how frequently each species occurred on the nights that acoustic surveys were completed in conjunction with radar surveys. Some species were rarely recorded, including SAR: Chimney Swift, Eastern Wood-Pewee, Evening Grosbeak, and Rusty Blackbird. These species were each recorded on only one night. Many species were recorded throughout the spring migration period with varying temporal trends in activity level. These include resident species: Barred Owl, Black-capped Chickadee, and Red-Breasted Nuthatch (SOCC), as well as migratory species: Hermit Thrush, Palm Warbler, Swamp Sparrow, White-throated Sparrow, Winter Wren, and Yellow-rumped Warbler, all of which also likely breed in the area.

Fall Surveys

Overall, 16,798 vocalizations were identified as bird vocalizations in the fall and 16,585 (99%) of those were identified to species. A total of 65 species were identified, including waterfowl, raptors, gamebirds, shorebirds, and landbirds (Appendix B Table 2). Of these, 23 species are year-round residents, and the remaining 42 species are migrants. The most frequently recorded resident species were Red-breasted nuthatch (SOCC; n = 2,750; 16%), Barred Owl (n = 2,088; 12%), and Golden-crowned Kinglet (n = 1,639; 10%). The most commonly recorded migrant species was Cedar Waxwing (n = 2,309; 14%).

Of the 65 species identified in fall acoustic surveys, 5 were SAR and 9 were SOCC. SAR included Canada Warbler (n = 11), common nighthawk (n = 1), Eastern Wood-Pewee (n = 1), Evening Grosbeak (n = 6), and Olive-sided Flycatcher (n = 45), all of which individually constituted less than 1% of total recorded vocalizations. SOCC included Black-billed Cuckoo (n =31; <1% of vocalizations), Boreal Chickadee (n = 34; <1%), Canada Jay (n = 16; <1%), Great Crested Flycatcher (n = 5; <1%), Pine Grosbeak (n = 9; <1%), Pine Siskin (n = 1; <1%), Red-breasted Nuthatch (n = 2,750; 16%), and Red-breasted Grosbeak (n = 5; <1%), and Semipalmated Plover (n = 1; <1%).

Total vocalizations of all species are graphed against time after sunset in Figure 3.17. The average number of vocalizations was greatest just before sunset and during hours 10 and 11 after sunset. Timing of vocalizations was also mapped for individual species; these graphs are presented in Appendix B. Most species, besides owls which are nocturnal and Common Loon, which can be more vocal at night, show hourly trends similar to the overall data.

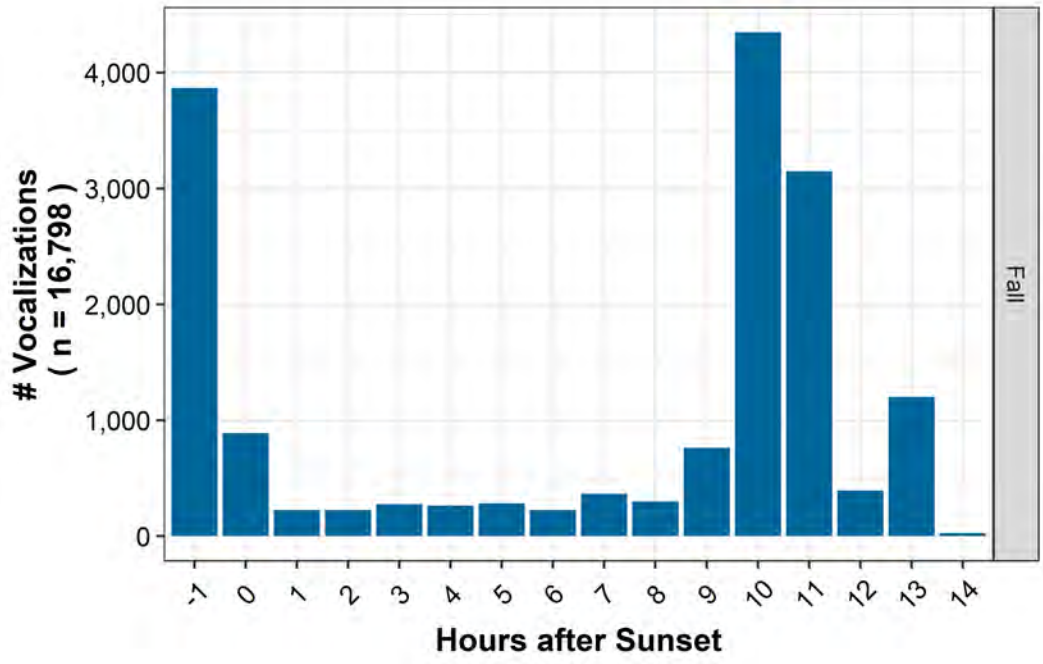

Figure 3.17 Total Number of Vocalizations by Hour after Sunset During Fall 2022 Avian Acoustic Surveys

The number of vocalizations per detector-night were graphed by night of survey, to look for seasonal trends within the nocturnal radar/avian acoustic fall survey period (Figure 3.18). Note that detectors did not operate on August 20–21 and October 17–18. These results, which include all species, show greater activity in August, followed by September, then October.

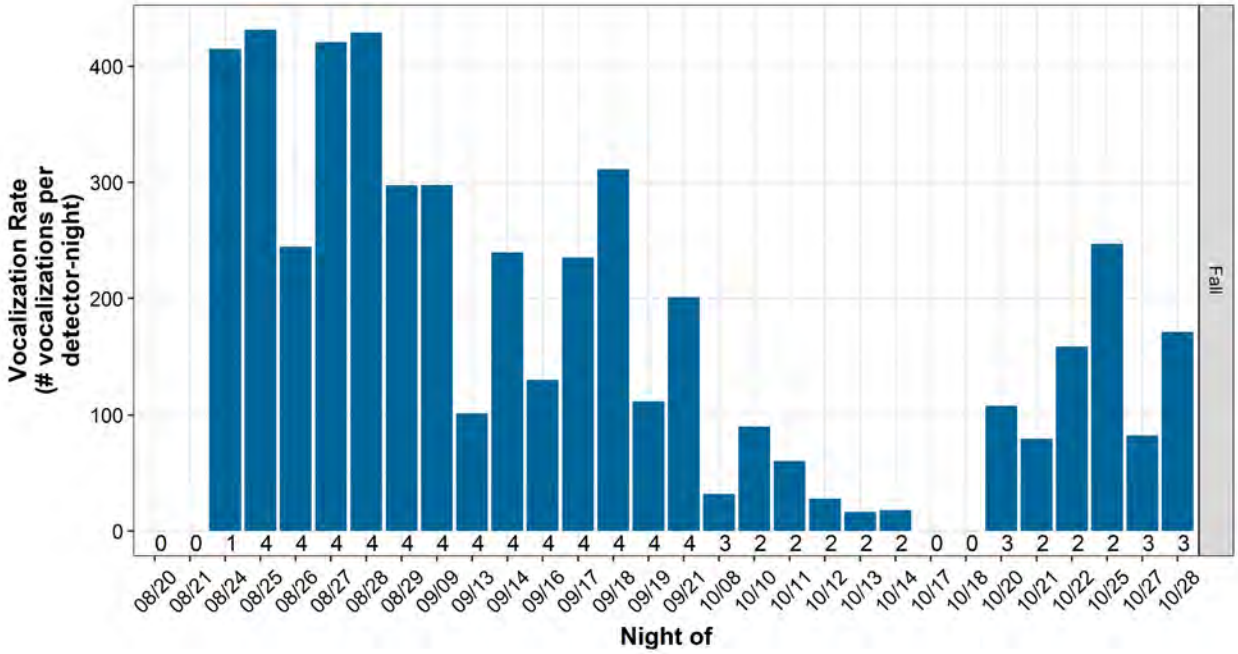

Figure 3.18 Vocalizations per Detector-night by Date During Fall 2022 Avian Acoustic Surveys

Vocalization results by date are shown for each species in Appendix B. These data indicate how frequently each species occurred. Some species were rarely recorded, including SAR: Common Nighthawk, Eastern Wood-Pewee, Evening Grosbeak, and Olive-sided Flycatcher and SOCC: Great Crested Flycatcher, Pine Grosbeak, Pine Siskin, and Rose-breasted Grosbeak. These species were only recorded on one or two nights. Many species were recorded throughout the spring migration period with varying temporal trends in activity level. This includes resident species: Barred Owl, Black-capped Chickadee, Common Raven, Golden-crowned Kinglet, Great Horned Owl, Pileated Woodpecker, and Red-Breasted Nuthatch (SOCC), as well as migratory species: Brown Creeper, and Hermit Thrush.

4.0 DISCUSSION

4.1 NOCTURNAL RADAR SURVEY

The 2022 radar surveys characterized the abundance and timing of nocturnal migratory activity of birds and bats through the Project during the spring and fall migration periods. Approximately 1–2% of targets were determined to have been potential bats, with the remainder presumably being birds or bats flying along straight flightlines. Mean flight height of targets during spring was 317 m ± 3 m and during fall was 380 m ± 1 m, well above potential turbine heights between 180 m and 200 m. The seasonal mean passage rate in spring was 93 ± 9 t/km/hr and during fall was 607 ± 34 t/km/hr.

Comparative data sets of nighttime bird migration using radar from eastern Canada are generally lacking. Two available data sets collected for proposed wind energy projects, one from Prince Edward Island (Wood Environment and Infrastructure Solutions 2019) and the other from Nova Scotia (Hemmera Envirochem Inc. 2021), used notably different equipment and methods of analysis, making meaningful comparisons with results from the Project not possible. However, data from wind energy projects in the northeastern United States, where Stantec has completed approximately a dozen surveys at 10 different sites in Maine between 2005 and 2016, are available and comparable (Appendix A Table 9).

In general, nighttime bird migration for the Project during spring was lower than other sites surveyed using identical equipment and analysis methods. Specifically, the spring migration passage rate for the Project was less than all 10 sites studied in Maine using identical equipment and analysis methods. During fall migration, passage rates for the Project were within the range of passage rates for those 10 sites studied in Maine. Fall migration does bring some landbird species to the east and southeast, out of the boreal forest and to the north Atlantic coastline. Individuals of some species, such as the blackpoll warbler (*Setophaga striata*), are known to leave the north Atlantic coastline (including Atlantic Canada) and make a single southern flight over the Atlantic Ocean to the tropics. Other species are believed to follow a more coastal route south or make shorter open ocean flights along the east coast of the continent. Therefore, greater passage rates in the fall would be expected in Atlantic Canada compared to springtime passage rates.

Nightly variation in the magnitude and flight characteristics of nocturnal migrants is not uncommon and is often attributed to weather patterns such as cold fronts and winds aloft (Hassler et al. 1963, Gauthreaux and Able 1970, Richardson 1972, Able 1973, Bingman et al. 1982, Gauthreaux 1991). The night with the

highest passage rate in fall (September 18) was characterized by weather patterns favorable for migration (i.e., average temperatures and low wind speeds from the north). Nightly variation of migration activity during spring did not follow this same pattern related to weather. The night with the highest passage rate in spring (May 3) was characterized by average winds from the southeast which are favorable for migration but was also characterized by low temperatures (less favorable for migration). Overall flight direction at the Project supported migration trends along the Nova Scotia Atlantic coastline in spring (east-northeast) and fall (west-southwest).

Radar surveys are not capable of quantifying the level of collision risk involving nocturnal migrants at a particular project. Statistical analysis of publicly available radar survey data with bird mortality data for wind projects in Maine has shown no relationship between pre-construction passage rate and post-construction level of mortality (the correlation is very low, with no significant trend [Stantec 2017]). Fatality data collected at operational wind projects have shown that the cause of fatality events involving multiple passerine individuals has occurred during the migratory season and either a) when weather conditions have caused migratory fall-out behavior (i.e., when birds dramatically reduce migratory flight heights in response to sudden, inclement weather), or b) when lighting at facility structures proximal to turbines disorients or attracts night migrants, resulting in them colliding with the nearby turbines or succumbing to exhaustion. The limitations of the radar to effectively sample nocturnal migration activity during inclement weather events (e.g., steady precipitation) limits our ability to characterize potential fall-out events resulting from poor weather.

4.2 AVIAN ACOUSTIC SURVEYS

The acoustic surveys completed in 2022 provide insight on the birds that were present at the project site during the course of the two migration seasons monitored. This includes identification of which species were present, when within the migration seasons they were present, and when within each night sampled were they actively producing sounds. However, it is important to identify some of the limitations of the acoustic data to properly interpret the results. First, due to the near ground-level (up to 2 m) placement of detectors, there is a recording bias towards birds at or near ground level over higher-flying birds, particularly for those flying at high altitudes (more than 100 m above the ground). Not all recorded vocalizations can be identified to species due to the brevity or quality of recorded calls and, therefore, not all species actually present at, or flying over, the site were necessarily identified as present with the recordings. There is also overlap of species migrating past the site with other species starting their nesting season locally (or even overlap of individuals of the same species) such that some breeding-related territorial and display calls were recorded at the same time as nighttime flight calls during active migration. In addition, the type of calls produced by many bird species in migration are more difficult to identify to the species level and migrating birds may tend to vocalize less than non-migrating birds at ground level. In fact, some species may not produce flight calls at all when they are undertaking nighttime movements – these species would not be represented in acoustic recordings at night, even if the migrant population is very large. These factors lead to a bias in the data towards resident species and birds at ground level, rather than an acoustic data set that consists exclusively of migratory flyover calls.

During the 2022 avian acoustic surveys, the majority of vocalizations were recorded in the spring with 75,035 vocalizations recorded, represented by 77 species (as well as vocalizations that could not be

identified to species) with only 16,798 vocalizations recorded in the fall and represented by 65 species (in addition to the unidentifiable bird vocalizations). The greater number of vocalizations recorded in the spring is result of a higher level of vocalization activity during the breeding period. The majority of species recorded in spring and fall were landbirds, but waterfowl, raptors, gamebirds, and shorebirds also were also recorded. The most frequently recorded species in the spring was Hermit Thrush (a migrant species that also breeds locally), representing 36% of recorded vocalizations during the spring. Owls were other species that were recorded in relatively high numbers, indicating their presence in the project area as year-round, resident species. The most frequently recorded species in the fall included Red-breasted nuthatch (SOCC; 16%), Barred Owl (12%), Cedar Waxwing (14%), and Golden-crowned Kinglet (10%), all of which are resident species besides Cedar Waxwing.

SAR observed during the 2022 avian acoustic surveys included Canada Warbler, Chimney Swift (spring only), Common Nighthawk, Eastern Wood-Pewee, Evening Grosbeak, Olive-sided Flycatcher (fall only), and Rusty Blackbird (spring only). SAR vocalizations comprised only 1% of total recorded vocalizations in the spring and less than1% in the fall.

4.3 COMPARISON: NOCTURNAL RADAR AND AVIAN ACOUSTIC SURVEY

Nocturnal radar surveys allowed us to document migration trends at the Project while avian acoustic surveys allowed us to identify some of the bird species occurring in the Project Boundary during the same nights when radar sampling occurred. The nocturnal radar surveys and avian acoustic surveys, while completed simultaneously on most nights, sampled the migrant (and locally breeding nocturnal species) bird community in different ways. As such, data from the two sources of migration information aren't directly comparable with respect to relative numbers of calls recorded and migration activity recorded by the on-site radar system. During the spring survey period, we observed peaks in activity throughout the survey period during both nocturnal radar and acoustic avian surveys, with some peaks lining up on the same nights between surveys early in the survey period and some peaks occurring on different nights towards the end of the survey period. During the fall survey period, we observed the greatest peak in nocturnal passage rates on September 18 through the nocturnal radar surveys but did not observe this same peak as the greatest recorded peak in activity during acoustic avian surveys.

These two sources of data may best be used to complement each other to form a broader, though not complete, picture of the progression of migration at the site. This includes not only the magnitude and flight characteristics of migration over the area relative to the proposed wind turbines (as determined with radar) but also the progression of different species' arrival at, departure from, or migratory passage through the project site. Additionally, the avian acoustic survey data provide an indication of the presence of SAR species, which radar data cannot provide on a wide scale basis.

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APPENDIX A

Nocturnal Radar Survey Tables

Appendix A Table 1 Summary of Survey Dates, Results, and Level of Effort During Spring 2022 Nocturnal Radar Surveys

Night of	Sunset	Sunrise	# of Hours Analyzed	Passage Rate (targets/km/hr)	Flight Direction (°)	Flight Height (m)	% Below 180 m	% Below 200 m	Average Nightly Temperature (°C)	Average Nightly Wind Speed (m/s)	Average Nightly Wind Direction (°)
04/17/22	20:03	6:27	10	109	147	185	65%	70%	1	9	353
04/25/22	20:13	6:14	4	187	42	282	48%	51%	4	5	354
04/26/22	20:15	6:13	10	42	61	377	18%	20%	7	5	354
04/28/22	20:17	6:09	8	5	125	197	75%	75%	2	6	306
05/02/22	20:22	6:03	10	254	94	482	21%	23%	0	6	299
05/03/22	20:23	6:02	10	284	68	316	33%	37%	1	8	124
05/09/22	20:31	5:54	9	60	344	177	63%	67%	2	8	315
05/15/22	20:38	5:47	7	4	327	363	27%	33%	8	7	304
05/16/22	20:39	5:46	9	51	16	460	15%	19%	9	7	283
05/18/22	20:41	5:44	9	161	181	209	52%	58%	4	9	307
05/20/22	20:43	5:42	9	76	29	340	29%	34%	8	8	213
05/21/22	20:45	5:41	9	30	28	414	19%	25%	10	8	250
05/22/22	20:46	5:40	9	80	109	359	34%	37%	11	8	329
05/23/22	20:47	5:39	9	165	126	216	60%	65%	6	8	163
05/24/22	20:48	5:38	9	50	80	262	40%	45%	3	4	164
05/25/22	20:49	5:37	9	40	125	290	41%	45%	5	8	313
05/26/22	20:50	5:37	8	72	54	290	40%	45%	11	8	76
05/27/22	20:51	5:36	9	9	58	207	58%	63%	17	9	58
05/29/22	20:53	5:34	3	45	113	242	47%	51%	12	11	86
05/30/22	20:54	5:34	no data	no data	no data	205	56%	61%	12	8	263
Entire Season			**160**	**93**	**85**	**317**	**38%**	**42%**			

Appendix A Table 2 Summary of Passage Rates by Hour, Night, and For Entire Season During Spring 2022 Nocturnal Radar Surveys

Night of	BirdCast Migration Rate Category	Passage Rate (targets/km/hr) by Hour After Sunset										Entire Night			
		1	2	3	4	5	6	7	8	9	10	Mean	Median	Stdev	SE
04/17/22	None	25	57	121	214	243	211	100	43	36	39	109	79	84	27
04/25/22	Medium/High	86	104	232	325	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]	187	168	113	56
04/26/22	Low	46	4	71	61	89	75	18	4	4	46	42	46	33	10
04/28/22	None	0	Rain	0	18	0	Rain	0	0	7	13	5	0	7	3
05/02/22	Medium/High	32	141	232	254	579	511	364	182	232	11	254	232	186	59
05/03/22	Low/Medium	150	518	596	464	279	332	236	154	93	14	284	257	193	61
05/09/22	Low	146	104	96	64	50	25	21	18	14	NA	60	50	47	16
05/15/22	None	Rain	Rain	7	0	0	11	11	0	0	NA	4	0	5	2
05/16/22	Low/Medium	68	93	93	68	86	39	4	0	7	NA	51	68	39	13
05/18/22	Low/Medium	36	236	279	271	186	136	161	86	61	NA	161	161	90	30
05/20/22	Medium	96	114	154	79	57	69	39	71	4	NA	76	71	43	14
05/21/22	Low/Medium	100	46	29	18	25	18	14	14	7	NA	30	18	29	10
05/22/22	Low/Medium	21	64	25	43	100	100	125	182	56	NA	80	64	52	17
05/23/22	None	68	150	204	236	171	175	239	218	26	NA	165	175	74	25
05/24/22	Medium/High	43	61	114	75	43	43	25	46	0	NA	50	43	32	11
05/25/22	Low/Medium	29	57	39	50	75	50	21	32	4	NA	40	39	21	7
05/26/22	None	54	71	132	104	90	86	14	Rain	21	NA	72	79	40	14
05/27/22	Low/Medium	18	29	7	7	4	7	7	4	0	NA	9	7	9	3
05/29/22	Low	14	7	114	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]	NA	45	14	60	35
Entire Season		**57**	**109**	**134**	**131**	**122**	**118**	**82**	**66**	**34**	**25**	**93**	**56**	**113**	**9**

0 indicates no targets counted for that hour; NA indicates no or only partial data for that hour; NA[1] indicates equipment failure during that hour

Appendix A Table 3 Mean Nightly Flight Direction During Spring 2022 Nocturnal Radar Surveys

Night of	Mean Flight Direction (°)	Circular Stdev (°)
04/17/22	147	69
04/25/22	42	71
04/26/22	61	67
04/28/22	125	146
05/02/22	94	60
05/03/22	68	40
05/09/22	344	73
05/15/22	327	31
05/16/22	16	71
05/18/22	181	98
05/20/22	29	104
05/21/22	28	101
05/22/22	109	92
05/23/22	126	74
05/24/22	80	67
05/25/22	125	82
05/26/22	54	102
05/27/22	58	92
05/29/22	113	98
Entire Season	**85**	**81**

Appendix A Table 4 Summary of Mean Flight Heights by Hour, Night, and For Entire Season During Spring 2022 Nocturnal Radar Surveys

Night of	Mean Flight Height (m) by Hour After Sunset										Entire Night				# of Targets Below 180 Meters	% of Targets Below 180 Meters	# of Targets Below 200 Meters	% of Targets Below 200 Meters
	1	2	3	4	5	6	7	8	9	10	Mean	Median	STDV	SE				
04/17/22	183	178	153	257	168	159	192	103	84	333	185	136	178	11	171	65%	183	70%
04/25/22	134	376	316	256	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]	282	194	253	18	92	48%	97	51%
04/26/22	373	228	327	424	472	376	305	461	362	339	377	371	205	12	48	18%	56	20%
04/28/22	--	Rain	--	--	--	Rain	Rain	--	305	161	197	167	73	36	3	75%	3	75%
05/02/22	138	576	565	500	419	472	463	575	417	723	482	427	322	14	111	21%	125	23%
05/03/22	222	362	327	283	284	256	373	401	343	--	316	258	228	9	199	33%	226	37%
05/09/22	171	270	103	207	85	164	127	--	--	NA	177	153	145	16	49	63%	52	67%
05/15/22	Rain	Rain	316	581	Rain	134	--	--	--	NA	363	333	224	58	4	27%	5	33%
05/16/22	443	463	496	554	492	369	381	322	265	NA	460	375	303	17	46	15%	59	19%
05/18/22	139	247	243	181	178	127	166	182	138	NA	209	170	160	10	129	52%	145	58%
05/20/22	206	296	292	297	388	418	423	452	218	NA	340	275	247	15	75	29%	89	34%
05/21/22	334	367	431	469	403	424	408	412	494	NA	414	378	255	14	66	19%	84	25%
05/22/22	352	362	432	411	386	360	281	269	345	NA	359	271	274	10	273	34%	300	37%
05/23/22	218	257	306	230	174	115	89	108	116	NA	216	145	213	11	229	60%	247	65%
05/24/22	224	309	254	279	229	223	225	235	277	NA	262	221	193	12	101	40%	113	45%
05/25/22	139	387	342	345	218	224	223	277	266	NA	290	226	224	12	138	41%	151	45%
05/26/22	198	295	315	350	369	265	Rain	Rain	144	NA	290	219	205	11	139	40%	157	45%
05/27/22	166	205	221	252	255	329	144	183	103	NA	207	150	180	16	77	58%	84	63%
05/29/22	228	241	309	266	216	174	181	238	237	NA	242	197	196	10	163	47%	179	51%
05/30/22	179	195	204	218	283	161	227	Rain	Rain	NA	205	162	172	10	167	56%	181	61%
Entire Season	**239**	**318**	**337**	**337**	**328**	**304**	**308**	**329**	**309**	**329**	**317**	**241**	**253**	**3**	**2,280**	**38%**	**2,536**	**42%**

-- indicates no targets counted for that hour; NA indicates no or only partial data for that hour; NA[1] indicates equipment failure during that hour

Appendix A Table 5 Summary of Survey Dates, Results, and Level of Effort During Fall 2022 Nocturnal Radar Surveys

Night of	Sunset	Sunrise	# of Hours Analyzed	Passage Rate (targets/km/hr)	Flight Direction (°)	Flight Height (m)	% Below 180 m	% Below 200 m	Average Nightly Temperature (°C)	Average Nightly Wind Speed (m/s)	Average Nightly Wind Direction (°)
08/20/22	20:16	6:25	10	981	206	291	36%	42%	14	5	7
08/21/22	20:15	6:26	10	589	340	272	42%	46%	14	6	358
08/24/22	20:10	6:30	10	363	36	323	29%	33%	20	3	326
08/25/22	20:08	6:31	10	1,493	221	327	31%	35%	16	6	345
08/26/22	20:06	6:32	11	358	359	343	21%	25%	18	7	338
08/27/22	20:04	6:33	11	1,402	253	409	18%	22%	14	5	357
08/28/22	20:03	6:34	10	576	12	347	29%	33%	14	5	350
08/29/22	20:01	6:36	11	420	65	266	37%	44%	18	7	5
09/09/22	19:40	6:49	11	1,145	233	360	20%	24%	12	7	1
09/13/22	19:33	6:54	10	555	324	287	31%	35%	19	7	354
09/14/22	19:31	6:55	10	542	114	314	30%	34%	14	9	16
09/16/22	19:27	6:57	12	754	237	367	27%	29%	7	9	335
09/17/22	19:25	6:58	12	346	326	221	51%	56%	9	10	30
09/18/22	19:23	6:59	12	2,225	268	407	24%	28%	9	4	351
09/19/22	19:21	7:01	7	1,184	347	351	28%	32%	10	5	351
09/21/22	19:18	7:03	12	569	140	379	27%	30%	15	4	353
10/08/22	18:46	7:24	11	431	195	472	19%	22%	0	8	352
10/10/22	18:42	7:27	12	246	227	250	54%	57%	5	7	7
10/11/22	18:40	7:28	12	258	261	284	58%	60%	1	10	355
10/12/22	18:38	7:29	11	1,012	266	451	27%	30%	4	7	10
10/13/22	18:37	7:30	13	706	285	228	48%	56%	11	9	354
10/14/22	18:35	7:32	13	419	280	153	69%	73%	16	12	3
10/17/22	18:30	7:36	13	263	294	484	20%	21%	13	8	11
10/18/22	18:28	7:37	13	299	294	282	39%	43%	16	12	356
10/20/22	18:25	7:40	12	247	281	525	22%	23%	3	10	4
10/21/22	18:23	7:41	13	192	273	331	41%	43%	2	8	356
10/22/22	18:21	7:42	12	299	239	282	42%	46%	4	7	350
10/25/22	18:16	7:46	13	71	271	416	23%	28%	15	4	311
10/27/22	18:13	7:49	13	529	222	404	16%	18%	7	10	157
10/28/22	18:12	7:50	13	376	248	621	15%	17%	-2	3	180
Entire Season			**343**	**607**	**262**	**380**	**27%**	**31%**			

Appendix A Table 6 Summary of Passage Rates by Hour, Night, and For Entire Season During Fall 2022 Nocturnal Radar Surveys

Night of	BirdCast Migration Rate Category	Passage Rate (targets/km/hr) by Hour After Sunset													Entire Night			
		1	2	3	4	5	6	7	8	9	10	11	12	13	Mean	Median	Stdev	SE
08/20/22	Low	593	1,296	1,257	1,171	929	1,000	936	939	1,029	657	NA	NA	NA	981	970	230	73
08/21/22	None	321	789	1,171	1,064	596	536	521	393	332	168	NA	NA	NA	589	529	328	104
08/24/22	Low	211	743	589	629	418	325	57	75	229	354	NA	NA	NA	363	339	233	74
08/25/22	Medium/High	486	1,864	2,004	1,475	1,264	1,414	1,454	1,729	1,600	1,643	NA[1]	NA	NA	1,493	1,538	417	132
08/26/22	Low	836	1,114	714	314	168	71	129	154	64	371	0	NA	NA	358	168	368	111
08/27/22	Medium/High	804	1,561	2,614	2,004	1,604	1,811	1,754	1,307	1,046	854	64	NA	NA	1,402	1,561	691	208
08/28/22	None	493	1,157	989	679	364	Rain	446	650	411	568	7	NA	NA	576	530	324	102
08/29/22	None	261	961	921	725	500	304	250	275	189	232	0	NA	NA	420	275	316	95
09/09/22	Medium	1,014	1,829	1,486	1,671	1,961	1,361	1,286	861	550	279	300	NA	NA	1,145	1,286	592	179
09/13/22	None	457	1,439	1,711	921	507	146	93	163	54	54	NA[1]	NA[1]	NA	555	310	606	192
09/14/22	Medium	382	754	868	754	629	700	493	420	214	207	NA[1]	NA[1]	NA	542	561	233	74
09/16/22	Low/Medium	1,200	1,682	1,375	1,204	1,096	861	664	421	218	139	171	14	NA	754	763	560	162
09/17/22	None	179	1,164	861	532	411	250	239	125	93	157	79	64	NA	346	209	347	100
09/18/22	None	721	2,571	2,932	3,043	3,943	3,904	3,300	2,125	1,875	1,057	661	568	NA	2,225	2,348	1,249	361
09/19/22	None	893	2,086	1,921	2,104	Rain	Rain	604	Rain	321	357	Rain	Rain	NA	1,184	893	822	311
09/21/22	Low	1,136	814	575	1,450	554	121	39	26	125	389	1,121	480	NA	569	517	474	137
10/08/22	Low/Medium	NA[1]	668	589	382	346	489	482	375	275	393	375	364	NA[1]	431	382	115	35
10/10/22	Low/Medium	275	657	296	200	218	129	168	132	79	189	229	375	NA[1]	246	209	153	44
10/11/22	None	NA[1]	454	518	464	382	268	211	139	136	121	129	118	154	258	182	154	44
10/12/22	None	379	1,920	2,486	1,599	1,067	775	904	657	436	350	564	NA[1]	NA[1]	1,012	775	701	211
10/13/22	None	407	582	918	750	1,357	1,164	1,104	789	729	504	346	329	206	706	729	355	99
10/14/22	None	218	507	911	1,114	825	704	471	211	204	193	54	25	7	419	218	368	102
10/17/22	None	132	154	125	229	329	343	307	443	739	375	154	61	29	263	229	192	53
10/18/22	None	454	904	939	496	157	282	261	218	39	46	18	32	36	299	218	319	88
10/20/22	None	111	261	432	475	429	357	246	150	221	61	125	100	NA[1]	247	234	145	42
10/21/22	Low	75	282	361	361	311	254	154	107	121	132	100	79	164	192	154	106	30
10/22/22	Low	129	Rain	225	432	389	279	225	311	418	407	239	271	268	299	275	94	27
10/25/22	None	25	89	29	36	54	25	29	25	25	114	168	214	93	71	36	62	17
10/27/22	Medium	368	443	368	754	536	682	682	564	654	589	611	357	264	529	564	154	43
10/28/22	None	211	286	493	479	536	489	554	511	579	286	168	129	164	376	479	170	47
Entire Season		**456**	**1,001**	**1,023**	**917**	**754**	**680**	**602**	**493**	**433**	**375**	**247**	**211**	**138**	**607**	**407**	**623**	**34**

0 indicates no targets counted for that hour; NA indicates no or only partial data for that hour; NA[1] indicates equipment failure during that hour

Appendix A Table 7 Mean Nightly Flight Direction During Fall 2022 Nocturnal Radar Surveys

Night of	Mean Flight Direction (°)	Circular Stdev (°)
08/20/22	206	80
08/21/22	340	62
08/24/22	36	82
08/25/22	221	52
08/26/22	359	44
08/27/22	253	39
08/28/22	12	83
08/29/22	65	59
09/09/22	233	52
09/13/22	324	52
09/14/22	114	70
09/16/22	237	57
09/17/22	326	113
09/18/22	268	37
09/19/22	347	86
09/21/22	140	111
10/08/22	195	69
10/10/22	227	67
10/11/22	261	95
10/12/22	266	54
10/13/22	285	23
10/14/22	280	26
10/17/22	294	36
10/18/22	294	27
10/20/22	281	71
10/21/22	273	68
10/22/22	239	62
10/25/22	271	71
10/27/22	222	35
10/28/22	248	40
Entire Season	**262**	**73**

Appendix A Table 8 Summary of Mean Flight Heights by Hour, Night, and For Entire Season During Fall 2022 Nocturnal Radar Surveys

Night of	Mean Flight Height (m) by Hour After Sunset													Entire Night				# of Targets Below 180 Meters	% of Targets Below 180 Meters	# of Targets Below 200 Meters	% of Targets Below 200 Meters
	1	2	3	4	5	6	7	8	9	10	11	12	13	Mean	Median	STDV	SE				
08/20/22	307	315	289	359	326	263	267	268	235	271	NA	NA	NA	291	233	224	7	361	36%	417	42%
08/21/22	339	313	278	211	264	279	296	207	245	196	NA	NA	NA	272	218	204	7	351	42%	387	46%
08/24/22	405	350	270	265	352	313	340	378	352	288	NA	NA	NA	323	267	210	8	193	29%	222	33%
08/25/22	319	389	398	364	361	267	224	203	243	238	NA[1]	NA	NA	327	267	225	5	729	31%	844	35%
08/26/22	332	305	301	391	404	424	407	341	377	435	116	NA	NA	343	319	190	7	143	21%	173	25%
08/27/22	323	387	386	393	412	416	437	464	513	468	368	NA	NA	409	359	239	4	611	18%	732	22%
08/28/22	373	314	339	387	489	Rain	405	278	259	278	165	NA	NA	347	296	238	7	296	29%	337	33%
08/29/22	264	246	263	256	297	356	325	248	253	223	266	NA	NA	266	221	174	6	349	37%	410	44%
09/09/22	470	415	429	336	344	319	296	245	287	291	284	NA	NA	360	305	229	4	521	20%	643	24%
09/13/22	284	318	239	265	301	284	269	257	464	328	NA[1]	NA[1]	NA	287	262	186	5	428	31%	485	35%
09/14/22	268	346	301	343	326	324	289	313	299	279	NA[1]	NA[1]	NA	314	271	208	6	326	30%	374	34%
09/16/22	317	424	355	393	346	342	344	389	356	389	304	320	NA	367	316	246	6	518	27%	566	29%
09/17/22	267	230	205	262	248	205	218	172	215	174	132	158	NA	221	179	179	7	377	51%	414	56%
09/18/22	355	392	438	445	425	385	371	416	404	431	352	364	NA	407	331	284	5	876	24%	1,020	28%
09/19/22	344	328	401	383	284	246	Rain	Rain	286	Rain	Rain	Rain	NA	351	285	239	6	473	28%	532	32%
09/21/22	265	262	376	431	553	521	422	328	341	334	265	204	NA	379	315	268	9	255	27%	283	30%
10/08/22	NA[1]	494	555	607	544	488	378	343	380	401	323	256	NA[1]	472	424	296	7	357	19%	415	22%
10/10/22	303	217	249	192	213	333	279	296	236	267	230	231	NA[1]	250	169	238	10	327	54%	347	57%
10/11/22	NA[1]	285	250	298	215	207	197	339	405	343	357	372	465	284	133	306	17	199	58%	206	60%
10/12/22	307	313	430	457	535	529	487	535	469	440	276	NA[1]	NA[1]	451	388	317	6	669	27%	750	30%
10/13/22	273	385	288	262	189	152	128	138	142	134	161	173	168	228	185	164	5	566	48%	657	56%
10/14/22	195	182	181	100	119	128	107	138	164	143	97	141	--	153	122	104	6	249	69%	263	73%
10/17/22	218	289	420	274	218	217	292	515	363	714	580	519	411	484	450	305	9	249	20%	271	21%
10/18/22	261	319	239	246	305	199	195	264	335	Rain	566	532	251	282	245	199	8	259	39%	287	43%
10/20/22	213	245	206	170	182	178	130	759	439	443	159	120	86	525	517	329	11	183	22%	192	23%
10/21/22	249	287	268	362	414	424	369	298	284	95	86	377	222	331	239	287	13	187	41%	196	43%
10/22/22	243	Rain	267	293	251	260	242	288	277	319	350	281	300	282	222	217	9	240	42%	260	46%
10/25/22	460	395	443	398	436	517	401	439	499	443	448	338	222	416	348	278	14	96	23%	114	28%
10/27/22	356	423	409	395	449	417	391	388	396	384	320	299	317	404	367	220	4	584	16%	670	18%
10/28/22	331	680	653	698	702	678	635	545	439	370	352	269	245	621	633	362	7	354	15%	403	17%
Entire Season	**332**	**371**	**390**	**390**	**412**	**392**	**365**	**418**	**358**	**375**	**377**	**315**	**258**	**380**	**306**	**270**	**1**	**11,326**	**27%**	**12,870**	**31%**

-- indicates no targets counted for that hour; NA indicates no or only partial data for that hour; NA[1] indicates equipment failure during that hour

Appendix A Table 9 Summary of Publicly Available Avian Spring and Fall Radar Survey Results Conducted at Proposed (Pre-Construction) Wind Power Facilities in Nova Scotia, Canada; Maine, U.S.; Using X-band Mobile Radar Systems (2005-2022 Sorted by Season and Mean Passage Rate Low to High).

Project Site	Year	Number of Survey Nights	Number of Survey Hours	Landscape	Mean Passage Rate (t/km/hr)	Range in Nightly Passage Rates	Mean Flight Direction	Mean Flight Height (m)	Reference
Spring									
Proposed Wind Site near Bear Lake, Nova Scotia	2022	20	160	Forested ridge	93	4–284	85	317	*This Report*
Stetson, Washington Cty, ME	2007	21	138	Forested ridge	147	3–434	55	210	Woodlot Alternatives, Inc. 2007. A Spring 2007 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine. Prepared for Evergreen Wind V, LLC.
Rollins, Penobscot Cty, ME	2008	20	189	Forested ridge	247	40–766	75	316	Stantec Consulting Services Inc. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for First Wind, LLC.
Bowers,Penobscot Cty, ME	2010	20	188	Forested ridge	289	20–589	56	243	Stantec Consulting Services Inc. 2010. 2010 Spring Avian and Spring/Summer Bat Surveys for the Bowers Wind Project. Prepared for Champlain Wind Energy LLC.
Mars Hill, Aroostook Cty, ME	2006	15	85	Forested ridge	338	76–674	58	384	Woodlot Alternatives, Inc. 2006. A Spring 2006 Radar, Visual, and Acoustic Survey of Bird Migration at the Mars Hill Wind Farm in Mars Hill, Maine. Prepared for Evergreen Windpower, LLC.
Bull Hill, Hancock Cty, ME	2010	20	184	Forested ridge within Coastal plain	387	43–879	48	217	Stantec Consulting Services Inc. 2010. Spring 2010 Avian and Bat Survey Report for the Bull Hill Wind Project. Prepared for Blue Sky East Wind LLC.
Number Nine, Aroostock Cty, ME	2014	20	170	Forested ridge	402	26-1,056	43	357	Stantec Consulting Services Inc. 2014. Fall 2014 Nocturnal Radar Survey Report. Prepared for Number Nine Wind Farm, LLC.
Downeast, Washington Cty, ME	2016	20	189	Agricultural plateau within Coastal plain	469	86–1,969	68	384	Stantec Consulting Services Inc. 2017. Nocturnal Migration Radar Report Downeast Wind Project - September 2015 to October 2016.
Passadumkeag, Penobscot, ME	2011	20	179	Forested ridge	476	3–1,950	67	321	Stantec Consulting Services Inc. 2011. Spring and Summer 2011 Avian and Bat Survey Report for the Passadumkeag Wind Project in Grand Falls Township, Maine. Prepared for Passadumkeag Windpark LLC.
Oakfield, Penobscot Cty, ME	2008	20	194	Forested ridge	498	132–899	33	276	Stantec Consulting Services Inc. 2008.A Spring 2008 Survey of Bird and Bat Migration at the Oakfield Wind Project, Washington County, Maine. Prepared for Evergreen Wind, LLC.
Bull Hill, Hancock Cty, ME	2011	10	94	Forested ridge within Coastal plain	519	88–1,108	98	371	Stantec Consulting Services Inc. 2011. Spring 2011 Radar Survey Results and Comparison to Spring 2010 Results: Memo for the Bull Hill Wind Project. Prepared for First Wind.
Weaver, Hancock Cty, ME	2014	20	188	Forested ridge within Coastal plain	806	49–2,586	72	365	Stantec Consulting Services Inc. 2014. 2014 Pre-Construction Avian and Bat Surveys – Weaver Wind Project. Prepared for First Wind, LLC.
Fall									
Number Nine, Aroostock Cty, ME	2014	20	227	Forested ridge	247	47–806	218	354	Stantec Consulting Services Inc. 2014. Fall 2014 Nocturnal Radar Survey Report. Prepared for Number Nine Wind Farm, LLC.
Bowers, Washington Cty, ME	2009	22	249	Forested ridge	344	95–844	231	315	Stantec Consulting Services Inc. 2010. Fall 2009 Avian and Bat Surveys for the Bowers Wind Project. Prepared for Champlain Wind Energy, LLC.
Rollins, Lincoln, Penobscot Cty, ME	2007	22	231	Forested ridge	368	82–953	284	343	Woodlot Alternatives, Inc. 2008. A Fall 2007 Survey of Bird and Bat Migration at the Rollins Wind Project, Washington County, Maine. Prepared for Evergreen Wind, LLC.

Passadumkeag, Penobscot Cty, ME	2011	20	222	Forested ridge	394	65–1,281	251	325	Stantec Consulting Services. 2011. Summer and Fall 2011 Avian and Bat Survey Report for the Passadumkeag Wind Project in Grand Falls Township, Maine. Prepared for Passadumkeag Windpark LLC.
Bull Hill, Hancock Cty, ME	2011	10	112	Forested ridge within Coastal plain	431	111–747	282	279	Stantec Consulting Services Inc. 2011. Fall 2011 Radar Survey Results and Comparison to Fall 2009 Radar Results: Memo for the Bull Hill Wind Project. Prepared for Blue Sky East Wind, LLC.
Stetson, Washington Cty, ME	2006	12	77	Forested ridge	476	131–1,192	227	378	Woodlot Alternatives, Inc. 2007. A Fall 2006 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine. Prepared for Evergreen Wind V, LLC.
Downeast, Washington Cty, ME	2016	20	227	Agricultural plateau within Coastal plain	486	113–1,768	252	465	Stantec Consulting Services Inc. 2017. Nocturnal Migration Radar Report Downeast Wind Project - September 2015 to October 2016.
Oakfield, Penobscot Cty, ME	2008	20	NA	Forested ridge	501	116–945	200	309	Woodlot Alternatives, Inc. 2008. A Fall 2008 Survey of Bird and Bat Migration at the Oakfield Wind Project, Washington County, Maine. Prepared for Evergreen Wind, LLC.
Mars Hill, Aroostook Cty, ME	2005	18	117	Forested ridge	512	60–1,092	228	424	Woodlot Alternatives, Inc. 2006. A Fall 2005 Radar, Visual, and Acoustic Survey of Bird Migration at the Mars Hill Wind Farm in Mars Hill, Maine. Prepared for Evergreen Windpower, LLC.
Weaver, Hancock Cty, ME	2016	20	225	Forested ridge	543	61–1,126	207	479	Stantec Consulting Services Inc. 2018. Weaver Wind Project Pre-Construction Nocturnal Radar Migration Surveys, Fall 2016. Prepared for Weaver Wind LLC.
Proposed Wind Site near Bear Lake, Nova Scotia	2022	30	343	Forested ridge	607	71–2,225	262	380	*This Report*
Bull Hill, Hancock Cty, ME	2009	20	232	Forested ridge	614	188–1,500	260	357	Stantec Consulting Services Inc. 2010. Summer and Fall 2009 Avian and Bat Survey Report for the Bull Hill Project. Prepared for Blue Sky East Wind, LLC.
Weaver, Hancock Cty, ME	2014	20	211	Forested ridge	657	239–1,122	259	412	Stantec Consulting Services Inc. 2014. 2014 Pre-Construction Avian and Bat Surveys – Weaver Wind Project. Prepared for First Wind, LLC.
Downeast, Washington Cty, ME	2015	20	227	Agricultural plateau	920	66–2,173	255	428	Stantec Consulting Services Inc. 2017. Nocturnal Migration Radar Report Downeast Wind Project - September 2015 to October 2016.

APPENDIX B

Acoustic Tables and Acoustic Results by Species: Vocalizations by Time of Day and Date

Appendix B Table 1 Species Identified, by Detector, During Spring 2022 Avian Acoustic Surveys

Species	Scientific Name	Seasonal Presence	B1	B2	B3	B4	B5	Total
Alder Flycatcher	*Empidonax alnorum*	Migrant/Breeder				1,134	2	1,136
American Bittern	*Botaurus lentiginosus*	Migrant/Breeder		1				1
American Crow	*Corvus brachyrhynchos*	Resident/Breeder			2		15	17
American Goldfinch	*Spinus tristis*	Resident/Breeder	4	29	109	6	10	158
American Kestrel	*Falco sparverius*	Migrant/Breeder				2		2
American Redstart	*Setophaga ruticilla*	Migrant/Breeder			5		251	256
American Robin	*Turdus migratorius*	Migrant/Breeder		7	17	21	149	194
American Tree Sparrow	*Spizella arborea*	Migrant/Non-breeder				9		9
American Woodcock	*Scolopax minor*	Migrant/Breeder		2	1		6,344	6,347
Barred Owl	*Strix varia*	Resident/Breeder	120	683	283	122	2	1,210
Bay-breasted Warbler	*Setophaga castanea*	Migrant/Breeder		3	198	1		202
Belted Kingfisher	*Megaceryle alcyon*	Migrant/Breeder					2	2
Black Scoter	*Melanitta americana*	Migrant/Non-breeder				1		1
Black-and-white Warbler	*Mniotilta varia*	Migrant/Breeder	302	113	667	60	618	1,760
Black-backed Woodpecker	*Picoides arcticus*	Resident/Breeder			1	11	1	13
Black-bellied Plover	*Pluvialis squatarola*	Migrant/Non-breeder	1					1
Black-capped Chickadee	*Poecile atricapillus*	Resident/Breeder	164	63	573	12	40	852
Blackpoll Warbler	*Setophaga striata*	Migrant/Breeder			2			2
Black-throated Blue Warbler	*Setophaga caerulescens*	Migrant/Breeder	265	8	44		1	318
Black-throated Green Warbler	*Setophaga virens*	Migrant/Breeder	284	304	89		1,286	1,963
Blue Jay	*Cyanocitta cristata*	Resident/Breeder	29	8				37
Blue-headed Vireo	*Vireo solitarius*	Migrant/Breeder	114	71	253	2	4	444
Boreal Chickadee	*Poecile hudsonicus*	Resident/Breeder		3		2	63	68
Boreal Owl	*Aegolius funereus*	Resident/Unknown		6				6
Brown Creeper	*Perisoreus canadensis*	Migrant/Breeder	4	104	27	9		144
Canada Goose	*Branta canadensis*	Migrant/Breeder		2	2	3	3	10
Canada Jay	*Perisoreus canadensis*	Resident/Breeder	2			2	54	58
Canada Warbler	*Cardellina canadensis*	Migrant/Breeder		62	6	39	2	109
Cedar Waxwing	*Bombycilla cedrorum*	Migrant/Breeder				2		2
Chestnut-sided Warbler	*Setophaga pensylvanica*	Migrant/Breeder				106	1	107
Chimney Swift	*Chaetura pelagica*	Migrant/Breeder				1		1
Common Goldeneye	*Bucephala clangula*	Migrant/Breeder		5				5
Common Grackle	*Quiscalus quiscula*	Migrant/Breeder	19	2	1			22
Common Loon	*Gavia immer*	Migrant/Breeder	44	245	16	7	62	374
Common Nighthawk	*Chordeiles minor*	Migrant/Breeder	245	10	71	10	11	347
Common Raven	*Corvus corax*	Resident/Breeder	9			18	9	36
Common Yellowthroat	*Geothlypis trichas*	Migrant/Breeder	77	2	12	711	3	805
Dark-eyed Junco	*Junco hyemalis*	Resident/Breeder		127	138	2		267
Eastern Wood-Pewee	*Contopus virens*	Migrant/Breeder					2	2
Evening Grosbeak	*Coccothraustes vespertinus*	Migrant/Breeder			1			1

Appendix B Table 1 Species Identified, by Detector, During Spring 2022 Avian Acoustic Surveys

Fox Sparrow	*Passerella iliaca*	Migrant/Breeder				2		2
Golden-crowned Kinglet	*Regulus satrapa*	Resident/Breeder	46	102	9	3	3	163
Great Blue Heron	*Ardea herodias*	Migrant/Breeder	2					2
Great Horned Owl	*Bubo virginianus*	Resident/Breeder		42	4	540	9	595
Hairy Woodpecker	*Picoides villosus*	Resident/Breeder		16	29			45
Hermit Thrush	*Catharus guttatus*	Migrant/Breeder	2,912	12,263	4,942	4,780	1,872	26,769
Killdeer	*Charadrius vociferus*	Migrant/Breeder			8			8
Least Flycatcher	*Empidonax minimus*	Migrant/Breeder			1			1
Lincoln's Sparrow	*Melospiza lincolnii*	Migrant/Breeder				1		1
Long-tailed Duck	*Clangula hyemalis*	Migrant/Non-breeder		2	1			3
Magnolia Warbler	*Setophaga magnolia*	Migrant/Breeder	140		14	539	1,872	2,565
Mallard	*Anas platyrhynchos*	Resident/Breeder	652					652
Mourning Dove	*Zenaida macroura*	Migrant/Breeder	11	36				47
Nashville Warbler	*Oreothlypis ruficapilla*	Migrant/Breeder		18	7	21	29	75
Northern Flicker	*Colaptes auratus*	Migrant/Breeder	188		19	17		224
Northern Parula	*Setophaga americana*	Migrant/Breeder	3	88	181			272
Northern Saw-whet Owl	*Aegolius acadicus*	Resident/Breeder		230	1,354	1,435	10,803	13,822
Ovenbird	*Seiurus aurocapilla*	Migrant/Breeder	60	138	388	5	792	1,383
Palm Warbler	*Setophaga palmarum*	Migrant/Breeder	203	74	48	2,352	58	2,735
Pileated Woodpecker	*Dryocopus pileatus*	Resident/Breeder			2	4	3	9
Purple Finch	*Haemorhous purpureus*	Migrant/Breeder		28	4		9	41
Red-breasted Nuthatch	*Sitta canadensis*	Resident/Breeder	567	152	1,498	10	4	2,231
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Migrant/Breeder			8		2	10
Ruby-crowned Kinglet	*Regulus calendula*	Migrant/Breeder	15	3				18
Ruffed Grouse	*Bonasa umbellus*	Resident/Breeder	43	4		23	33	103
Rusty Blackbird	*Euphagus carolinus*	Migrant/Breeder				3		3
Sandhill Crane	*Grus canadensis*	Migrant/Unknown		1	1			2
Savannah Sparrow	*Passerculus sandwichensis*	Migrant/Breeder			1	2		3
Swainson's Thrush	*Catharus ustulatus*	Migrant/Breeder		34	32	7	273	346
Swamp Sparrow	*Not applicable*	Migrant/Breeder	1,020					1,020
Unidentified Bird	*Aves (gen, sp)*	Not applicable	100	30	7	3	3	143
White-throated Sparrow	*Zonotrichia albicollis*	Migrant/Breeder		5	17	598	77	697
White-winged Crossbill	*Loxia leucoptera*	Resident/Breeder	5	3		3	2	13
Winter Wren	*Troglodytes hiemalis*	Migrant/Breeder	367	1,183	1,065	3	1	2,619
Wood Duck	*Aix sponsa*	Migrant/Breeder	4					4
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Migrant/Breeder		1	1		3	5
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Migrant/Breeder	44	4	60			108
Yellow-rumped Warbler	*Setophaga coronata*	Migrant/Breeder	573	21	255	41	117	1,007

Note:
Bold and highlighted grey indicates Species at Risk
Bold indicates Species of Conservation Concern

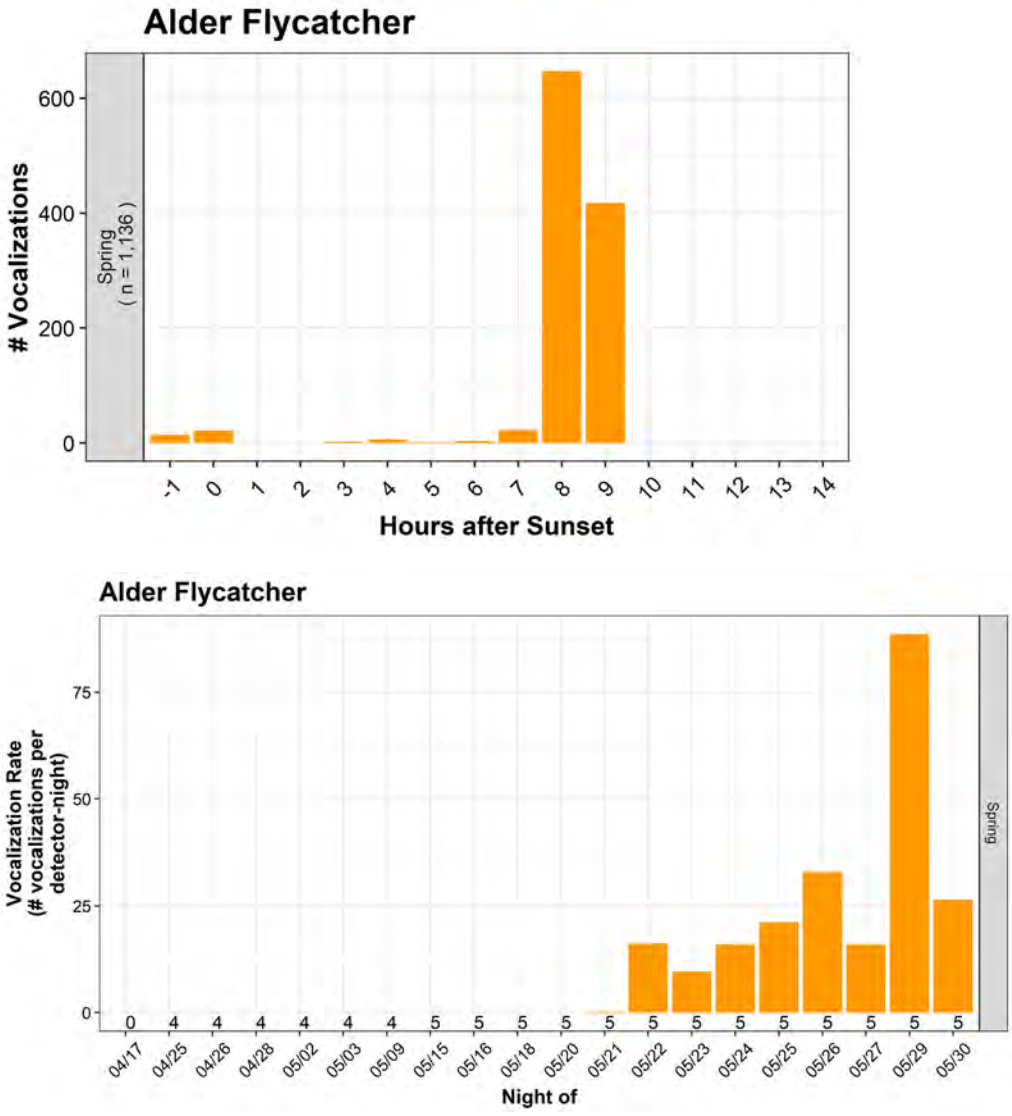
Appendix B Table 2 Species Identified, by Detector, During Fall 2022 Avian Acoustic Surveys

Species	Scientific Name	Seasonal Presence	B1	B2	B3	B4	B5	Total
American Crow	*Corvus brachyrhynchos*	Resident/Breeder		1			25	26
American Goldfinch	*Spinus tristis*	Resident/Breeder	9	43	28	14	35	129
American Robin	*Turdus migratorius*	Migrant/Breeder	6	36	5	6	7	60
American Tree Sparrow	*Spizella arborea*	Migrant/Non-breeder		1	2	11		14
American Woodcock	*Scolopax minor*	Migrant/Breeder					3	3
Barred Owl	*Strix varia*	Resident/Breeder	315	762	974	17	20	2,088
Bay-breasted Warbler	*Setophaga castanea*	Migrant/Breeder				2	1	3
Black-and-white Warbler	*Mniotilta varia*	Migrant/Breeder		1	7	39	58	105
Black-backed Woodpecker	*Picoides arcticus*	Resident/Breeder			1		6	7
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Migrant/Breeder				29	2	31
Black-capped Chickadee	*Poecile atricapillus*	Resident/Breeder	32	25	27	130	59	273
Blue Jay	*Cyanocitta cristata*	Resident/Breeder	326	72	75	138	294	905
Bohemian Waxwing	*Bombycilla garrulus*	migrant/Non-breeder		1		12		13
Boreal Chickadee	*Poecile hudsonicus*	Resident/Breeder				28	6	34
Brown Creeper	*Certhia americana*	Migrant/Breeder	34	170	184	3	48	439
Canada Goose	*Branta canadensis*	Migrant/Breeder					3	3
Canada Jay	*Perisoreus canadensis*	Resident/Breeder	5	9		1	1	16
Canada Warbler	*Cardellina canadensis*	Migrant/Breeder				11		11
Cedar Waxwing	*Bombycilla cedrorum*	Migrant/Breeder	537	1	264	1,506	1	2,309
Chestnut-sided Warbler	*Setophaga pensylvanica*	Migrant/Breeder				3		3
Common Grackle	*Quiscalus quiscula*	Migrant/Breeder				2		2
Common Loon	*Gavia immer*	Migrant/Breeder	9	73			4	86
Common Nighthawk	*Chordeiles minor*	Migrant/Breeder	1					1
Common Raven	*Corvus corax*	Resident/Breeder	24	31	1	91	18	165
Common Redpoll	*Acanthis flammea*	Migrant/Non-breeder		8	3	5		16
Common Yellowthroat	*Geothlypis trichas*	Migrant/Breeder	143			455		598
Dark-eyed Junco	*Junco hyemalis*	Resident/Breeder	202	165	101	14		482
Downy Woodpecker	*Picoides pubescens*	Resident/Breeder	3	3	5			11
Eastern Wood-Pewee	*Contopus virens*	Migrant/Breeder		1				1
Evening Grosbeak	*Coccothraustes vespertinus*	Migrant/Breeder		5			1	6
Golden-crowned Kinglet	*Regulus satrapa*	Resident/Breeder	394	655	453	101	36	1,639
Great Crested Flycatcher	*Myiarchus crinitus*	Migrant/Breeder				5		5
Great Horned Owl	*Bubo virginianus*	Resident/Breeder		132	132	190	405	859
Hairy Woodpecker	*Picoides villosus*	Resident/Breeder	109	273	158		1	541
Hermit Thrush	*Catharus guttatus*	Migrant/Breeder	66	70	75	343	101	655
Least Flycatcher	*Empidonax minimus*	Migrant/Breeder					20	20
Lincoln's Sparrow	*Melospiza lincolnii*	Migrant/Breeder	4	1		5		10
Magnolia Warbler	*Setophaga magnolia*	Migrant/Breeder	9				45	54
Mallard	*Anas platyrhynchos*	Resident/Breeder	17					17

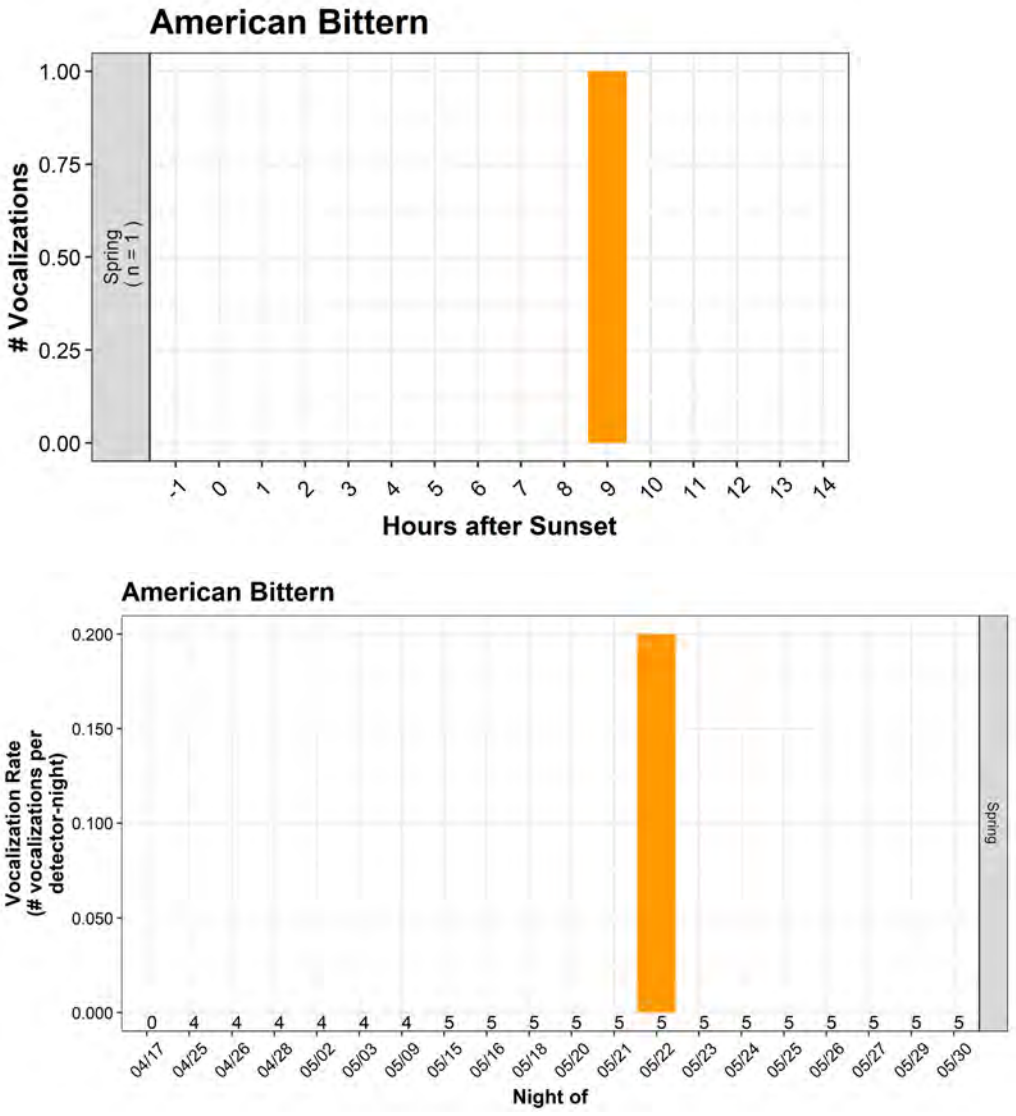
Appendix B Table 2 Species Identified, by Detector, During Fall 2022 Avian Acoustic Surveys

Mourning Dove	*Zenaida macroura*	Migrant/Breeder		15	1			16
Northern Flicker	*Colaptes auratus*	Migrant/Breeder	69	98	40	115	11	333
Northern Parula	*Setophaga americana*	Migrant/Breeder			18			18
Northern Saw-whet Owl	*Aegolius acadicus*	Resident/Breeder		1	11		4	16
Olive-sided Flycatcher	*Contopus cooperi*	Migrant/Breeder			45			45
Ovenbird	*Seiurus aurocapilla*	Migrant/Breeder		1			15	16
Palm Warbler	*Setophaga palmarum*	Migrant/Breeder	66	83	29	386	5	569
Pileated Woodpecker	*Dryocopus pileatus*	Resident/Breeder	32	43	31	3	6	115
Pine Grosbeak	*Pinicola enucleator*	Migrant/Breeder		9				9
Pine Siskin	*Spinus pinus*	Resident/Breeder		1				1
Red Crossbill	*Loxia curvirostra*	Resident/Breeder				11		11
Red-breasted Nuthatch	*Sitta canadensis*	Resident/Breeder	842	580	1,054	91	183	2,750
Red-tailed Hawk	*Buteo jamaicensis*	Resident/Breeder		15				15
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Migrant/Breeder			5			5
Ruffed Grouse	*Bonasa umbellus*	Resident/Breeder	1				3	4
Savannah Sparrow	*Passerculus sandwichensis*	Migrant/Breeder		1		3		4
Semipalmated Plover	*Charadrius semipalmatus*	Migrant/Breeder		1				1
Swainson's Thrush	*Catharus ustulatus*	Migrant/Breeder		6	1		83	90
Swamp Sparrow	*Melospiza georgiana*	Migrant/Breeder	265			4		269
Tennessee Warbler	*Not applicable*	Migrant/Breeder				1		1
Unidentified Bird	Not applicable	Not applicable	67	25	22	97	2	213
White-throated Sparrow	*Zonotrichia albicollis*	Migrant/Breeder		11	2	143	4	160
White-winged Crossbill	*Loxia leucoptera*	Resident/Breeder		1	1			2
Winter Wren	*Troglodytes hiemalis*	Migrant/Breeder	1	234	13			248
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Migrant/Breeder					70	70
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Migrant/Breeder	1	1			1	3
Yellow-rumped Warbler	*Setophaga coronata*	Migrant/Breeder	14	16	12	127	5	174

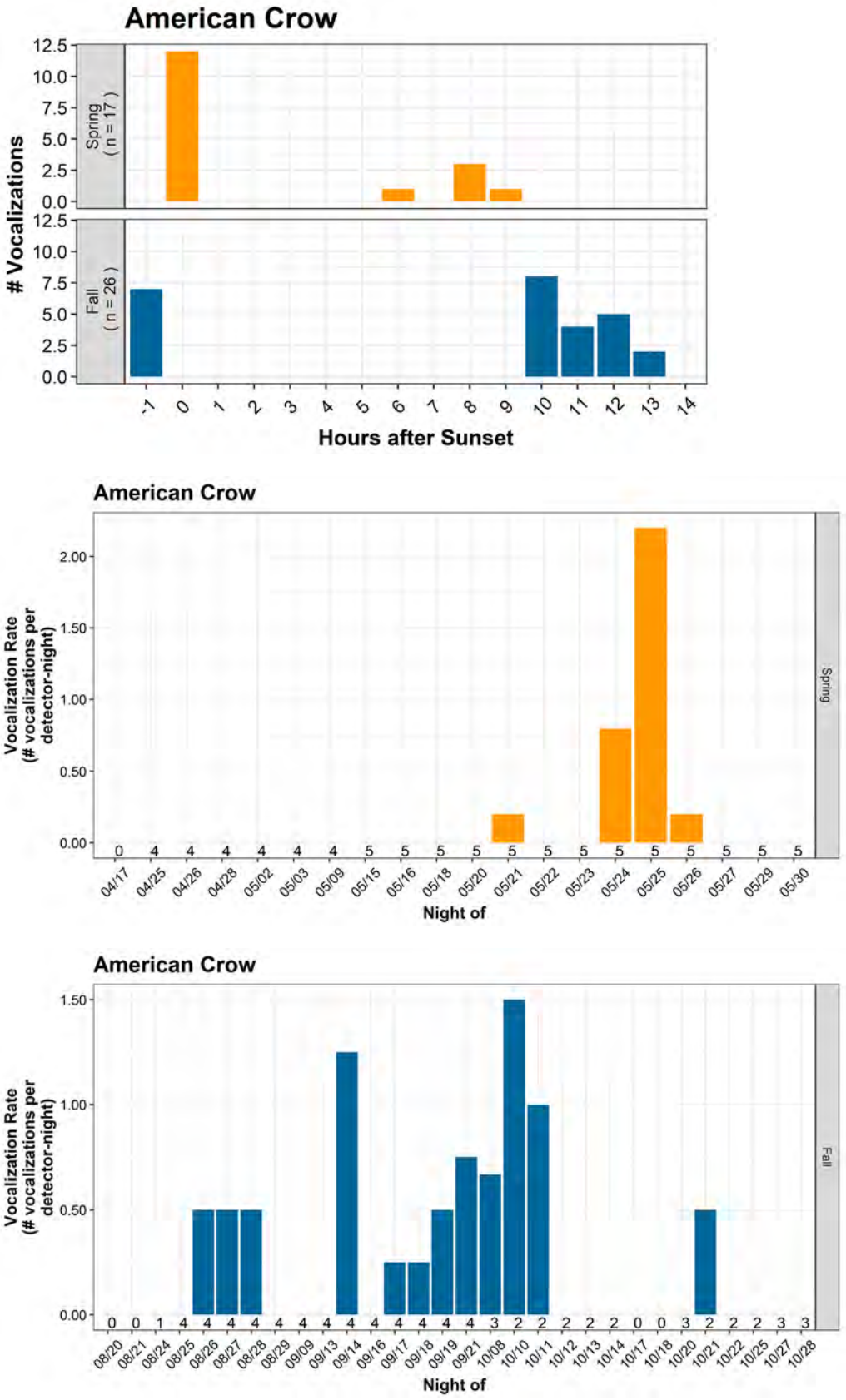
Note:
Bold and highlighted grey indicates Species at Risk
Bold indicates Species of Conservation Concern



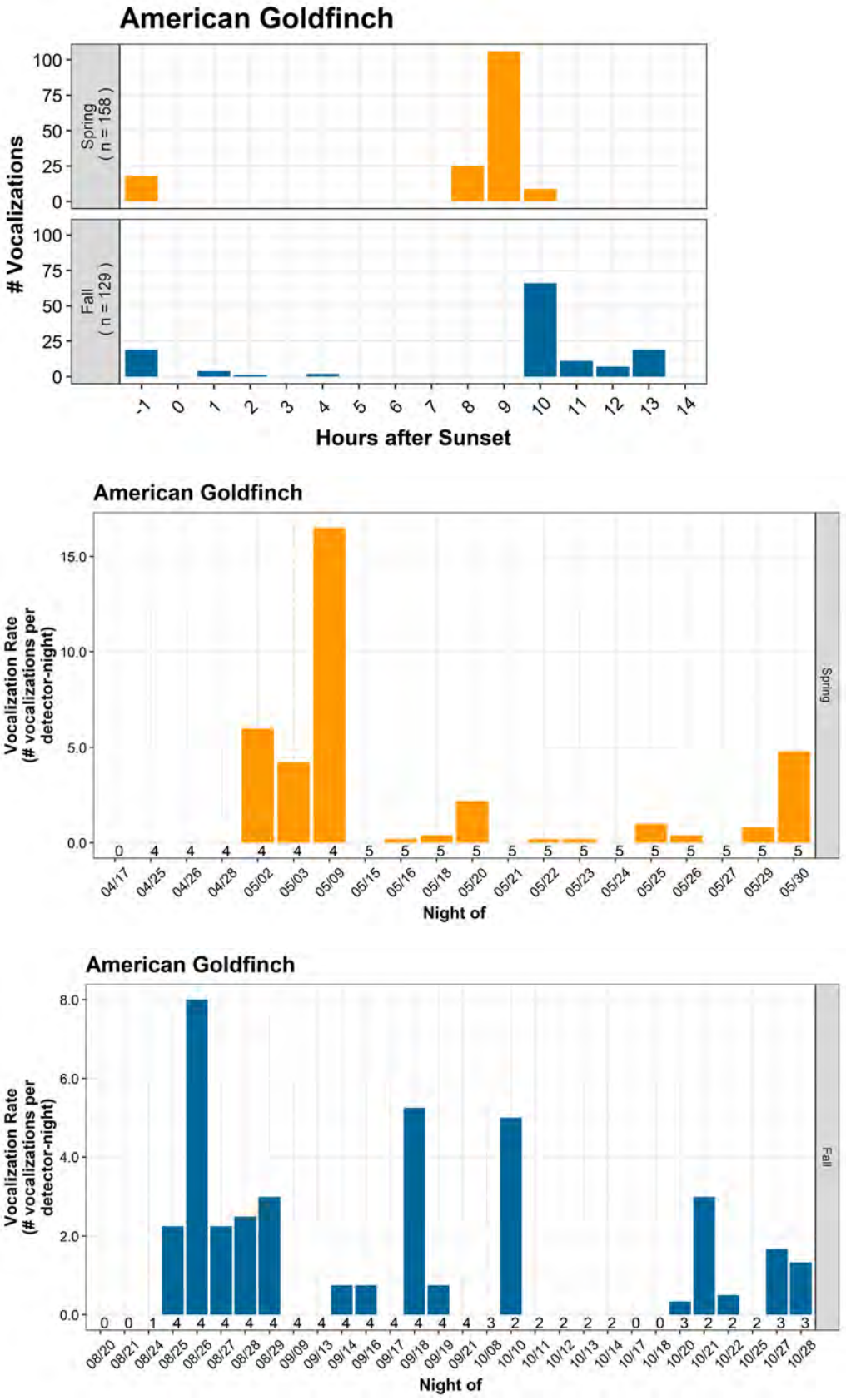
Appendix B Figure 1. Alder Flycatcher – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



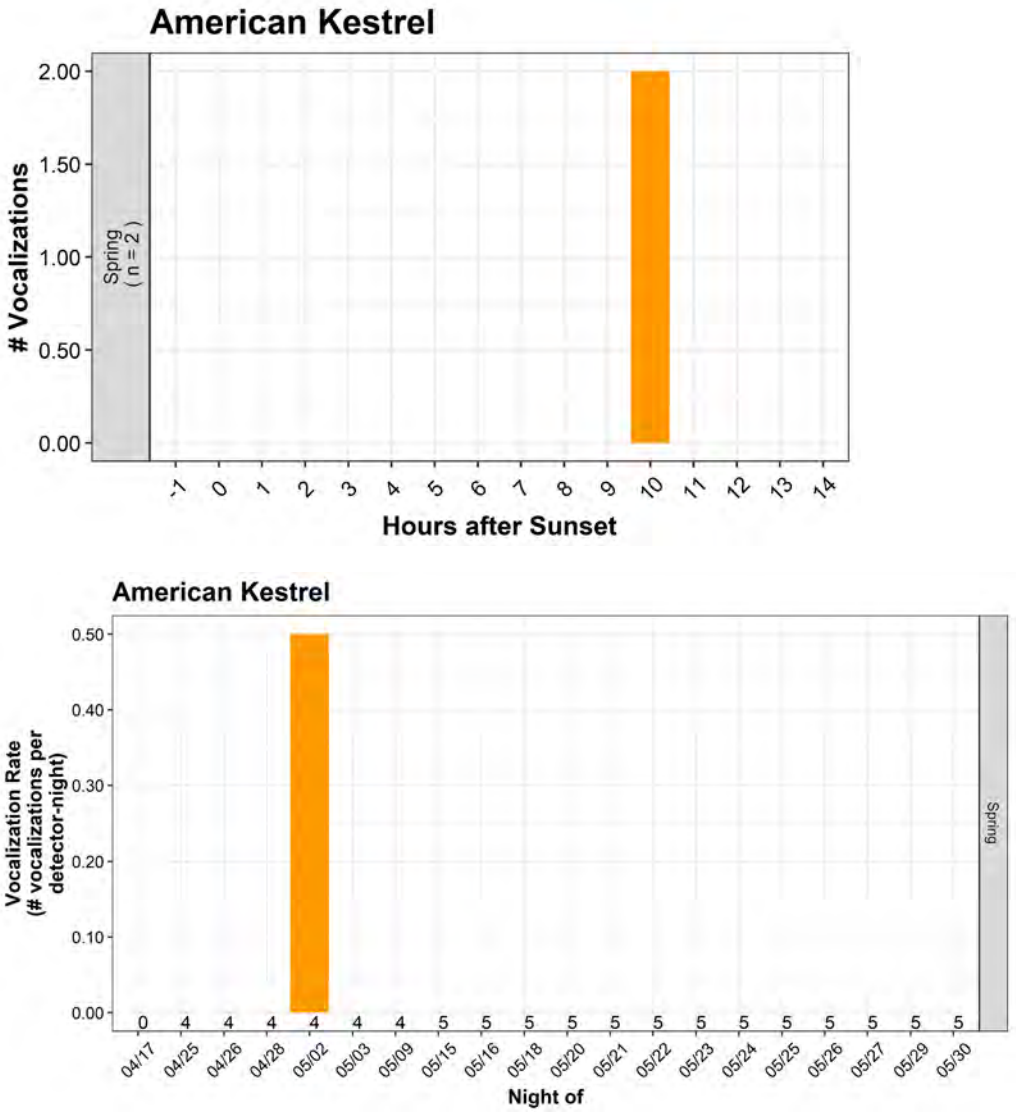
Appendix B Figure 2. American Bittern– Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



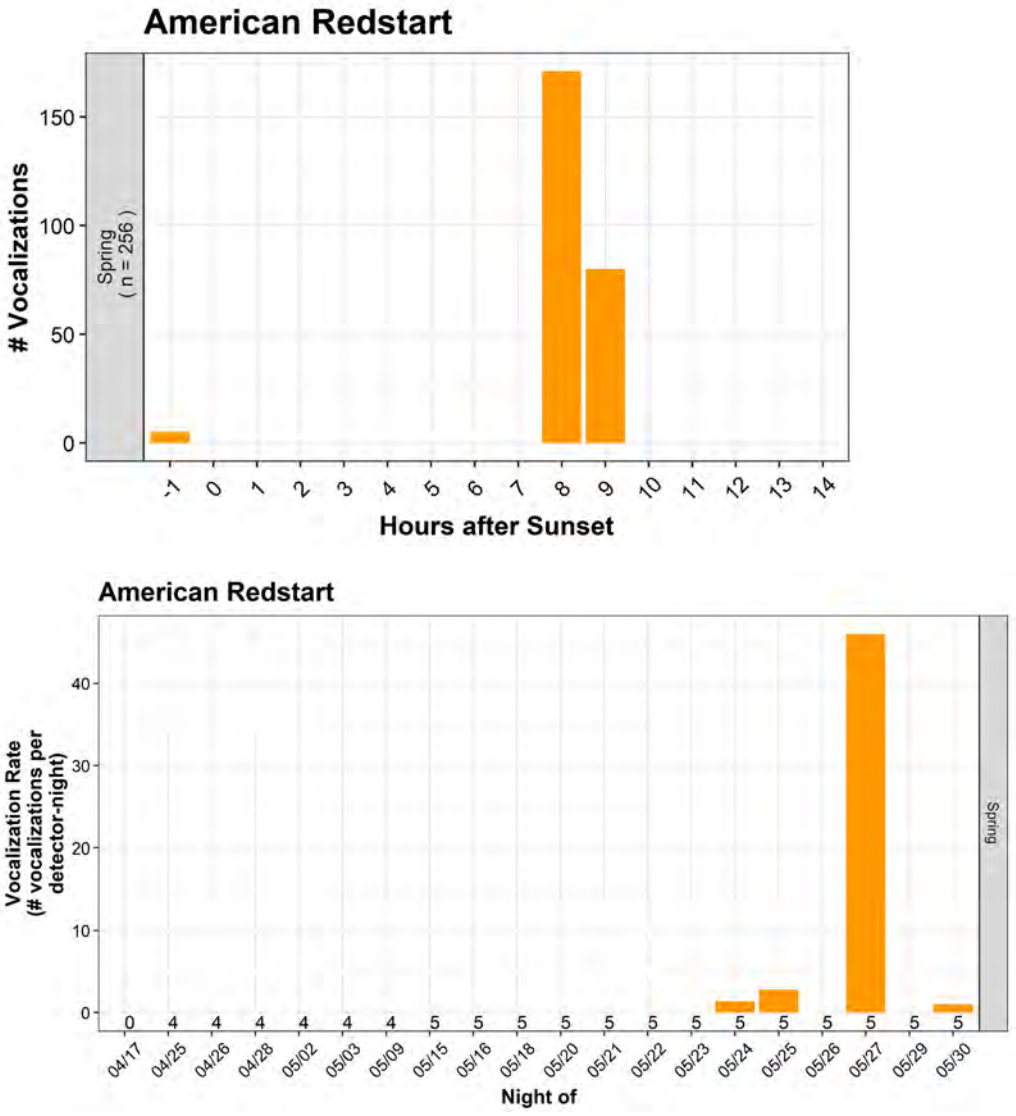
Appendix B Figure 3. American Crow – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



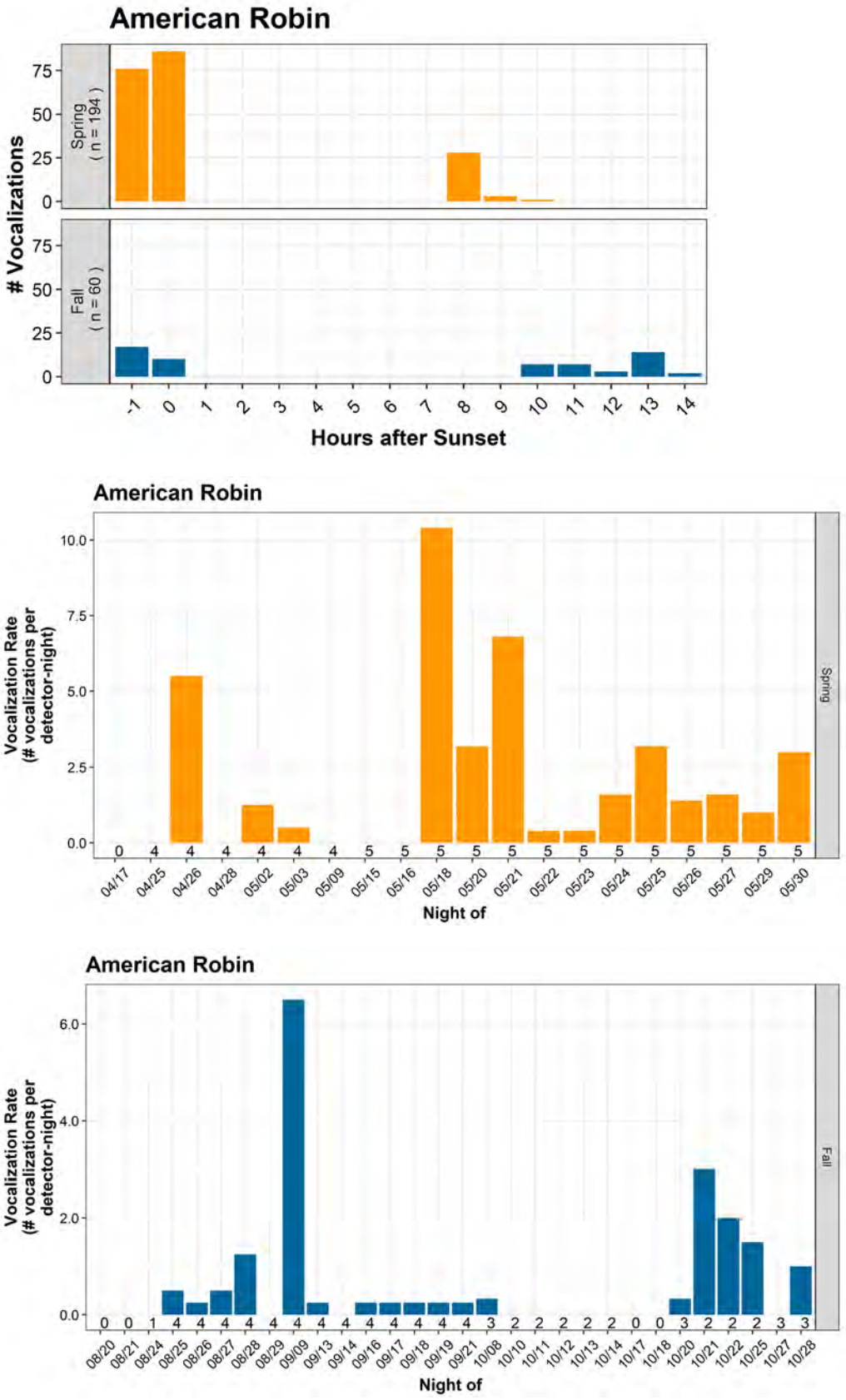
Appendix B Figure 4. American Goldfinch – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



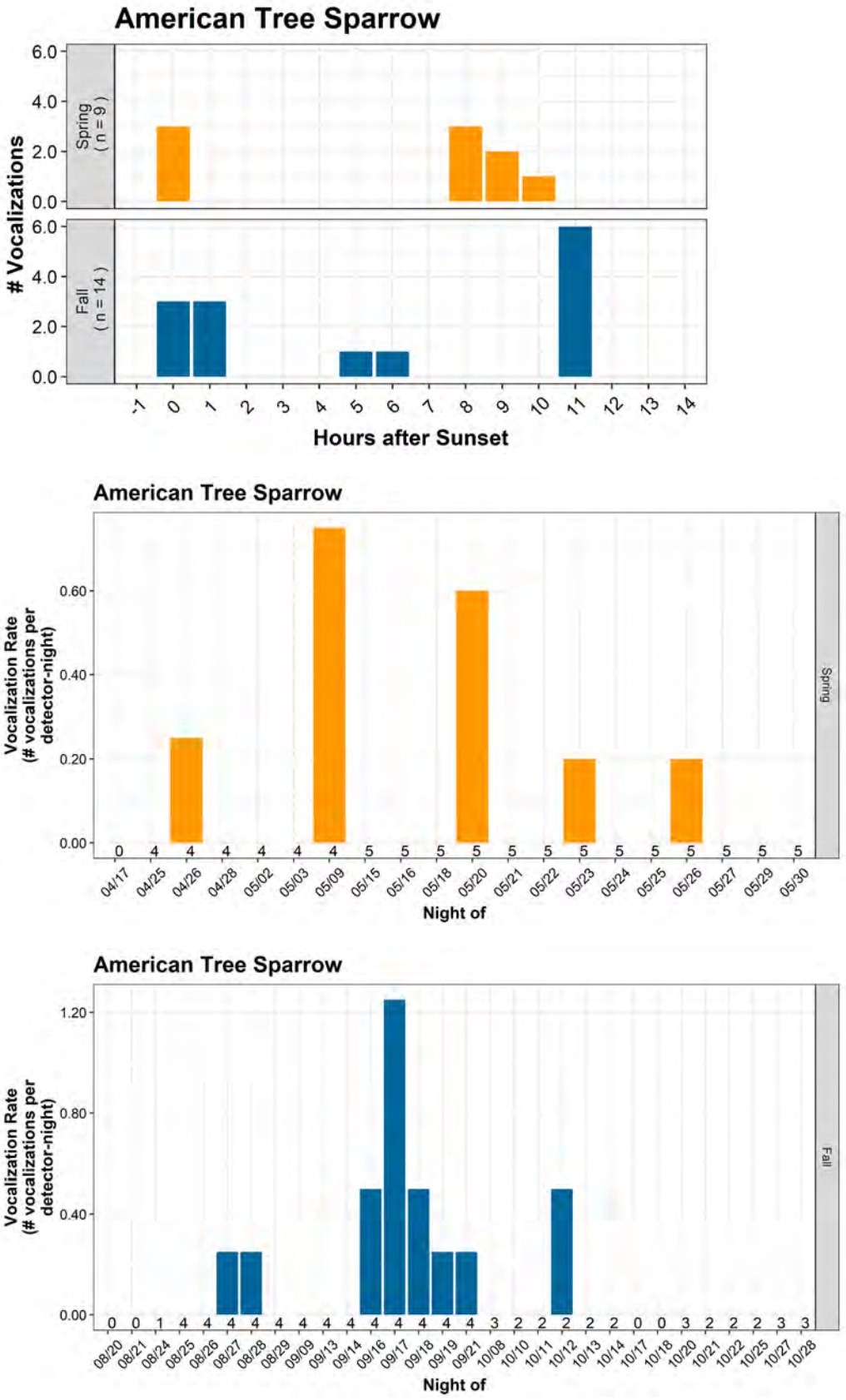
Appendix B Figure 5. American Kestrel – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



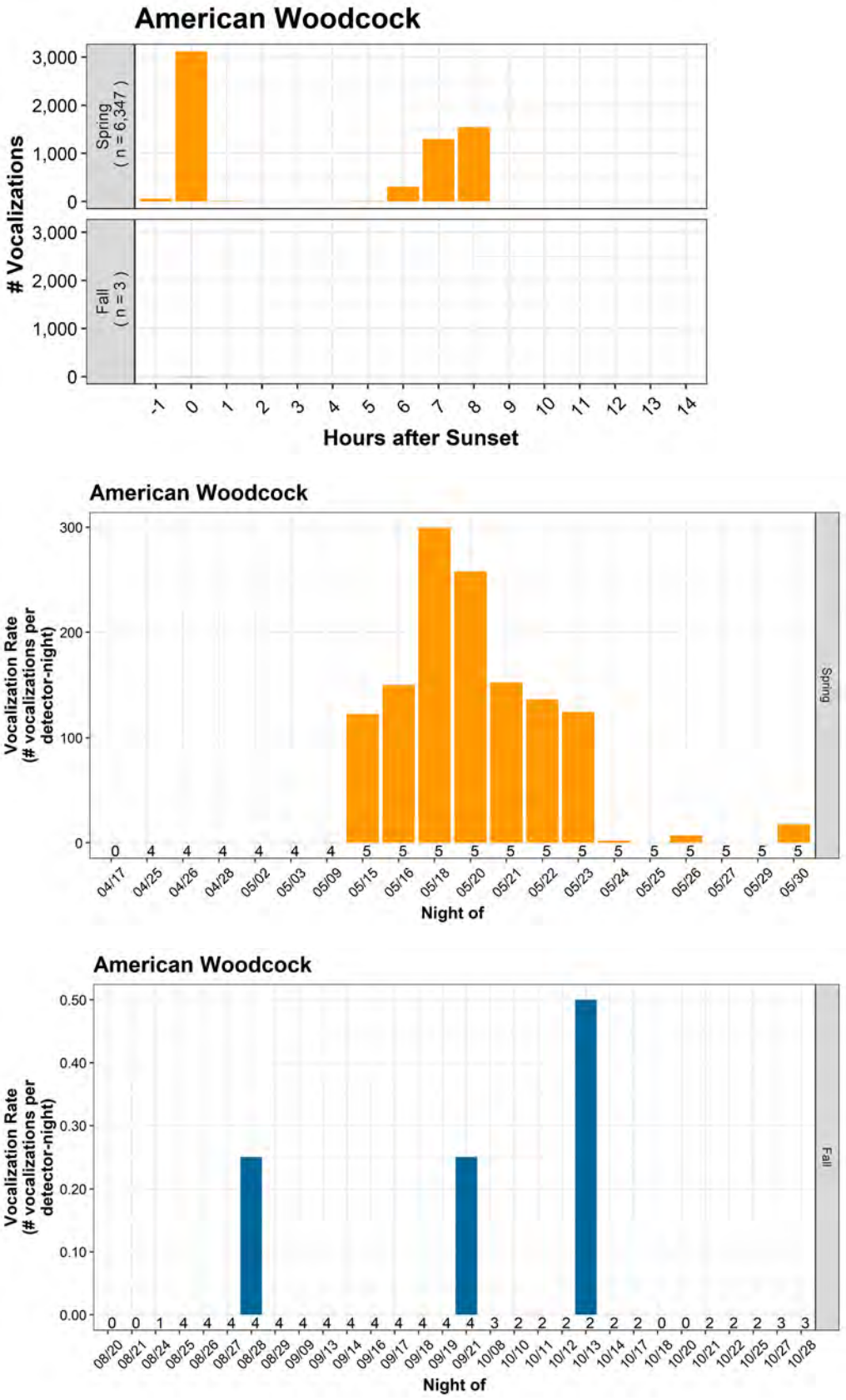
Appendix B Figure 6. American Redstart – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



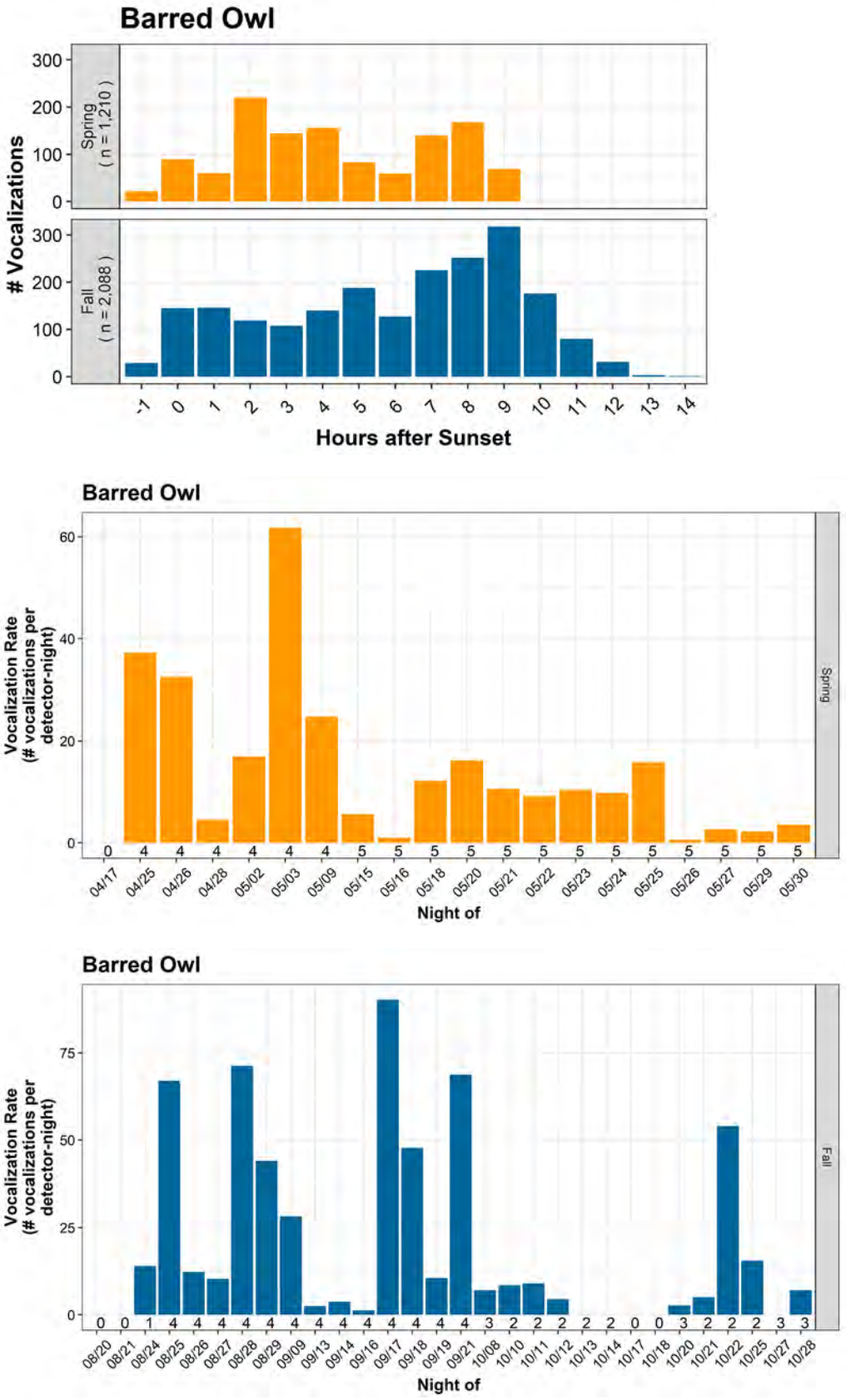
Appendix B Figure 7. American Robin – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



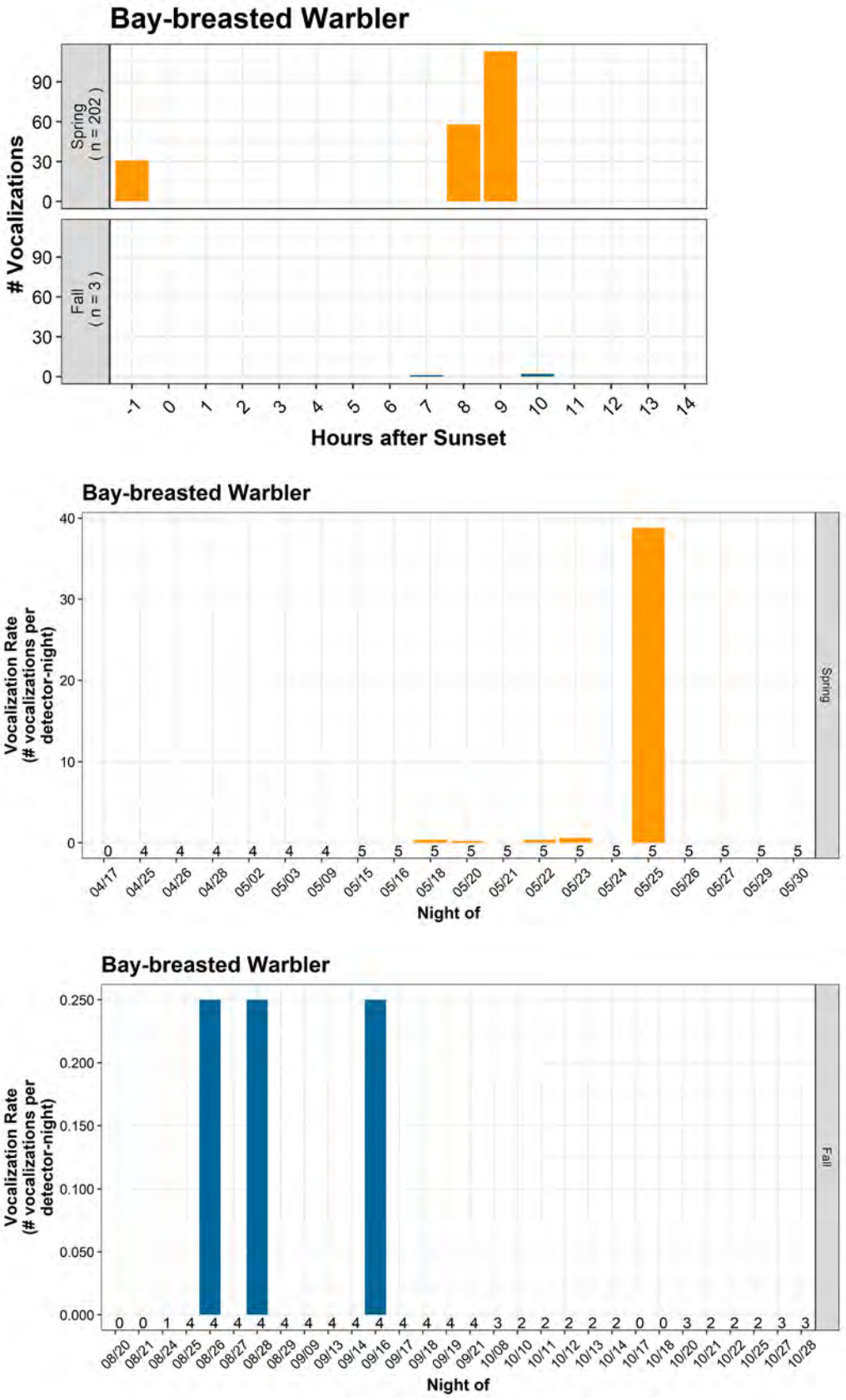
Appendix B Figure 8. American Tree Sparrow – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



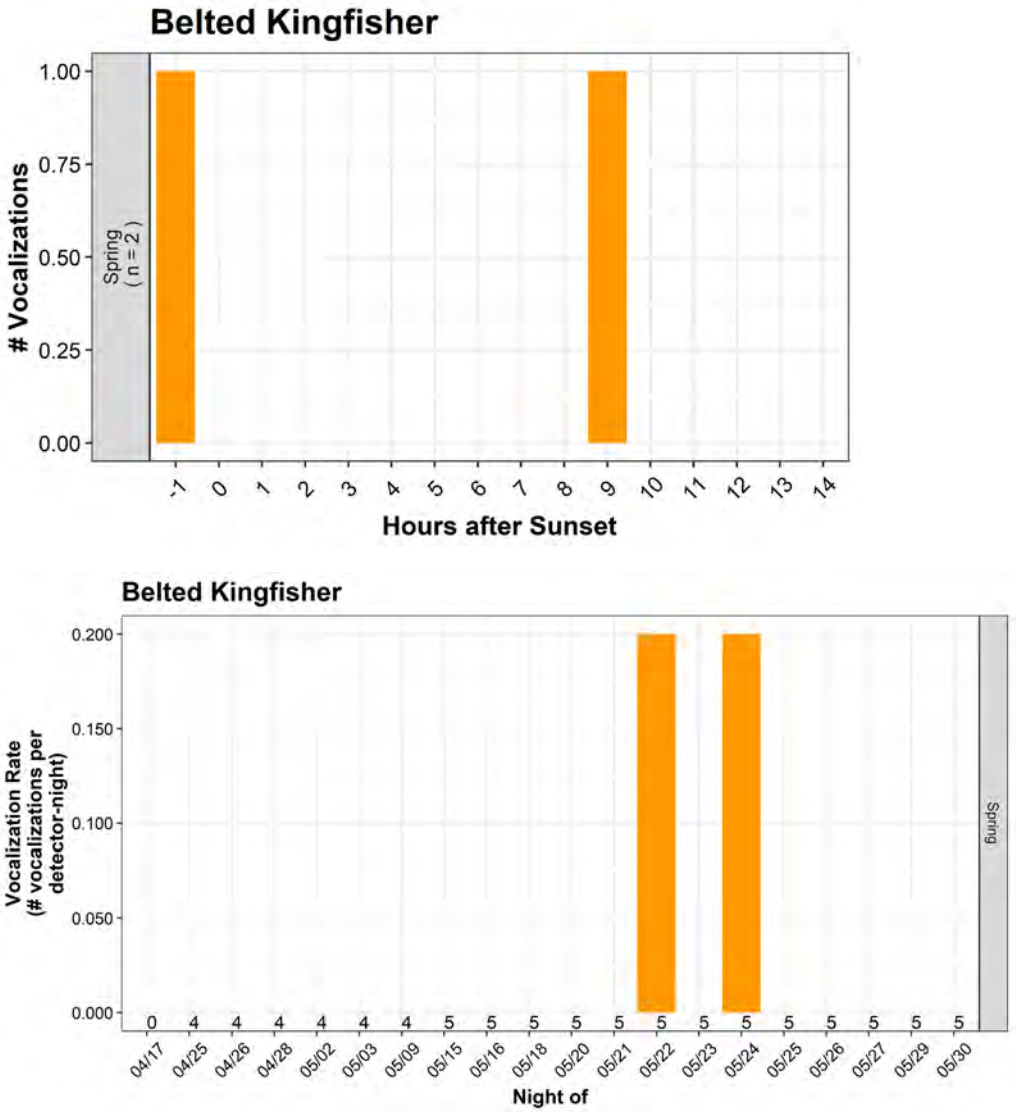
Appendix B Figure 9. American Woodcock – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



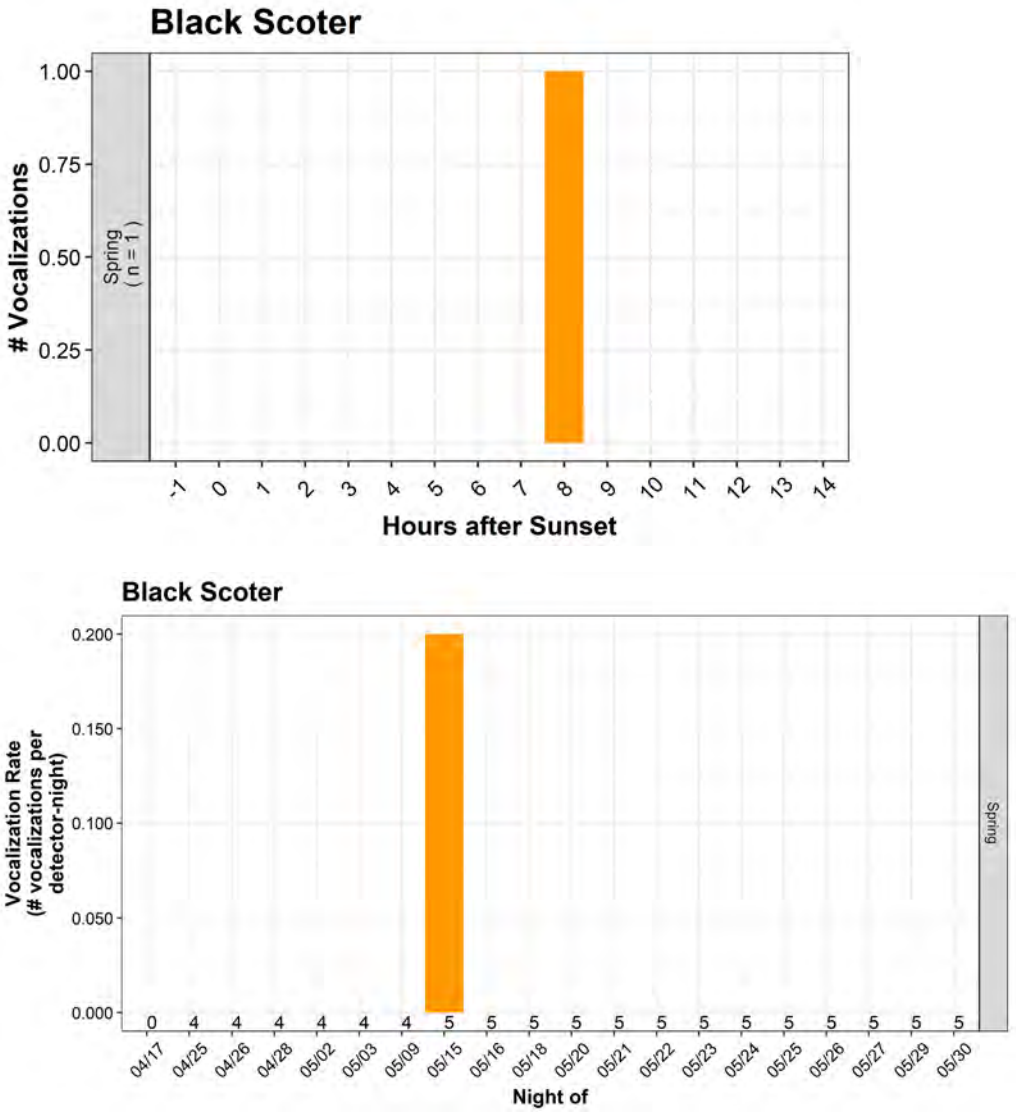
Appendix B Figure 10. Barred Owl – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



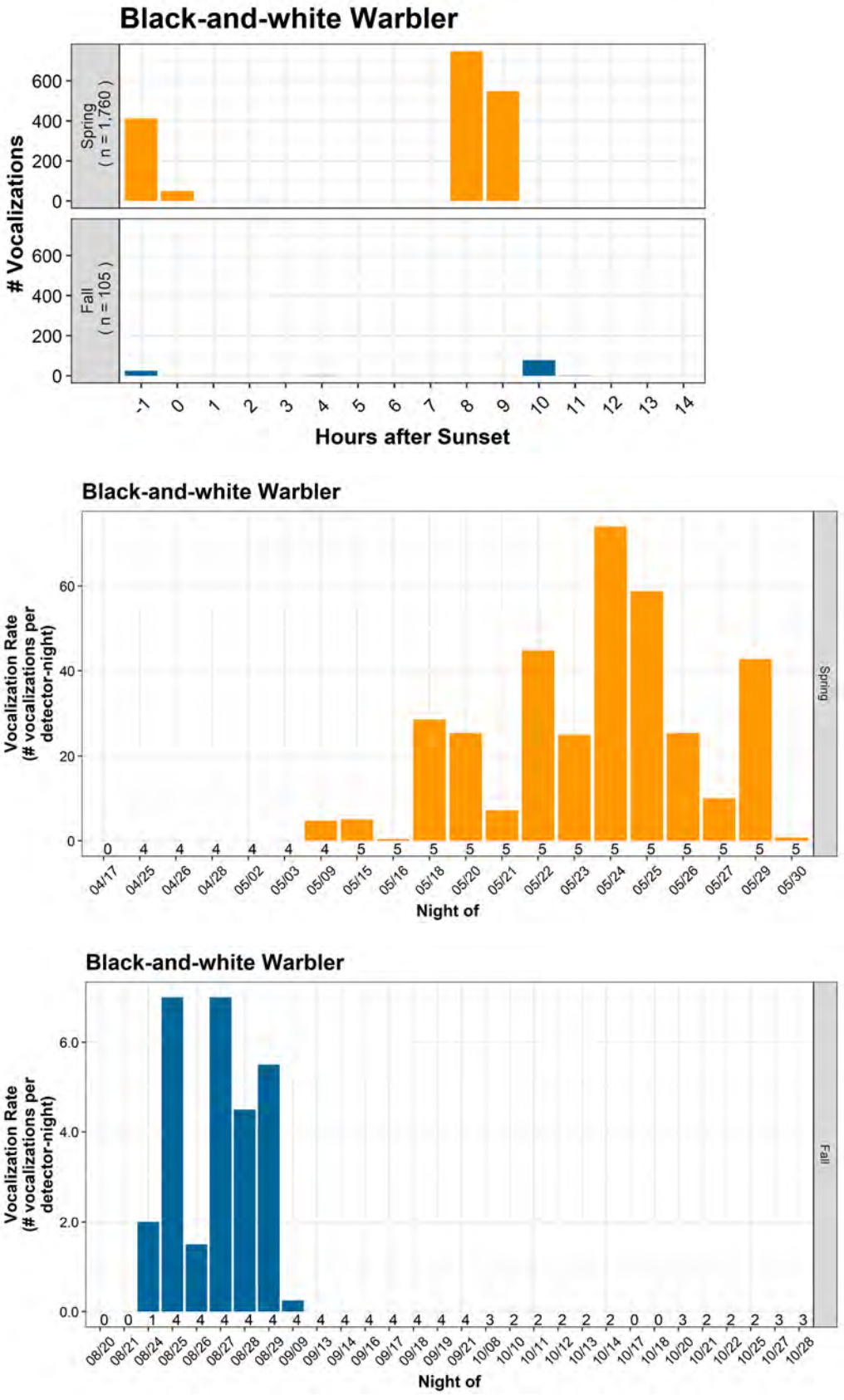
Appendix B Figure 11. Bay-breasted Warbler – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



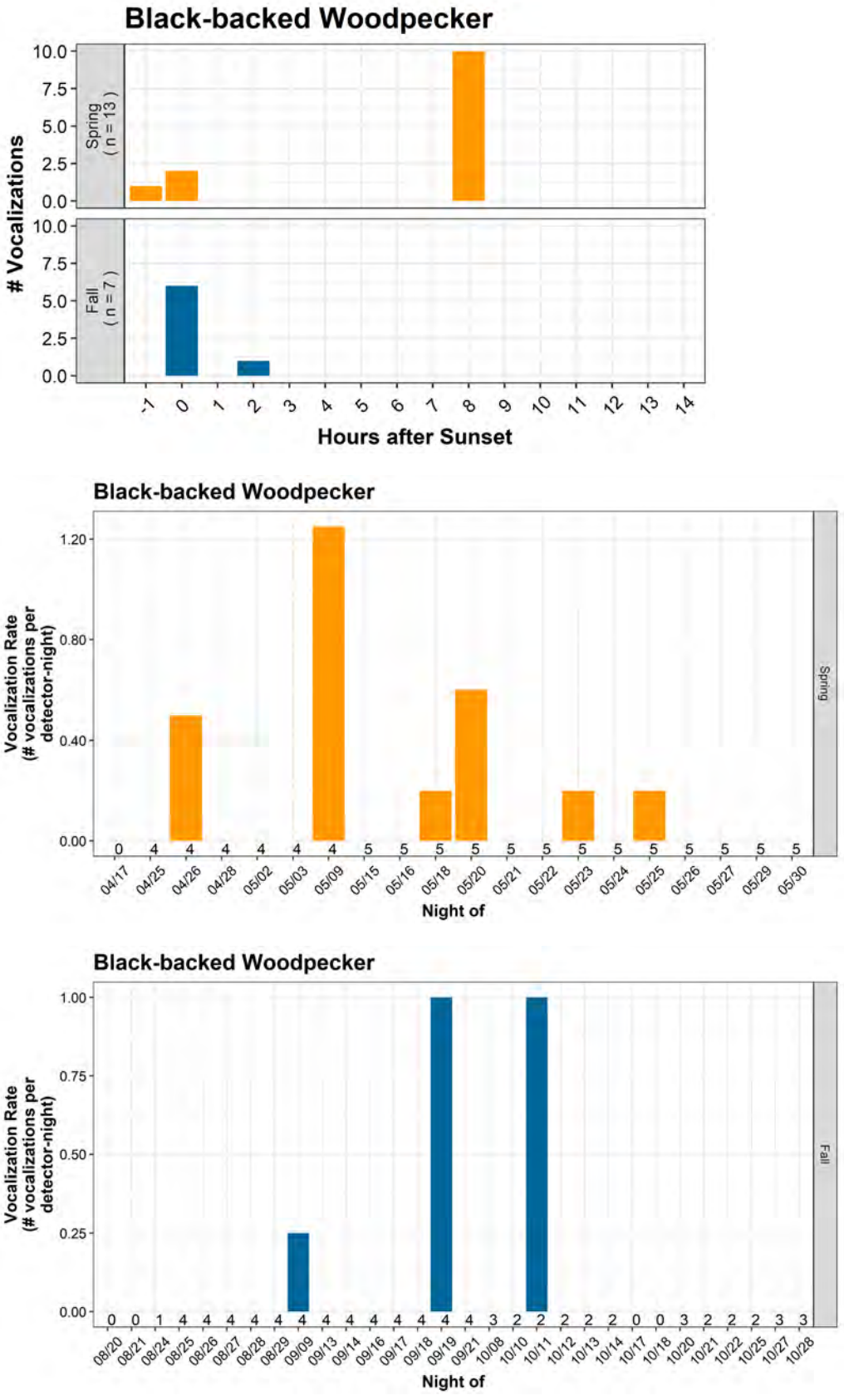
Appendix B Figure 12. Belted Kingfisher – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



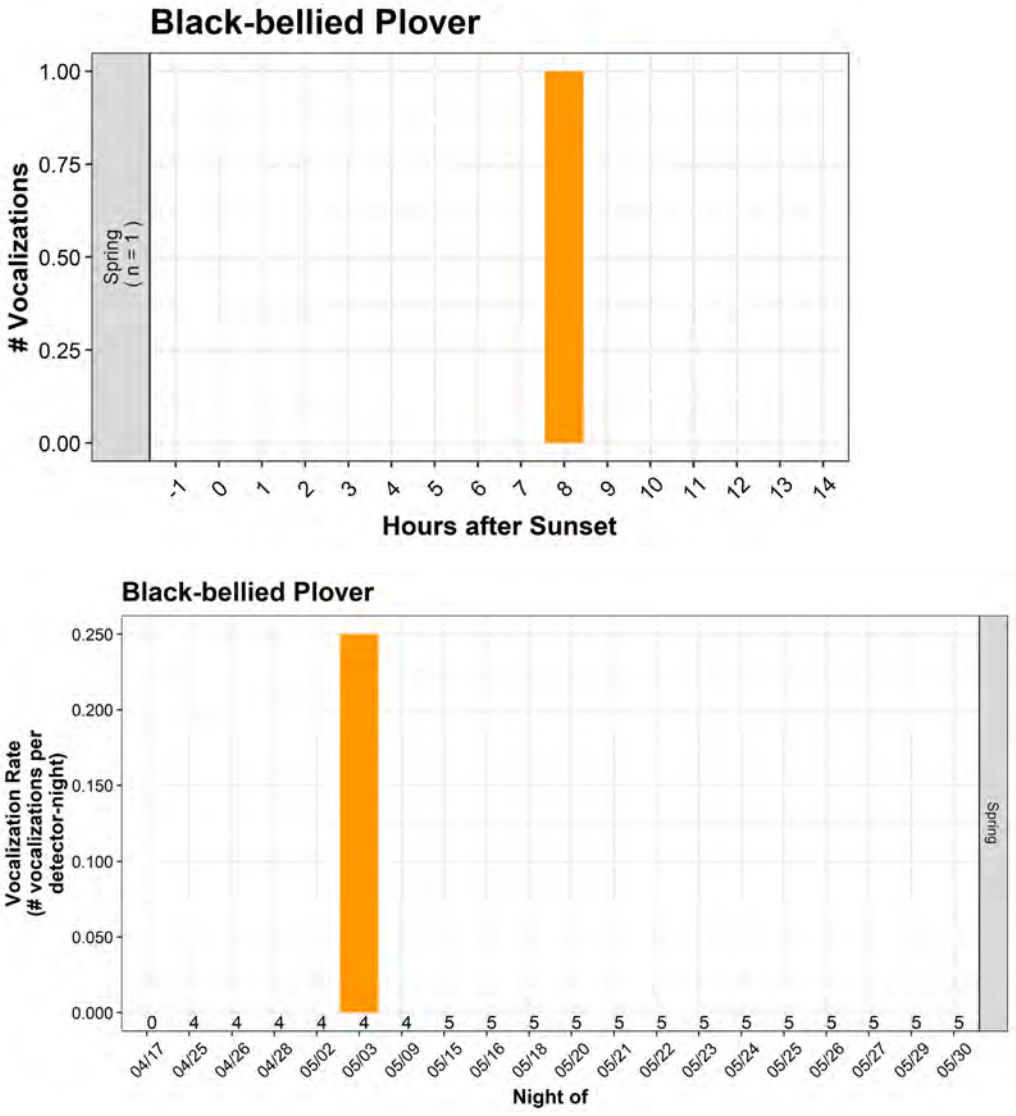
Appendix B Figure 13. Black Scoter – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



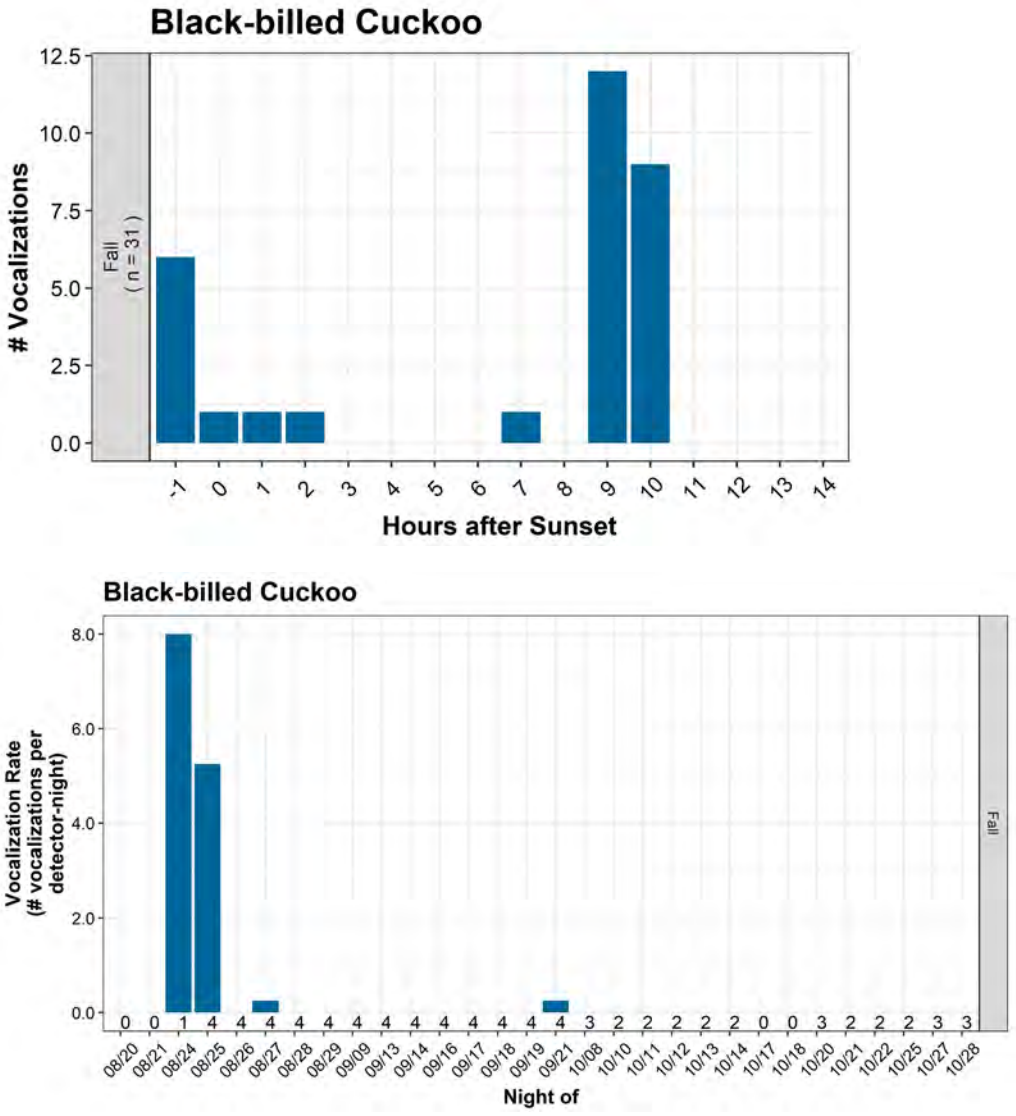
Appendix B Figure 14. Black-and-white Warbler – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



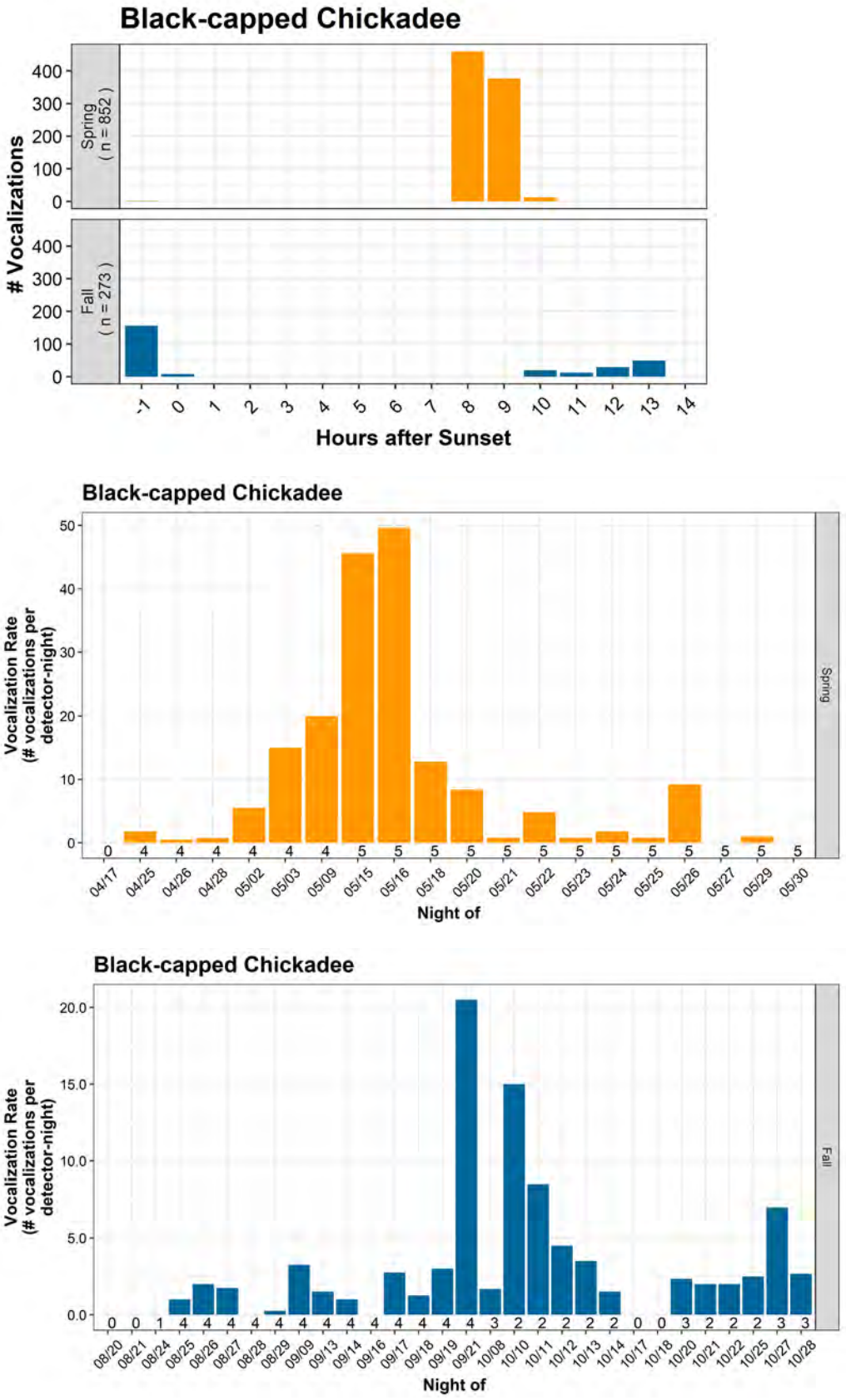
Appendix B Figure 15. Black-backed Woodpecker – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



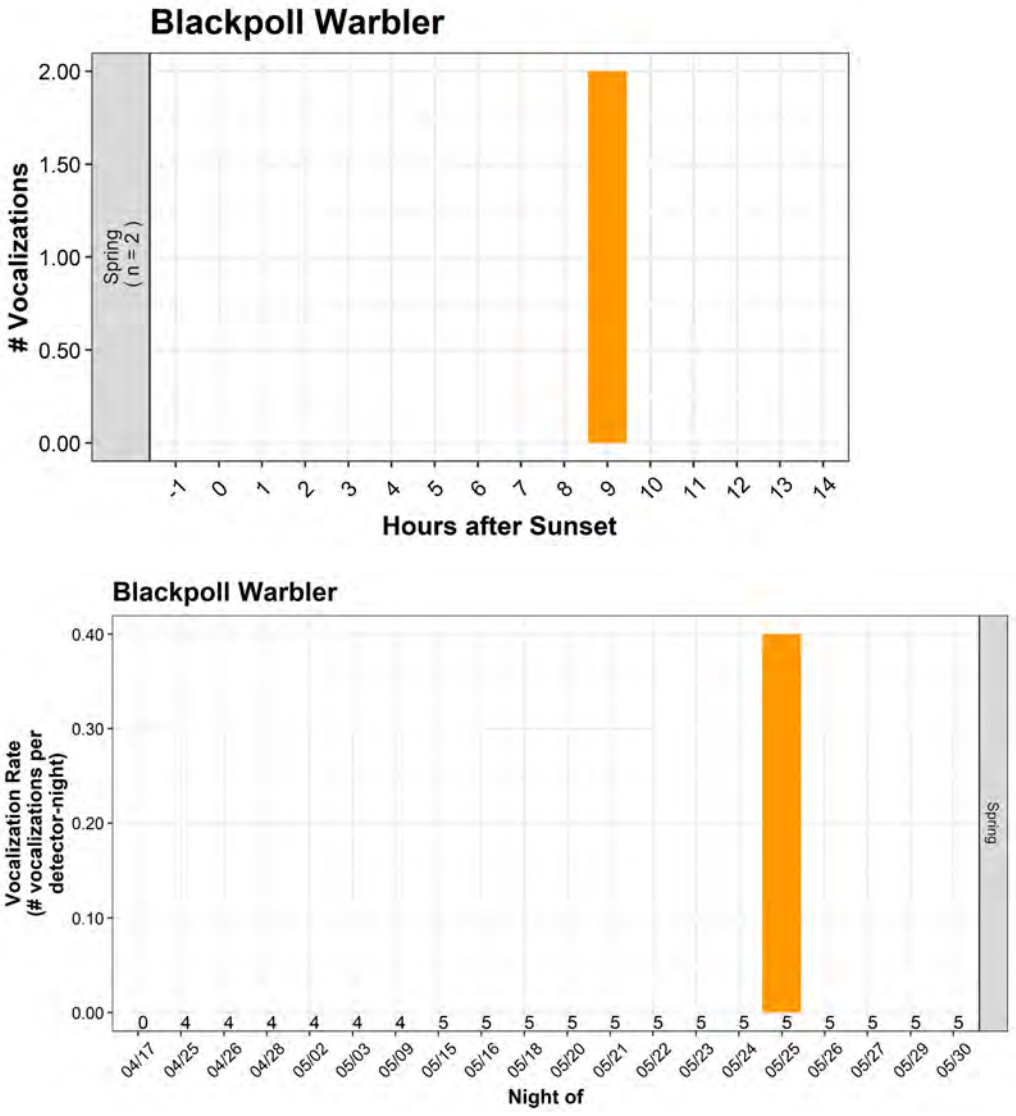
Appendix B Figure 16. Black-bellied Plover – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



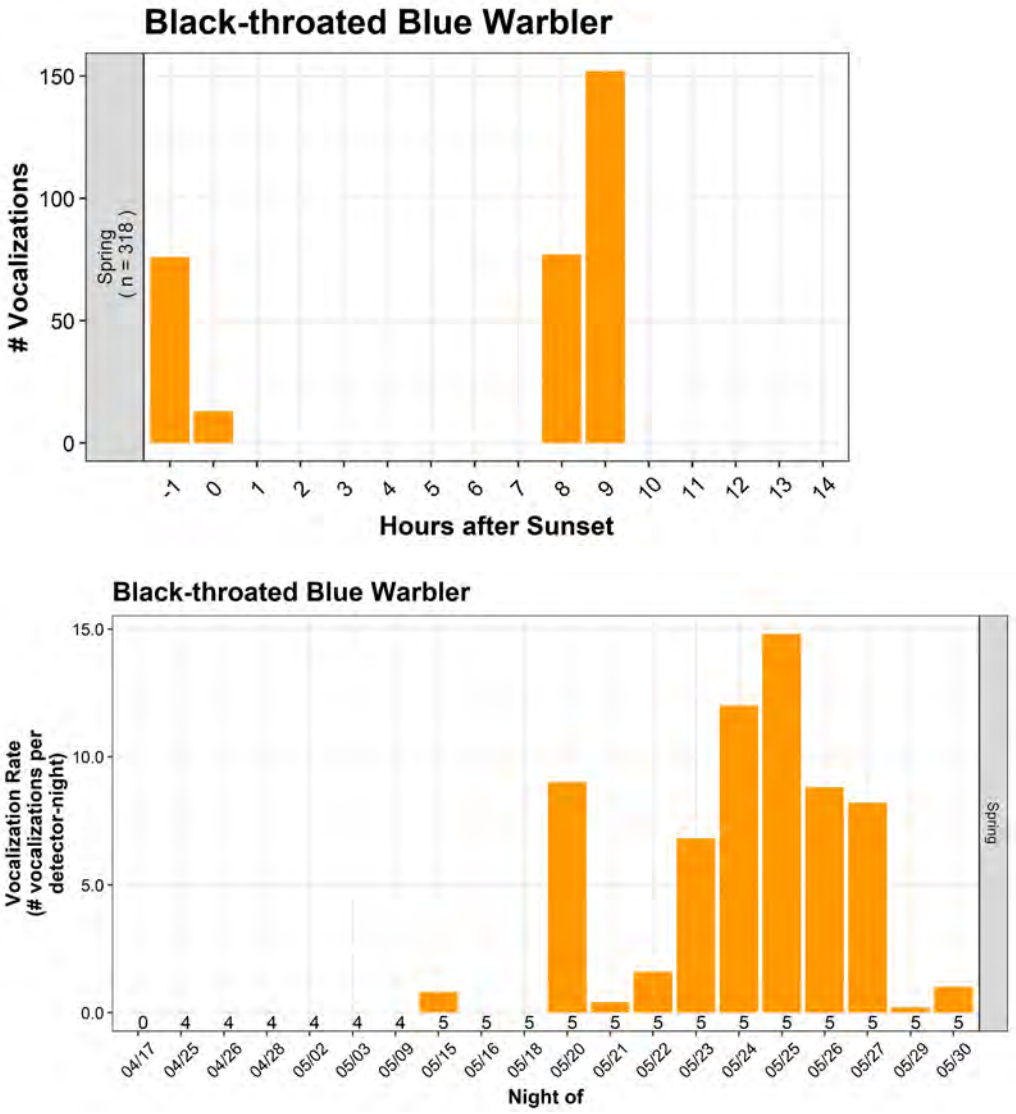
Appendix B Figure 17. Black-billed Cuckoo – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in fall)



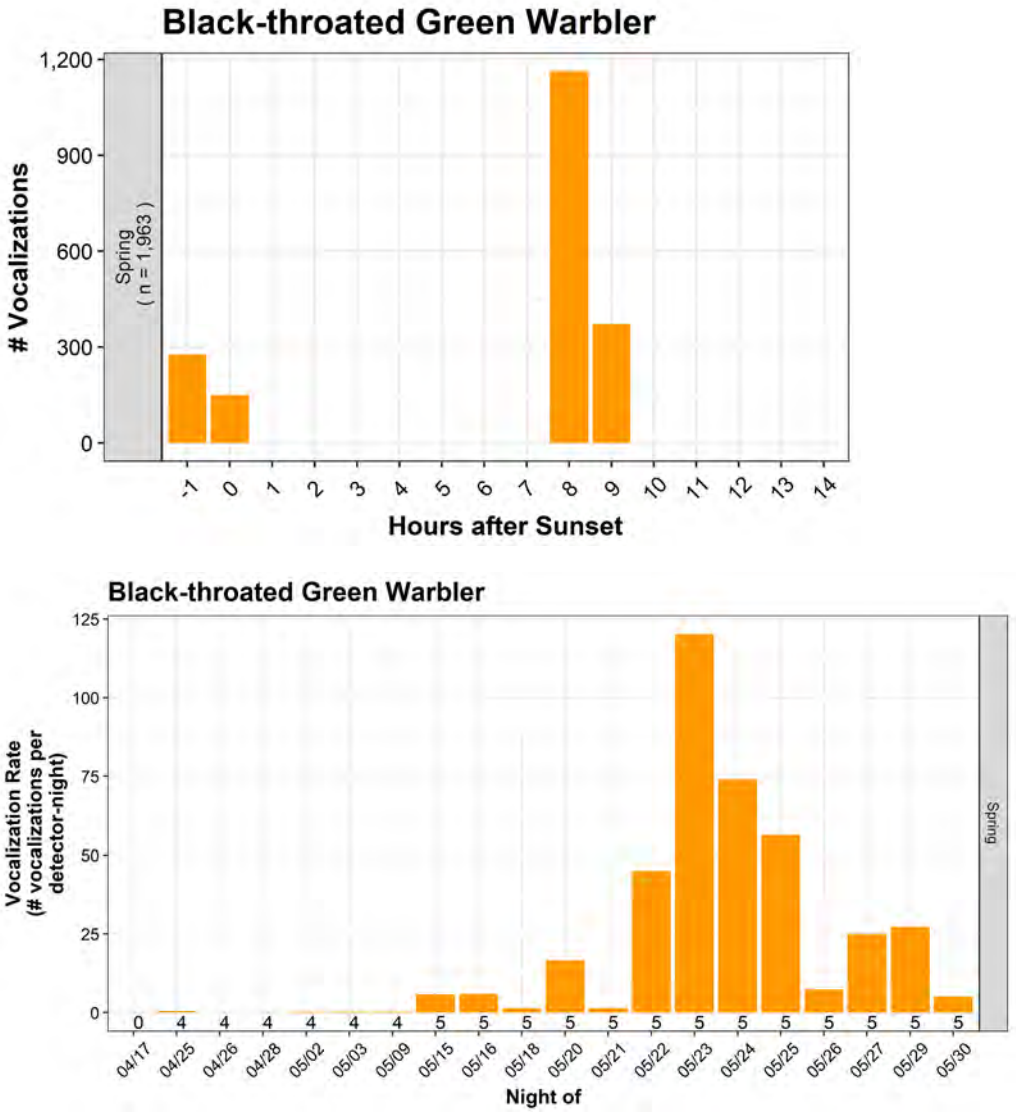
Appendix B Figure 18. Black-capped Chickadee – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



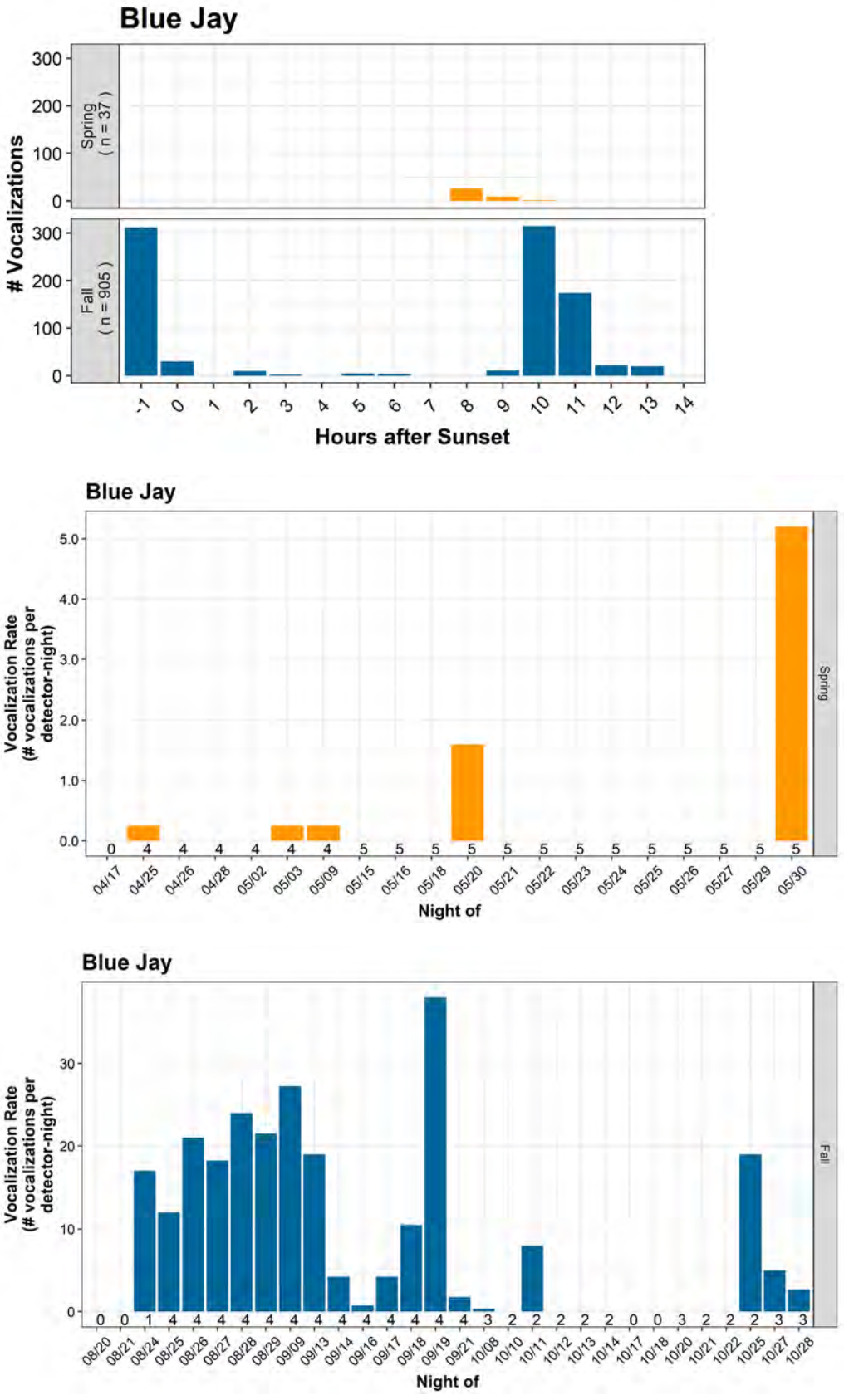
Appendix B Figure 19. Blackpoll Warbler – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



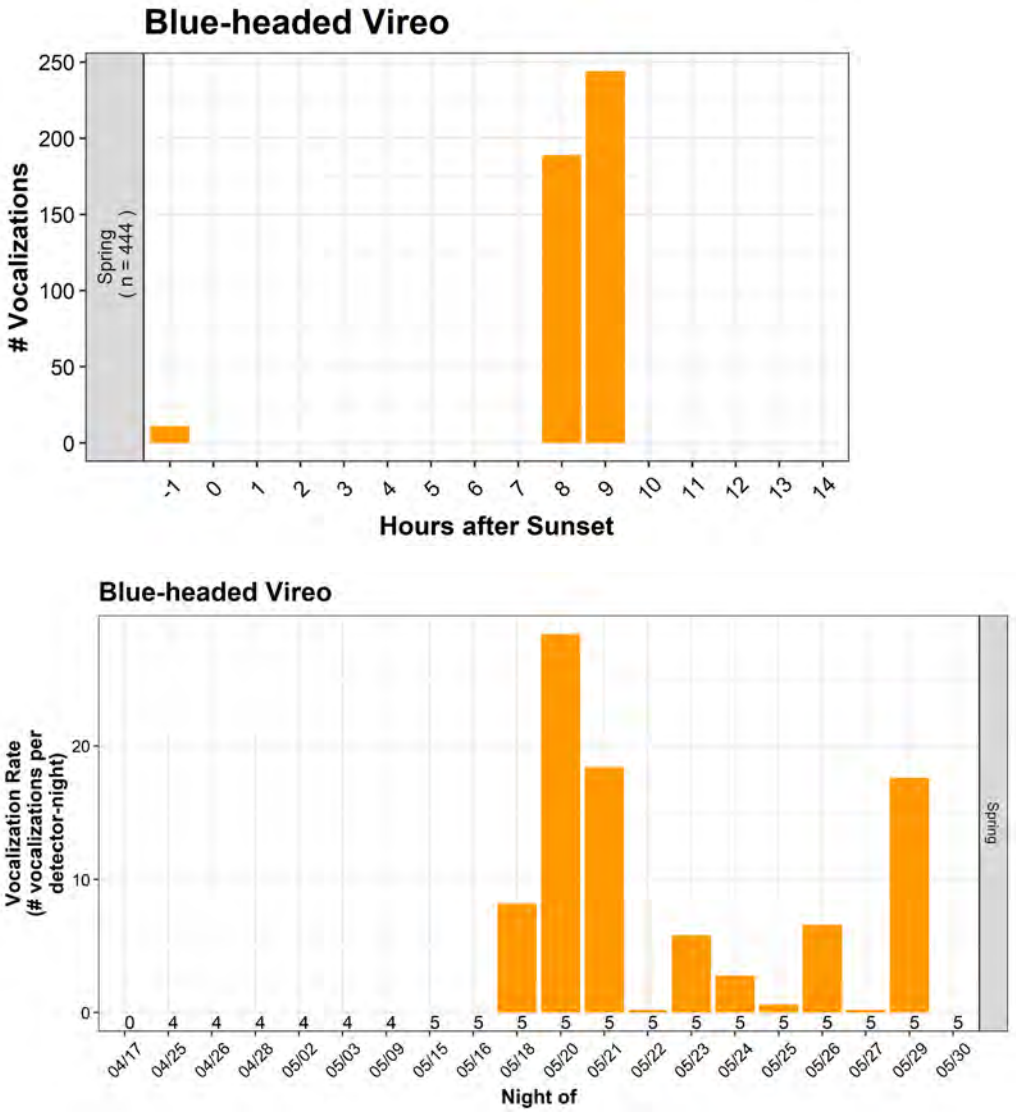
Appendix B Figure 20. Black-throated Blue Warbler – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



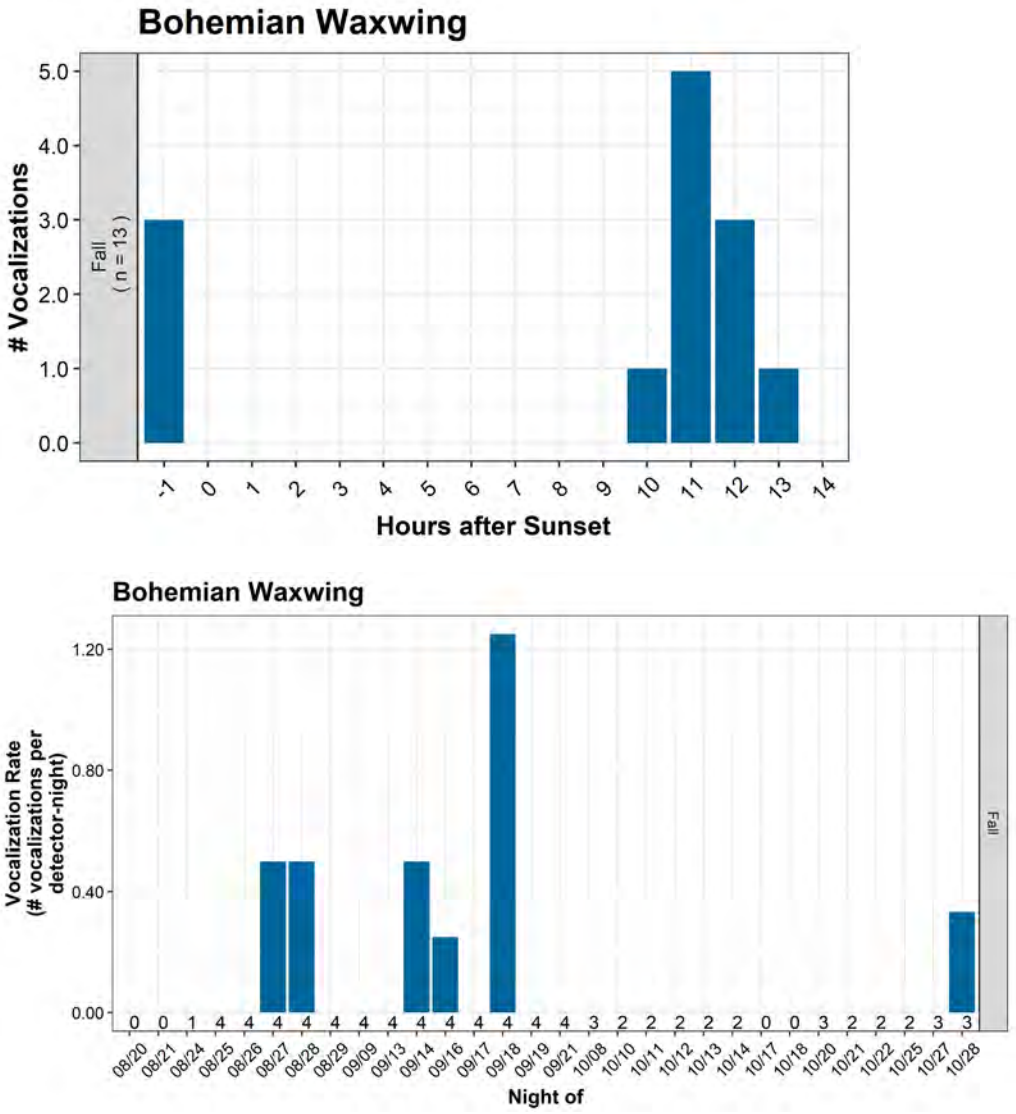
Appendix B Figure 21. Black-throated Green Warbler – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



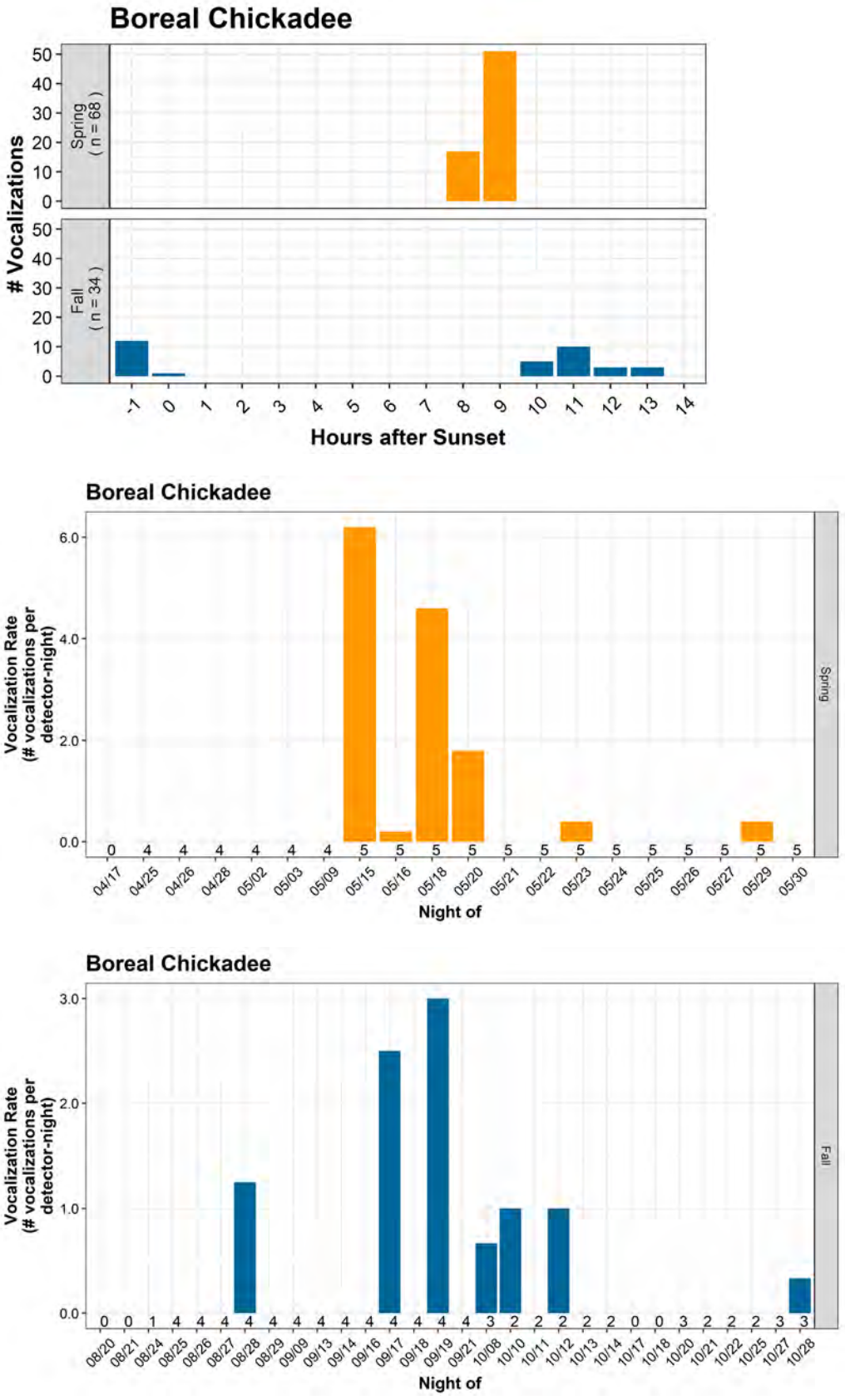
Appendix B Figure 22. Blue Jay – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



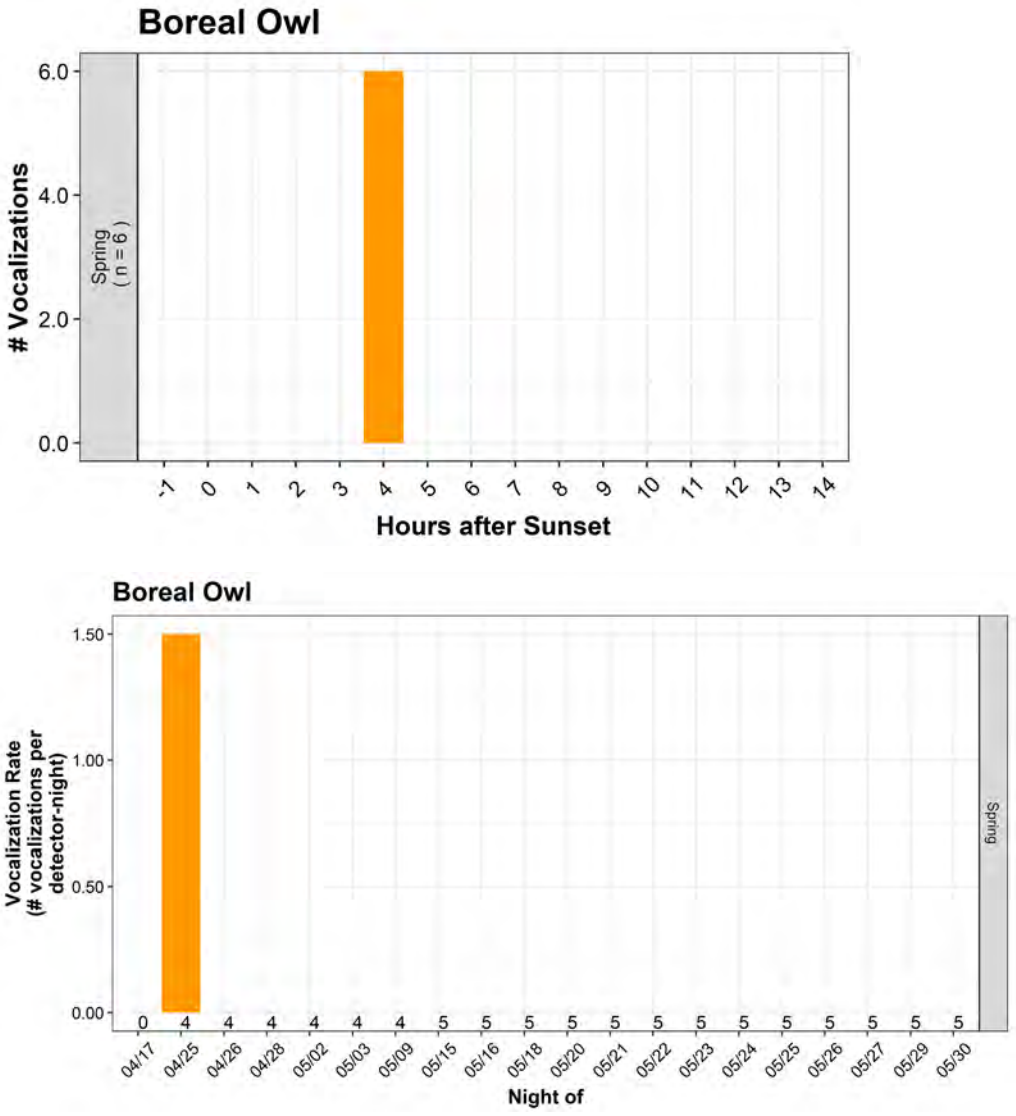
Appendix B Figure 23. Blue-headed Vireo – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



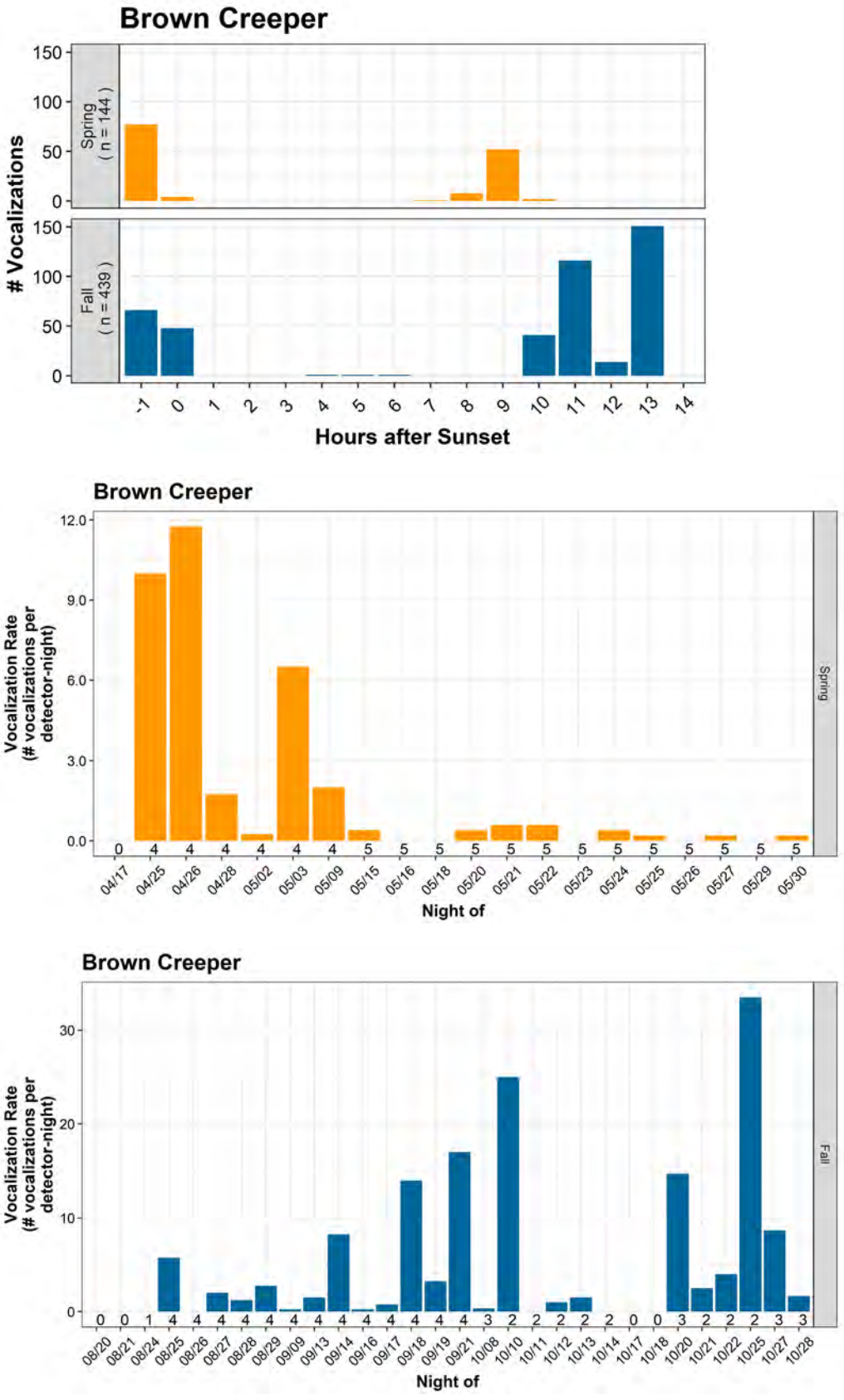
Appendix B Figure 24. Bohemian Waxwing – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in fall)



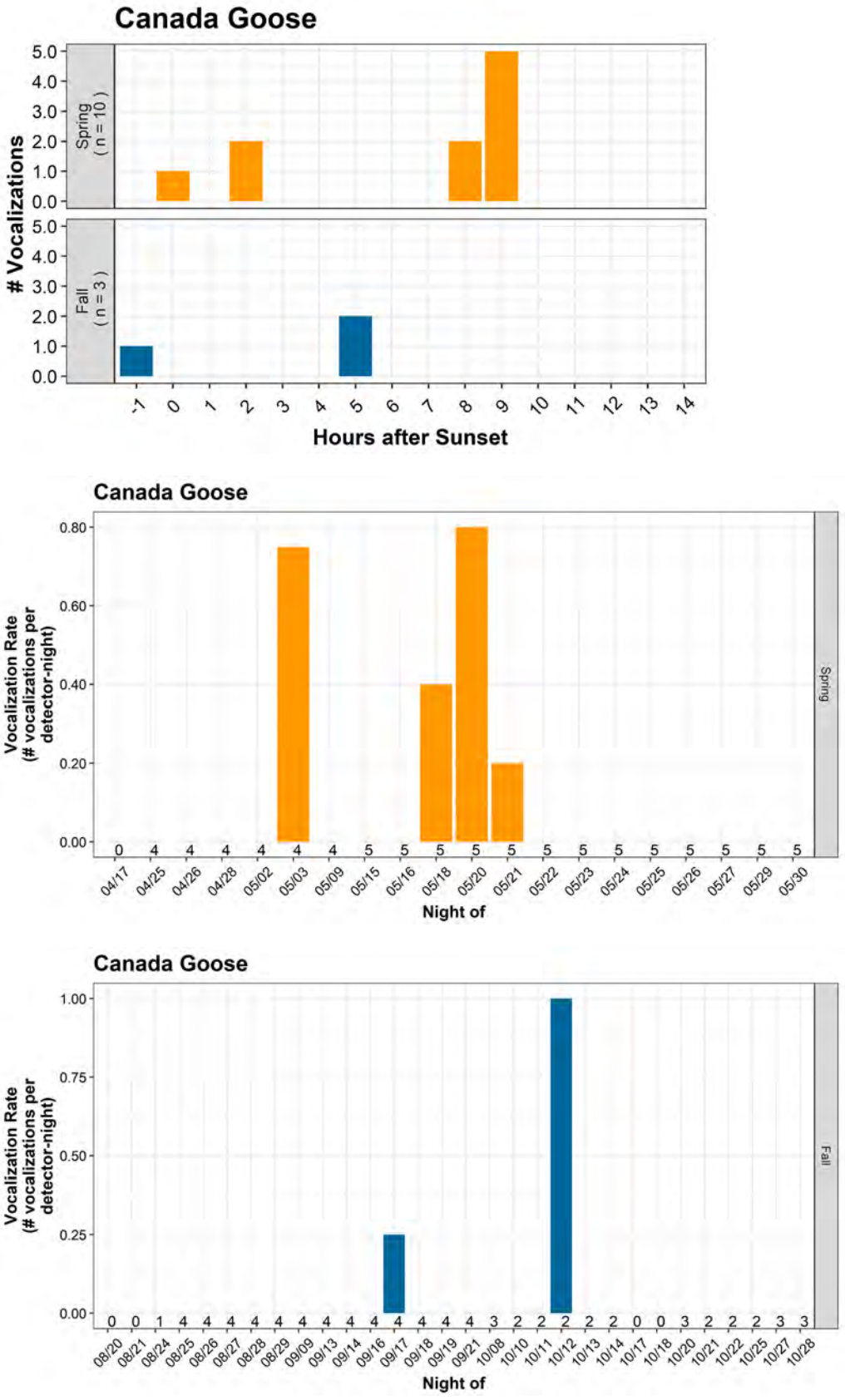
Appendix B Figure 25. Boreal Chickadee – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



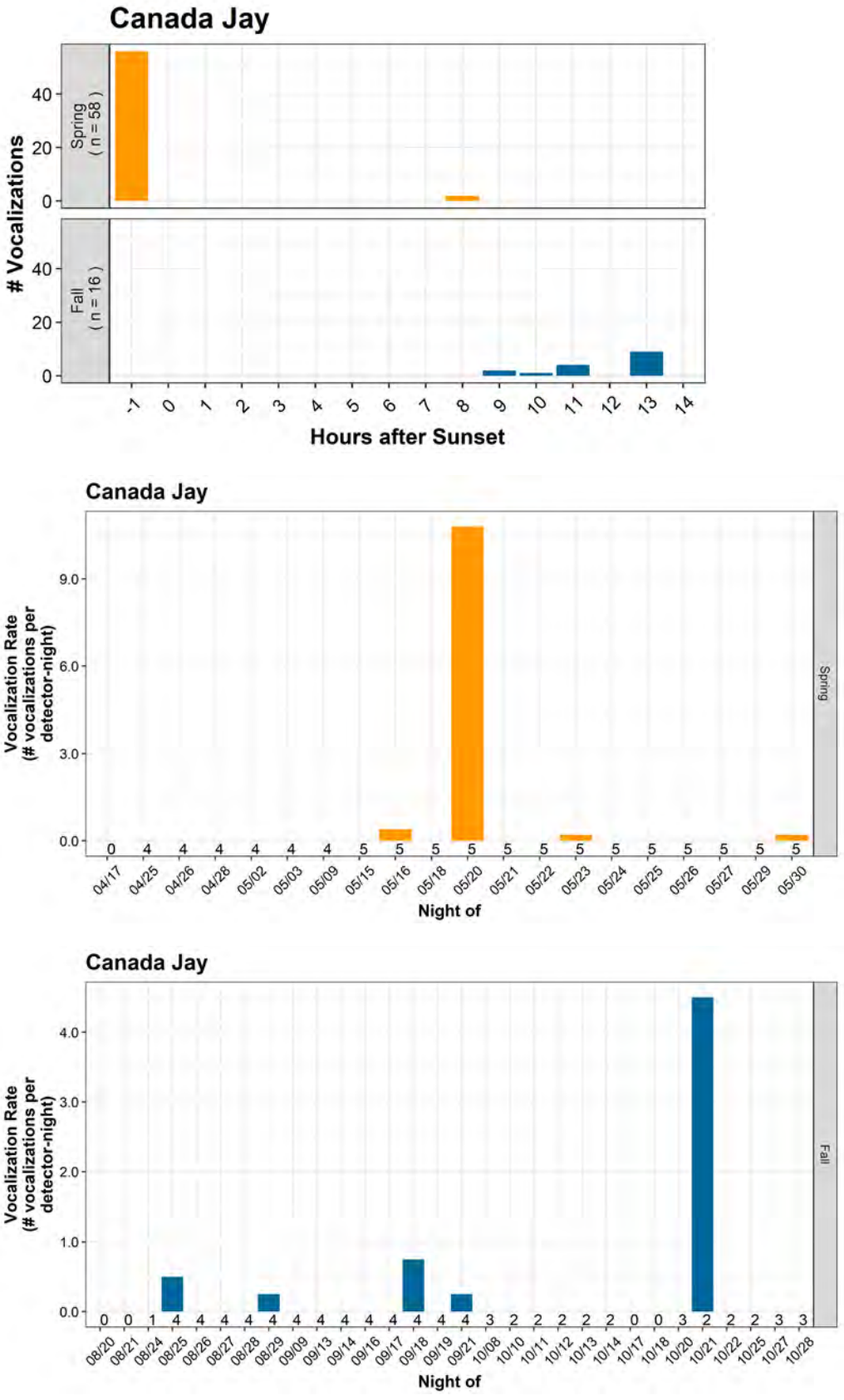
Appendix B Figure 26. Boreal Owl – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



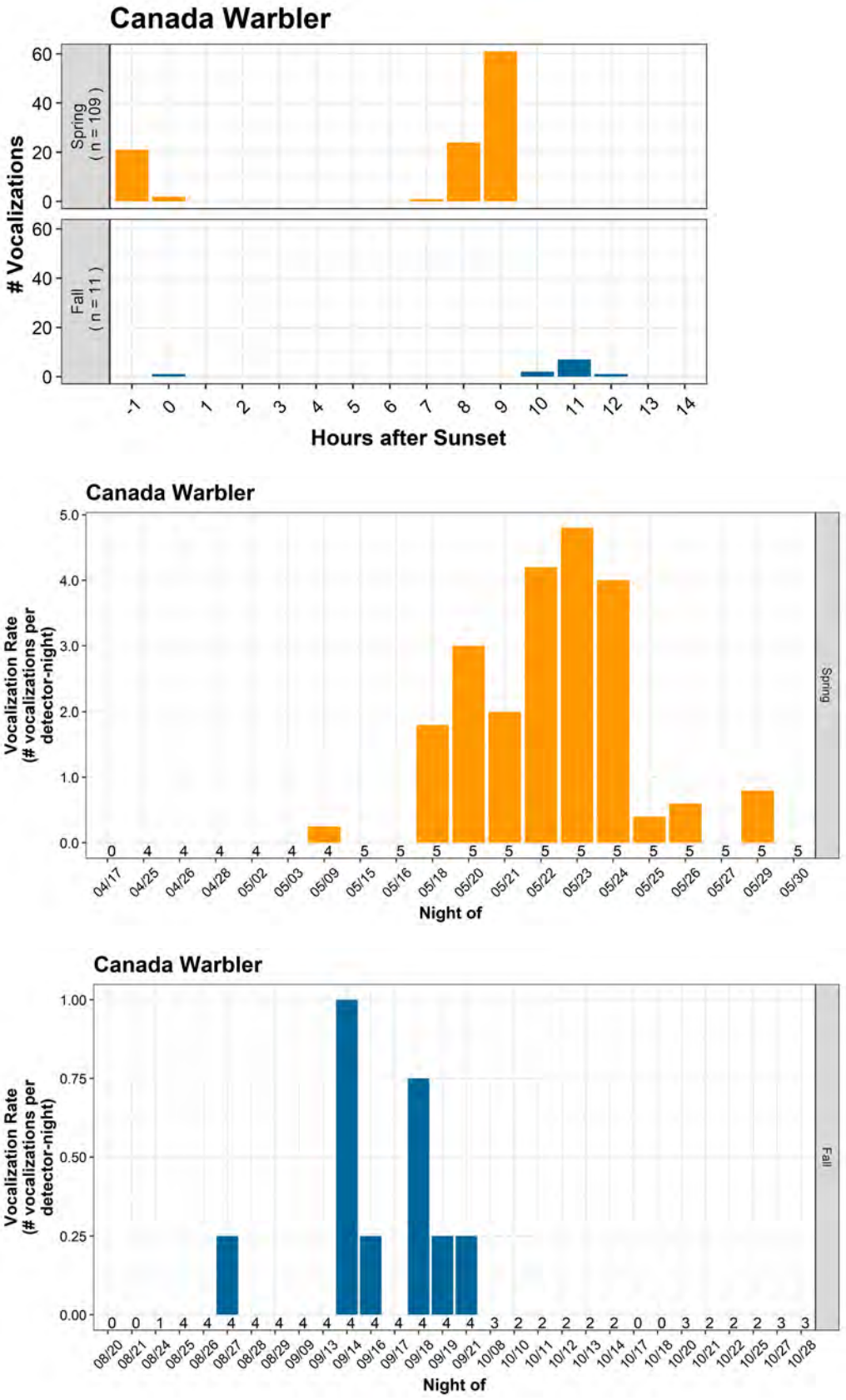
Appendix B Figure 27. Brown Creeper – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



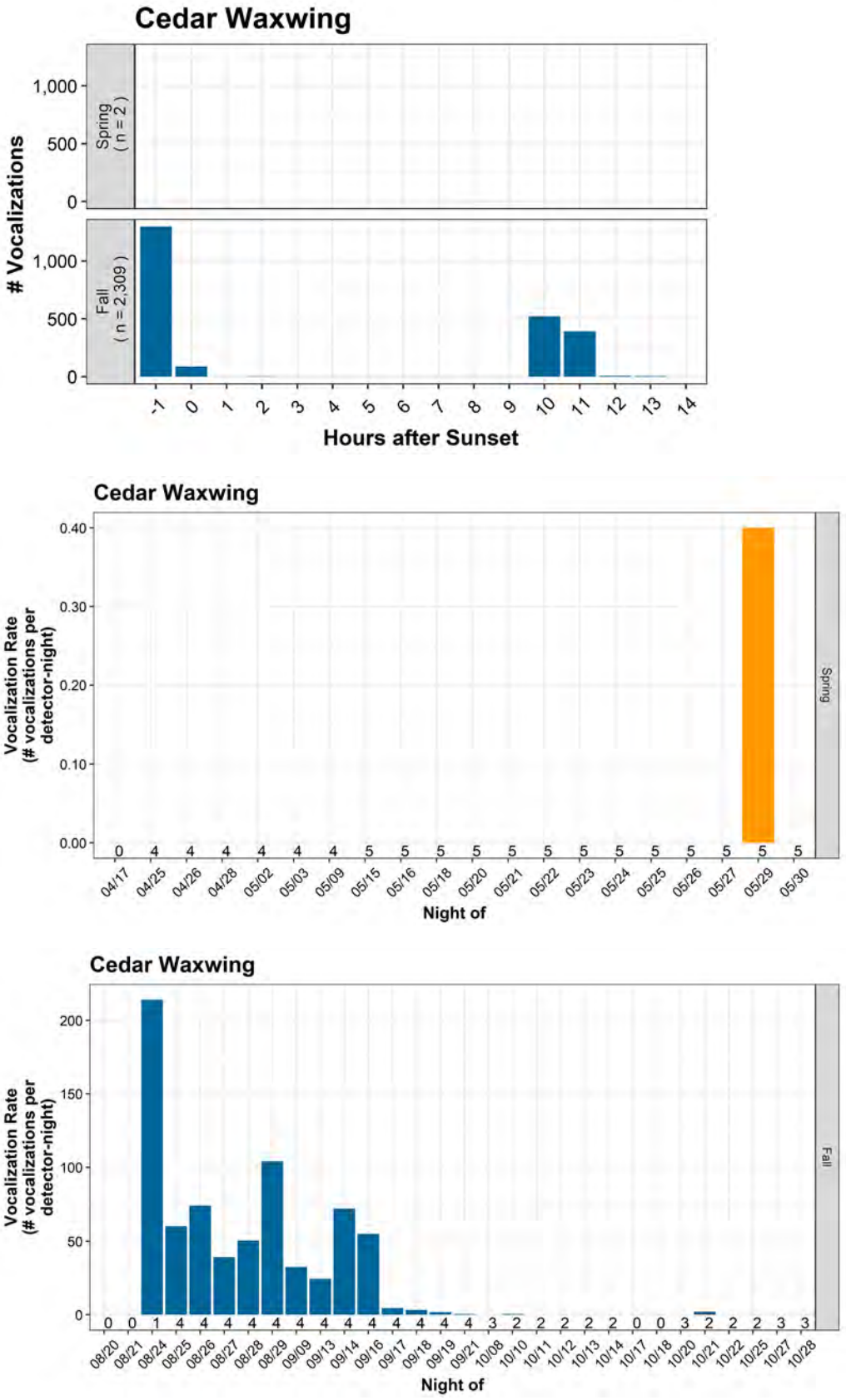
Appendix B Figure 28. Canada Goose – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



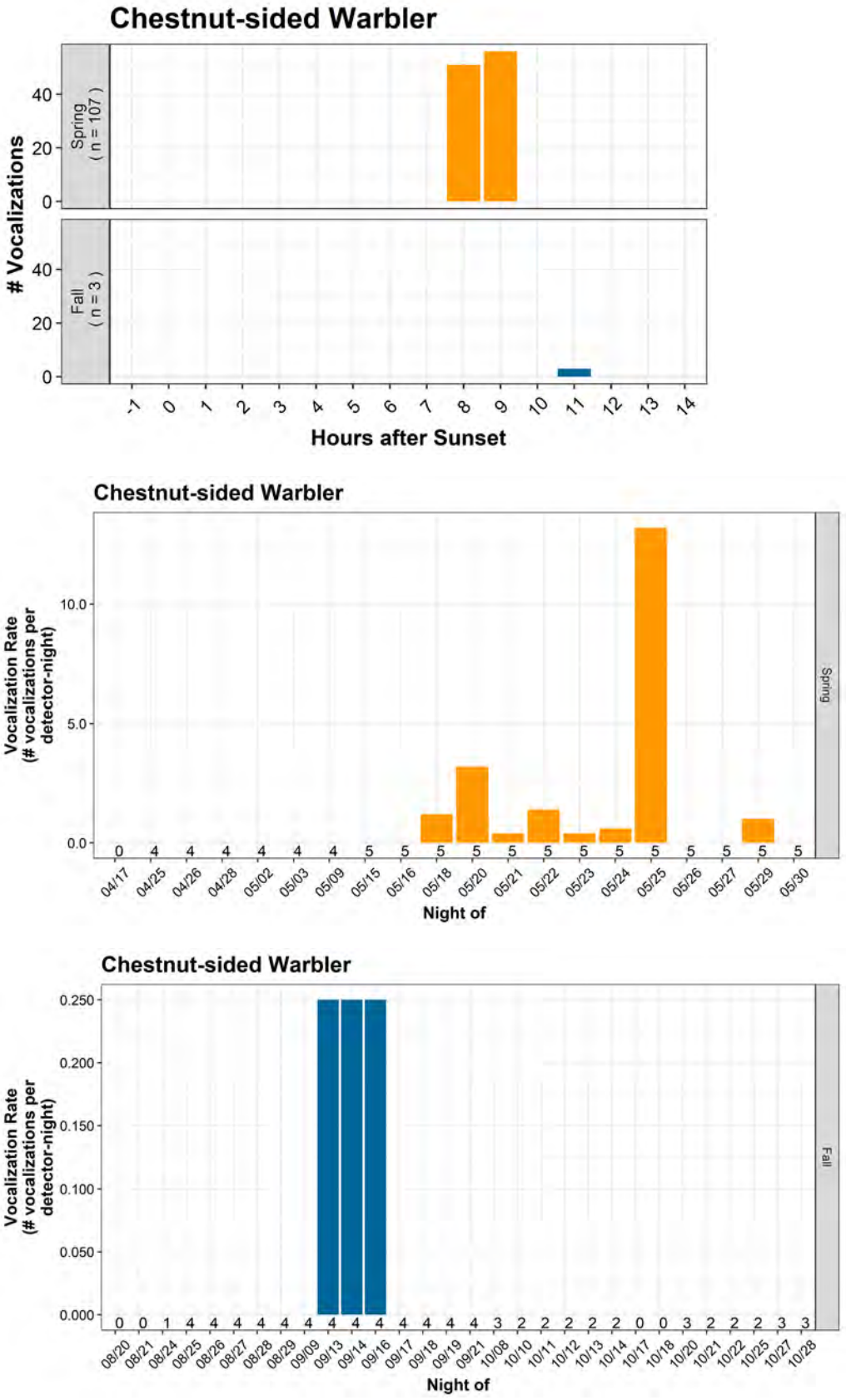
Appendix B Figure 29. Canada Jay – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



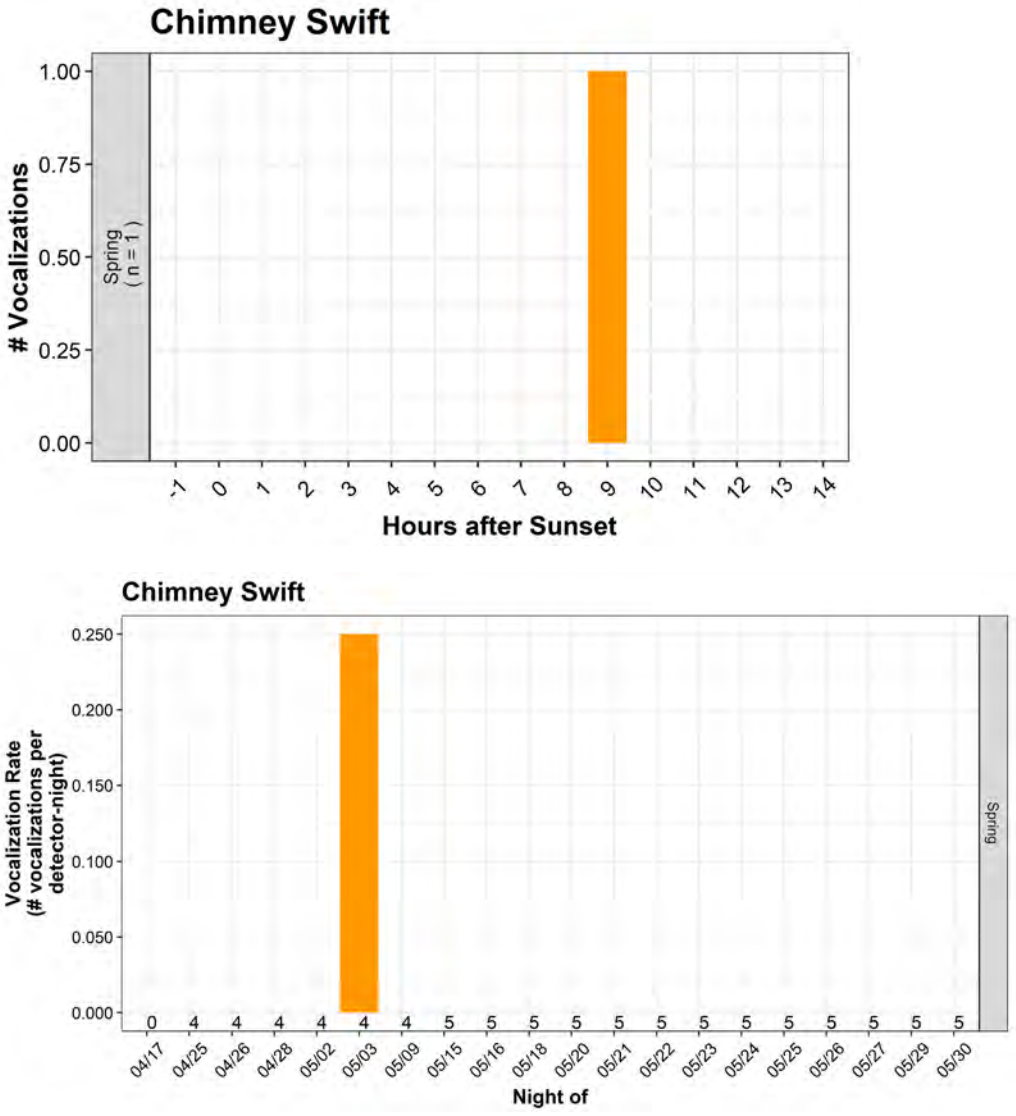
Appendix B Figure 30. Canada Warbler – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



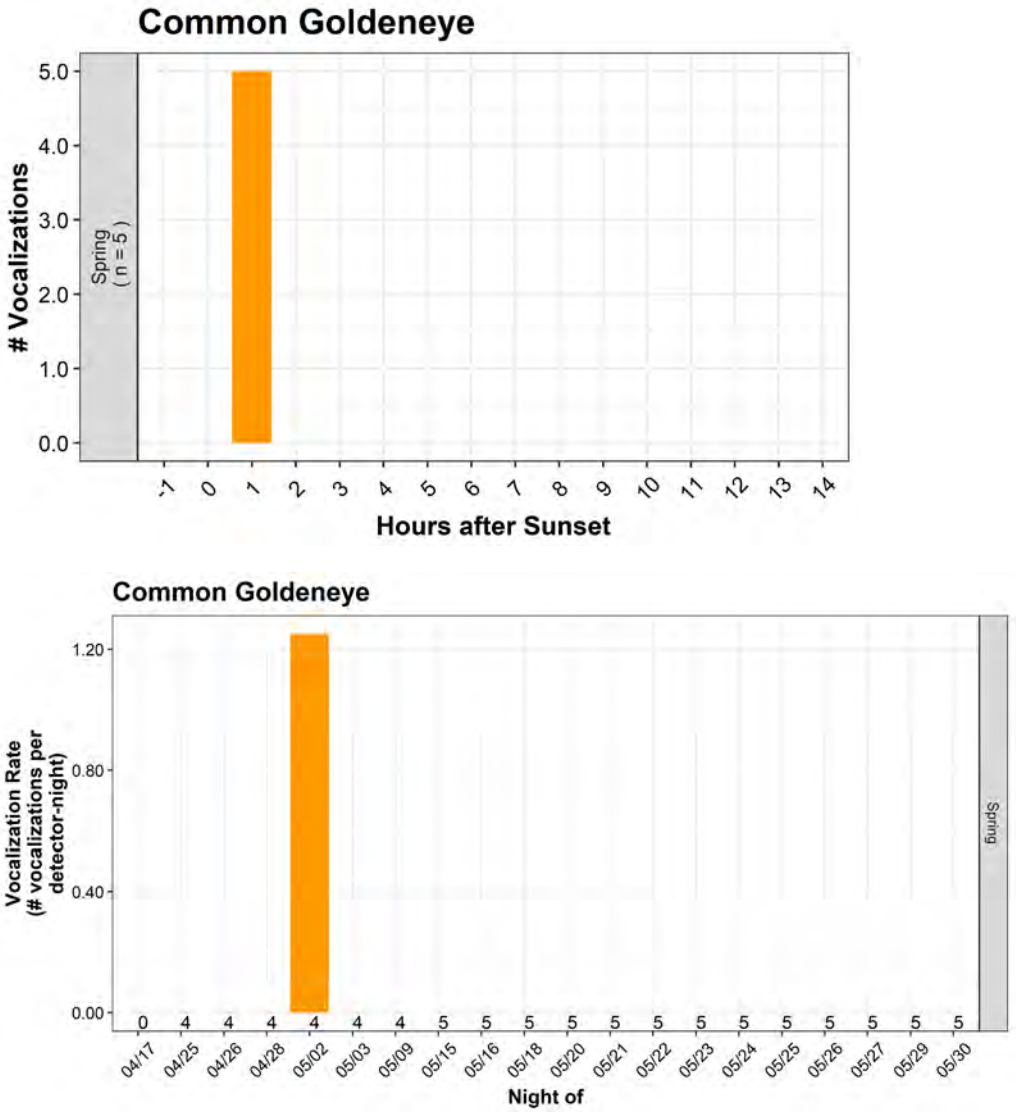
Appendix B Figure 31. Cedar Waxwing – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



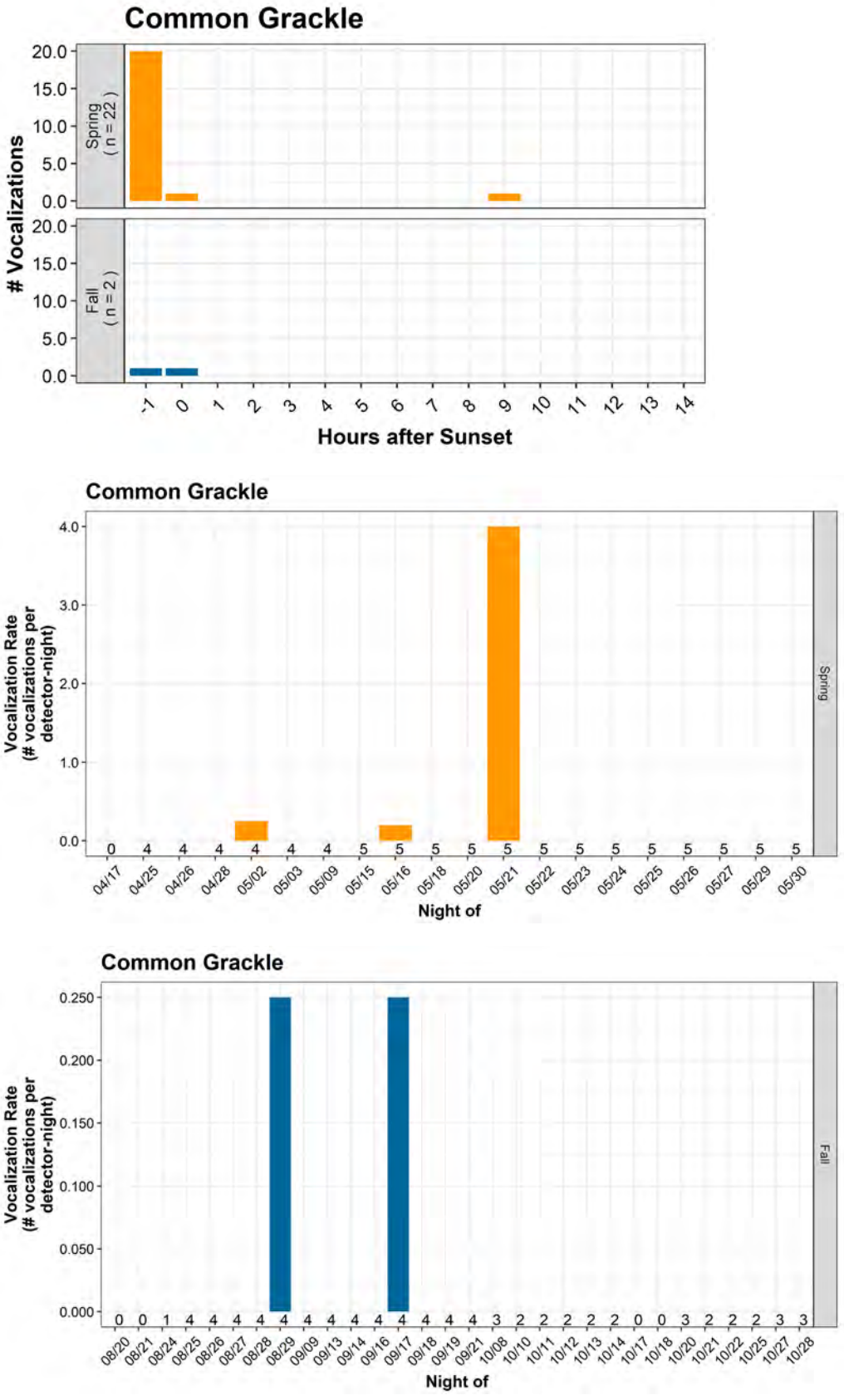
Appendix B Figure 32. Chestnut-sided Warbler – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



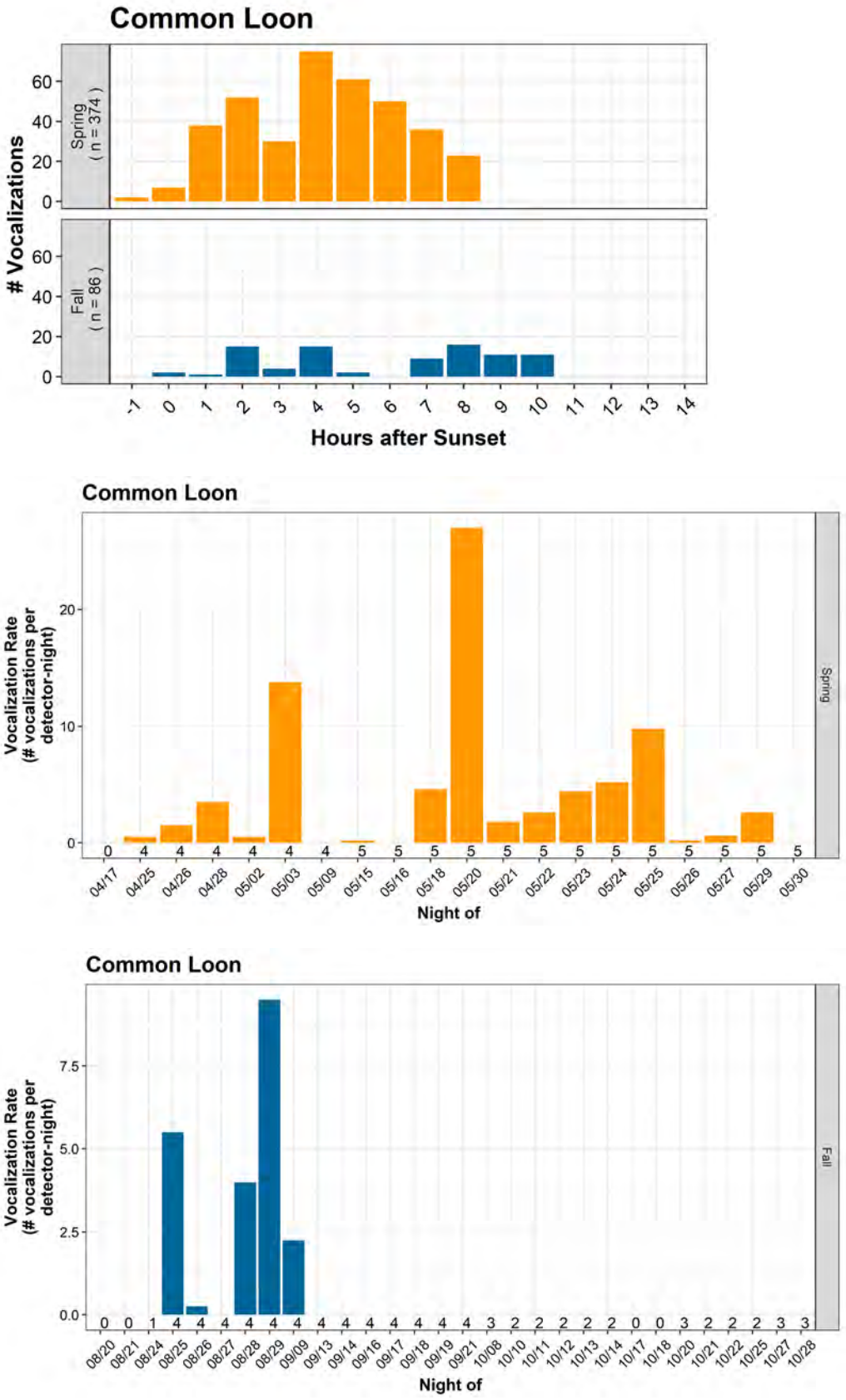
Appendix B Figure 33. Chimney Swift – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



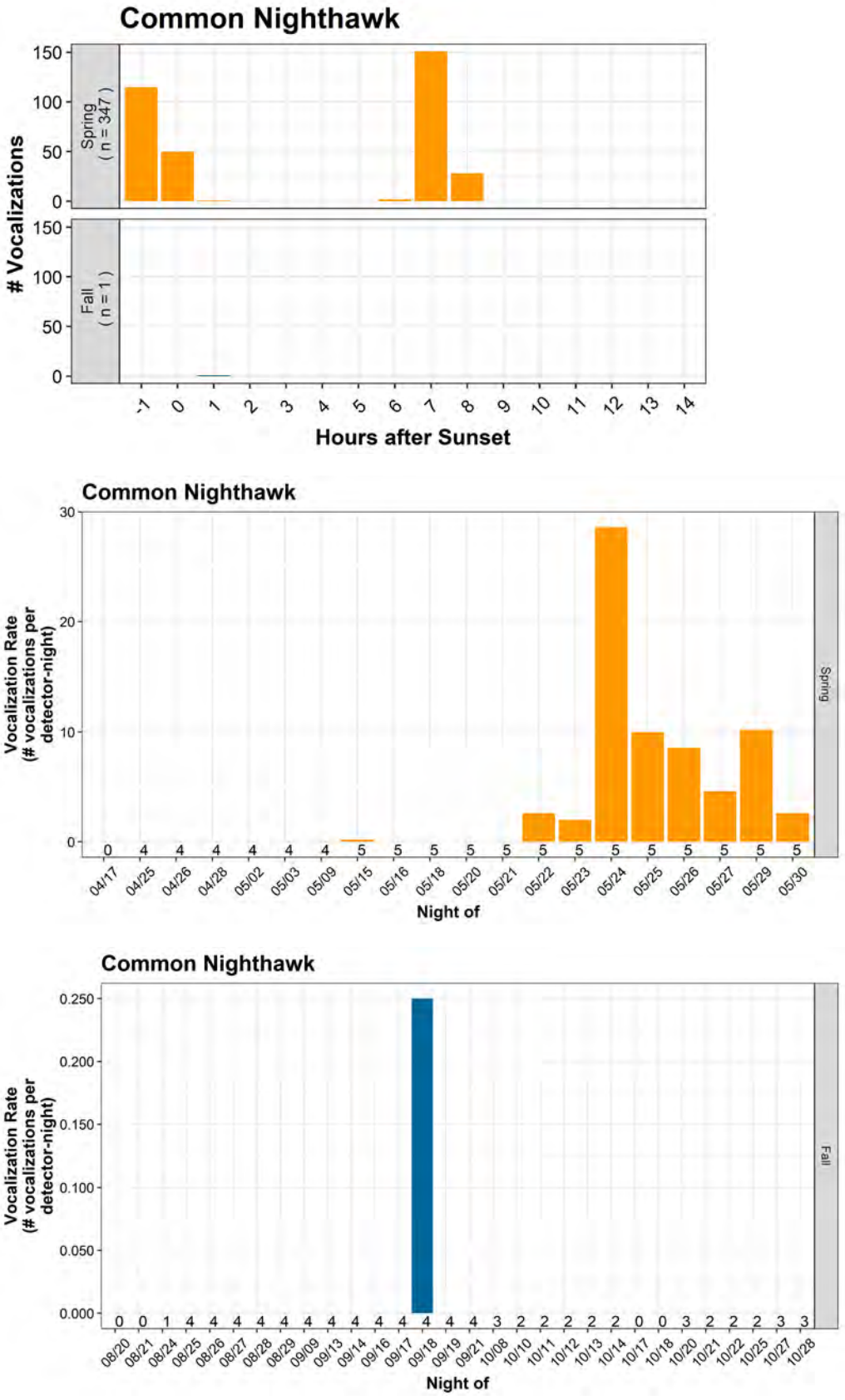
Appendix B Figure 34. Common Goldeneye – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



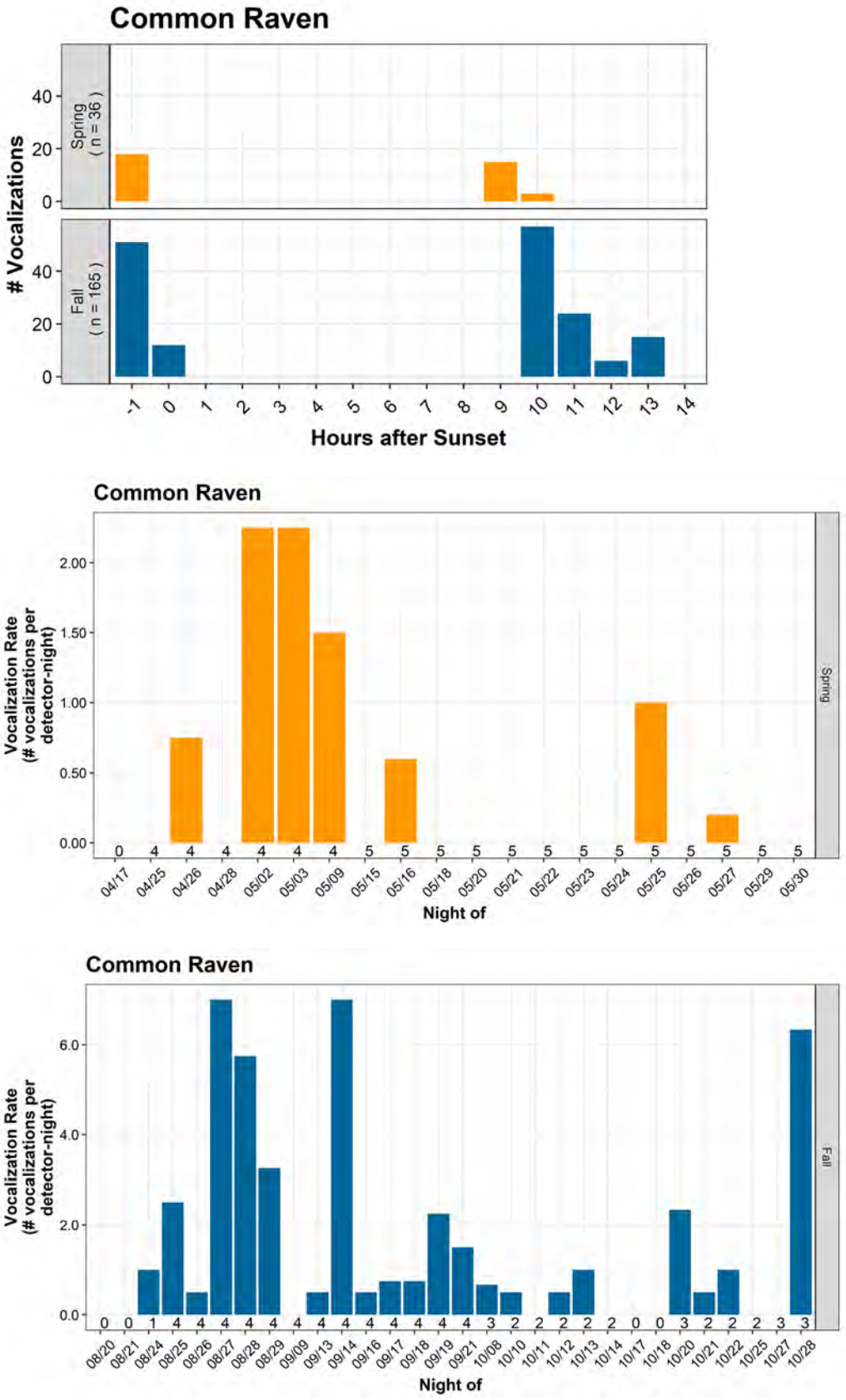
Appendix B Figure 35. Common Grackle – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



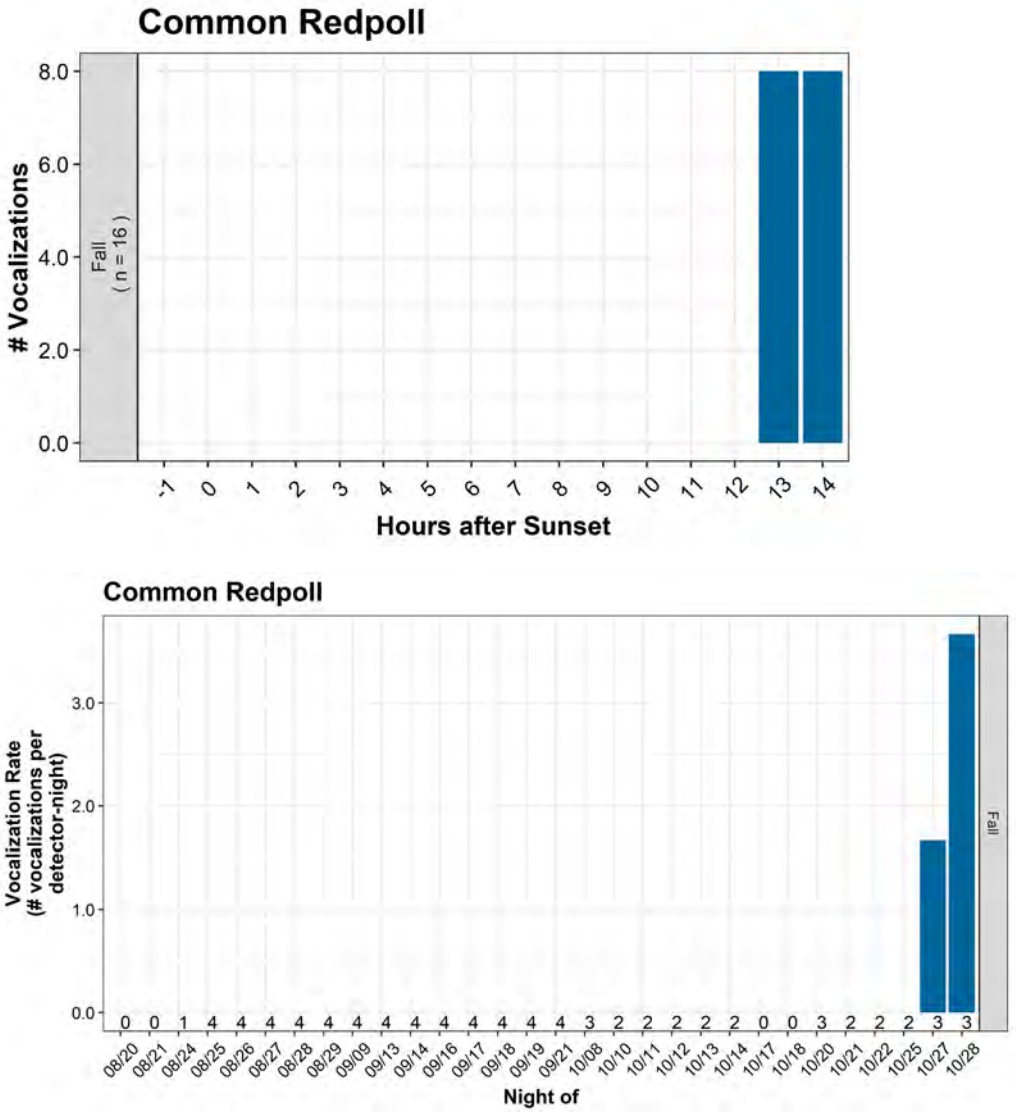
Appendix B Figure 36. Common Loon – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



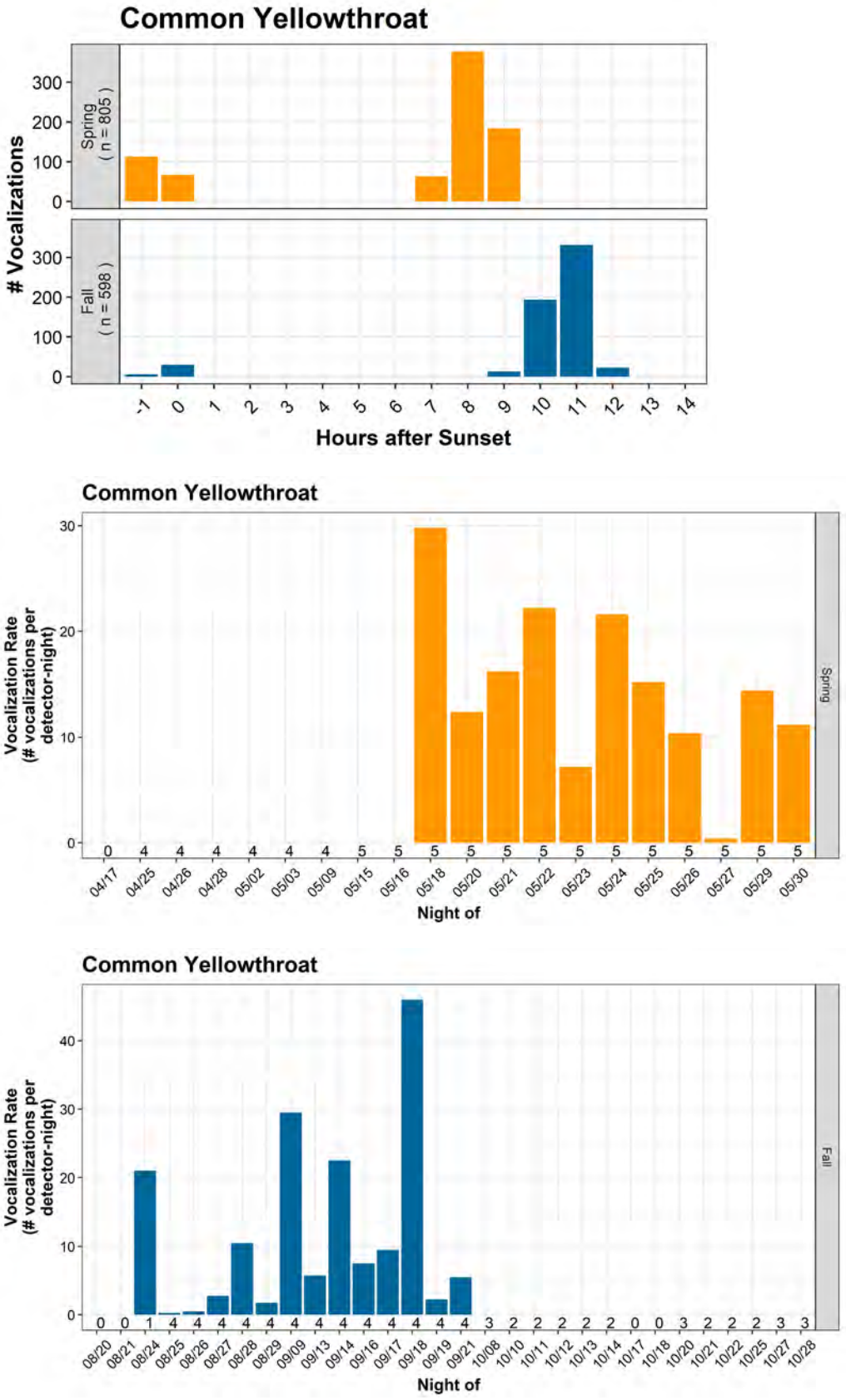
Appendix B Figure 37. Common Nighthawk – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



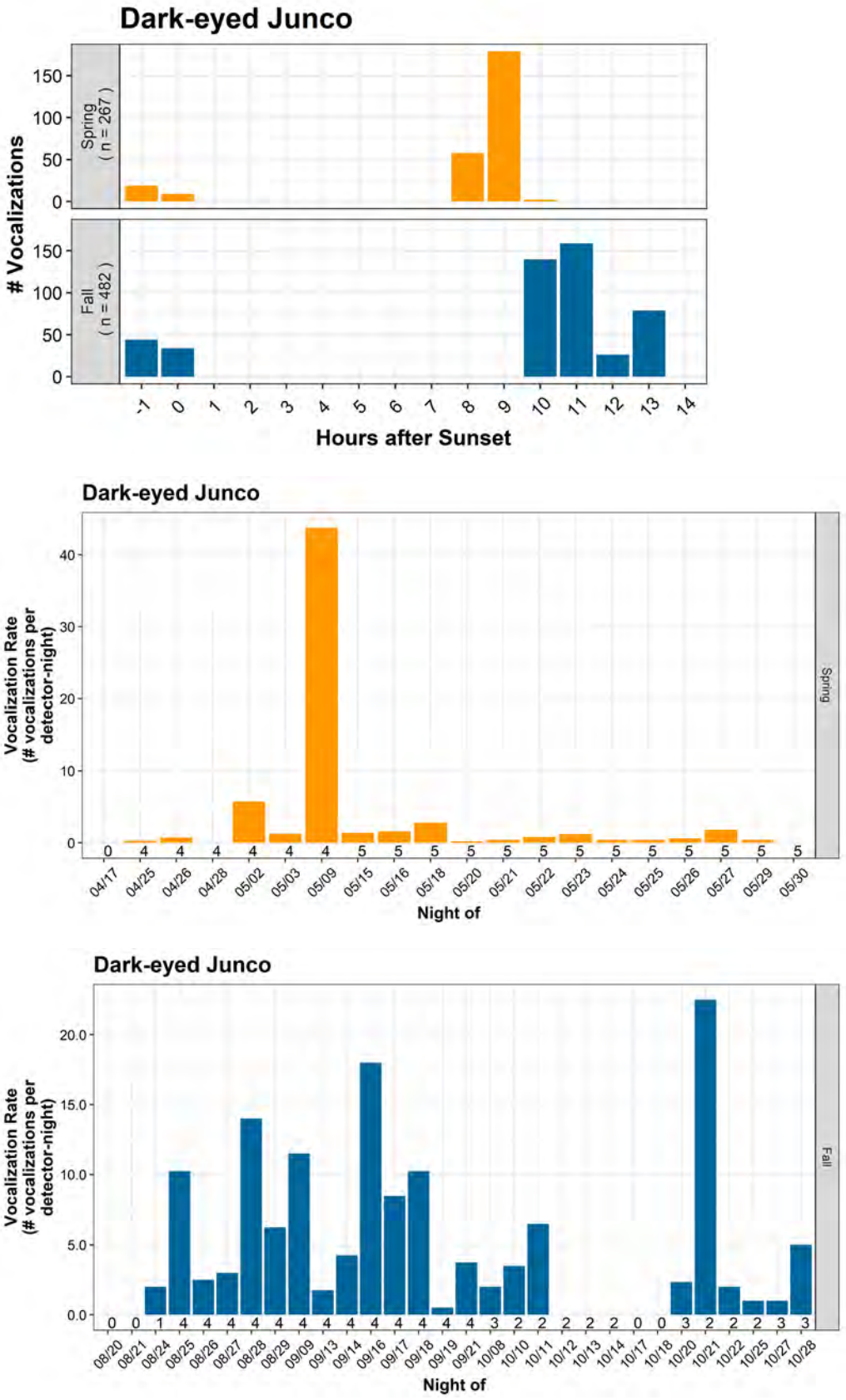
Appendix B Figure 38. Common Raven – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



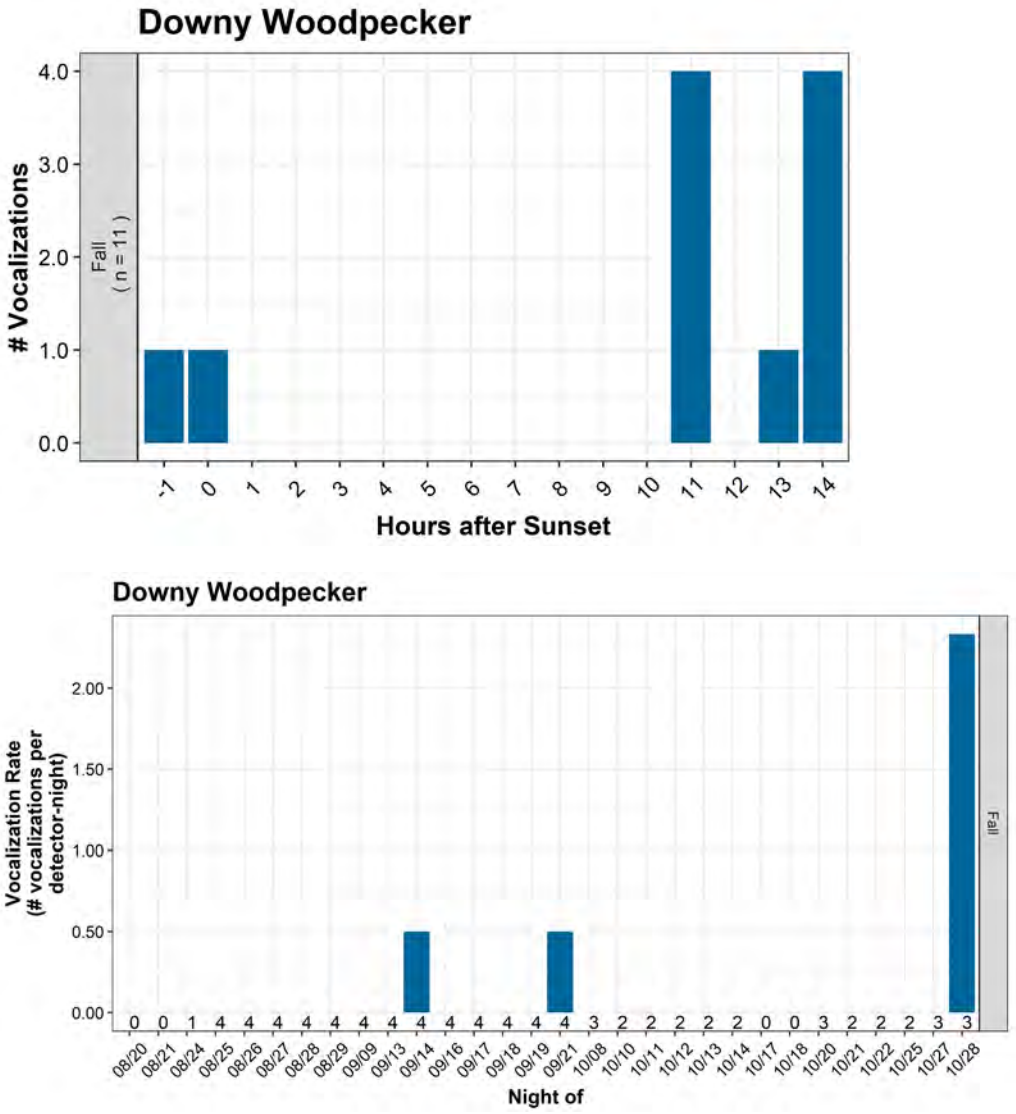
Appendix B Figure 39. Common Redpoll – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in fall)



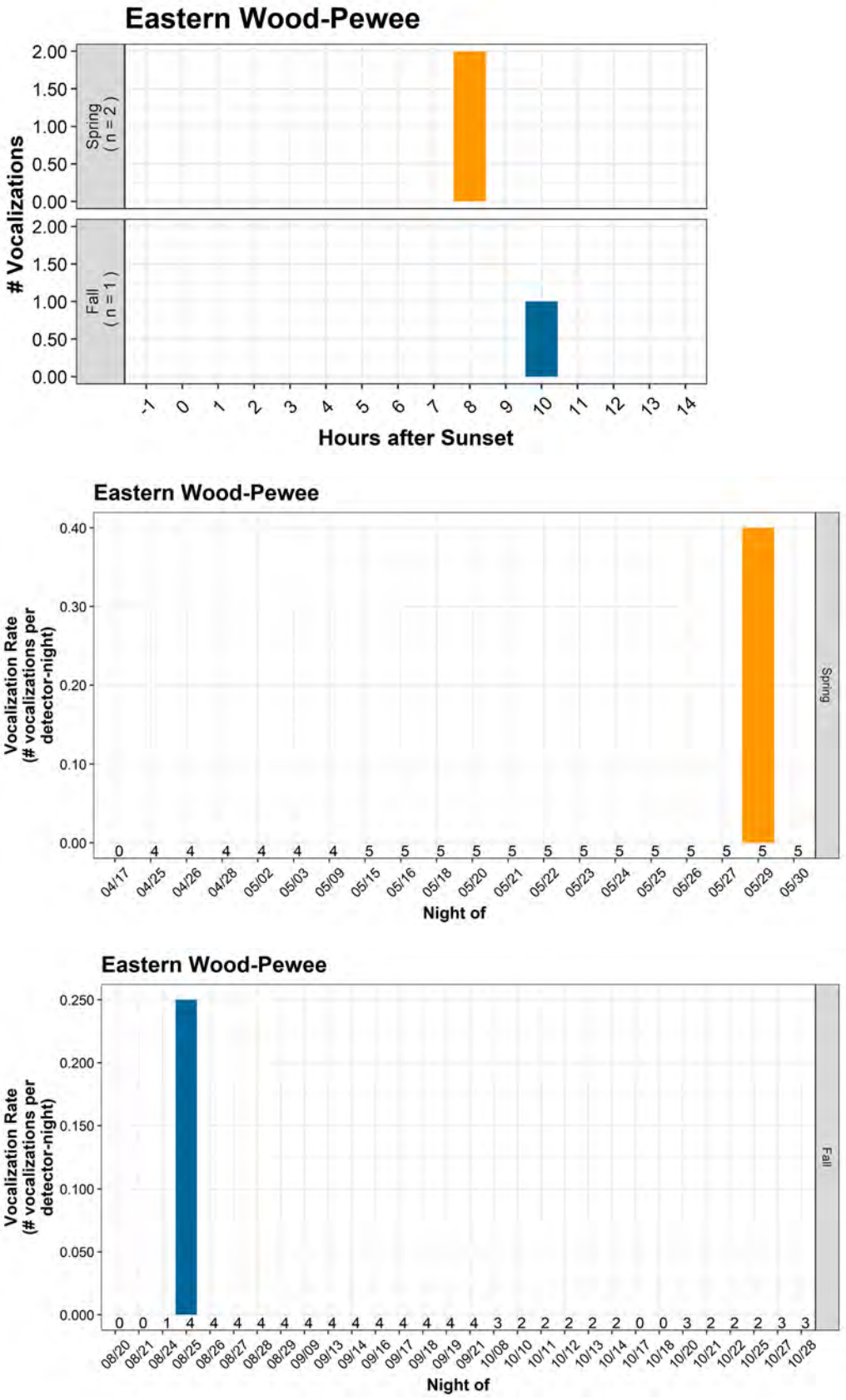
Appendix B Figure 40. Common Yellowthroat – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



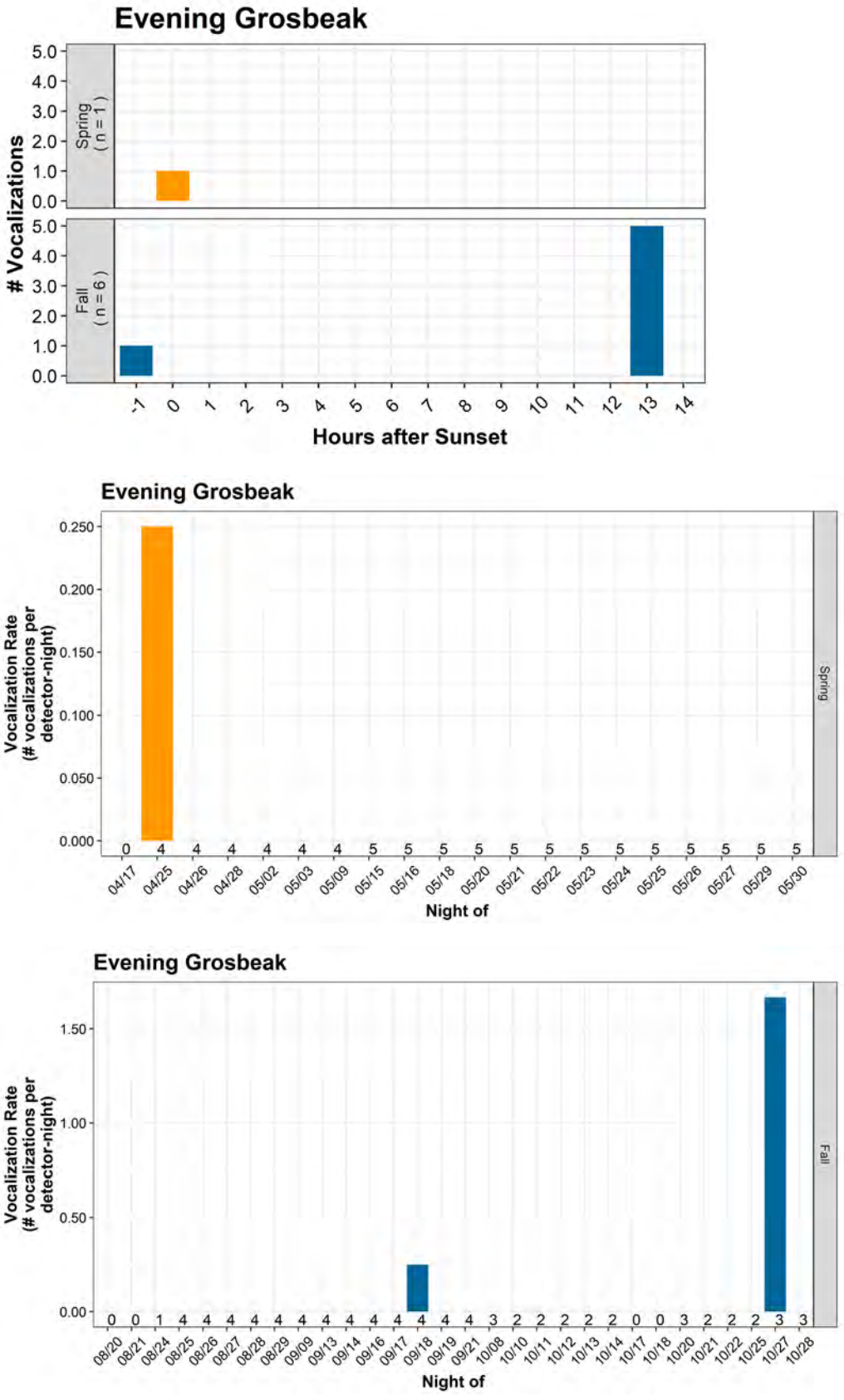
Appendix B Figure 41. Dark-eyed Junco – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



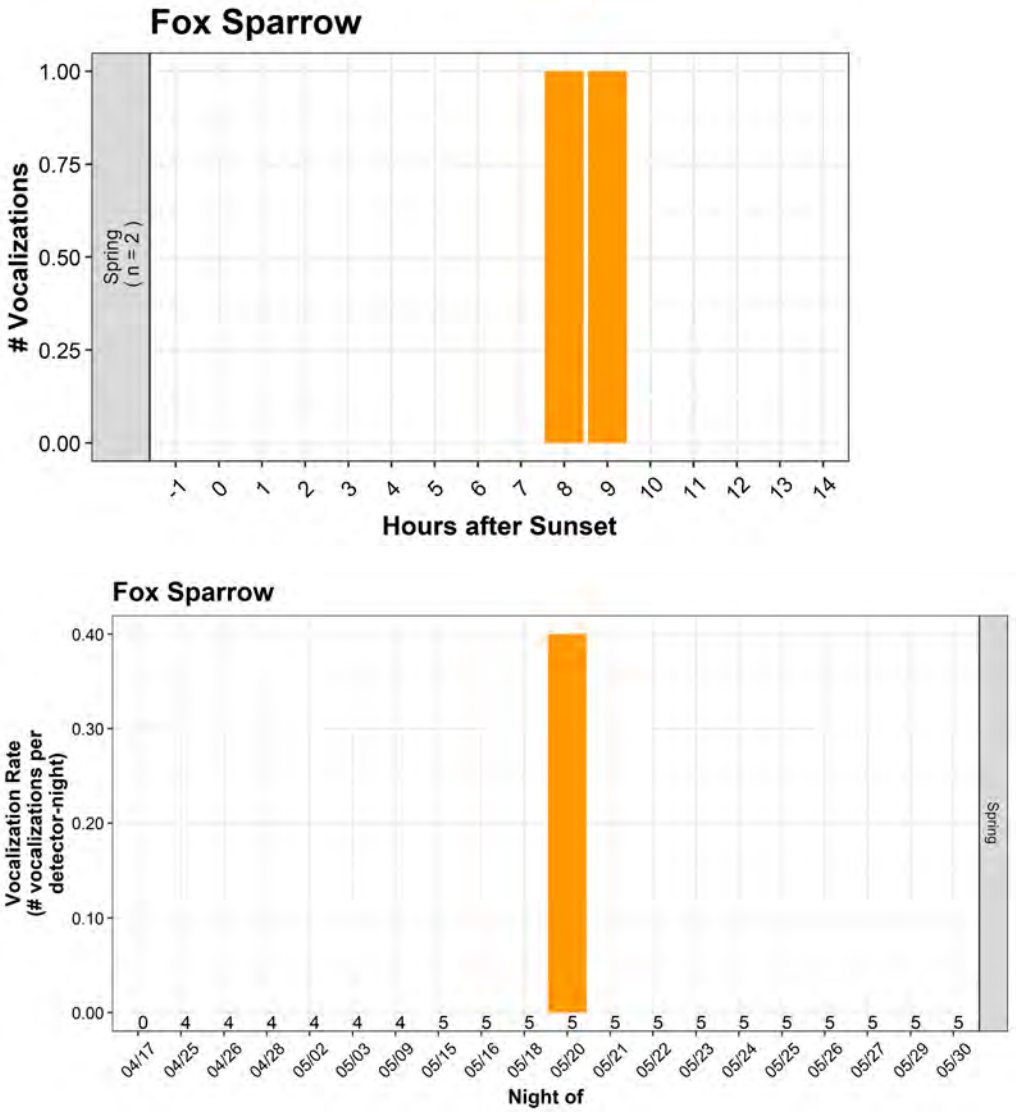
Appendix B Figure 42. Downy Woodpecker – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in fall)



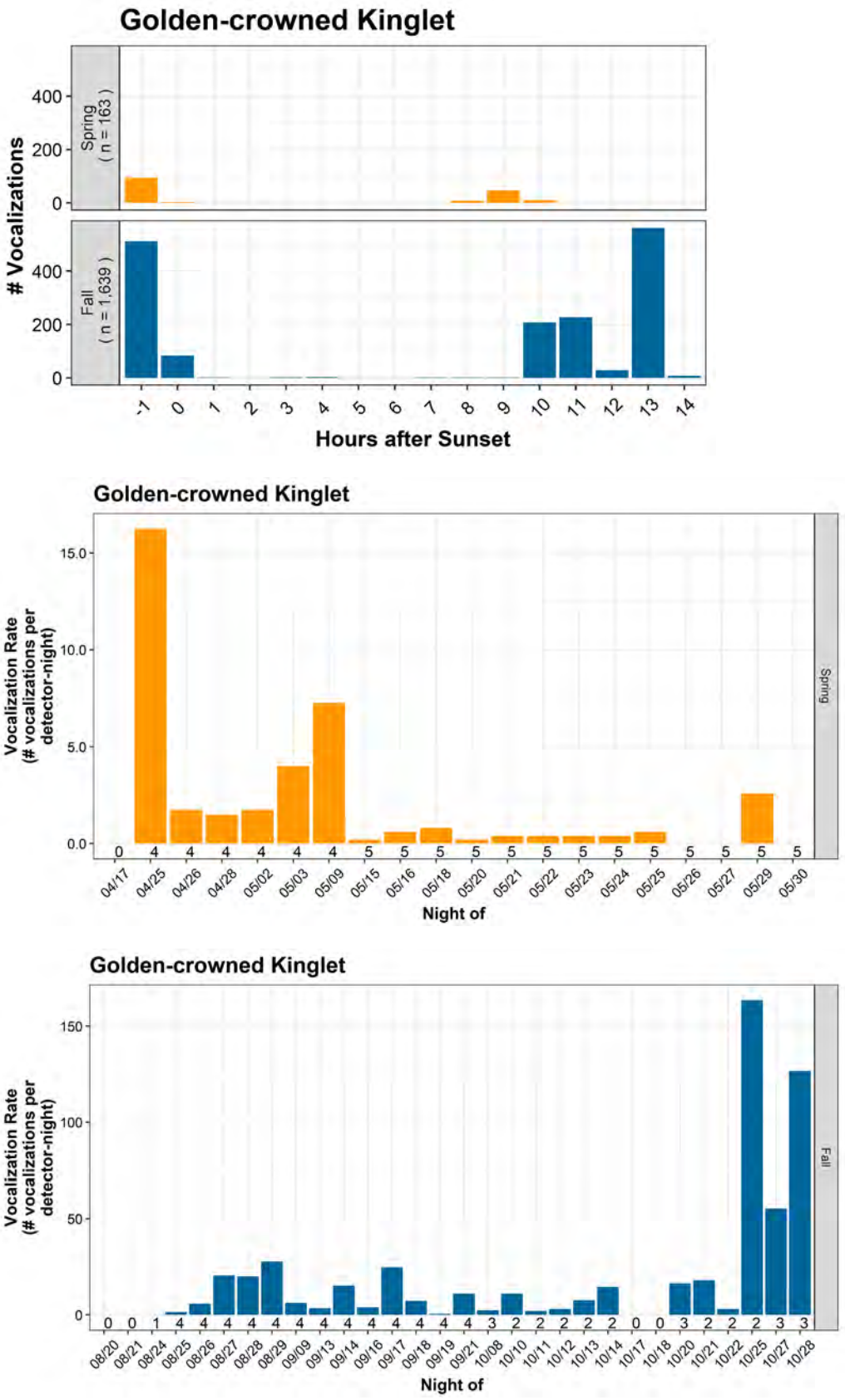
Appendix B Figure 43. Eastern Wood-Pewee – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



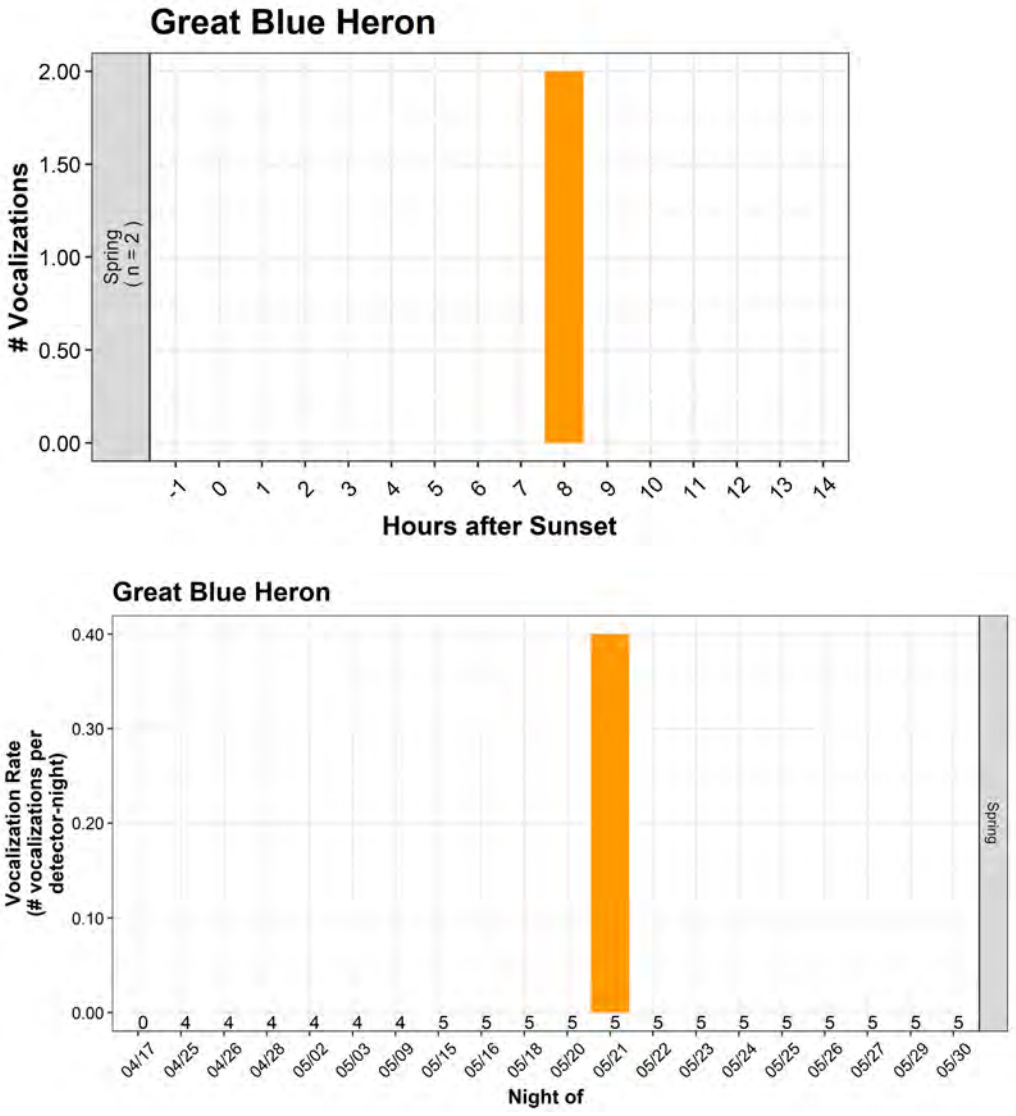
Appendix B Figure 44. Evening Grosbeak – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



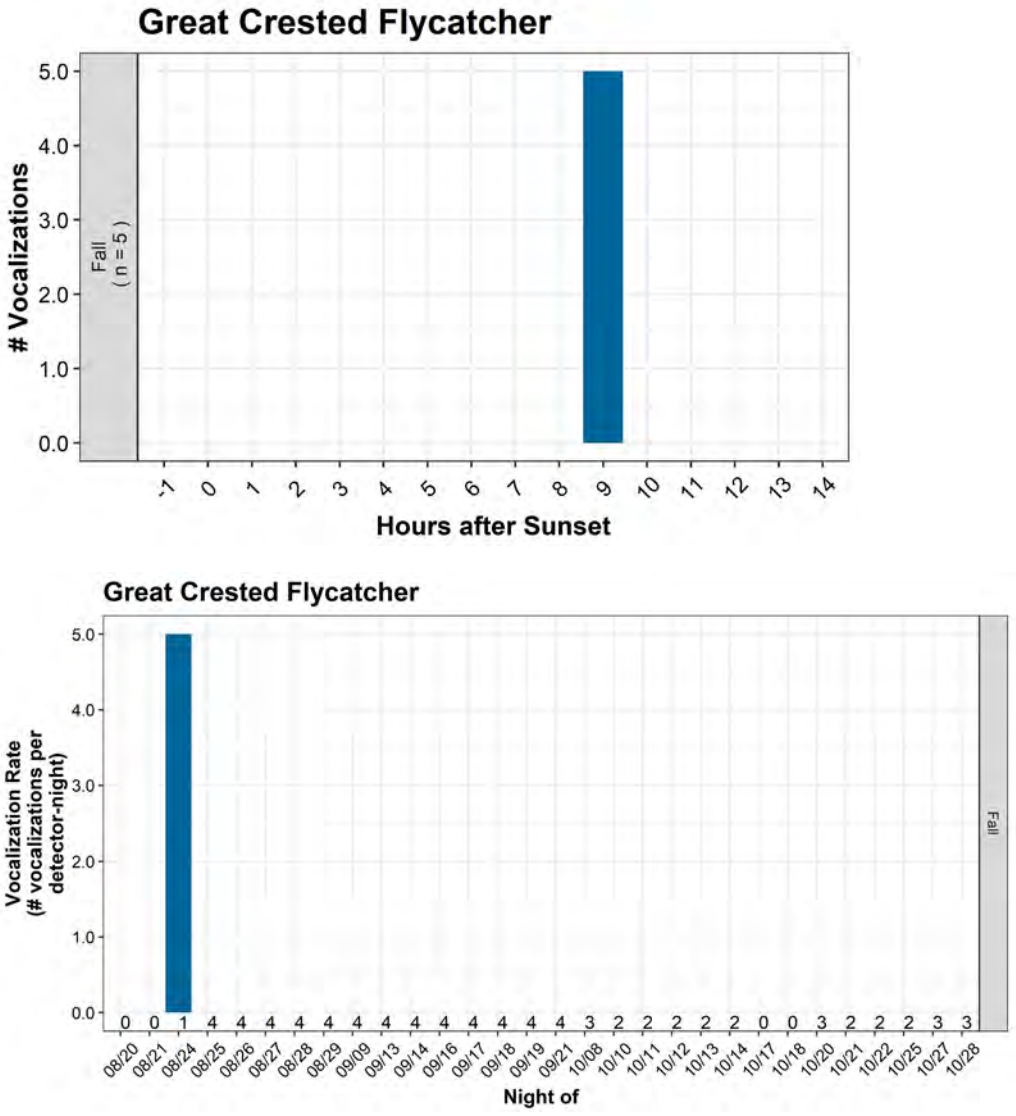
Appendix B Figure 45. Fox Sparrow – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



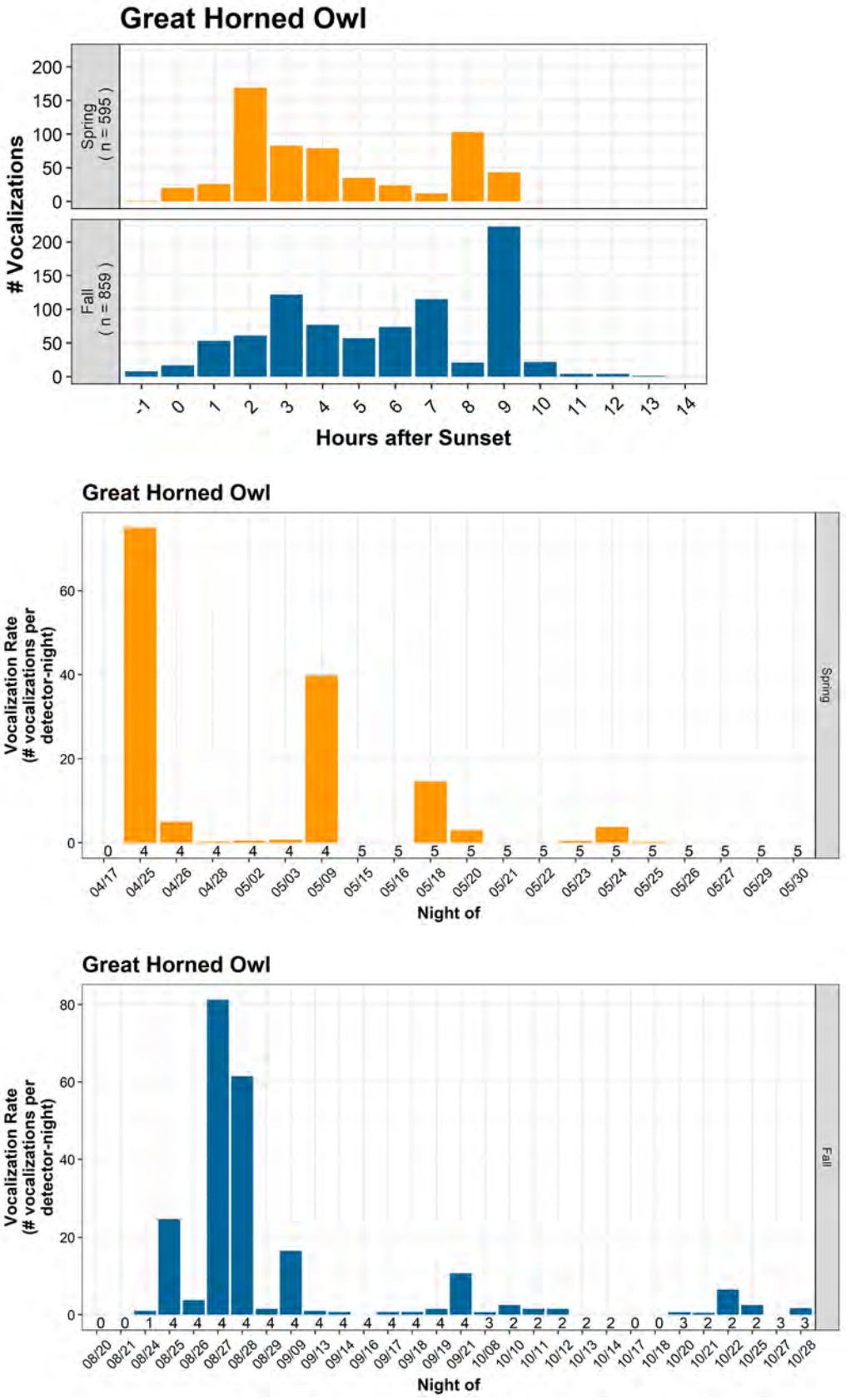
Appendix B Figure 46. Golden-crowned Kinglet – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



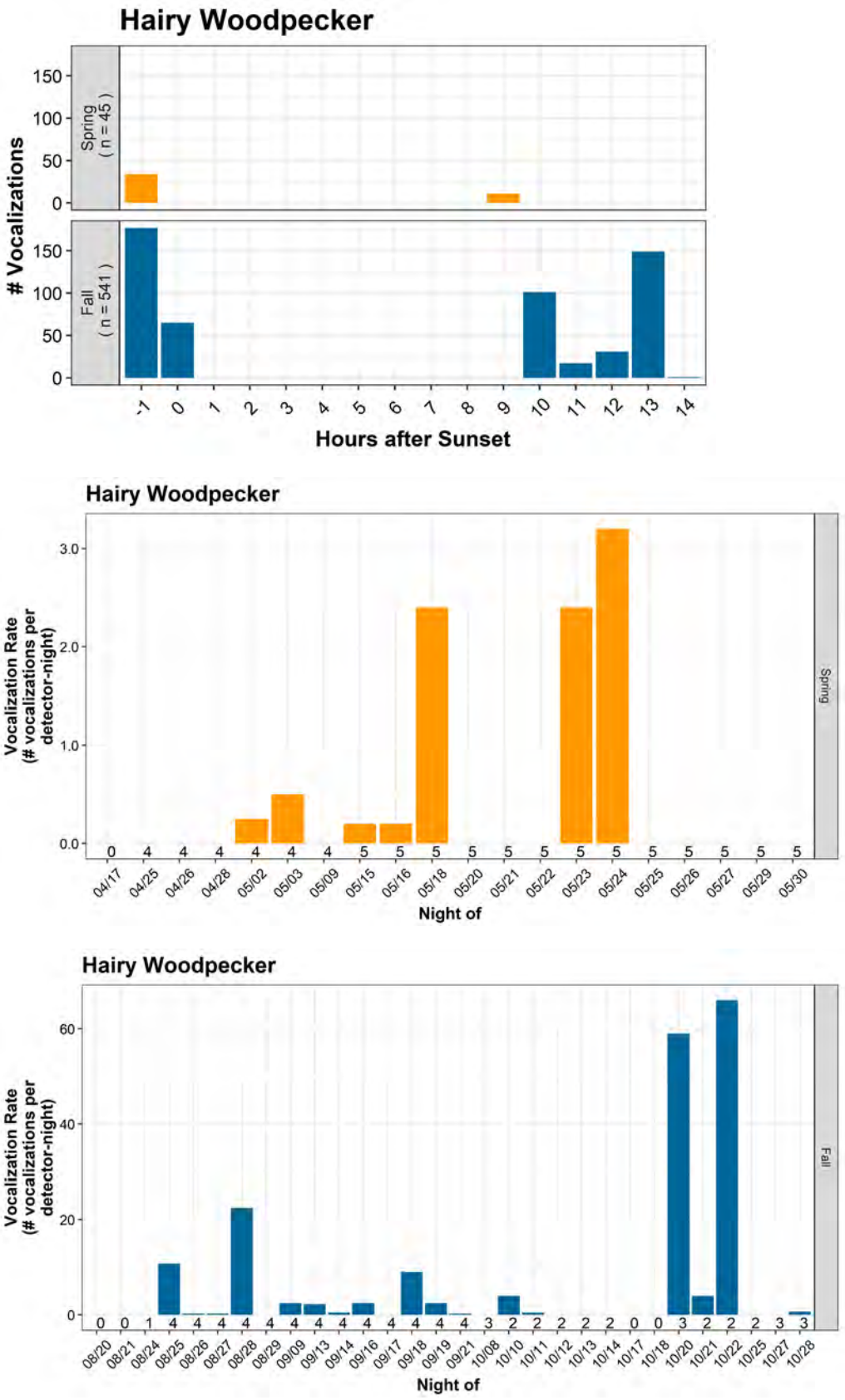
Appendix B Figure 47. Great Blue Heron – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



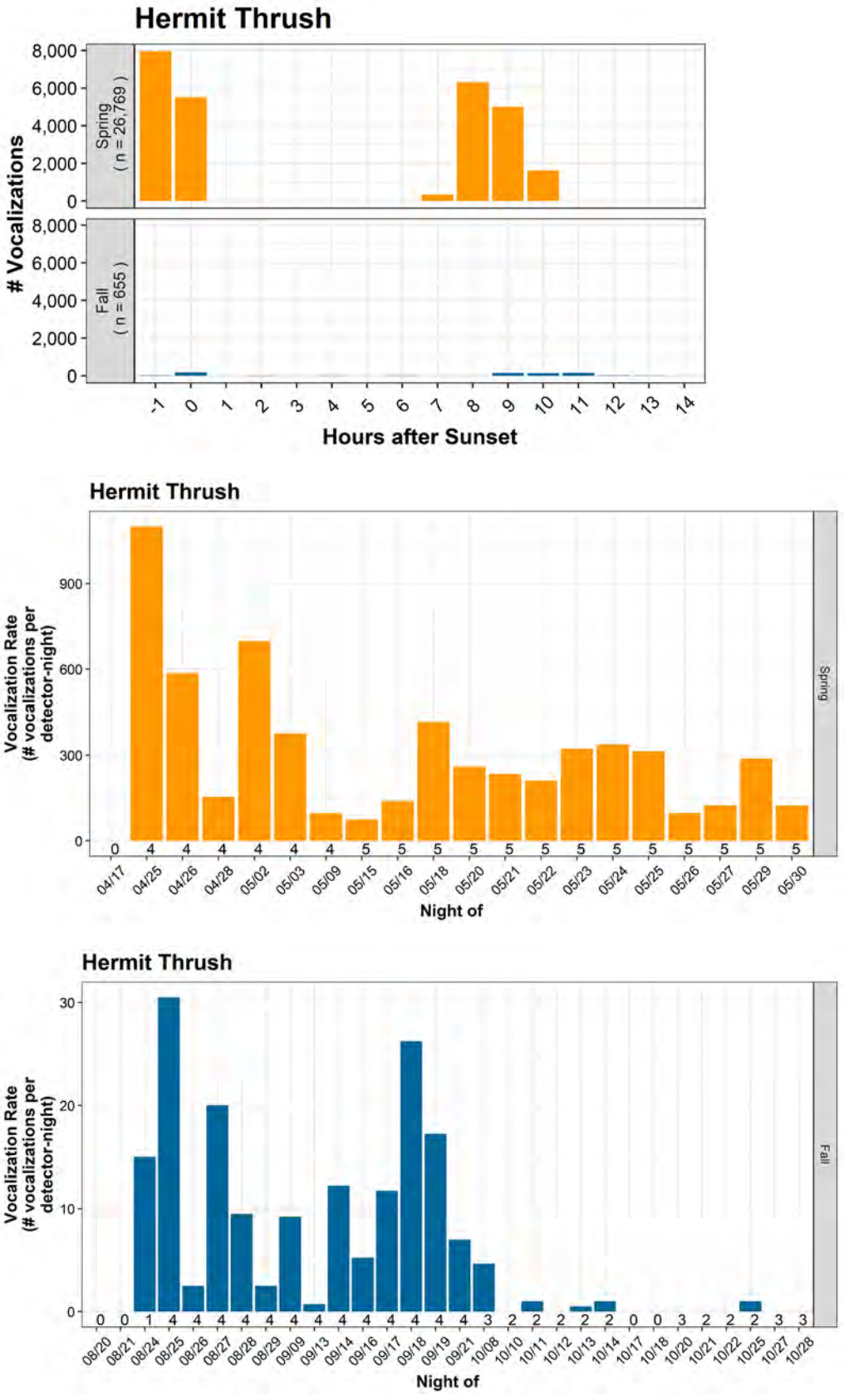
Appendix B Figure 48. Great Crested Flycatcher – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in fall)



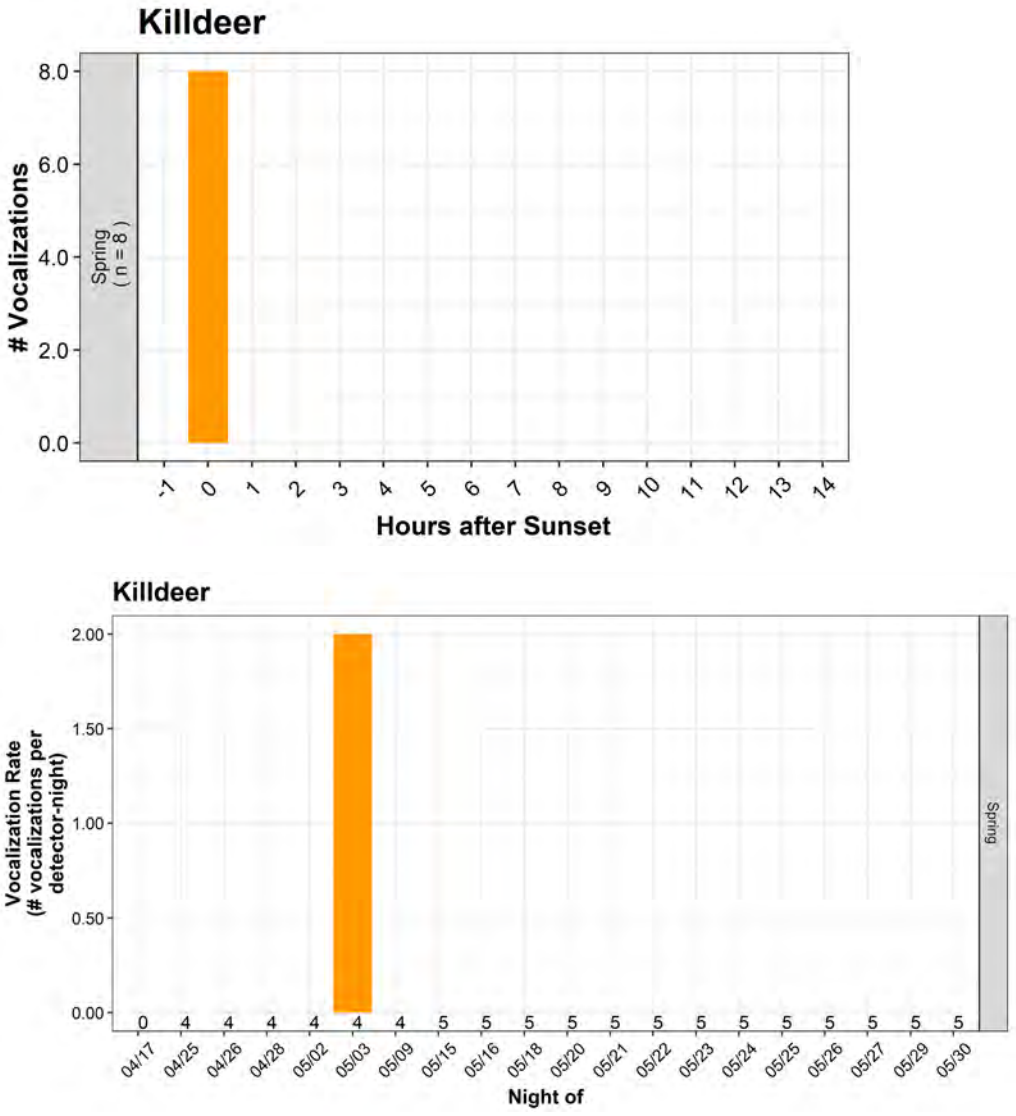
Appendix B Figure 49. Great Horned Owl – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



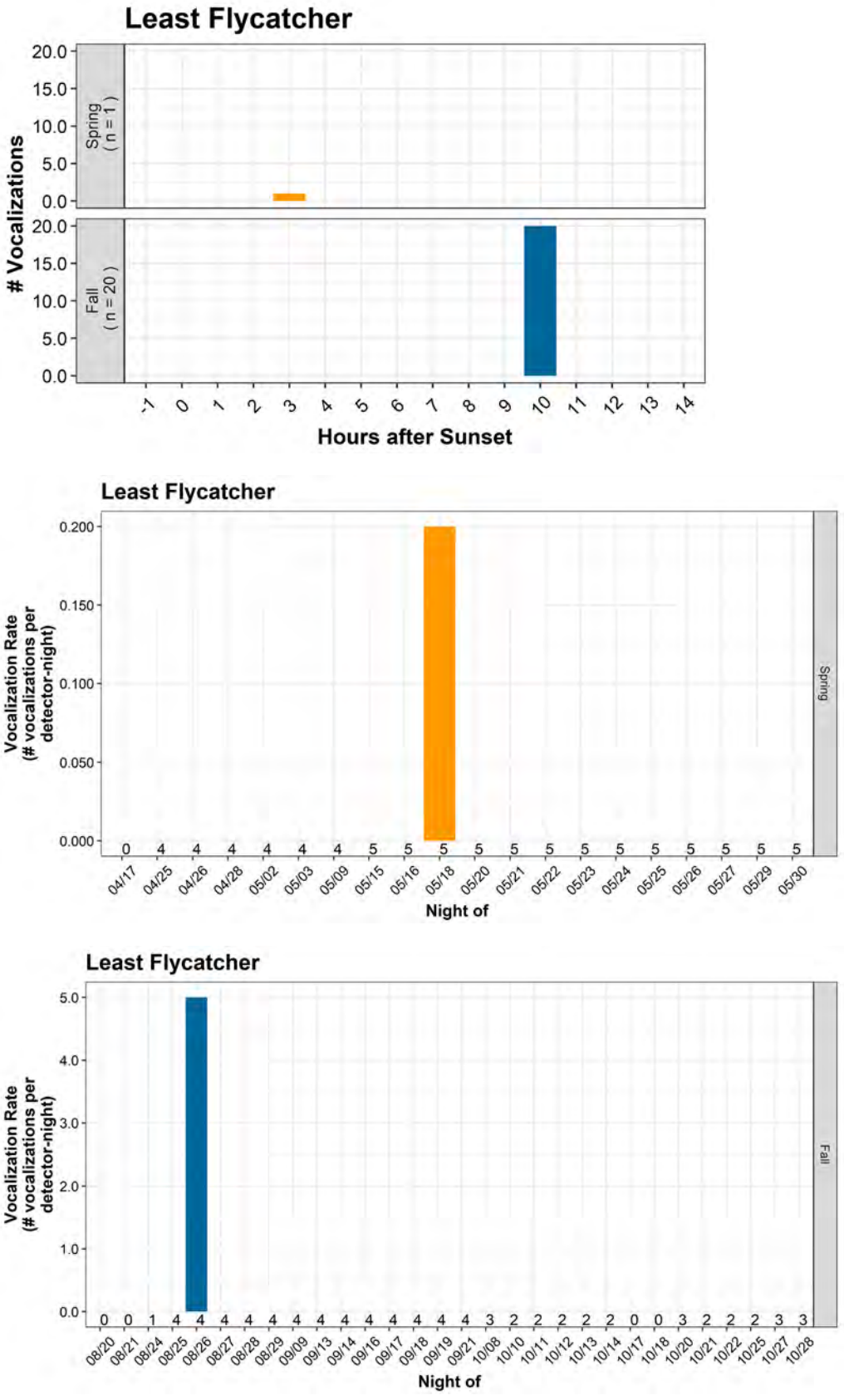
Appendix B Figure 50. Hairy Woodpecker – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



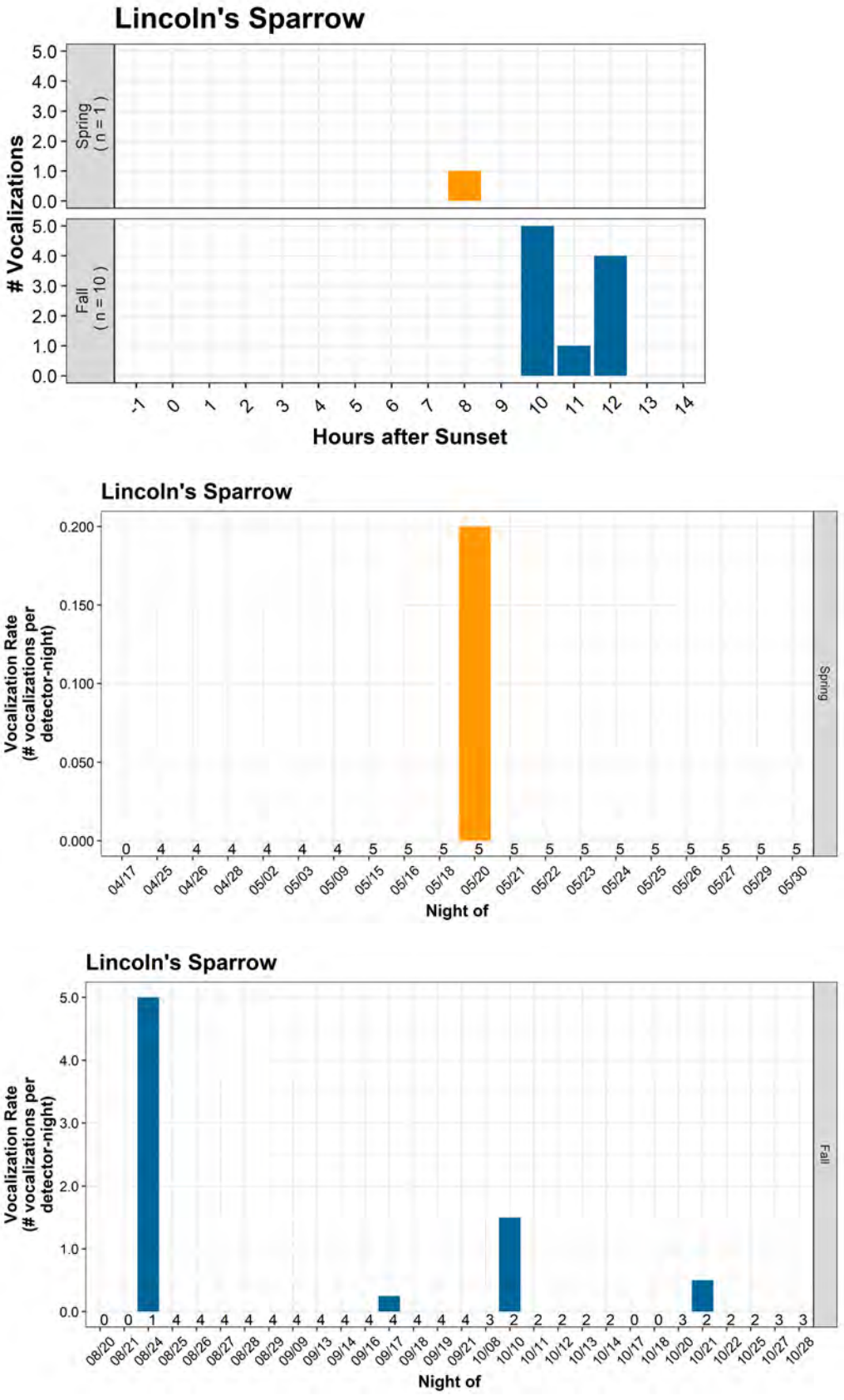
Appendix B Figure 51. Hermit Thrush – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



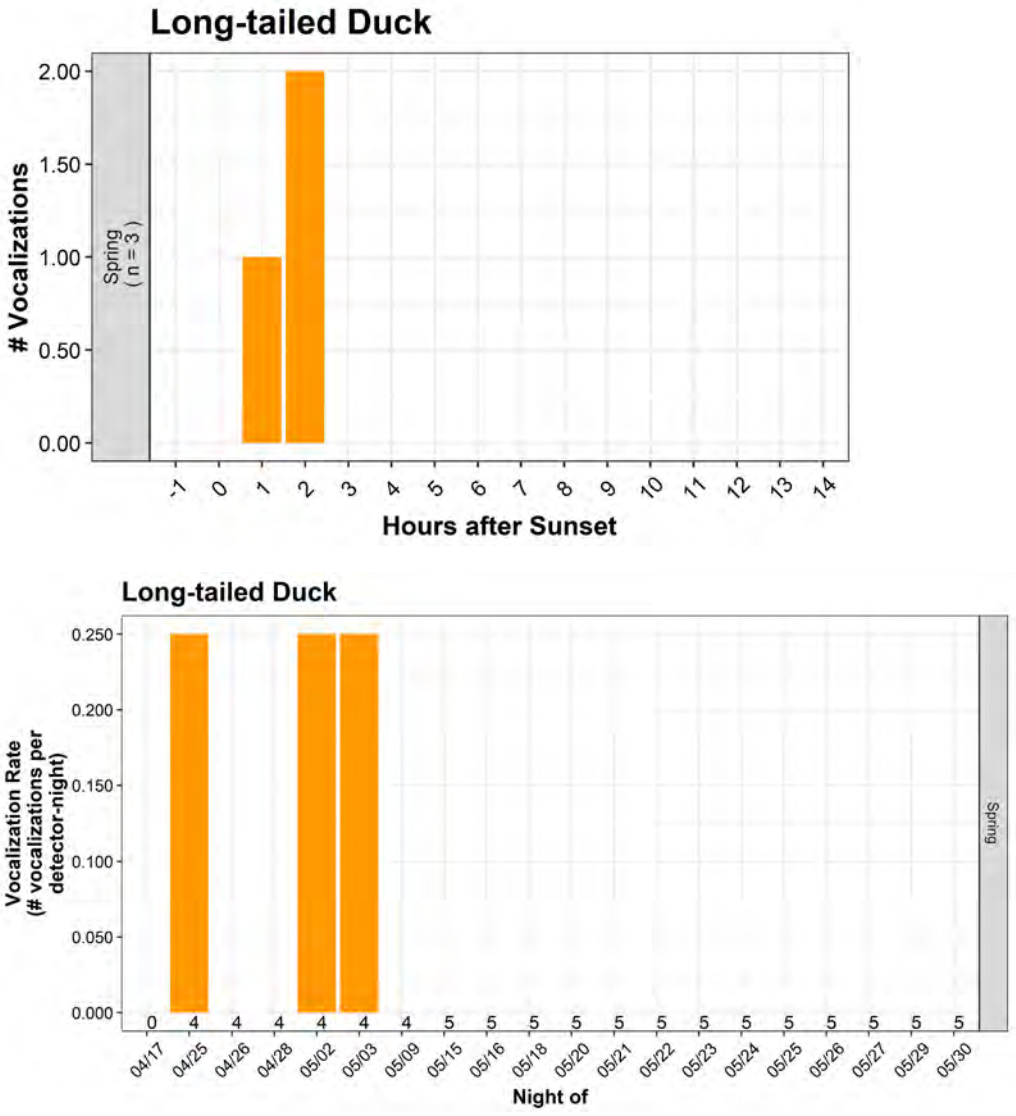
Appendix B Figure 52. Killdeer – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



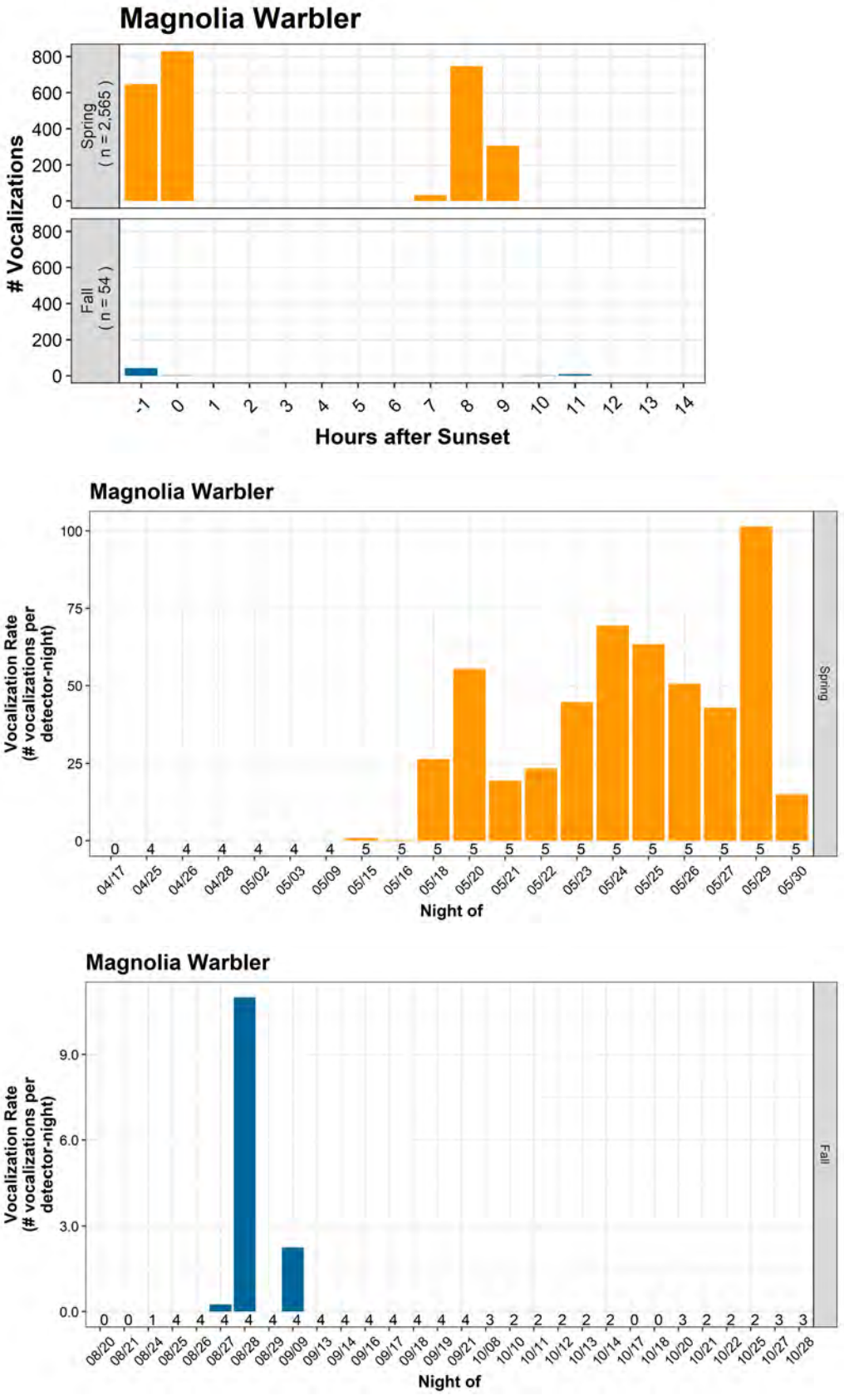
Appendix B Figure 53. Least Flycatcher – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



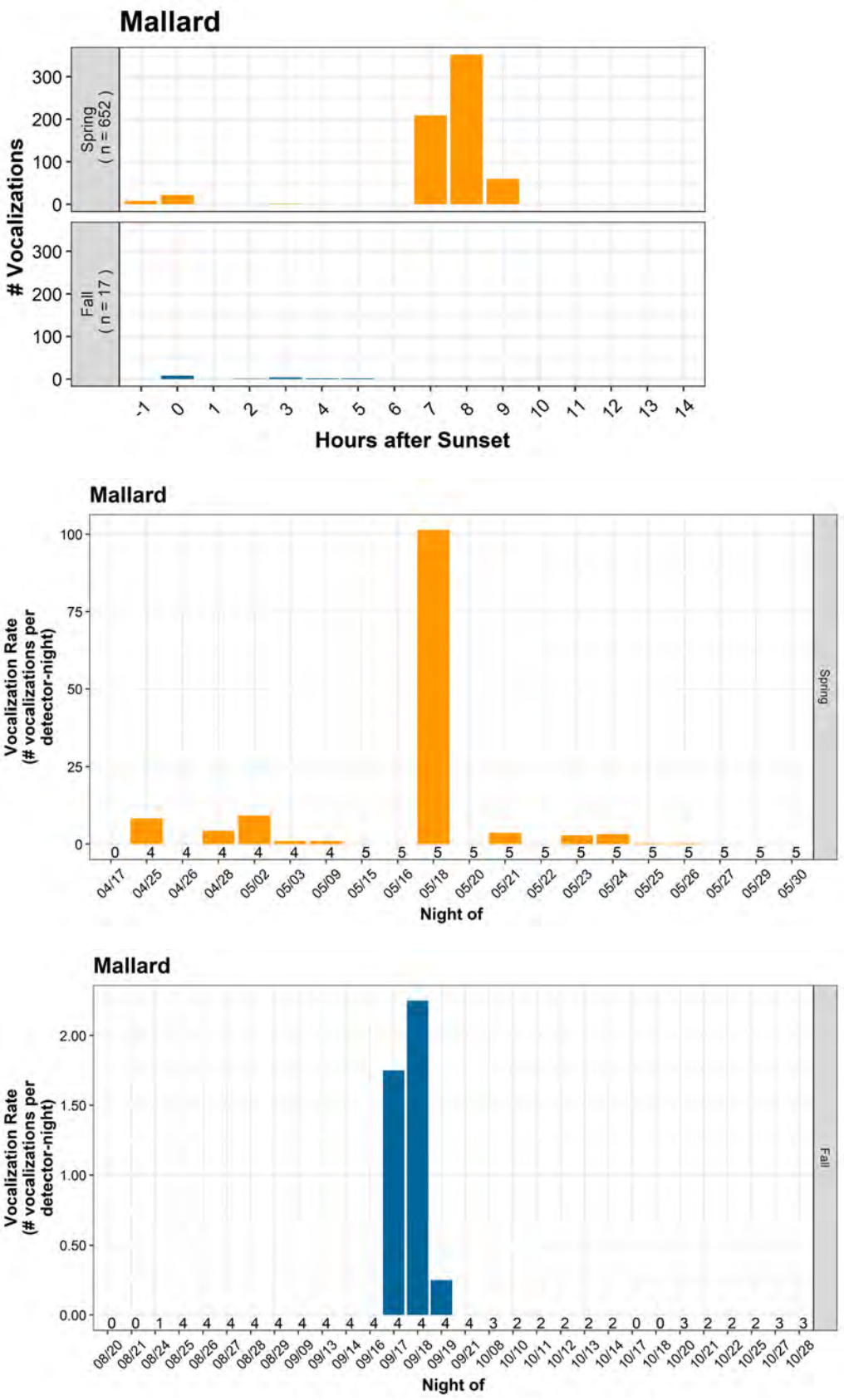
Appendix B Figure 54. Lincoln's Sparrow – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



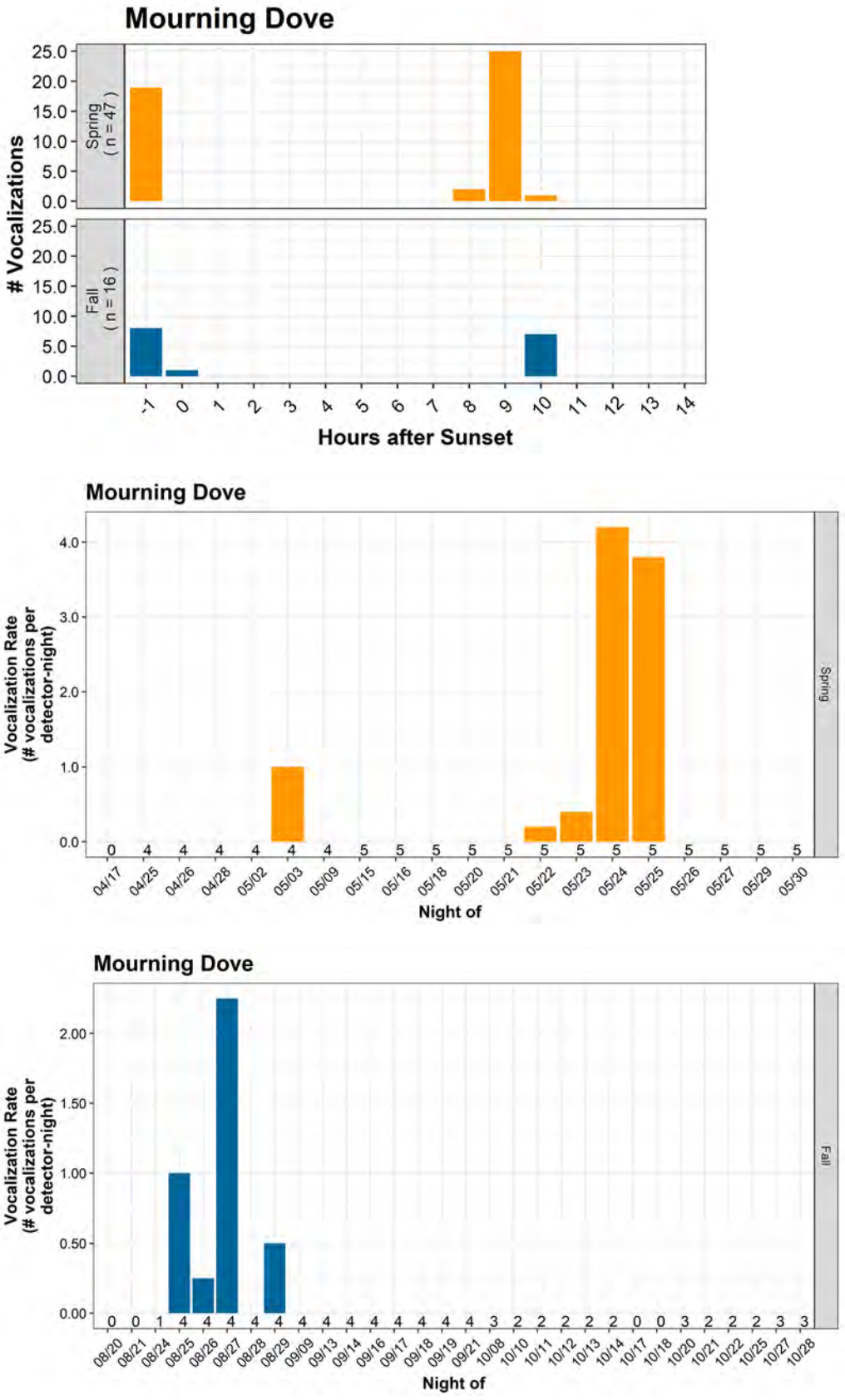
Appendix B Figure 55. Long-tailed Duck – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



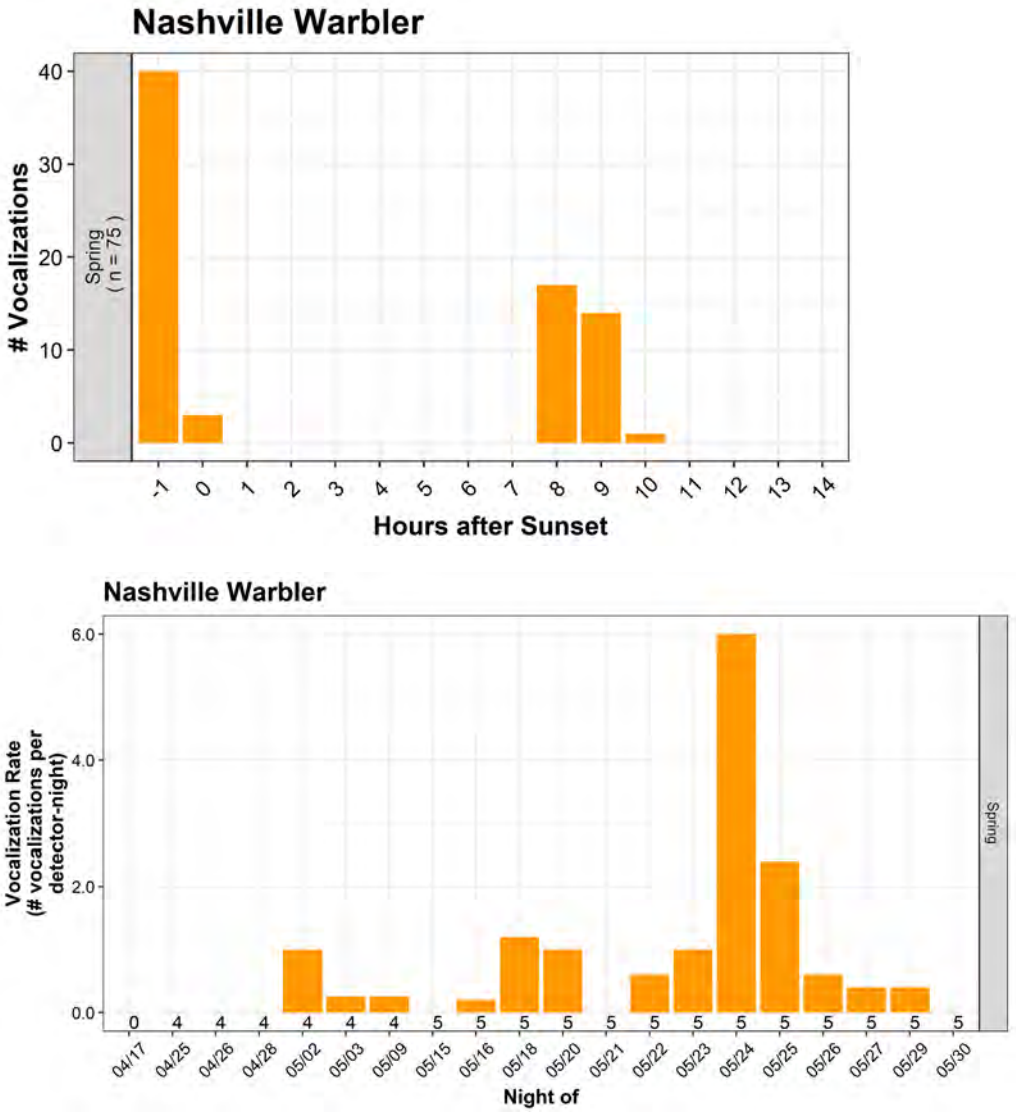
Appendix B Figure 56. Magnolia Warbler – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



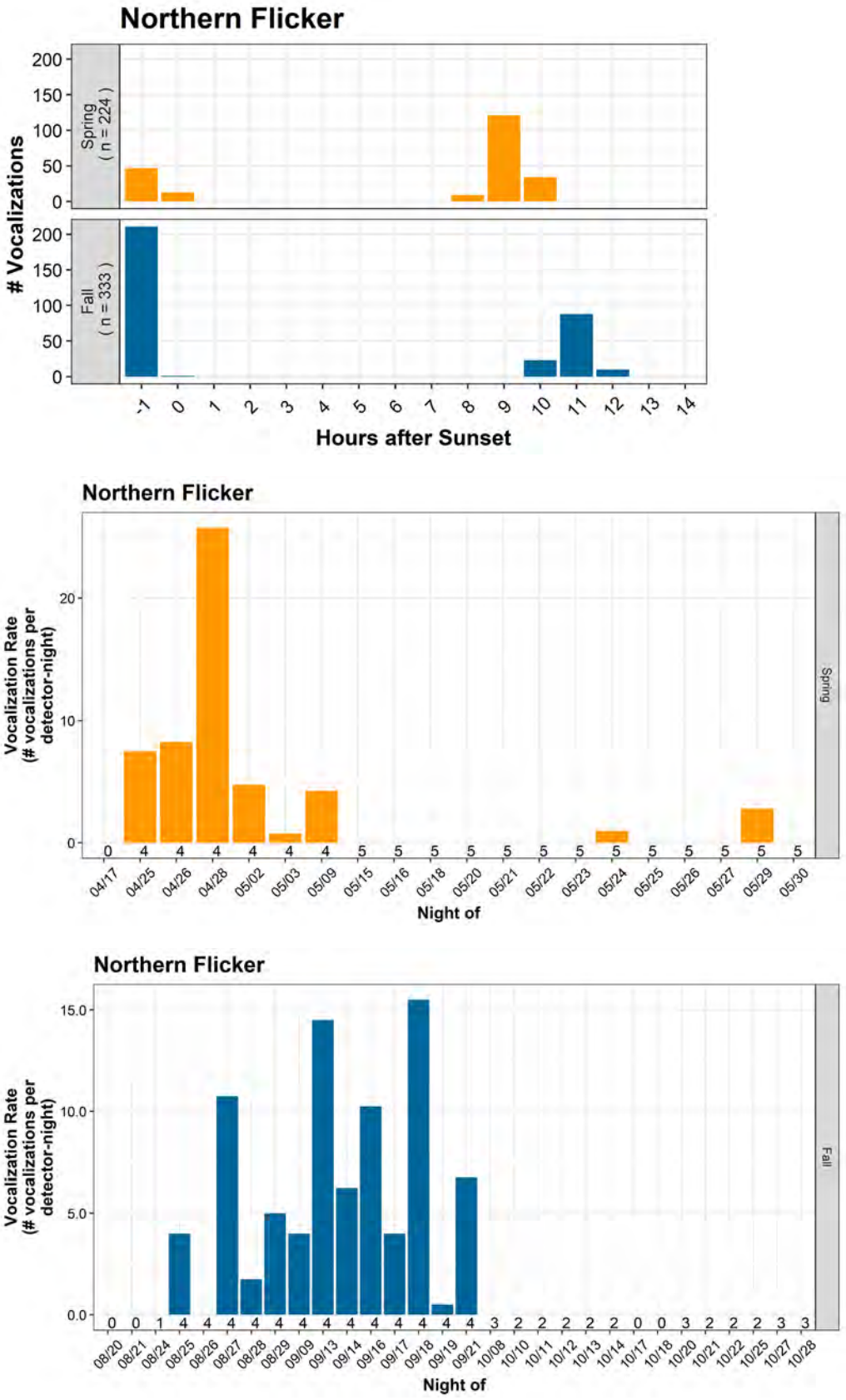
Appendix B Figure 57. Mallard – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



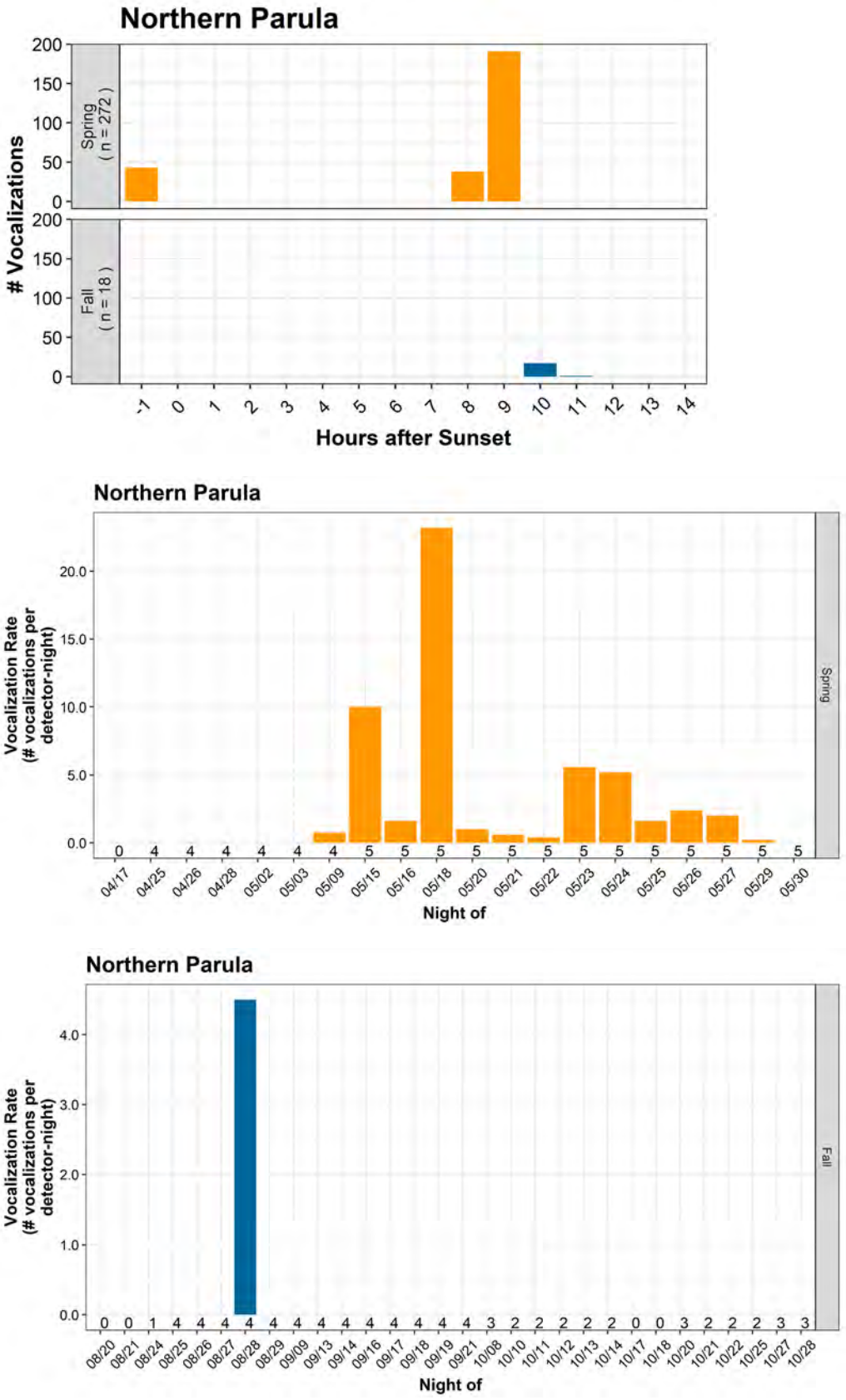
Appendix B Figure 58. Mourning Dove – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



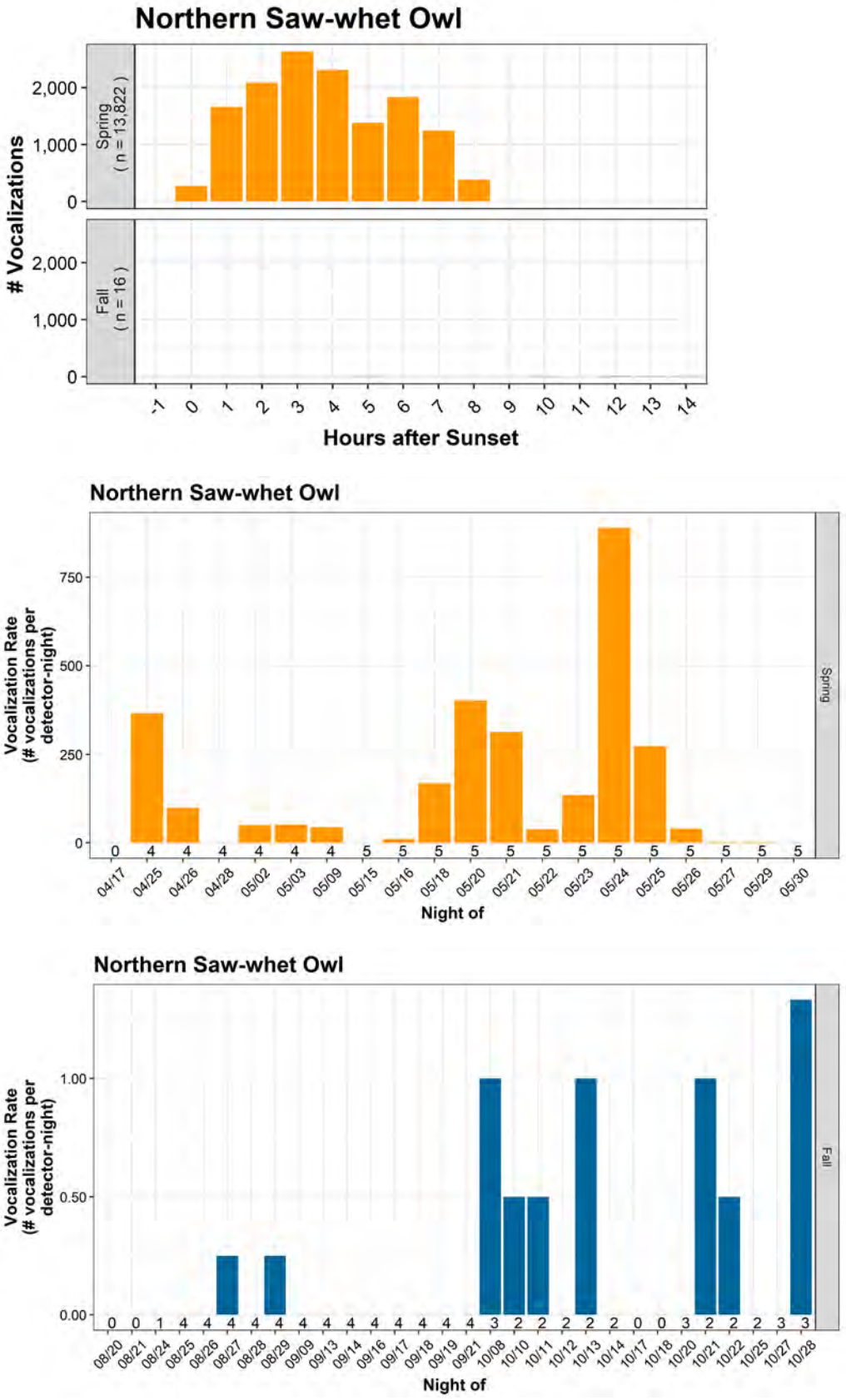
Appendix B Figure 59. Nashville Warbler – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



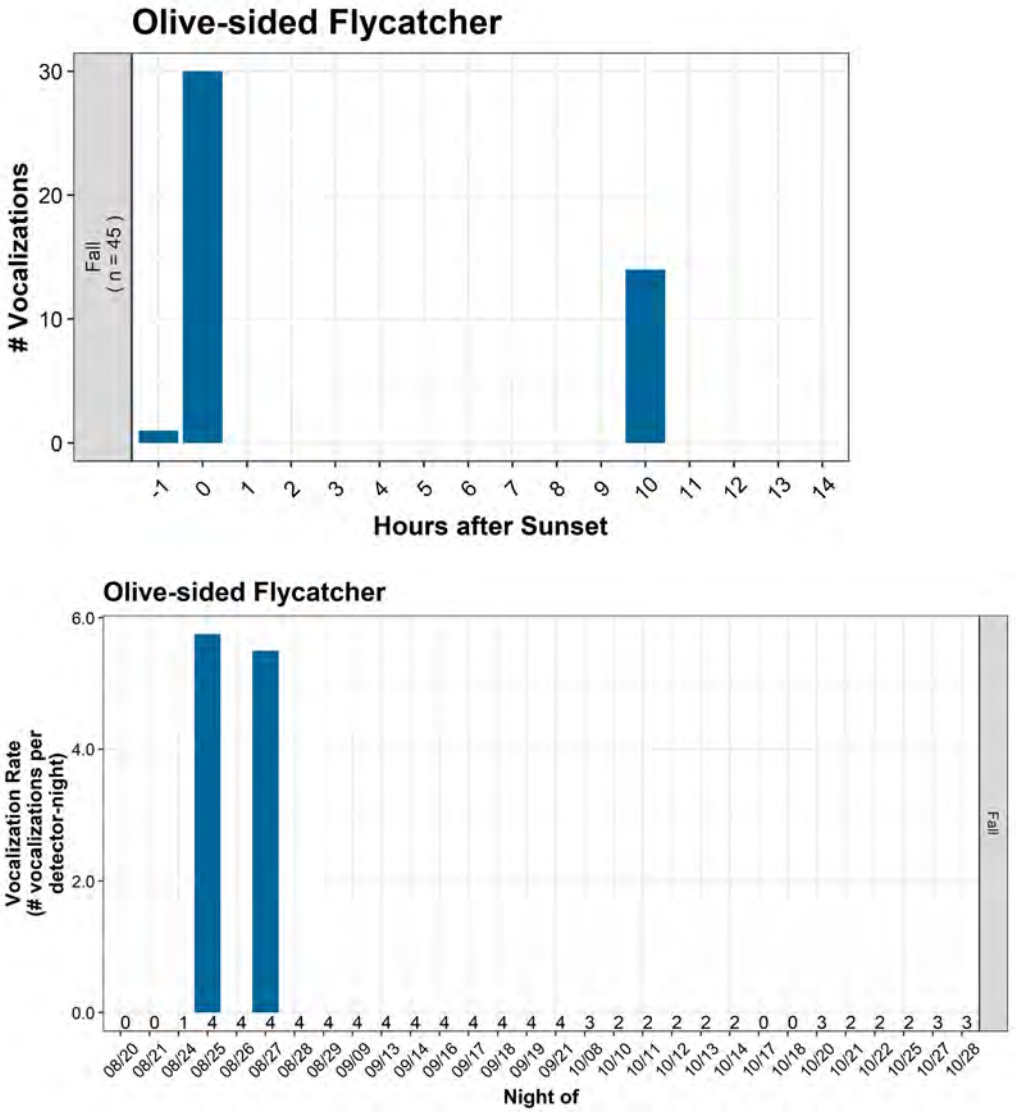
Appendix B Figure 60. Northern Flicker – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



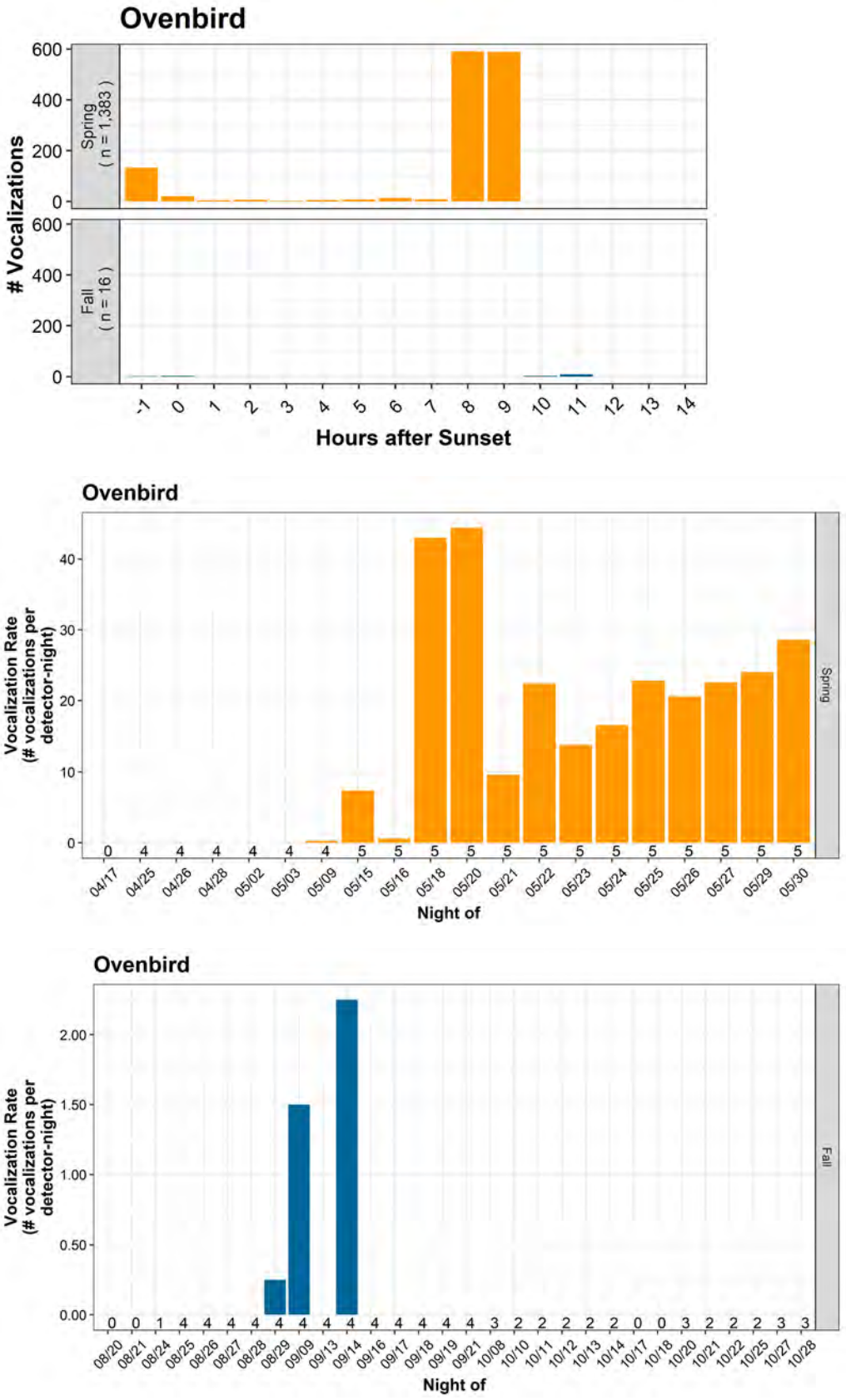
Appendix B Figure 61. Northern Parula – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



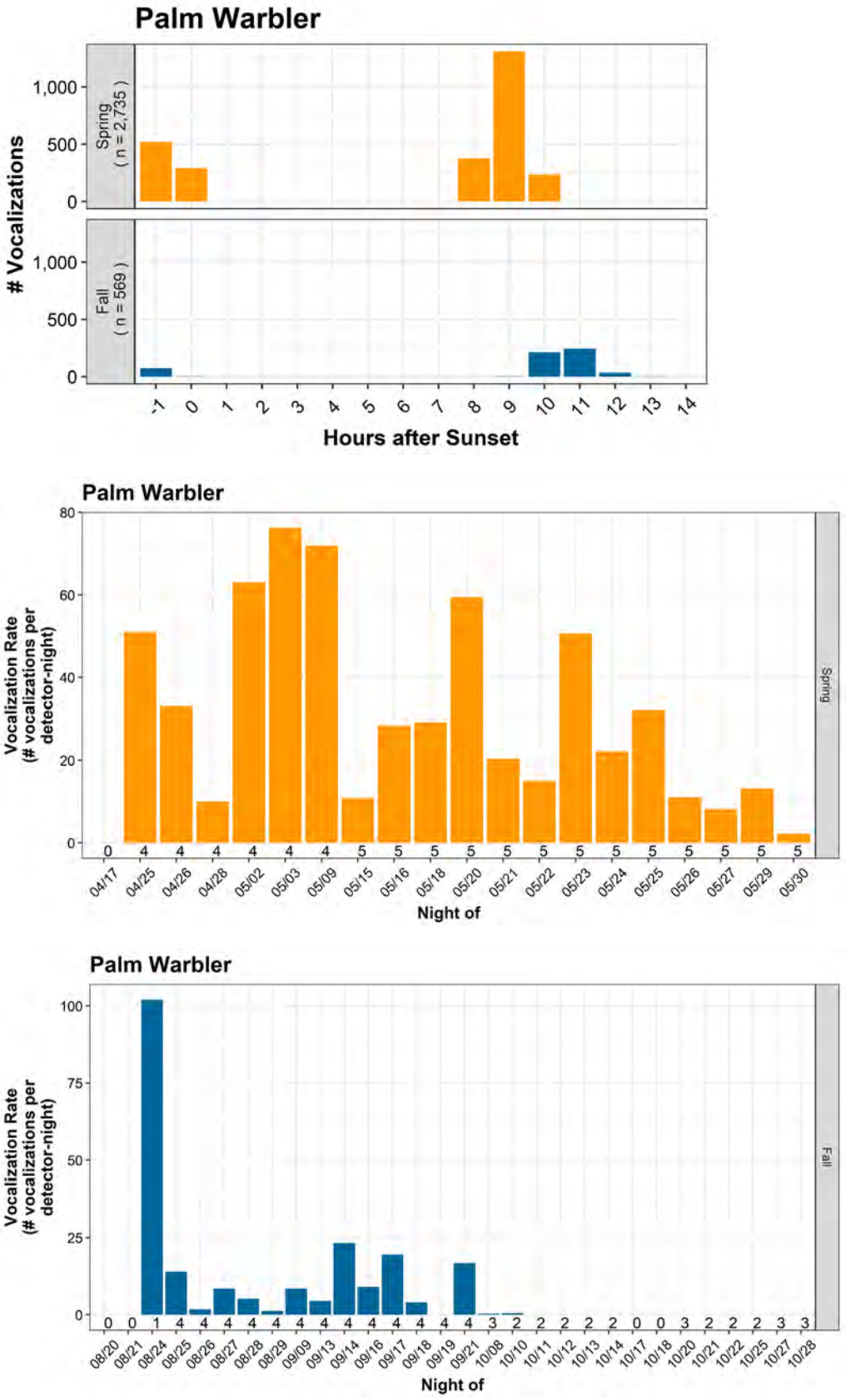
Appendix B Figure 62. Northern Saw-whet Owl – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



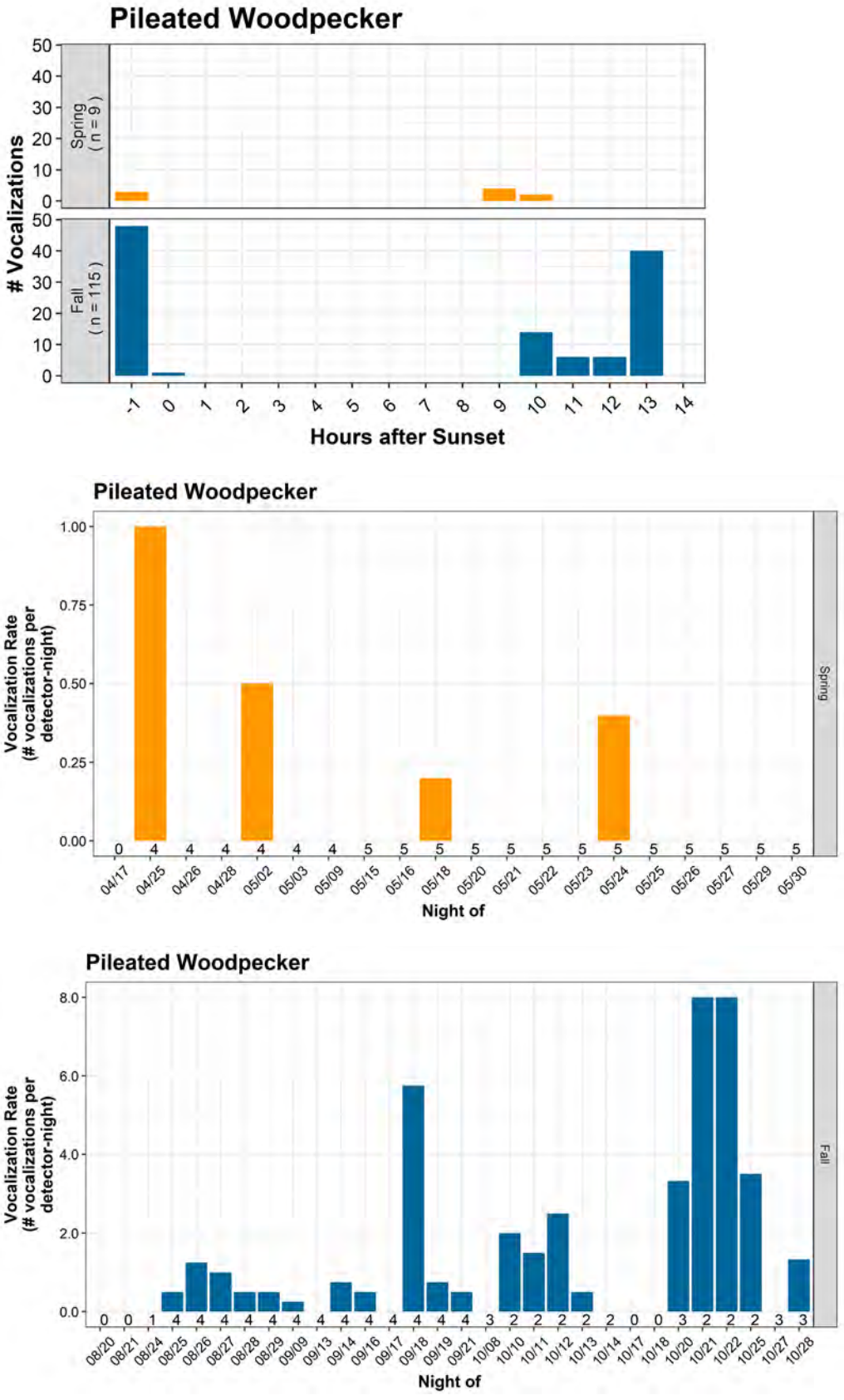
Appendix B Figure 63. Olive-sided Flycatcher – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in fall)



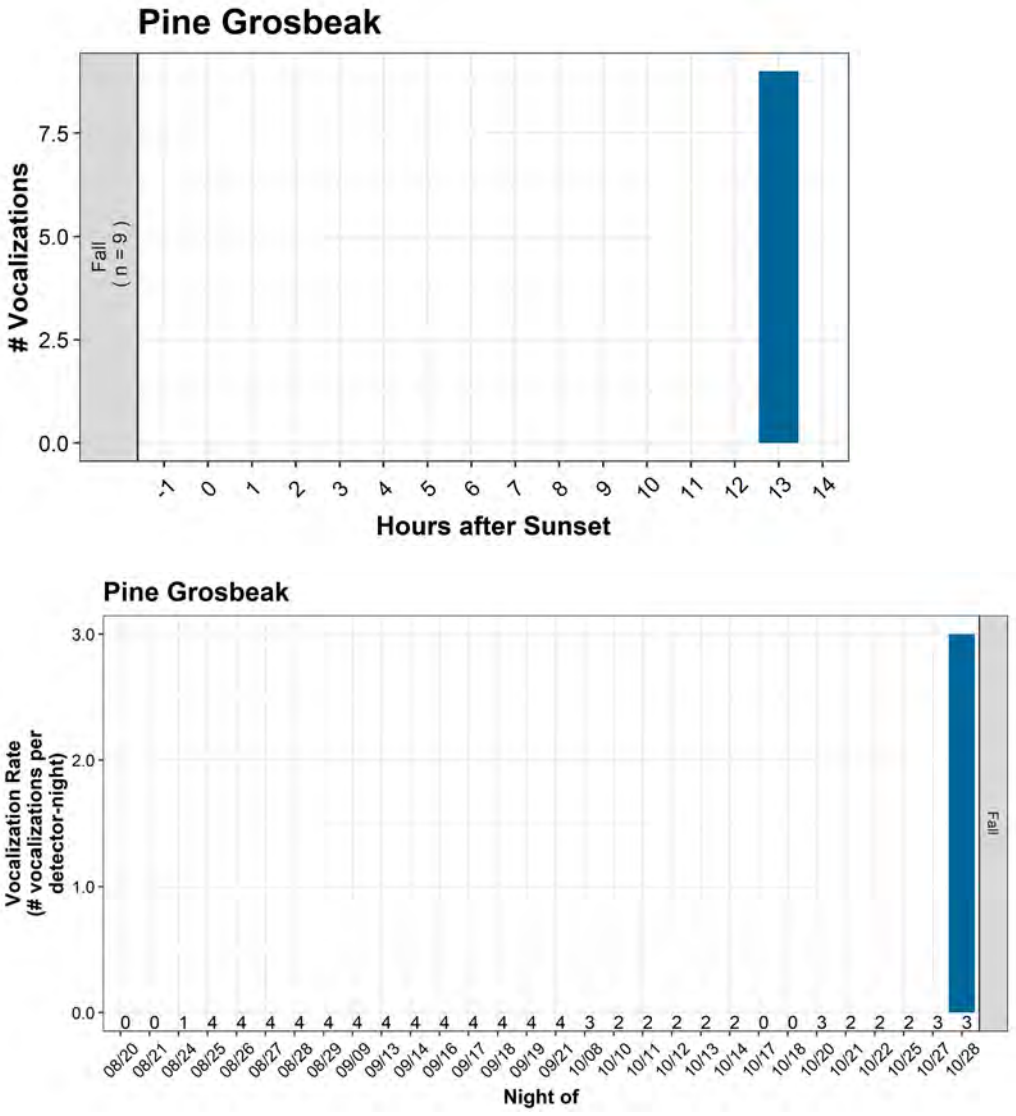
Appendix B Figure 64. Ovenbird – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



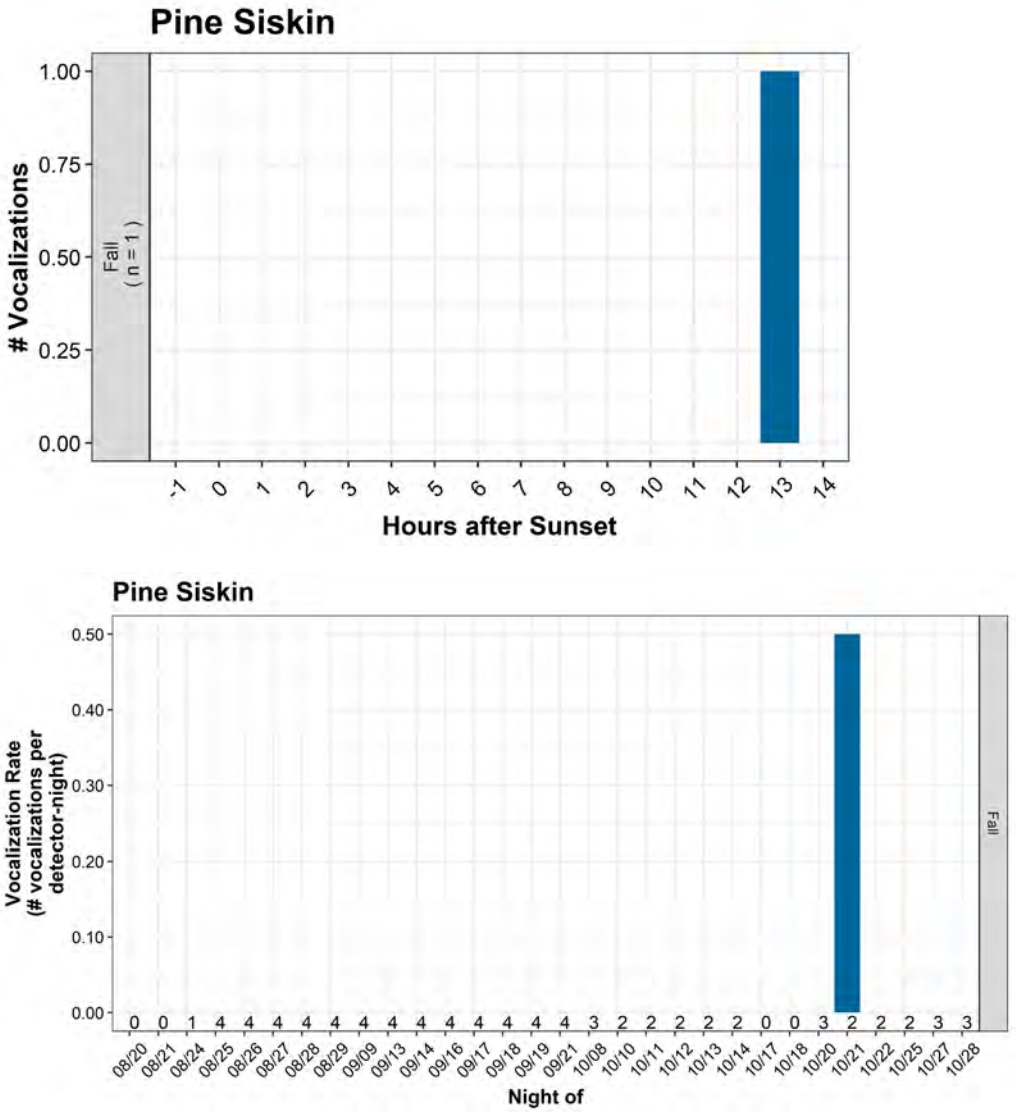
Appendix B Figure 65. Palm Warbler – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



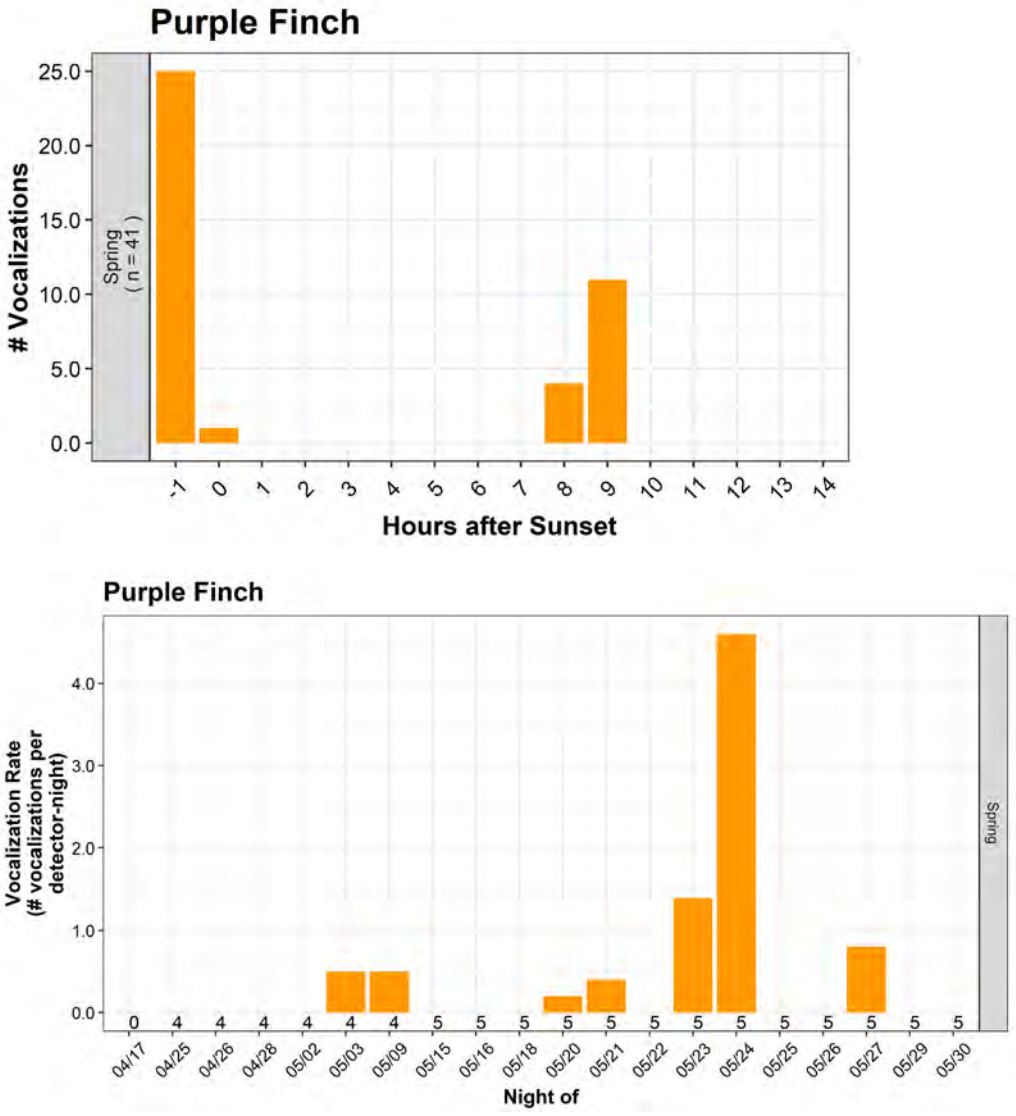
Appendix B Figure 66. Pileated Woodpecker – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



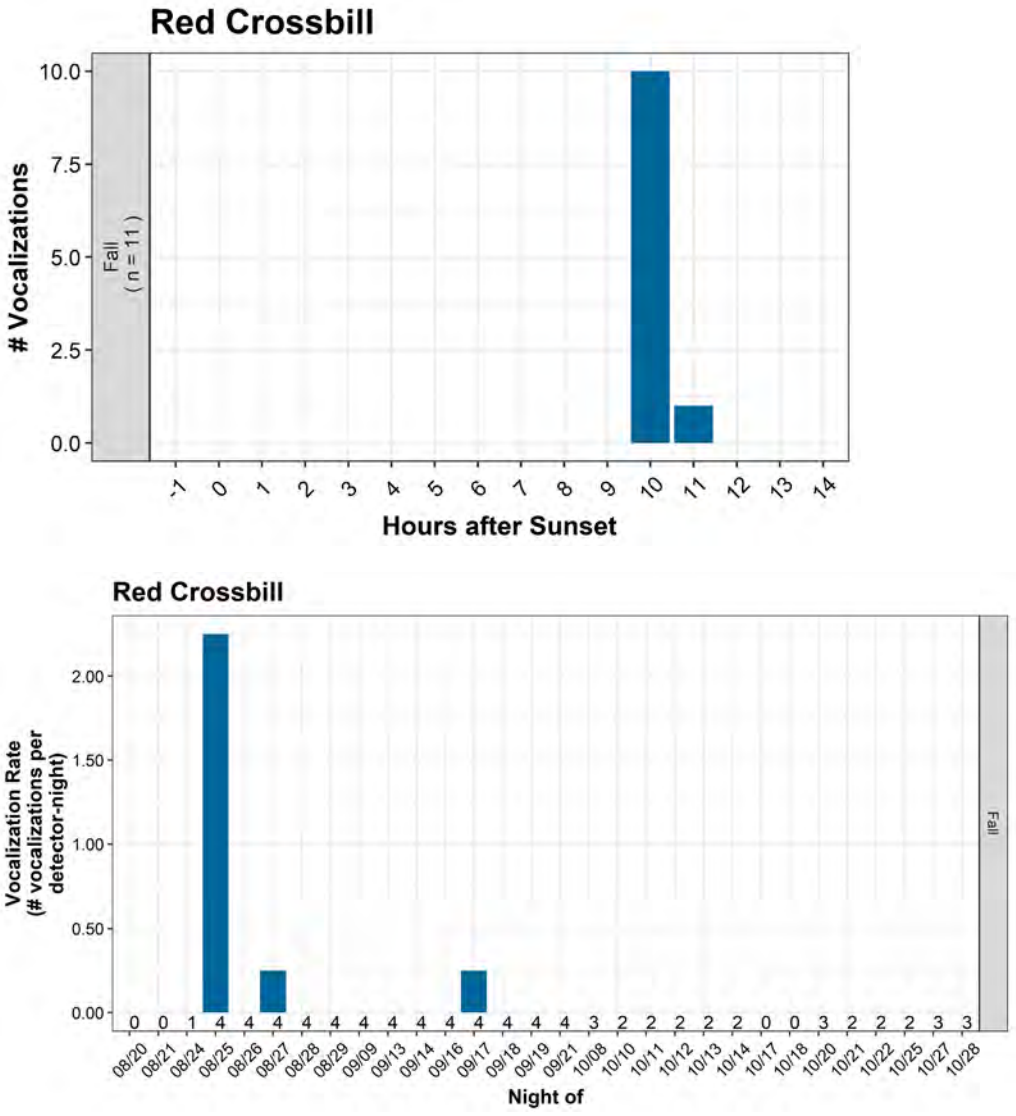
Appendix B Figure 67. Pine Grosbeak – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in fall)



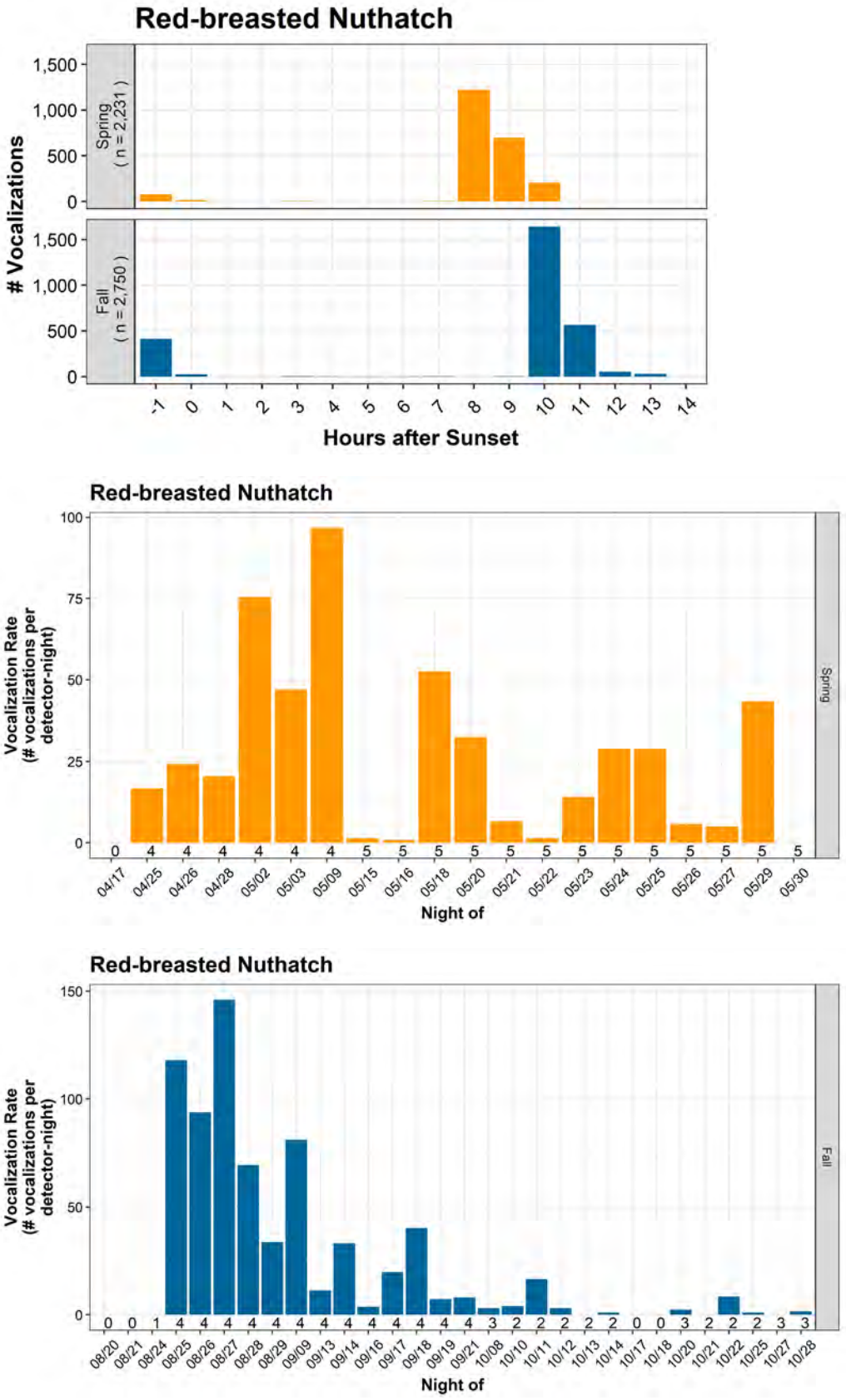
Appendix B Figure 68. Pine Siskin – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in fall)



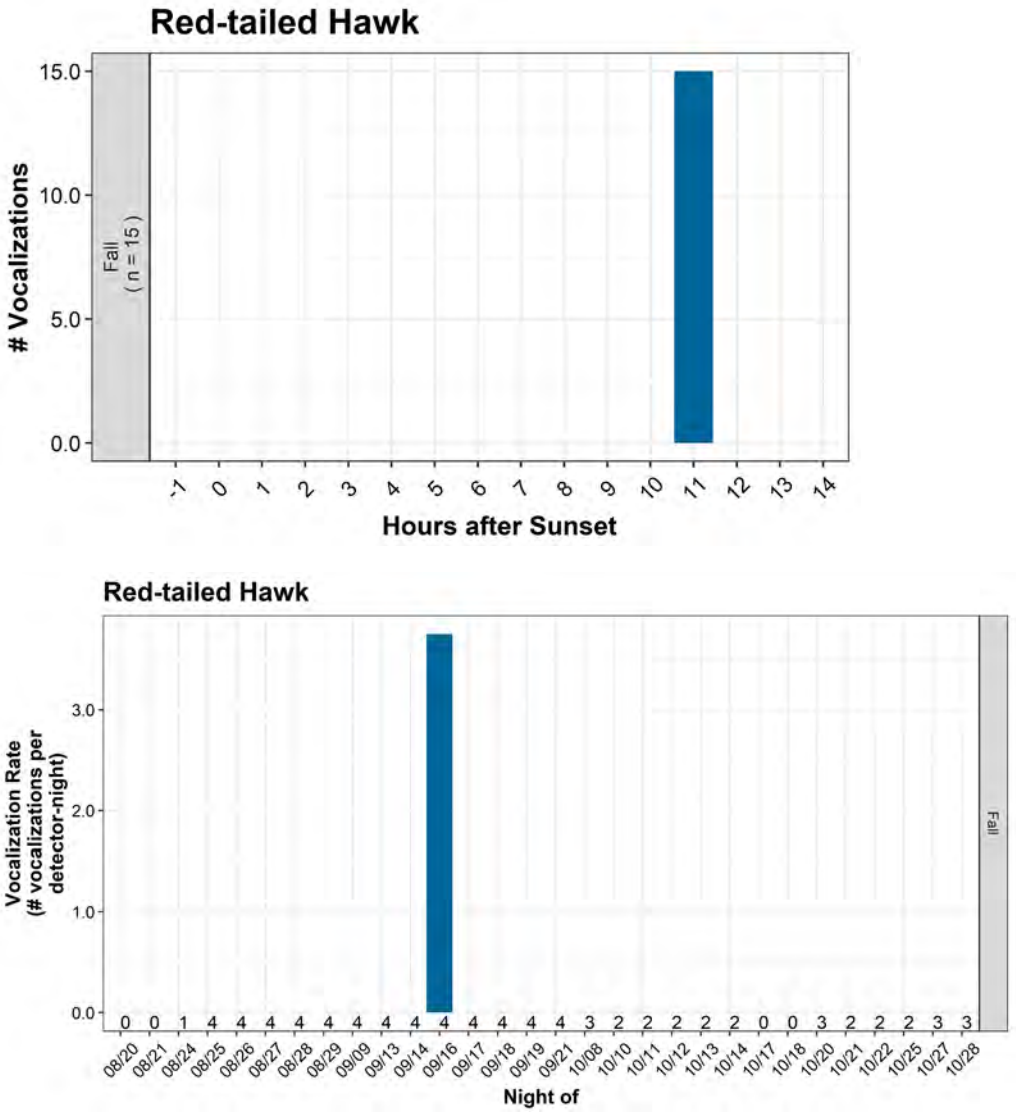
Appendix B Figure 69. Purple Finch – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



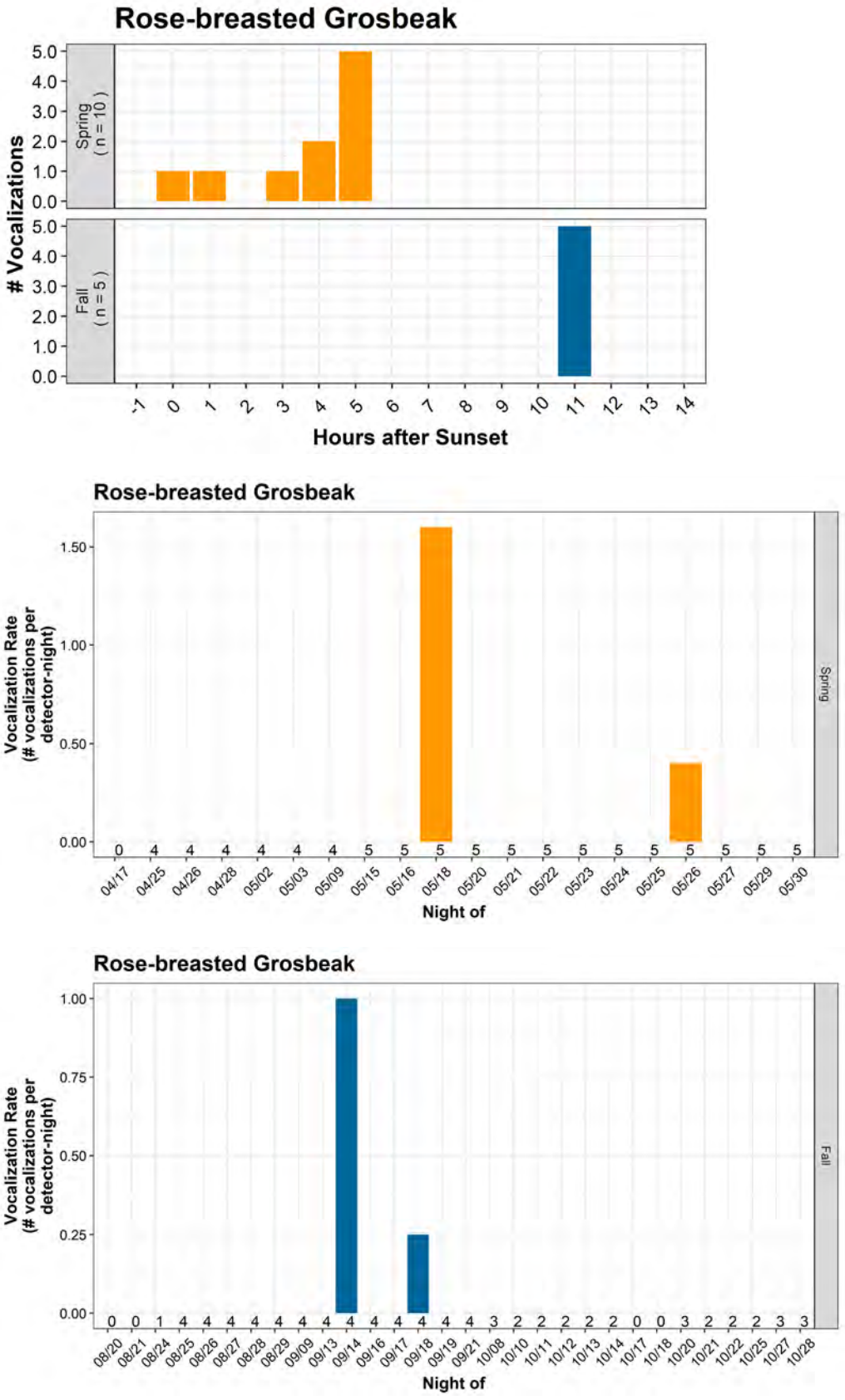
Appendix B Figure 70. Red Crossbill – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in fall)



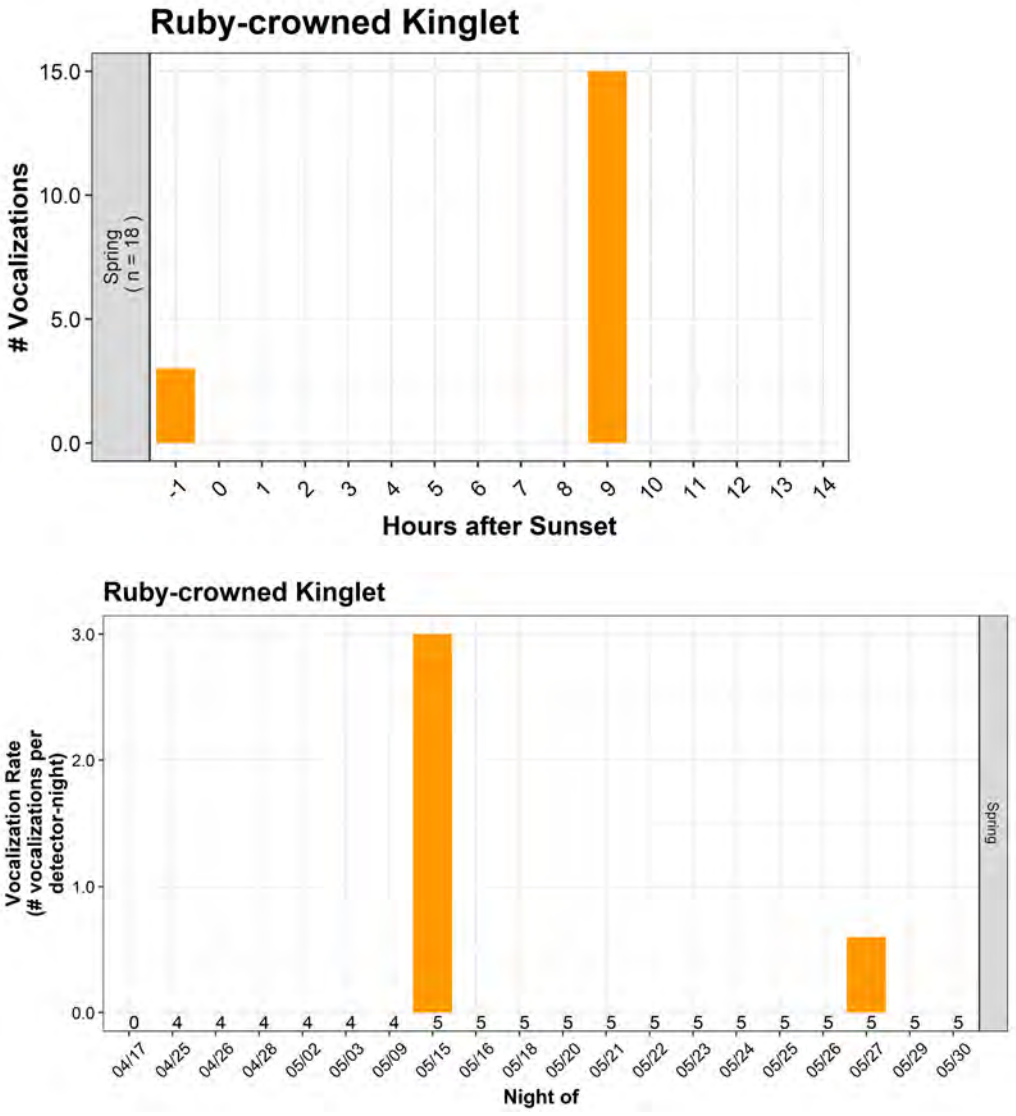
Appendix B Figure 71. Red-breasted Nuthatch – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



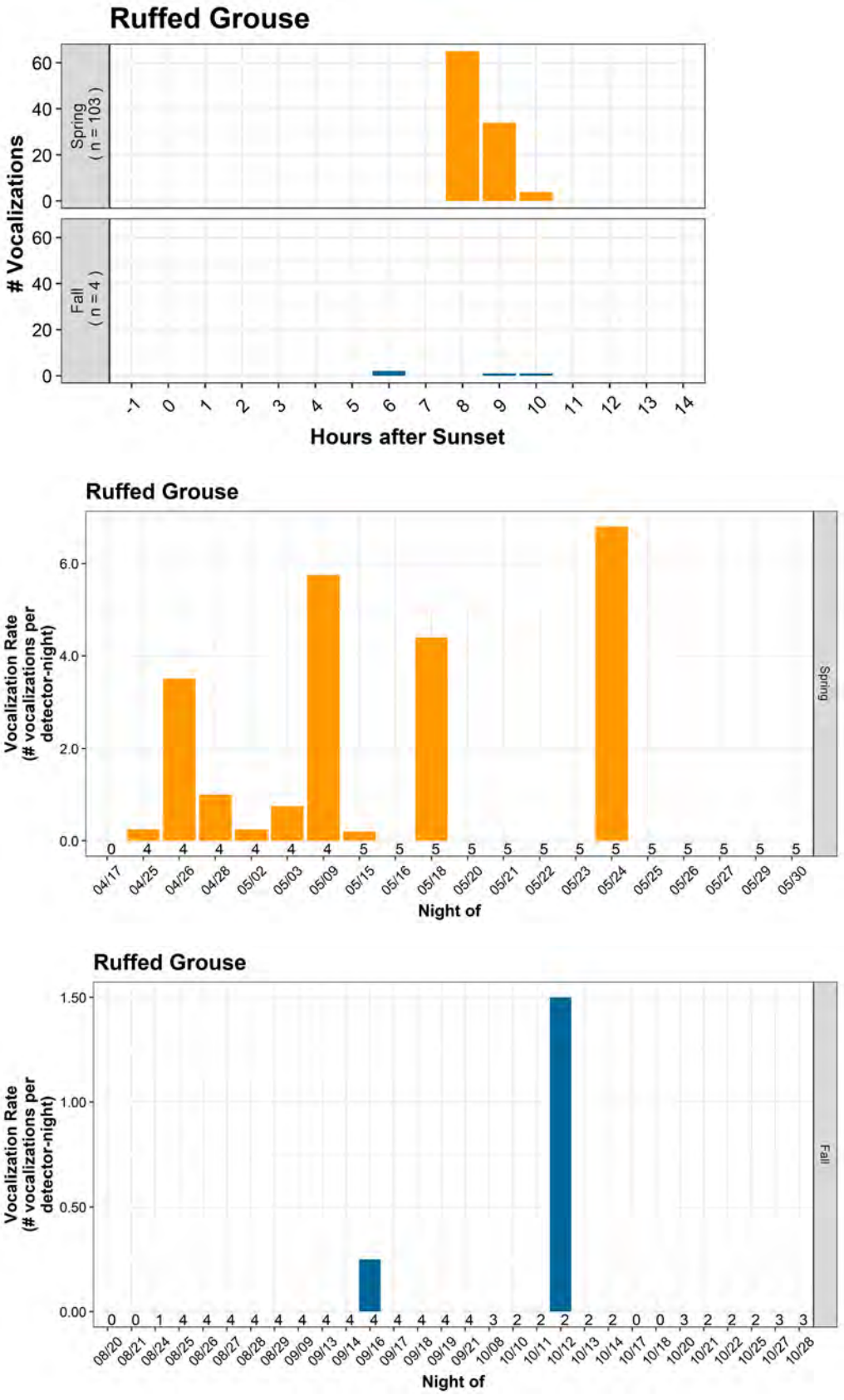
Appendix B Figure 72. Red-tailed Hawk – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in fall)



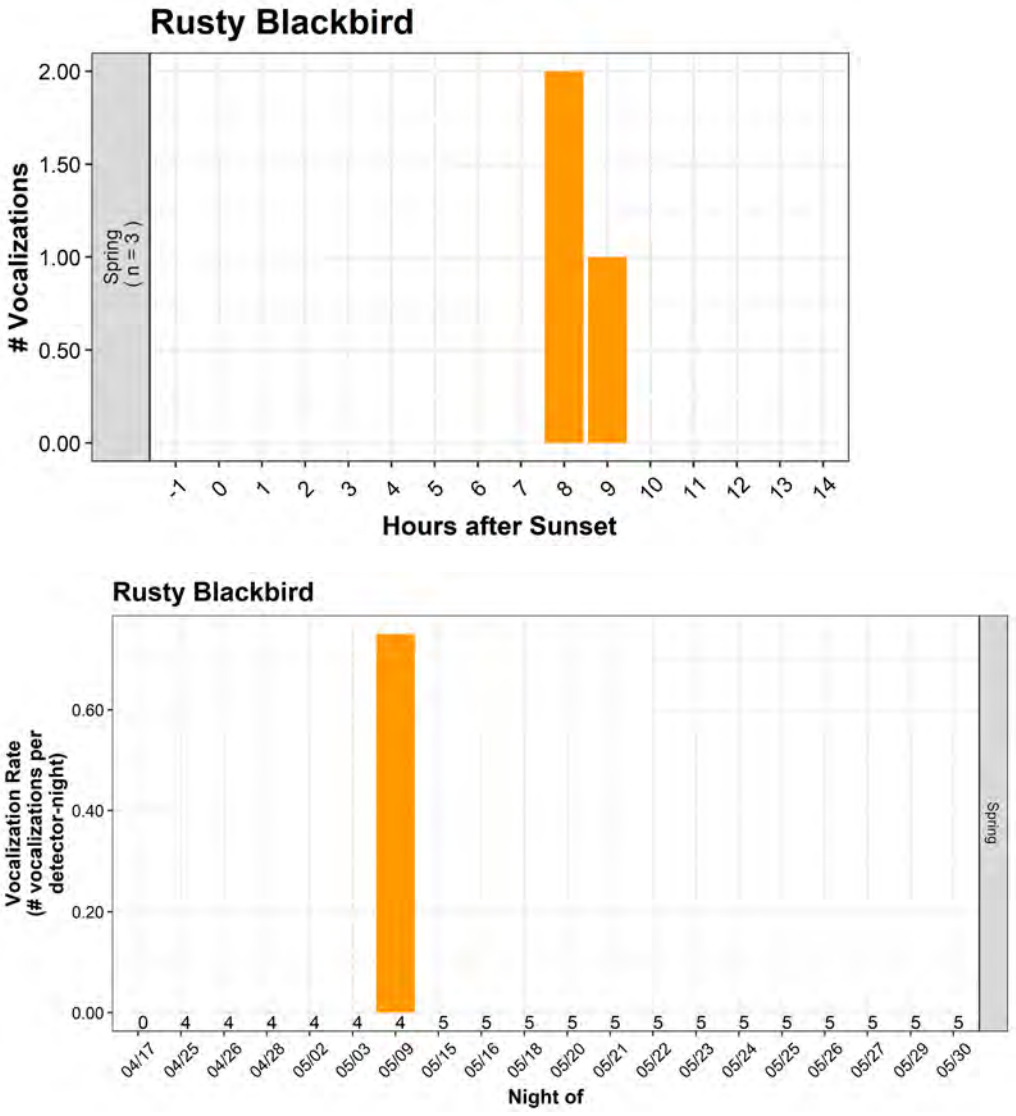
Appendix B Figure 73. Rose-breasted Grosbeak – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



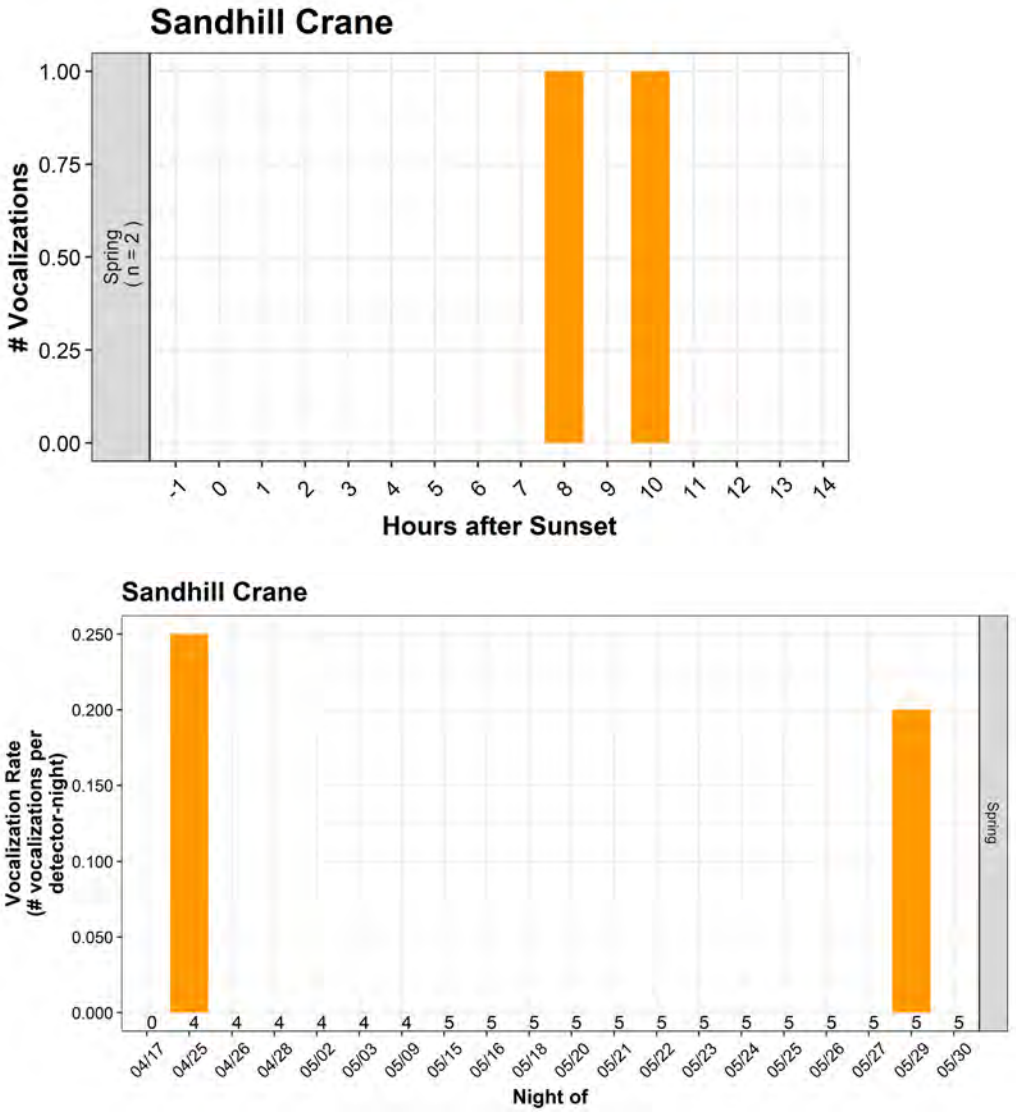
Appendix B Figure 74. Ruby-crowned Kinglet – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



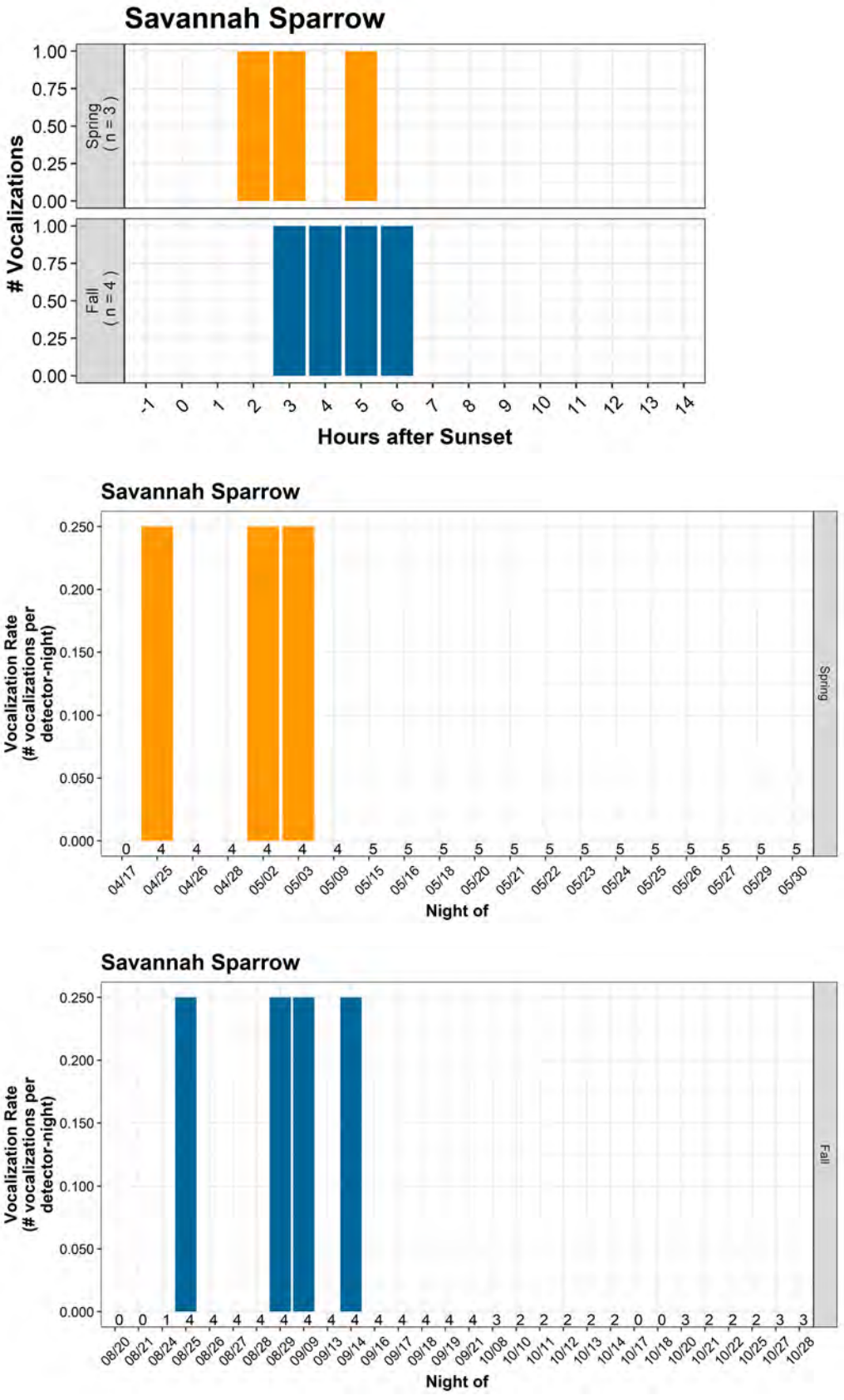
Appendix B Figure 75. Ruffed Grouse – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



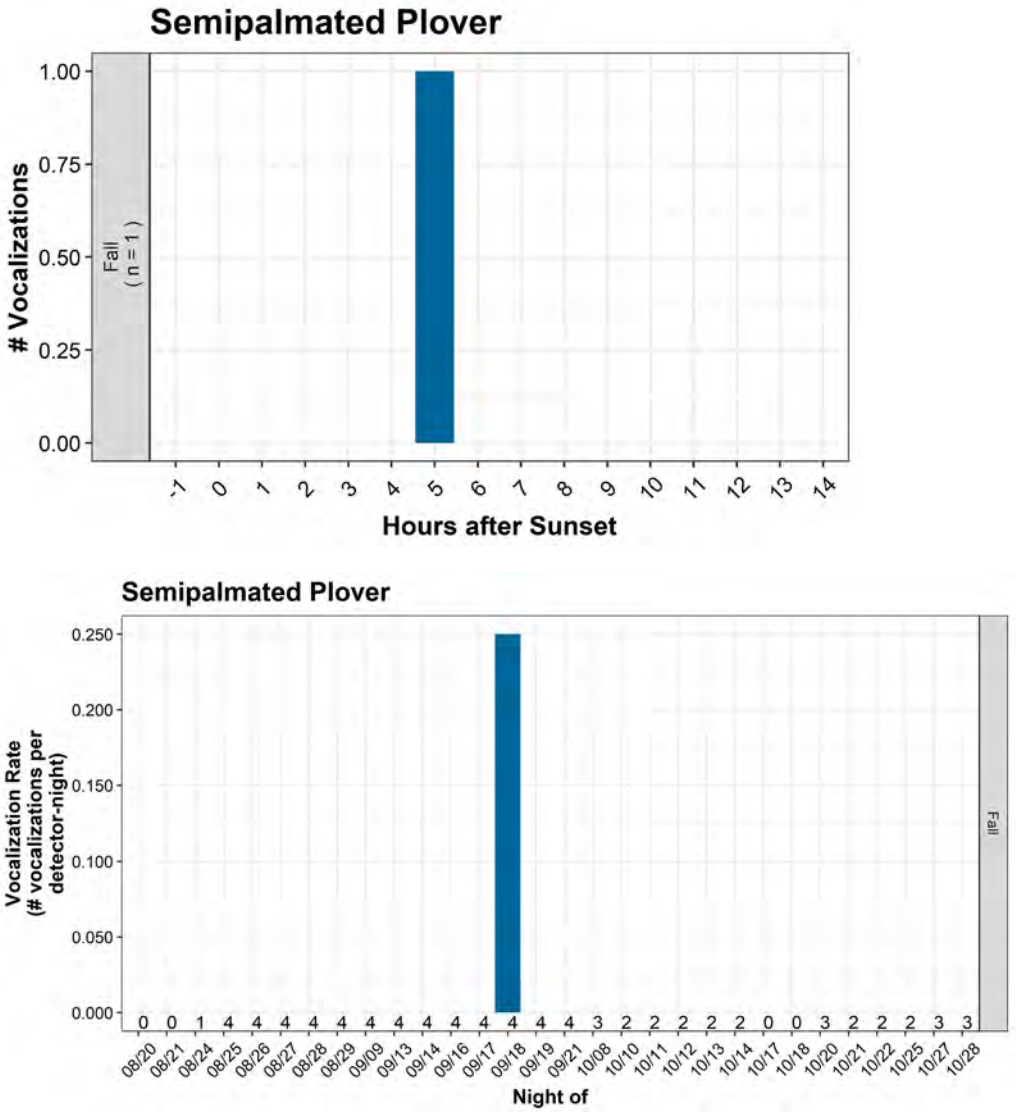
Appendix B Figure 76. Rusty Blackbird – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



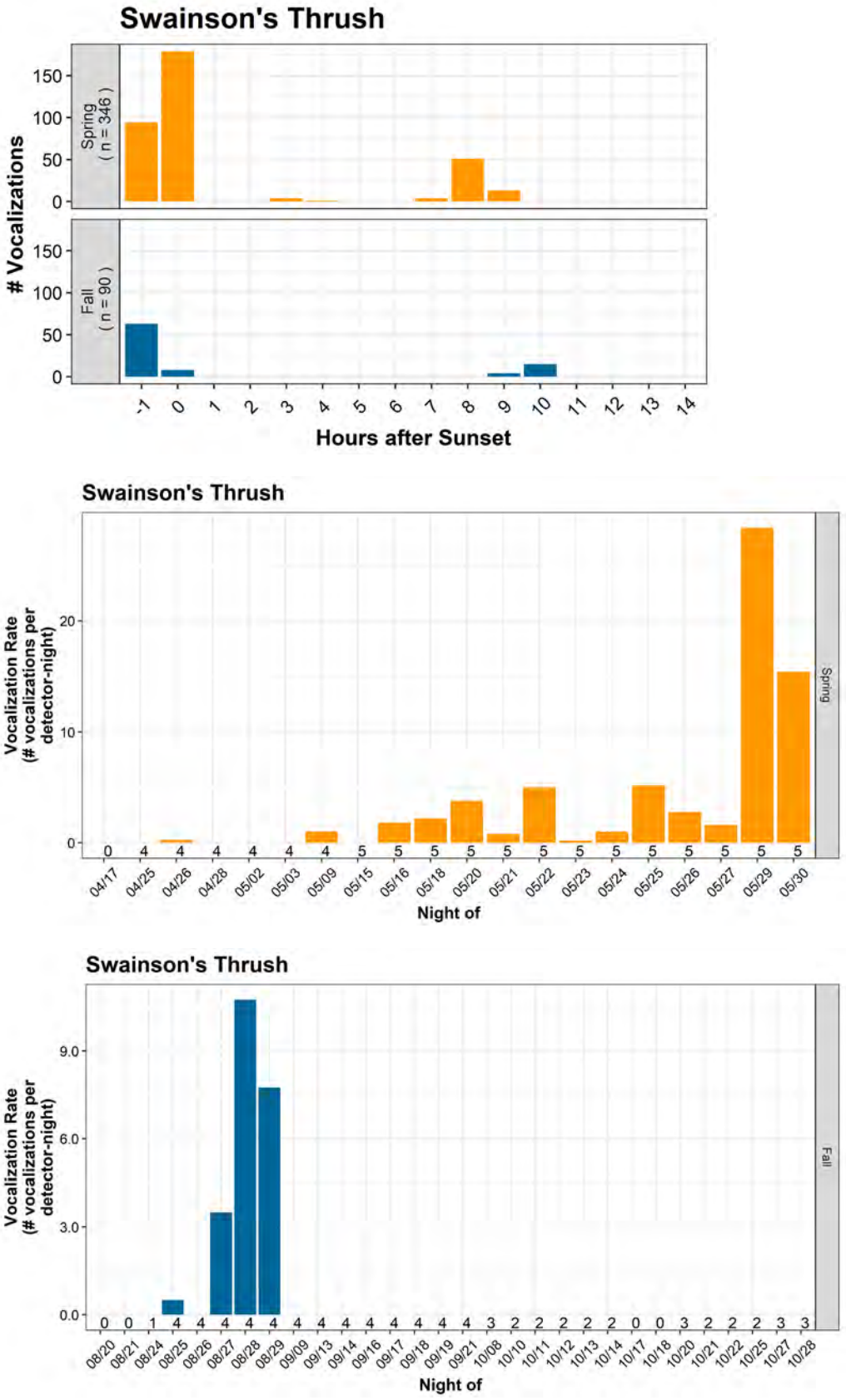
Appendix B Figure 77. Sandhill Crane – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



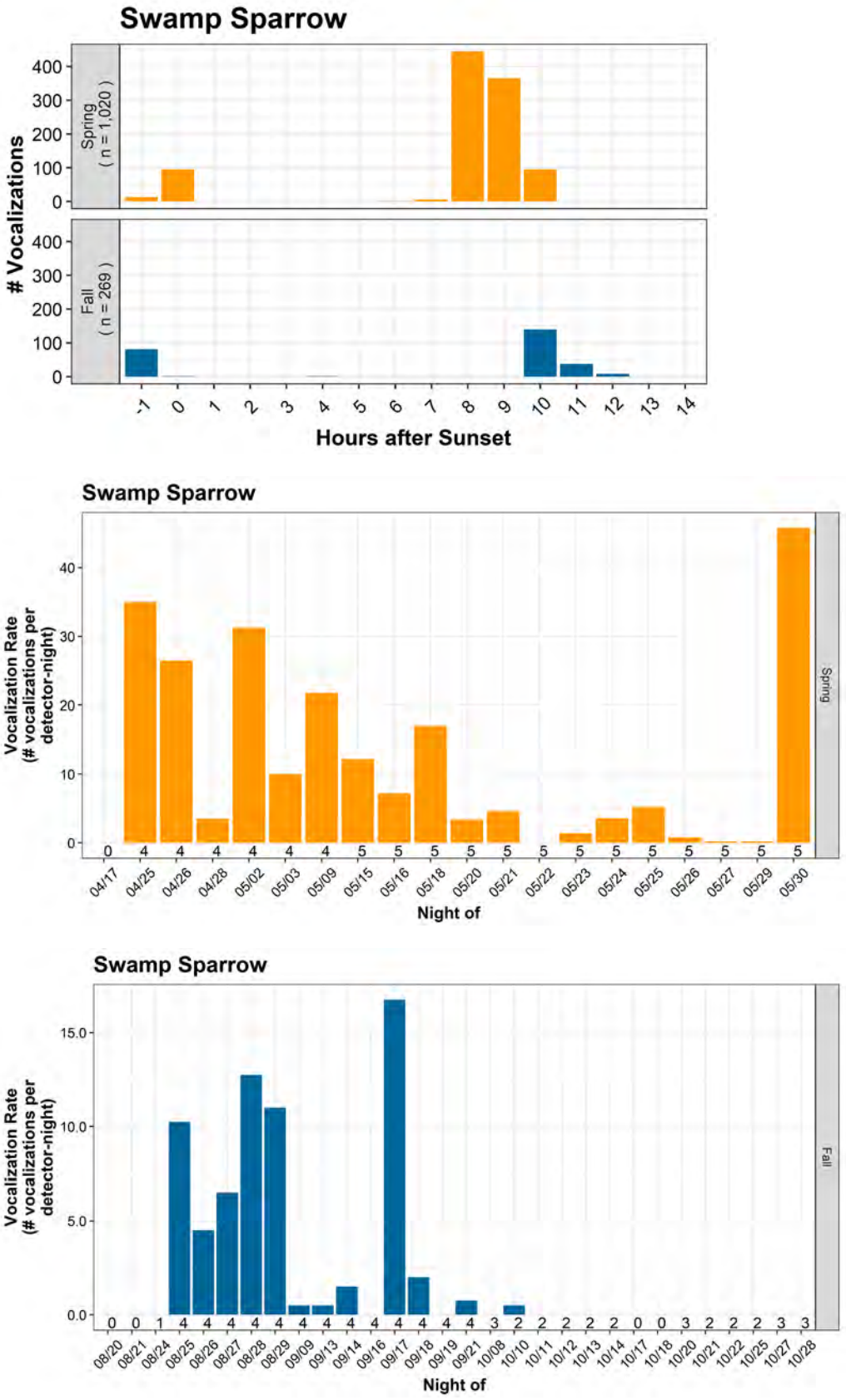
Appendix B Figure 78. Savannah Sparrow – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



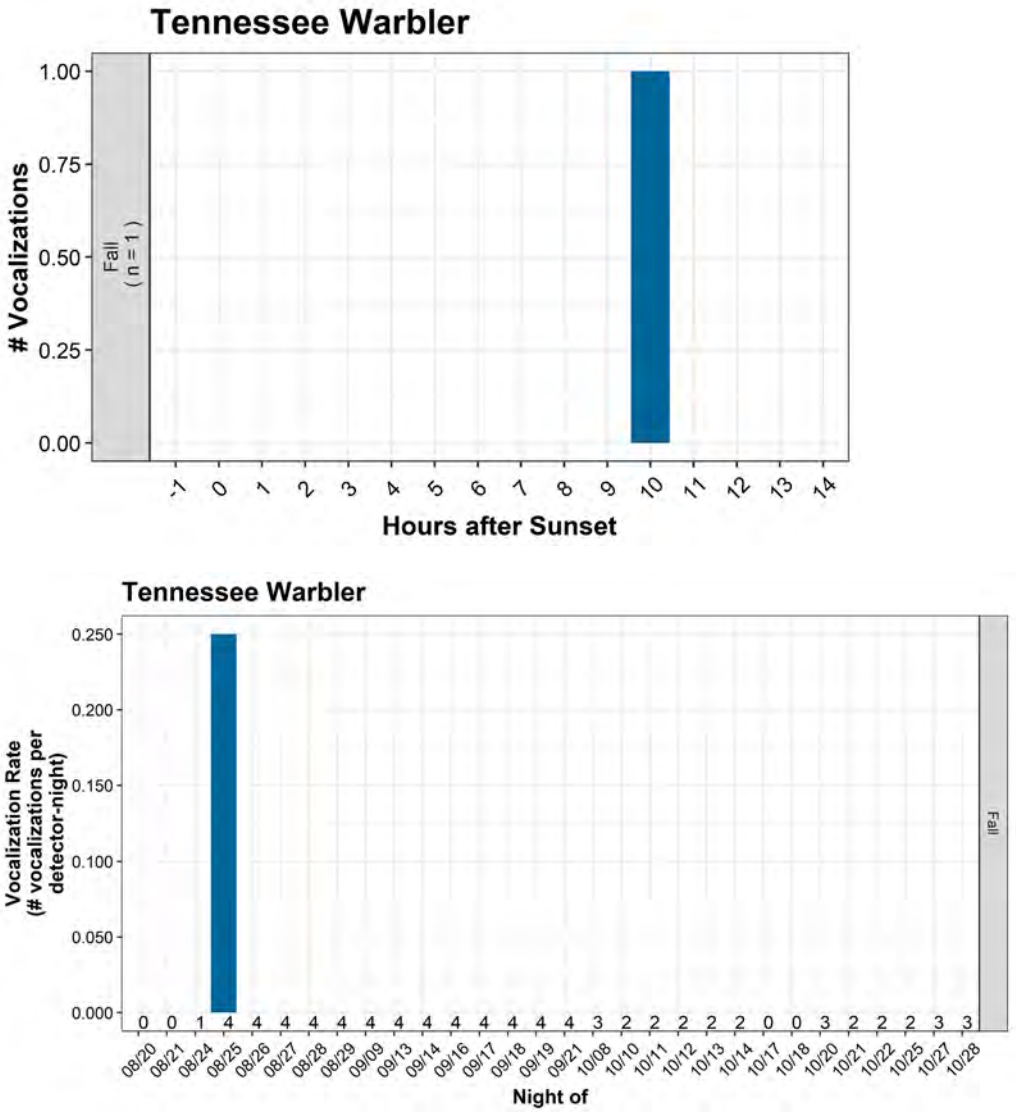
Appendix B Figure 79. Semipalmated Plover– Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in fall)



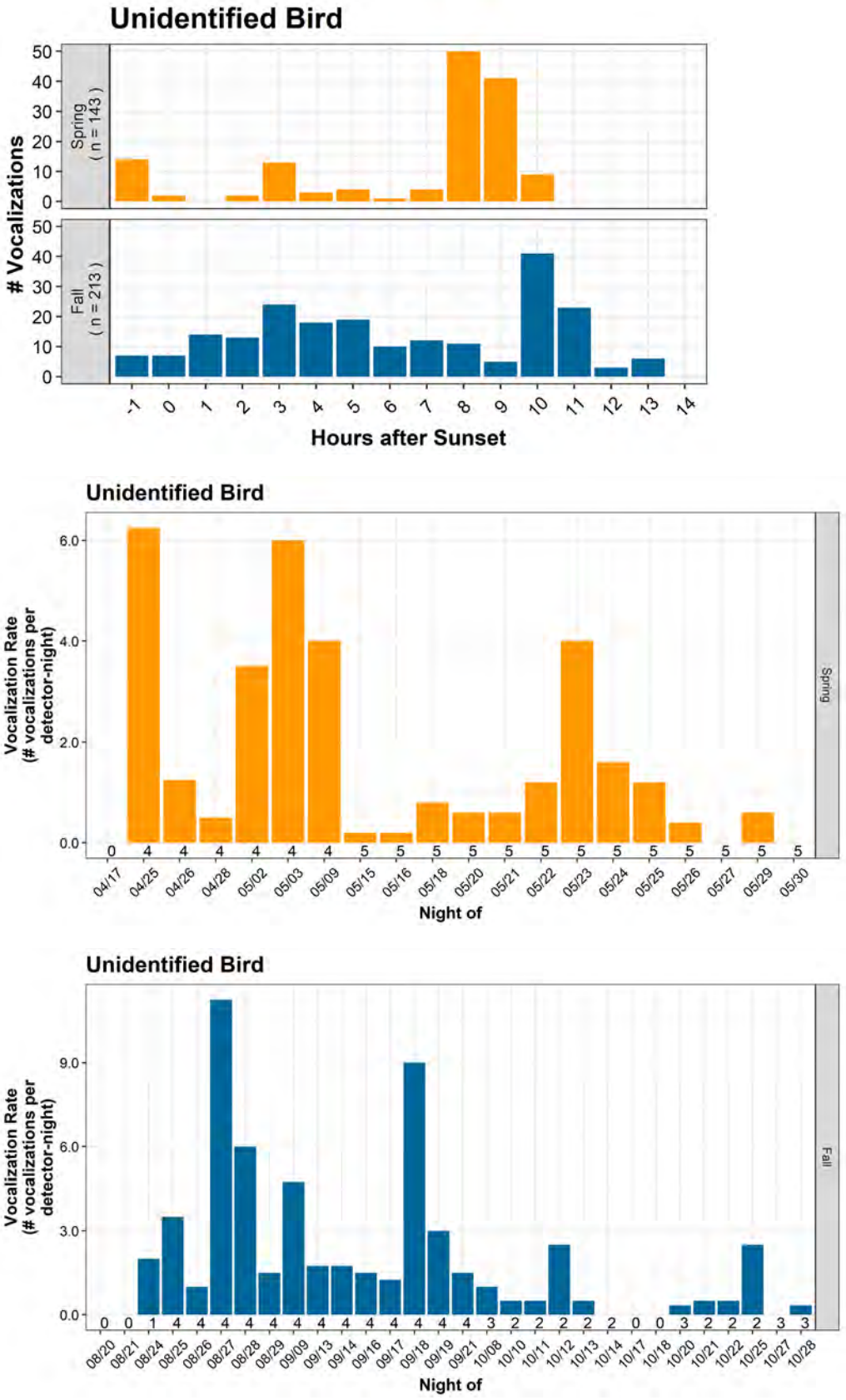
Appendix B Figure 80. Swainson's Thrush – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



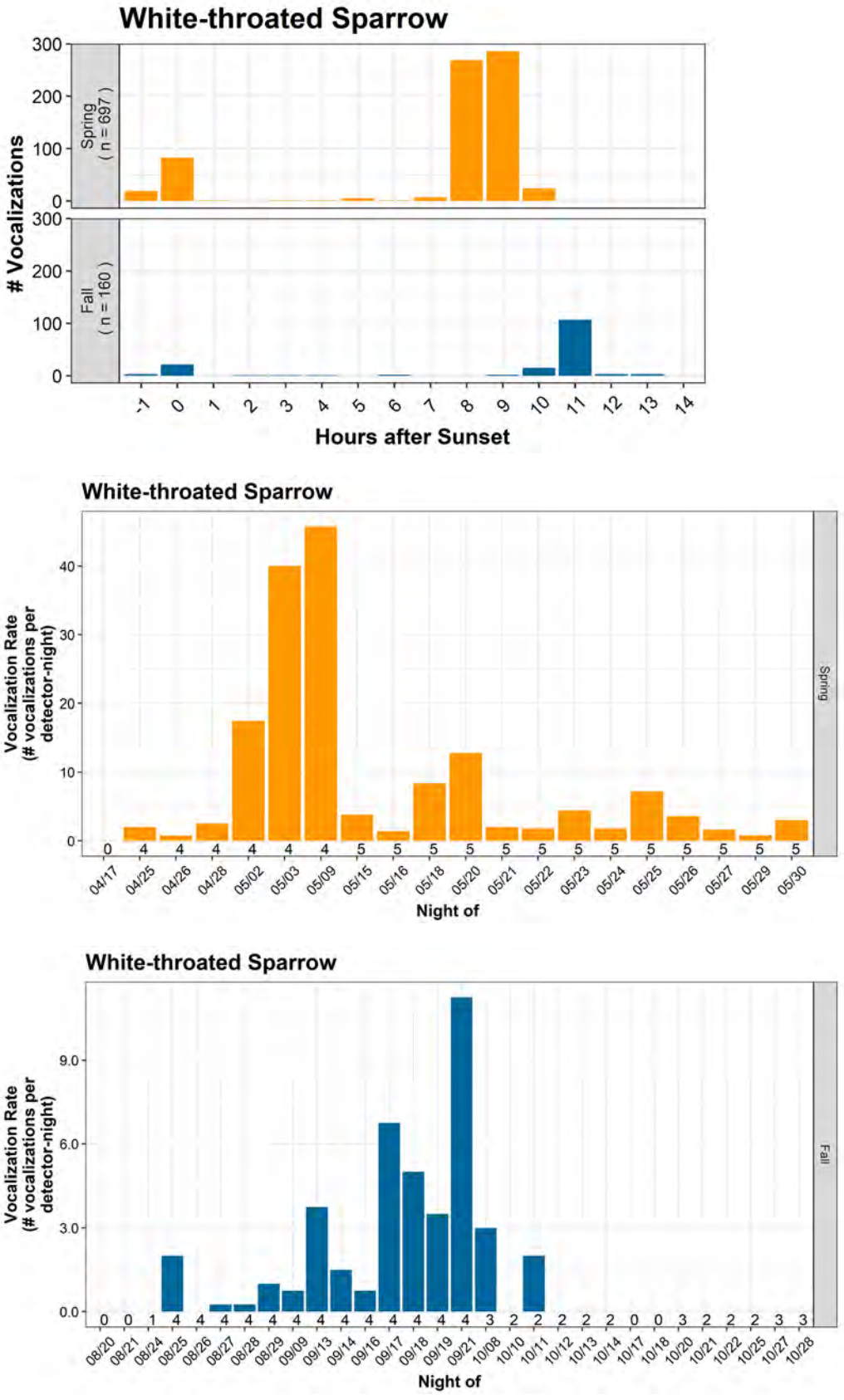
Appendix B Figure 81. Swamp Sparrow – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



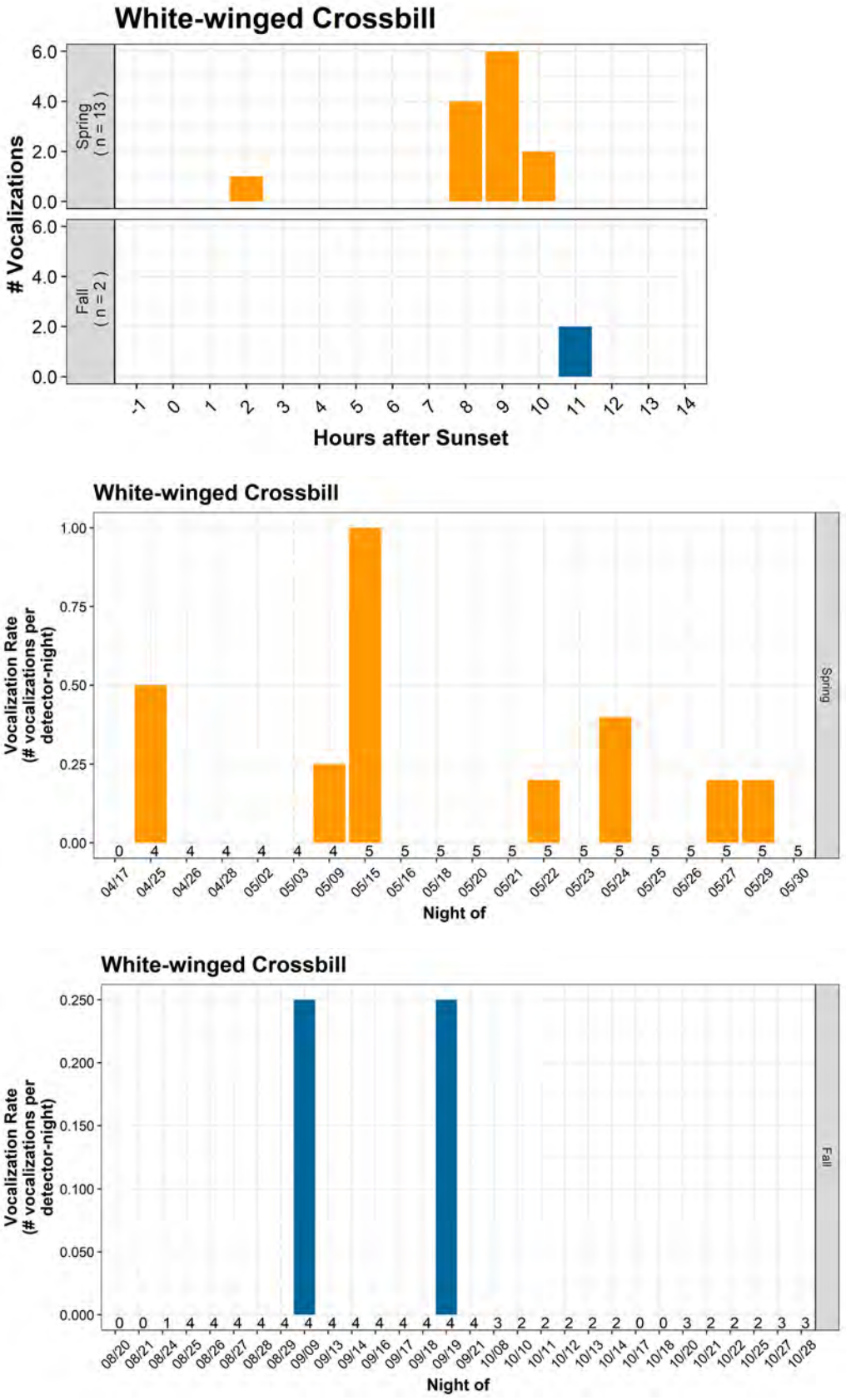
Appendix B Figure 82. Tennessee Warbler – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in fall)



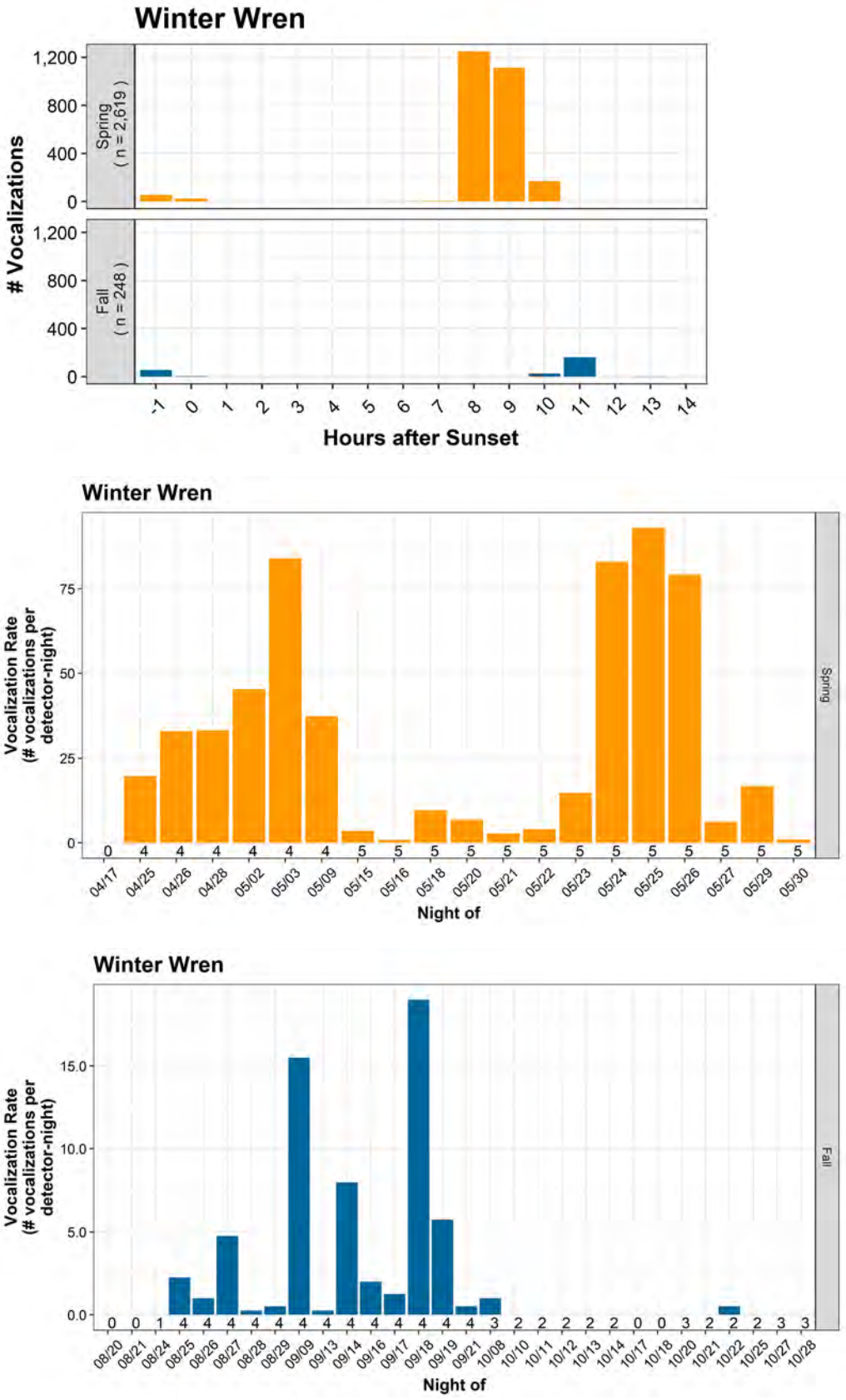
Appendix B Figure 83. Unidentified Bird – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



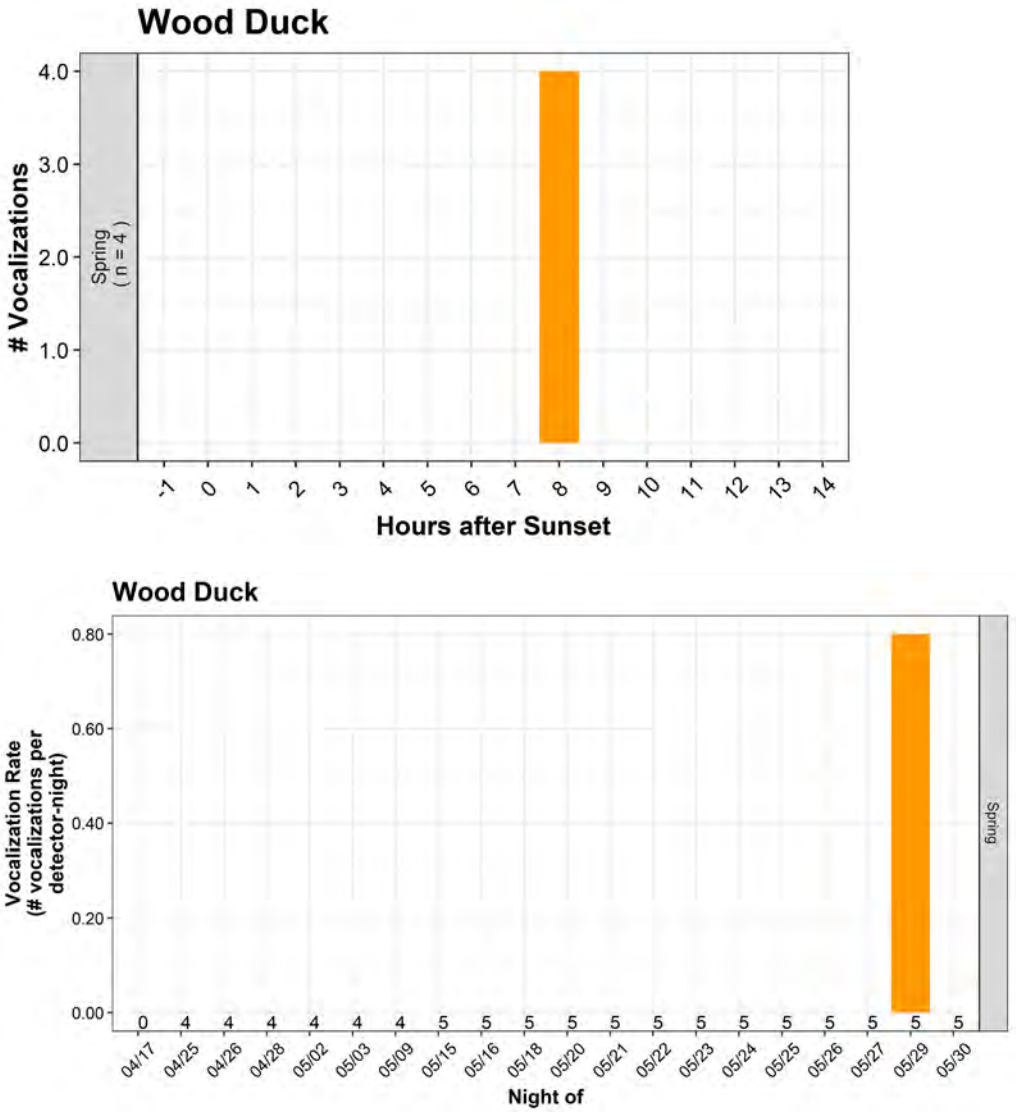
Appendix B Figure 84. White-throated Sparrow – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



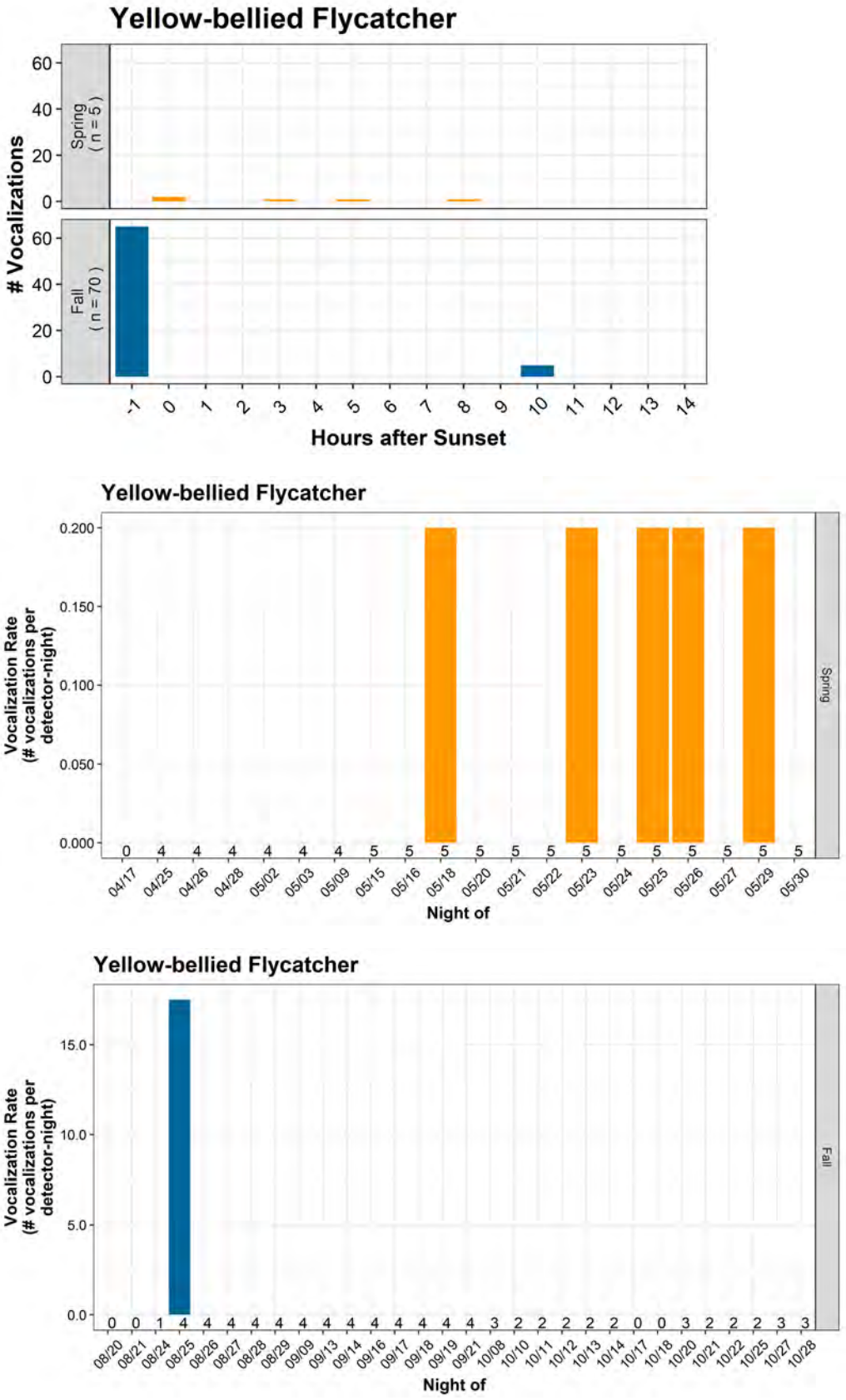
Appendix B Figure 85. White-winged Crossbill – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



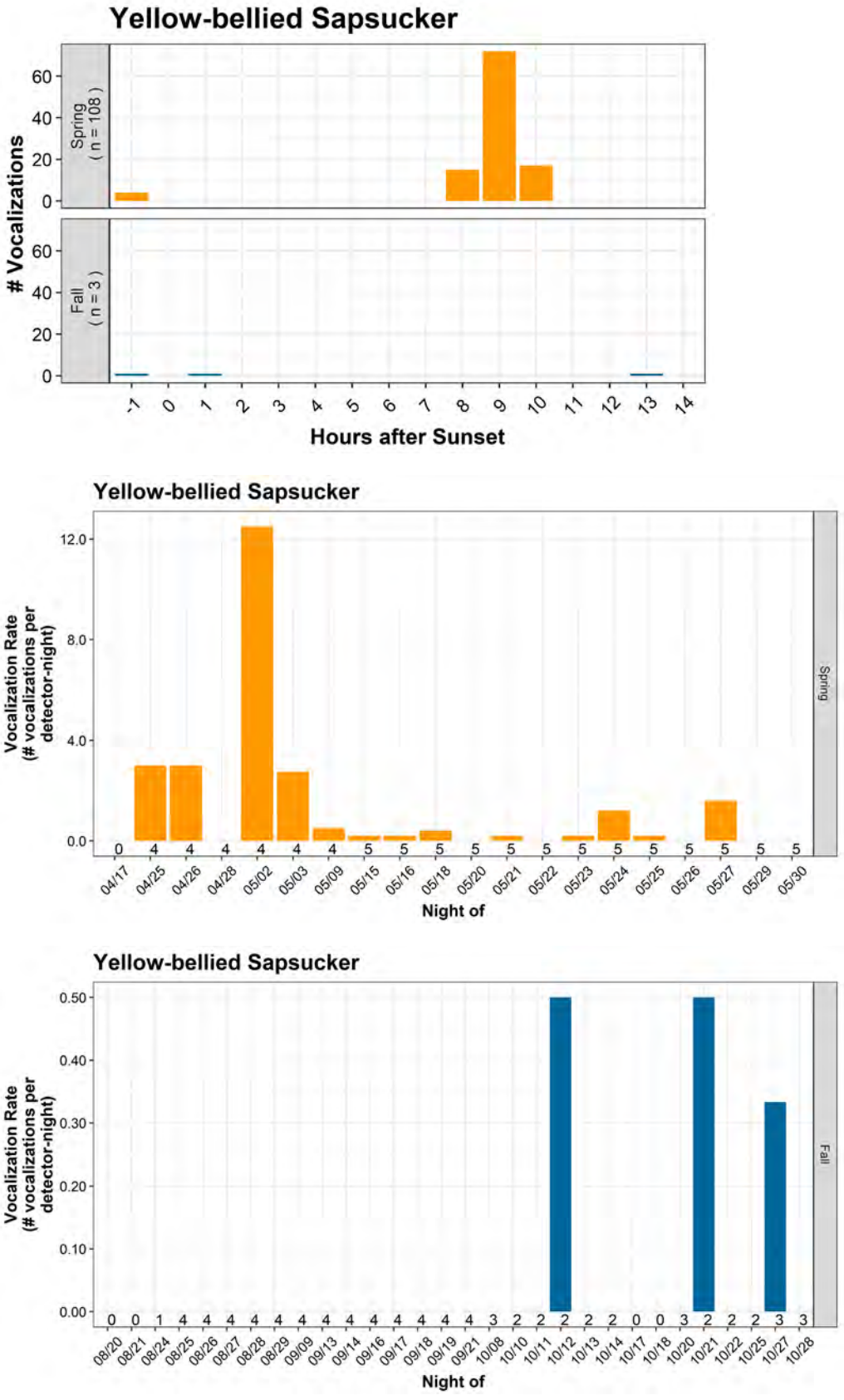
Appendix B Figure 86. Winter Wren – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



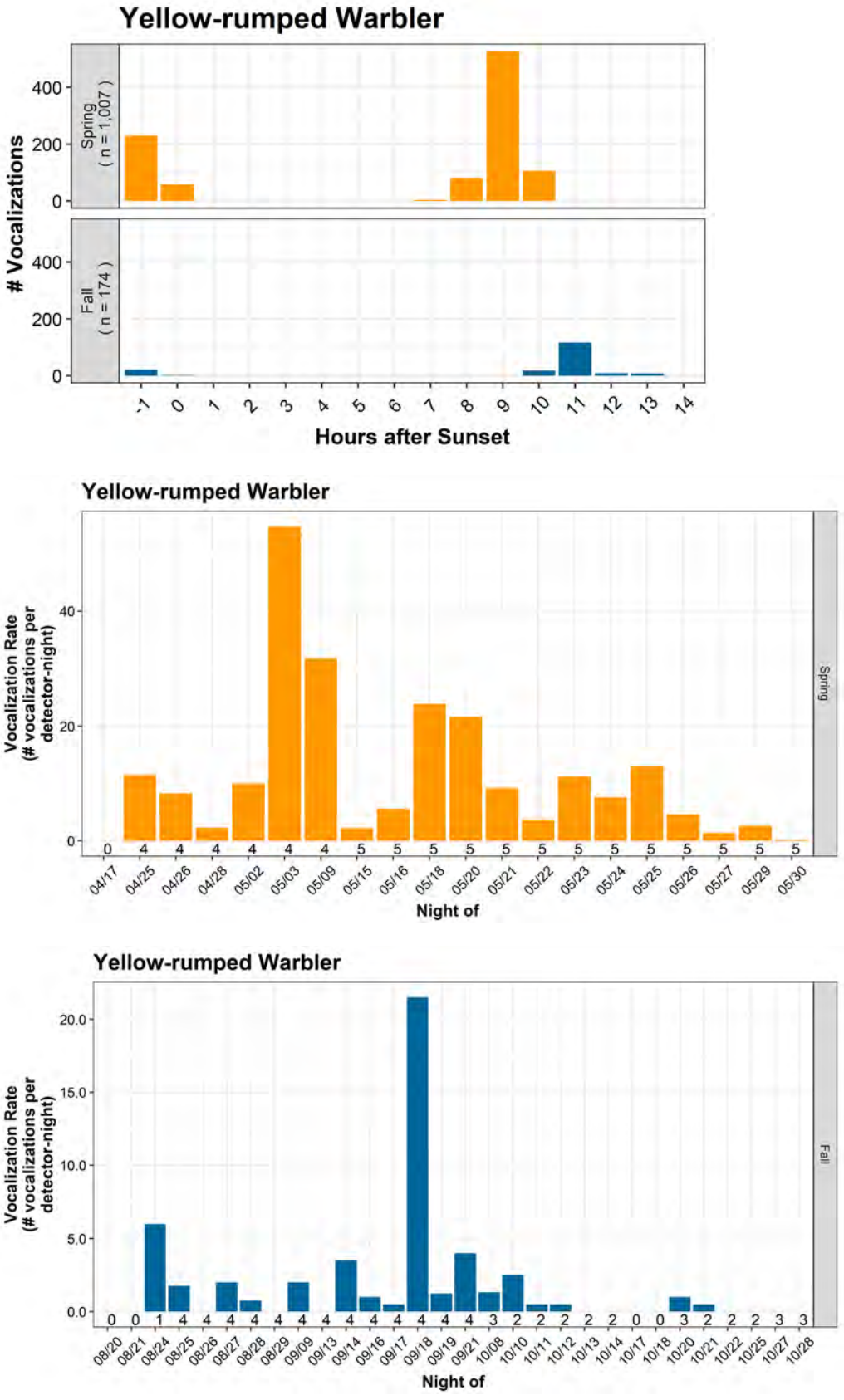
Appendix B Figure 87. Wood Duck – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys (only observed in spring)



Appendix B Figure 88. Yellow-bellied Flycatcher – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



Appendix B Figure 89. Yellow-bellied Sapsucker – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys



Appendix B Figure 90. Yellow-rumped Warbler – Acoustic Results by Time of Day and Date During Spring and Fall 2022 Avian Acoustic Surveys