Breeding Bird Surveys for the Rocky Forge Wind Project Botetourt County, Virginia

Final Report

May – June 2015

Prepared by:

Karen Tyrell, PhD

Western EcoSystems Technology, Inc.
8406 Wood Road
Corryton, Tennessee 37721

January 28, 2016

EXECUTIVE SUMMARY

This report presents the results of the 2015 breeding bird surveys (BBSs) conducted by Western EcoSystems Technology, Inc. (WEST) for the proposed Rocky Forge Wind Project (Project) located in Botetourt County, Virginia. The breeding bird surveys were conducted within the identified disturbance zone (referred to herein as the BBS assessment area) and consisted of two parts: a general point count survey, and audio playback and visual surveys for Tier I or Tier II Species of Greatest Conservation Need (SGCN) determined to have suitable habitat within the BBS assessment area. The objectives of the surveys were to identify federal or state threatened and endangered bird species and Tier I and Tier II bird SGCN during the species' annual breeding season.

Point count surveys were conducted three times between May 17 and June 30, 2015 at 30 points per survey, for a total of 90 point surveys. A total of 60 species (610 observations) were recorded during the point count surveys. Six species (10% of all species) composed 44.1% of bird observations: red-eyed vireo (*Vireo olivaceus*), indigo bunting (*Passerina cyanea*), eastern towhee (*Pipilo erythrophthalmus*), ovenbird (*Seiurus aurocapilla*), blue-headed vireo (*Vireo solitaries)*, and eastern wood-pewee (*Contopus vierns*). One Tier II SCGN species (Cerulean warbler, *Setophaga cerulea*) and seven Tier IV species (eastern towhee; eastern wood-pewee; wood thrush [*Hylocichla mustelina*]; black-and-white warbler [*Mniotilta varia*]; field sparrow [*Spizella pusilla*]; Canada warbler [*Cardellina Canadensis*]; and gray catbird [*Dumetella carolinensis*]) were recorded. Mean use for all bird species combined ranged from 2.0 to 9.0 birds/point/survey. Passerines had the highest mean use estimates compared to other bird types. Mean use by other bird type or subtype was below 2.67 birds/point/survey at all points.

A pedestrian survey was conducted between June 7 and June 13, 2015 to identify potentially suitable breeding habitat within or near the BBS assessment area for two Tier I SGCN species (golden-winged warbler [*Vermivora chrysoptera]* and loggerhead shrike [*Lanius ludovicianus*]) and three Tier II SGCN species (northern saw-whet owl [*Aegolius acadicus]*, Swainson's warbler [*Limnothlypis swainsoni]*, and peregrine falcon [*Falco peregrinus])*. Three areas were identified as having potentially suitable habitat for nesting and foraging loggerhead shrike; four areas were found to have potentially suitable habitat for Swainson's warbler, and five areas were found to have potentially suitable habitat for golden-winged warbler. Potentially suitable breeding habitat for northern saw-whet owl occurred Project-wide. No rocky outcrops suitable for nesting peregrine falcons were detected.

Species-specific surveys were conducted to evaluate the presence of breeding golden-winged warbler, northern saw-whet owl, Swainson's warbler, and loggerhead shrike within the identified potentially suitable habitat. No golden-winged warbler, loggerhead shrike, or northern saw-whet owl were detected; however, a Swainson's warbler call was heard multiple times at one survey location.

Results of these surveys indicate that impact to breeding birds within the BBS assessment area is likely to be low and comparable to other Appalachian ridgeline wind energy projects. No state-listed threatened and endangered bird species were found to occur and few SGCN Tier I or II species were documented at low numbers; therefore, impacts to breeding birds associated with construction and operation of the Project within the BBS assessment area is unlikely to be significant.

STUDY PARTICIPANTS

Western EcoSystems Technology

Karen Tyrell, PhD	Project Manager
Carmen Boyd	Data and Report Manager
Guy DiDonato	Statistician
Kristen Klaphake	GIS Technician
Casi Lathan	Report Compiler
Meghan Lout	Field Supervisor
Sarah Shoemaker	Field Technician
Michael Arnold Lindsay Gedacht	Field Technician
Curtis Hart	Field Technician

Table of Contents

List of Tables

List of Figures

List of Appendices

INTRODUCTION

This report presents the results of the 2015 breeding bird surveys (BBSs) conducted by Western EcoSystems Technology, Inc. (WEST) for the proposed Rocky Forge Wind Project (Project) located in Botetourt County, Virginia. The breeding bird surveys were conducted within the identified disturbance zone (referred to herein as the BBS assessment area) and consisted of two parts: a general point count survey, and audio playback and visual surveys for Tier I or Tier II Species of Greatest Conservation Need (SGCN) determined to have suitable habitat within the BBS assessment area. The objectives of the surveys were to identify federal or state threatened and endangered bird species and Tier I or Tier II bird SGCN occurring within the BBS assessment area during the species' annual breeding season, in accordance with the Virginia Administrative Code Title 9, Agency 15, Chapter 40 Small Renewable Energy Projects (Wind) Permit by Rule (PBR) 9VAC15-40-40 *Analysis of the Beneficial and Adverse Impacts on Natural Resources* (http://law.lis.virginia.gov/admincode/title9/agency15/chapter40/section40/).

PROJECT AREA

The Project is located approximately thirty miles (48 kilometers [km]) northeast of the city of Roanoke (Figure 1) within the Ridge and Valley Ecoregion, an area characterized by alternating forested ridges and agricultural valleys (USEPA 2013). The Project landscape is typified by steep ridgelines running approximately north-south, with peaks reaching approximately 3,200 feet ([ft]; 893 meters [m]). The region is dominated by hardwood forest, with few small wetlands and high gradient mountain streams. The proposed Project includes installation of up to 25 wind turbine generators to be located along a ridgeline, access roads, electrical collection lines, and a substation and laydown yard at the base of the ridgeline.

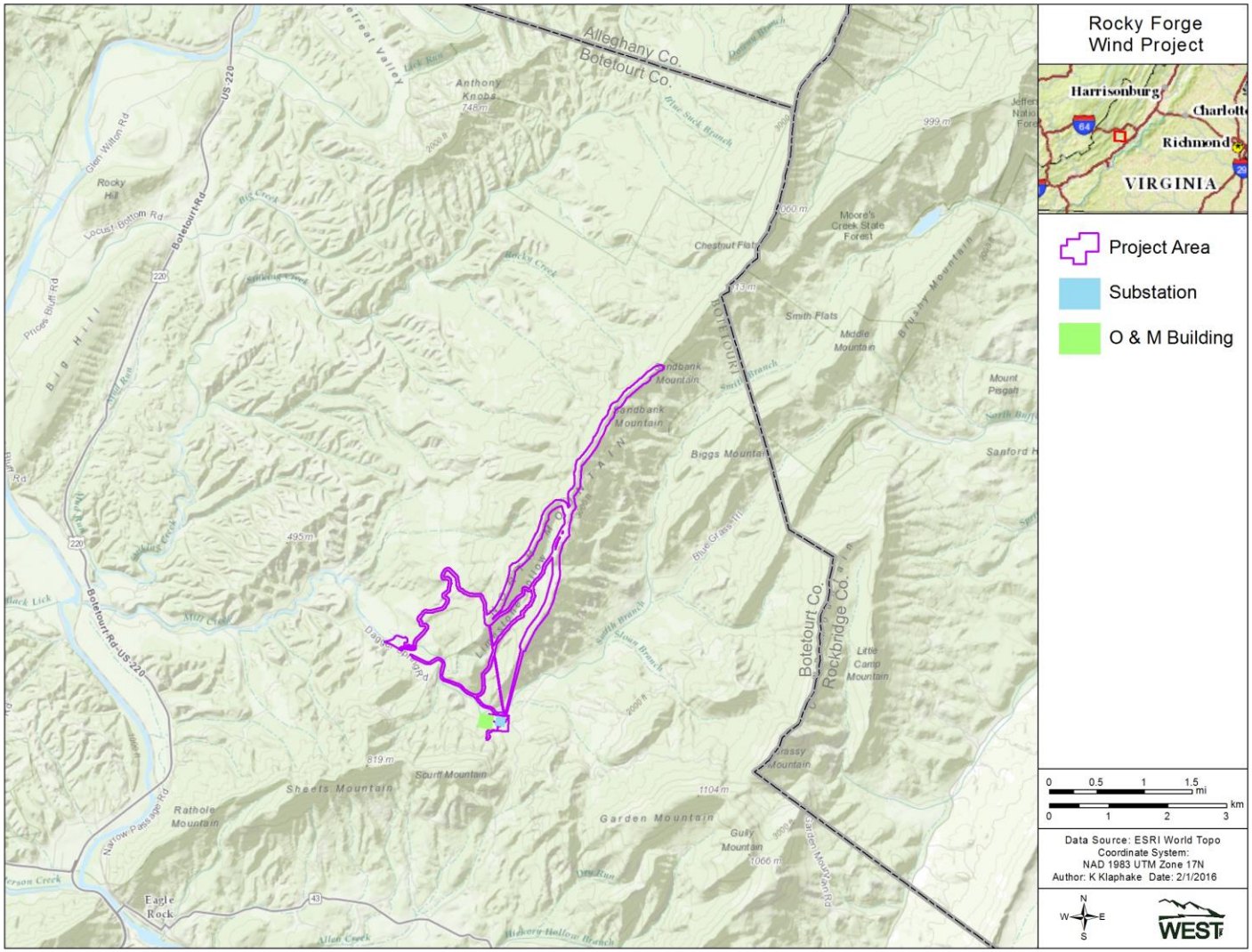


Figure 1. Rocky Forge Wind Project area.

METHODS

Breeding bird surveys were conducted within the identified BBS assessment area (Figures 2, 3). The Project area was later revised to include an extension of the ridgeline as shown in Figure 2.

General Breeding Bird Surveys

In accordance with the Virginia PBR Guidance REW2011-01S2 (2013), breeding bird surveys were conducted at least 21 days apart between May 17 and June 30, 2015. Thirty-four survey points, located approximately 100-m apart, were established within the BBS assessment area (Figure 2). Three 5-minute surveys were conducted at each point (one in May and two in June) between sunrise and 10am by a qualified biologist. Any bird seen or heard during the survey was recorded, regardless of distance from the observer; however, observations beyond a 100-m radius were excluded from statistical analyses. Of the 34 points, 30 were studied during each of the three survey rounds, for a total of 90 point surveys. Points 1-30 were surveyed during the first survey round, and points 1-26 and 31-34 were surveyed during the second and third survey rounds.

In addition to documenting species observed and the location of the observation, the following data were recorded during each survey: date, start and end time of observation period, point number, species, sex, age, number of individuals, distance from point, behavior, first observed altitude above ground, flight direction, and if the observation was auditory-only. Observed behavior was categorized and documented as perched, soaring, flapping, foraging, gliding, hovering, auditory, or other. Documented habitat categories included shrub, grassland, riparian, forest/woodlot, logged forest, rocky outcrop, and other. Climate information, such as temperature, wind speed, wind direction, precipitation, and cloud cover were recorded for each survey point.

Statistical Analysis

Bird Diversity and Species Richness

Bird diversity was measured by the total number of unique species observed. Species lists (with the number of observations and the number of groups) were generated and included all observations of birds detected, regardless of their distance from the observer. In some cases, the tally of observations may represent repeated sightings of the same individual. Species richness was calculated as the mean number of species observed per plot per survey (i.e., number of species/100-m plot/5-min survey).

Bird Use, Percent of Use, and Frequency of Occurrence

For the standardized breeding bird use estimates, only observations within a 100 m (328 ft) radius were used in the analysis. Estimates of mean bird use (i.e., number of birds/plot/5-min survey) were used to compare and contrast among bird types and survey points. Overall mean use was calculated as the average number of birds observed per plot, per survey, throughout the study period.

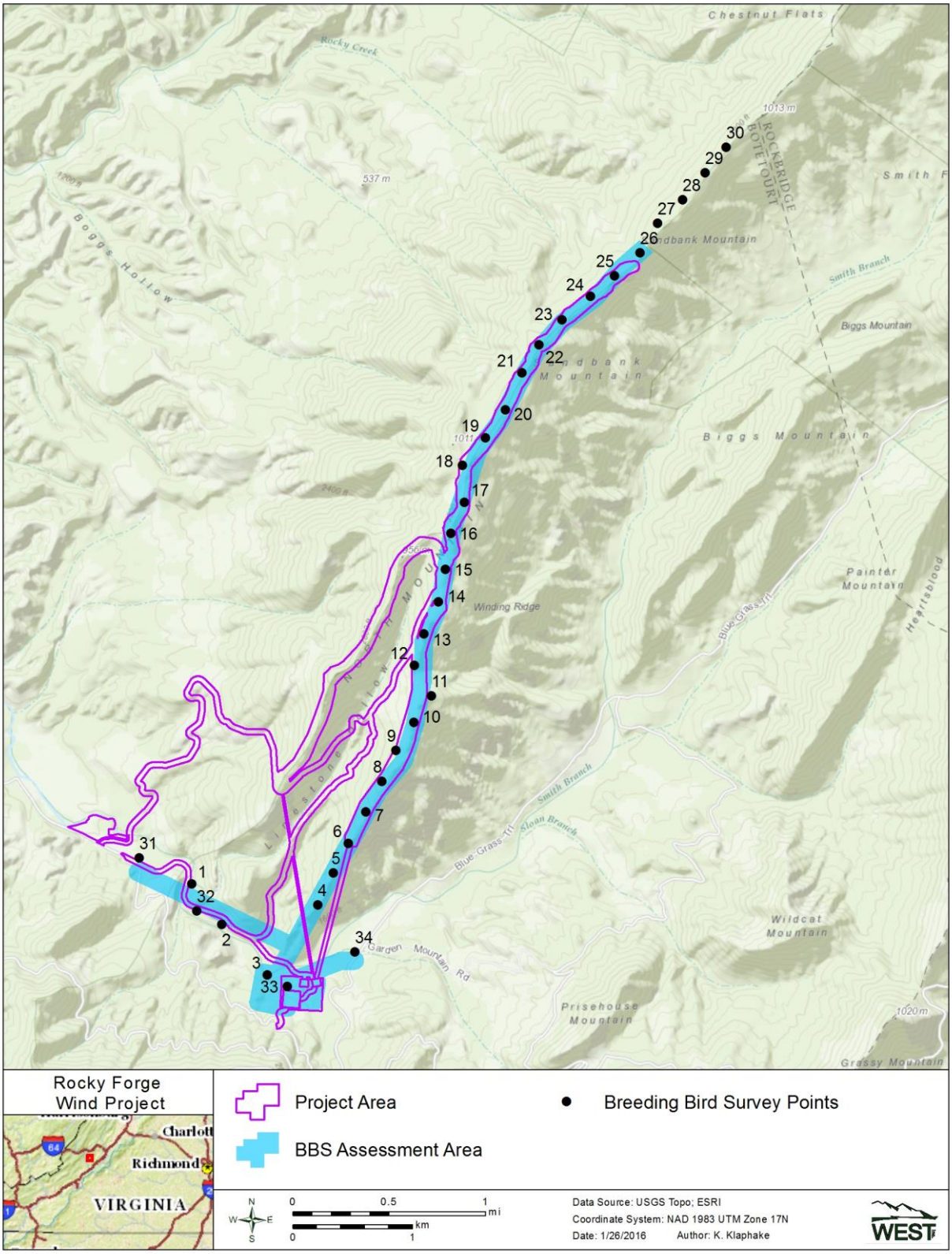


Figure 2. Rocky Forge Wind Project general breeding bird survey points.

Percent of use was calculated as the proportion of the overall mean use for a particular bird type or species, and the frequency of occurrence was calculated as the percent of surveys in which a particular bird type or species is observed. Frequency of occurrence and percent of use provide relative estimates of species exposure to the proposed wind energy facility.

Species-Specific Breeding Bird Surveys

In accordance with Virginia Department of Game and Inland Fisheries (VDGIF) recommendations, surveys were conducted to assess the presence of avian SGCN Tier I or Tier II species with the potential for breeding within the survey area: Swainson's warbler, loggerhead shrike, peregrine falcon, golden-winged warbler, and saw-whet owl. It was determined from desktop evaluation that suitable habitat for breeding saw-whet owl and golden-winged warbler existed within the survey area and species-specific surveys were warranted; however, habitat assessment surveys were necessary to evaluate habitat suitability for Swainson's warbler, loggerhead shrike, and peregrine falcon prior to conducting species-specific surveys. Assessments were completed between June 7 and June 13, 2015 and are described below for each species.

Loggerhead Shrike

Loggerhead shrike inhabit open country with scattered trees and shrubs. The species requires trees that have thorns (e.g. hawthorn [*Crataegus* spp.]*)*, Osage orange [*Maclura pomifera*]) and/or barbed wire for use as prey-impalement sites. Typical breeding habitat includes closely grazed pastures with fencerows of shrubs and trees. Red cedars (*Juniperus virginiana*) and hawthorns are often used as nest trees. This species inhabits agricultural areas which provide these characteristics (VDGIF, Sergio Harding, pers. comm., April 28 and June 4, 2015).

Three sites within the BBS assessment area were identified as having low-to-moderate potential to provide suitable habitat for nesting and foraging loggerhead shrike. Two of these sites (LOSH1 and LOSH2 in Figure 3; Appendix B Photographs 2a, 2b) were determined to lack many of the typical habitat features associated with use by loggerhead shrike (i.e., scattered shrubs, low trees, fencelines) and were considered to provide only low quality habitat for this species. The third site (LOSH3; Appendix B Photograph 2c) was determined to have moderate habitat attributes associated with loggerhead shrikes. All three locations (Figure 3) were surveyed using both pedestrian and playback survey techniques to assess potential occupancy by loggerhead shrike on July 9th and 14th, 2015, by a field biologist with extensive prior experience completing shrike surveys. Surveys were completed between dawn and 10:00 am on days when weather conditions were dry with calm to lightly breezy winds.

Pedestrian Survey

Pedestrian surveys were conducted by traversing the area slowly on foot, stopping approximately every 5 minutes to listen and watch for shrikes for 5 minutes before resuming walking. Conspicuous places (utility lines, fence wires, outer branches of shrubs and saplings) were visually checked for perched shrikes. All potential nesting trees and shrubs were inspected

for nesting shrikes. In addition, fences and thorny trees and shrubs at each survey location were examined for the presence of impaled prey items.

Playback Survey

Playback surveys were performed between dawn and 10:00 am by broadcasting shrike vocalizations (provided by VDGIF; Sergio Harding, pers. comm., June 1, 2015) using a FoxPro FX3 (model #TX1000). Each playback cycle was 5 minutes in length, with alternating periods of vocalization and silence as follows: 30 seconds silence, 30 seconds playback, 1 minute silence, 30 seconds playback, 1 minute silence, 30 seconds playback, and 1 minute silence. Playbacks were broadcast at each survey location.

Swainson's Warbler

Suitable habitat for breeding Swainson's warblers is characterized as woody thickets shaded by forest canopy. Thickets may include, but are not limited to, rhododendron (*Rhododendron ferrugineum),* mountain laurel (*Kalmia latifolia*), eastern hemlock (*Tsuga canadensis*), American holly (*Ilex opaca*) community types; rhododendron thickets; other thicket types (e.g. smilax [*Smilax* spp.], knotweed [*Polygonum* spp.], multiflora rose [*Rosa multiflora*]) may be used if shaded by forest canopy. Thickets used by Swainson's warblers are often associated with riparian habitat (VDGIF, Sergio Harding, pers. comm., April 28 and June 4, 2015).

Potentially suitable habitat for Swainson's warbler was found at four locations within the BBS assessment area (Figure 3, Appendix B, Photographs 3a-3d). The habitat in these locations was characterized by the nearby presence of a stream and thickets of rhododendron and mountain laurel. Based upon results of the habitat evaluation, playback surveys were conducted on June 1, 2015 to evaluate potential presence of Swainson's warblers at each of the four locations. Surveys were completed between 7:30am and 9:00 am on a day when it was not raining and winds were calm to lightly breezy. Playback surveys were performed by broadcasting Swainson's warbler vocalizations (provided by VDGIF; Sergio Harding, pers. comm., June 4, 2015) using a FoxPro FX3 (model #TX1000). Each initial playback survey was nine minutes in length; the first five minutes was a silent listening period, followed by a two-minute playback consisting of a minute and a half of song and a half minute of alarm calls, and completed with a final two minutes of silent listening. If Swainson's warblers were detected, the surveyor proceeded to the next survey point. If Swainson's warblers were not detected, the surveyor immediately performed a second cycle consisting of the two-minute playback followed by two minutes of silent listening. If a Swainson's warbler was detected during the second playback cycle, the surveyor proceeded to the next survey point. If not detected during the second playback cycle, a third and final playback cycle was immediately conducted, with a two minute playback followed by two minutes of silent listening.

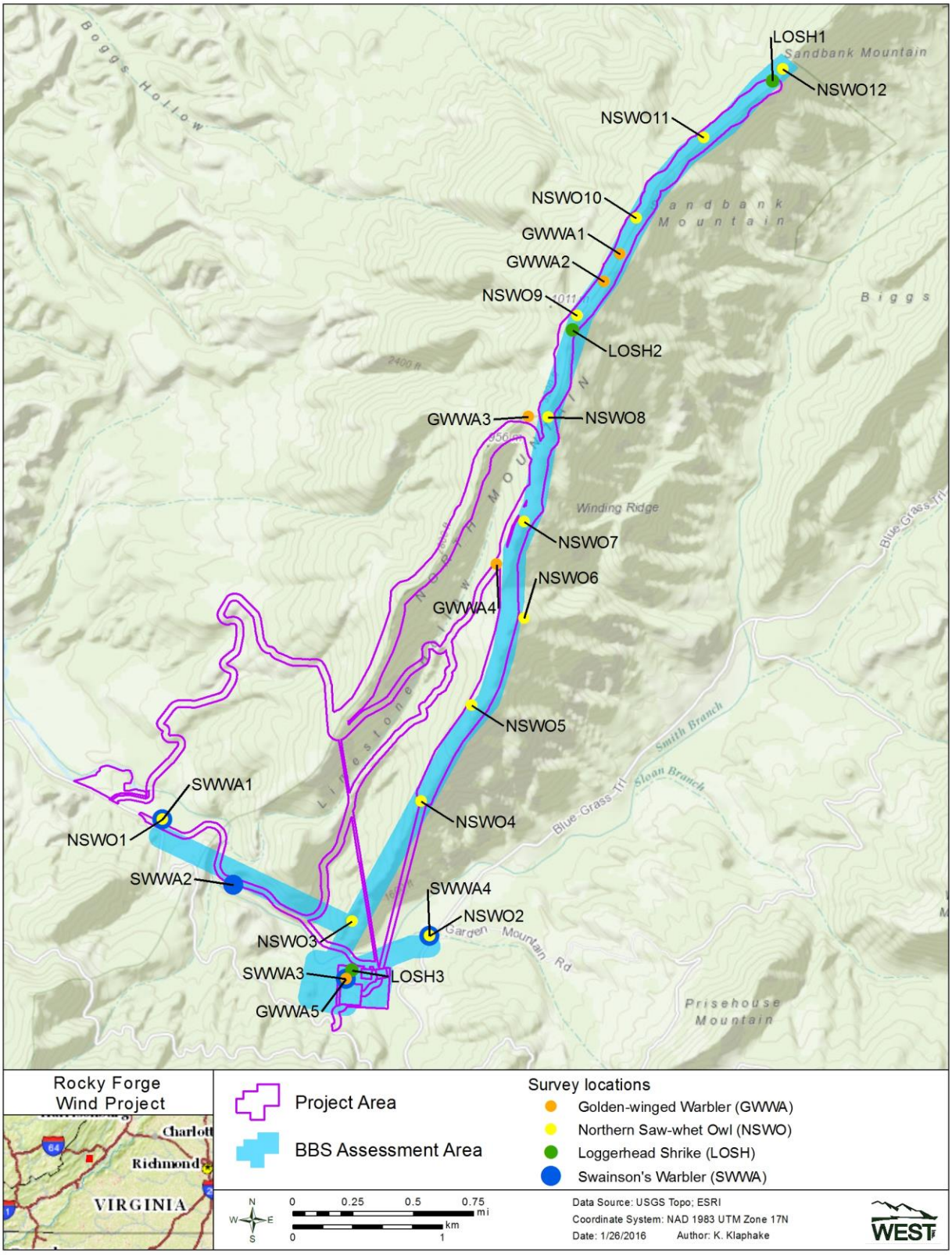


Figure 3. Rocky Forge Wind Project species-specific survey points.

Peregrine Falcon

Peregrine falcons typically breed in open landscapes with cliffs, rock outcrops, or manmade structures providing cliff-like nesting space such as building ledges on skyscrapers (Cornell Laboratory of Ornithology, http://www.allaboutbirds.org/guide/Peregrine_Falcon/lifehistory, downloaded September 16, 2015). Rocky outcrops in western Virginia potentially provide suitable habitat for and occupation by nesting peregrine falcons (VDGIF, Sergio Harding, pers. comm., April 28 and June 4, 2015).

One rocky outcrop located approximately 580 m to the northeast of the BBS assessment area was assessed for suitability of habitat for nesting peregrine falcons. The outcrop had no raised cliffs, and was predominantly covered with vegetation and the tree canopy. The rocky outcrop was determined to be unsuitable for nesting peregrine falcons and a species-specific survey was not conducted at this location.

Golden-winged Warbler

Two rounds of playback surveys were conducted between June 9th and June 14th, 2015 in five areas where appropriate early successional habitat was identified within the BBS assessment area (Figure 3). Surveys were completed using protocol and audio files provided by VDGIF (Sergio Harding, pers. comm., June 1, 2015) and were conducted between sunrise and 11:00 am. Survey points were separated by at least 250 m and each point was visited twice during each survey round. The first and second survey visits during each round took place at different times of day, once early (between sunrise and 9:00 am), and once late (after 9:00 am but before 11:00 am) to ensure that each point was visited at least once when avian activity was greatest.

Each playback survey was 10 minutes in length and included of a combination of silent listening and golden-winged warbler vocalization (5 min of silence, 2 min of Type I song, 1 min of silence, 1 min of Type II song, and 1 min of silence) displayed using a FoxPro FX3 (model #TX1000). The surveyor remained stationary at the survey point during each survey. In the event that a warbler was heard, the survey protocol included an attempt to visually confirm the birds' identity as golden-winged warbler, as blue-winged warblers and hybrids can co-exist with golden wing warblers and may respond to and sing each other's songs. The surveyor also listened for golden-winged warbler calls while walking between survey points.

Northern Saw-whet Owl

A playback survey for northern saw-whet owls was conducted June 12-14, 2015 in areas of potentially suitable habitat throughout the BBS assessment area (Figure 3). Surveys were conducted between dusk and midnight at 12 survey points spaced approximately 800 m apart. Each point was surveyed for a 15 minute period in accordance with methods described in Gross and Brauning (as cited in Dolby and Mellinger, 2006). Survey periods were divided into periods of quiet listening or observation/listening while the tape played owl vocalizations (L or P; respectively; Table 1). The surveyor also listened for saw-whet owl calls while walking between survey points. Surveys were conducted when it was not foggy or raining and winds were Beaufort scale 3 or less. All surveys were conducted between 20:10 and 21:56 H, during

suitable wind (0 – 6 mph), temperature (65 – 73.3 degrees Fahrenheit), and under fogless, clear – 75% cloudy skies.

Table 1. Northern saw-whet owl playback survey protocol used at each 15-min survey point, Rocky Forge Wind Project, June 2015.

Time	Period	Activity
0:00	L	Listen for owl vocalizations (2 minutes)
2:00	P	Tape plays owl vocalization (15 seconds)
2:15	L	Quiet. Listening period (25 seconds)
2:40	P	Tape plays owl vocalization (15 seconds)
2:55	L	Quiet. Listening period (25 seconds)
3:20	P	Tape plays owl vocalization (15 seconds)
3:35	L	Quiet. Listening period (25 seconds)
4:00	P	Tape plays owl vocalization (15 seconds)
4:15	L	Quiet. Listening period (25 seconds)
4:40	P	Tape plays owl vocalization (15 seconds)
4:55	L	Listen for 2 minutes
6:55	P	Calling period. Continuous vocalizations for 3 minutes (15 seconds of calls followed by 2-second breaks).
10:00	L	Quiet. Listening period (5 minutes)
15:00	end	End of survey

RESULTS AND DISCUSSION

General Breeding Bird Surveys

Bird Diversity and Species Richness

A total of 610 individual birds of 60 species were identified over the course of 90 surveys. The mean number of species observed per point per survey was 4.64. Six species comprised 44.1% of individual observations: red-eyed vireo *(Vireo olivaceus)*, indigo bunting *(Passerina cyanea)*, eastern towhee *(Pipilo erythrophthalmus)*, ovenbird *(Seiurus aurocapilla)*, blue-headed vireo *(Vireo solitaries)*, and eastern wood-pewee *(Contopus virens)* (Table 2).

Table 2. Total number of groups and individuals for each bird type and species by season during the Breeding bird surveys in the Rocky Forge Wind Project, May 17, 2015 – June 30, 2015.

Bird Type / Species	Scientific Name	# grps	# obs
Waterfowl		**1**	**1**
unidentified duck		1	1
Diurnal Raptors		**3**	**3**
broad-winged hawk	*Buteo platypterus*	1	1
red-shouldered hawk	*Buteo lineatus*	2	2
Vultures		**7**	**7**
turkey vulture	*Cathartes aura*	7	7
Doves/Pigeons		**6**	**6**
mourning dove	*Zenaida macroura*	6	6
Passerines		**521**	**580**
Corvids		*22*	*26*
American crow	*Corvus brachyrhynchos*	14	14
blue jay	*Cyanocitta cristata*	8	12
Passerines		*2*	*3*
unidentified passerine		2	3
Creepers/Nuthatches		*12*	*12*
red-breasted nuthatch	*Sitta canadensis*	1	1
white-breasted nuthatch	*Sitta carolinensis*	11	11
Finches/Crossbills		*13*	*15*
American goldfinch	*Spinus tristis*	13	15
Flycatchers		*32*	*34*
Acadian flycatcher	*Empidonax virescens*	2	2
eastern phoebe	*Sayornis phoebe*	1	1
eastern wood-pewee	*Contopus virens*	26	27
great crested flycatcher	*Myiarchus crinitus*	2	3
least flycatcher	*Empidonax minimus*	1	1
Gnatcatchers/Kinglet		*3*	*3*
blue-gray gnatcatcher	*Polioptila caerulea*	3	3
Grassland/Sparrows		*74*	*85*
chipping sparrow	*Spizella passerina*	13	17
dark-eyed junco	*Junco hyemalis*	4	5
eastern towhee	*Pipilo erythrophthalmus*	46	52
field sparrow	*Spizella pusilla*	5	5

Table 2. Total number of groups and individuals for each bird type and species by season during the Breeding bird surveys in the Rocky Forge Wind Project, May 17, 2015 – June 30, 2015.

Bird Type / Species	Scientific Name	# grps	# obs
song sparrow	*Melospiza melodia*	6	6
Mimids		*1*	*1*
gray catbird	*Dumetella carolinensis*	1	1
Tanagers		*84*	*94*
indigo bunting	*Passerina cyanea*	45	53
scarlet tanager	*Piranga olivacea*	39	41
Grosbeaks		*4*	*4*
rose-breasted grosbeak	*Pheucticus ludovicianus*	4	4
Cardinals		*5*	*5*
northern cardinal	*Cardinalis cardinalis*	5	5
Thrushes		*23*	*23*
American robin	*Turdus migratorius*	5	5
hermit thrush	*Catharus guttatus*	1	1
wood thrush	*Hylocichla mustelina*	17	17
Titmice/Chickadees		*22*	*22*
black-capped chickadee	*Poecile atricapilla*	8	8
Carolina chickadee	*Poecile carolinensis*	1	1
tufted titmouse	*Baeolophus bicolor*	13	13
Vireos		*93*	*105*
blue-headed vireo	*Vireo solitarius*	33	37
red-eyed vireo	*Vireo olivaceus*	59	67
yellow-throated vireo	*Vireo flavifrons*	1	1
Warblers		*124*	*132*
American redstart	*Setophaga ruticilla*	1	1
bay-breasted warbler	*Setophaga castanea*	3	3
black-and-white warbler	*Mniotilta varia*	16	16
black-throated green warbler	*Setophaga virens*	3	3
blue-winged warbler	*Vermivora cyanoptera*	2	2
Canada warbler	*Cardellina canadensis*	1	1
Cape May warbler	*Setophaga tigrina*	3	4
cerulean warbler	*Setophaga cerulea*	3	3
chestnut-sided warbler	*Setophaga pensylvanica*	2	2
hooded warbler	*Setophaga citrina*	10	10
Nashville warbler	*Oreothlypis ruficapilla*	1	2
ovenbird	*Seiurus aurocapilla*	35	38
palm warbler	*Setophaga palmarum*	1	1
pine warbler	*Setophaga pinus*	18	18
prairie warbler	*Setophaga discolor*	4	4
prothonotary warbler	*Protonotaria citrea*	1	1
Tennessee warbler	*Oreothlypis peregrina*	1	1
worm-eating warbler	*Helmitheros vermivorum*	19	22
Waxwings		*7*	*16*
cedar waxwing	*Bombycilla cedrorum*	7	16
Cuckoos		**3**	**3**
yellow-billed cuckoo	*Coccyzus americanus*	3	3

Table 2. Total number of groups and individuals for each bird type and species by season during the Breeding bird surveys in the Rocky Forge Wind Project, May 17, 2015 – June 30, 2015.

Bird Type / Species	Scientific Name	# grps	# obs
Swifts/Hummingbirds		**1**	**1**
ruby-throated hummingbird	*Archilochus colubris*	1	1
Woodpeckers		**9**	**9**
downy woodpecker	*Picoides pubescens*	1	1
pileated woodpecker	*Dryocopus pileatus*	6	6
red-bellied woodpecker	*Melanerpes carolinus*	1	1
Total		**551**	**610**

Mean Bird Use, Percent of Use, and Frequency of Occurrence by Species and Type

Use estimates, percent of total use, and frequency of occurrence for all species and bird types are shown in Table 3.

Diurnal Raptors

A single broad-winged hawk (*Buteo platypterus*) was observed, resulting in a mean use estimate of 0.01 birds/point/survey (Tables 2 and 3). Two red-shouldered hawks (*Buteo lineatus)* were observed during the survey. Both were observed outside the data collection viewshed distance (both were observed at 210 m), and were therefore excluded from mean use calculations.

Vultures

One species of vulture, turkey vulture (*Cathartes aura*), was observed during surveys and resulted in a use of 0.03 birds/point/survey (Tables 2 and 3). Turkey vulture was observed in 2.2% of surveys and composed 0.6% of overall use.

Doves and Pigeons

Six observations of mourning dove (*Zenaida macroura*) were recorded, resulting in a use of 0.03 birds/point/survey (Tables 2 and 3). Mourning dove was observed in 3.3% of the surveys and composed 0.6% of overall use.

Passerines

Mean use was highest for passerines (5.68 birds/point/survey), primarily consisting of the subtypes warblers and vireos (1.30 and 1.09 birds/point/survey, respectively; Table 3). Within this bird type, red-eyed vireo (0.70 birds/point/survey), indigo bunting (0.58 birds/point/survey) and eastern towhee (0.58 birds/point/survey) were species with highest mean use. Passerines were observed more frequently (97.8% of surveys) and in greater numbers (97.3% of overall use) than all other bird types.

Cuckoos

Three observations of yellow-billed cuckoo (*Coccyzus americanus*) were recorded, resulting in a use of 0.01 birds/point/survey (Tables 2 and 3). Cuckoos were observed in 1.1% of the surveys and composed 0.2% of the overall use.

Swifts and Hummingbirds

A single ruby-throated hummingbird (*Archilochus colubris*) was observed, resulting in a use of 0.01 birds/point/survey (Tables 2 and 3). Ruby-throated hummingbird was observed in 1.1% of the surveys and composed 0.2% of the overall use.

Woodpeckers

Three species of woodpeckers were observed, resulting in an overall use for this group of 0.06 birds/point/survey. Woodpeckers were observed in 5.6% of surveys and composed 1.0% of overall use by birds (Table 3).

Spatial Use

Mean use (birds/point/survey) was plotted by point for all birds combined: Diurnal raptors, vultures, doves and pigeons, passerines (including subtypes), cuckoos, swifts and humming birds, and woodpeckers. Use was highest at points 20 and 30 (9.0 birds/point/survey) for all species combined. Use at other points ranged from 2.0 to 8.67 birds/point/survey. Passerines had the highest use estimate at points 20 and 30 and use by passerines also ranged from 2.0 to 8.67 birds/point/survey at the other points. Use by any other bird type or subtypes never surpassed 2.67 birds/point/survey at any point (Appendix A).

Table 3. Mean bird use (number of birds/plot/5-min survey), percent of total use (%), and frequency of occurrence (%) for each bird type and species by season during the breeding bird use surveys at the Rocky Forge Wind Project from May 17, 2015 – June 30, 2015.

Bird Type / Species	Mean Use	% of Use	% Frequency
Diurnal Raptors	**0.01**	**0.2**	**1.1**
broad-winged hawk	0.01	0.2	1.1
Vultures	**0.03**	**0.6**	**2.2**
turkey vulture	0.03	0.6	2.2
Doves/Pigeons	**0.03**	**0.6**	**3.3**
mourning dove	0.03	0.6	3.3
Passerines	**5.68**	**97.3**	**97.8**
Passerines	*0.03*	*0.6*	*2.2*
unidentified passerine	0.03	0.6	2.2
Creepers/Nuthatches	*0.10*	*1.7*	*10.0*
red-breasted nuthatch	0.01	0.2	1.1
white-breasted nuthatch	0.09	1.5	8.9
Finches/Crossbills	*0.14*	*2.5*	*13.3*
American goldfinch	0.14	2.5	13.3
Flycatchers	*0.31*	*5.3*	*27.8*
Acadian flycatcher	0.02	0.4	2.2
eastern phoebe	0.01	0.2	1.1

Table 3. Mean bird use (number of birds/plot/5-min survey), percent of total use (%), and frequency of occurrence (%) for each bird type and species by season during the breeding bird use surveys at the Rocky Forge Wind Project from May 17, 2015 – June 30, 2015.

Bird Type / Species	Mean Use	% of Use	% Frequency
eastern wood-pewee	0.24	4.2	23.3
great crested flycatcher	0.02	0.4	1.1
least flycatcher	0.01	0.2	1.1
Gnatcatchers/Kinglet	*0.03*	*0.6*	*3.3*
blue-gray gnatcatcher	0.03	0.6	3.3
Grassland/Sparrows	*0.93*	*16.0*	*53.3*
chipping sparrow	0.19	3.2	12.2
dark-eyed junco	0.06	1.0	4.4
eastern towhee	0.58	9.9	43.3
field sparrow	0.06	1.0	3.3
song sparrow	0.06	1.0	4.4
Mimids	*0.01*	*0.2*	*1.1*
gray catbird	0.01	0.2	1.1
Tanagers	*0.91*	*15.6*	*57.8*
indigo bunting	0.58	9.9	40.0
scarlet tanager	0.33	5.7	30.0
Grosbeaks	*0.04*	*0.8*	*4.4*
rose-breasted grosbeak	0.04	0.8	4.4
Cardinals	*0.03*	*0.6*	*3.3*
northern cardinal	0.03	0.6	3.3
Thrushes	*0.24*	*4.2*	*17.8*
American robin	0.06	1.0	5.6
hermit thrush	0.01	0.2	1.1
wood thrush	0.18	3.0	14.4
Titmice/Chickadees	*0.20*	*3.4*	*18.9*
black-capped chickadee	0.09	1.5	8.9
Carolina chickadee	0.01	0.2	1.1
tufted titmouse	0.10	1.7	8.9
Vireos	*1.09*	*18.7*	*70.0*
blue-headed vireo	0.38	6.5	28.9
red-eyed vireo	0.70	12.0	53.3
yellow-throated vireo	0.01	0.2	1.1
Warblers	*1.30*	*22.3*	*71.1*
American redstart	0.01	0.2	1.1
bay-breasted warbler	0.03	0.6	2.2
black-and-white warbler	0.18	3.0	15.6
black-throated green warbler	0.03	0.6	3.3
blue-winged warbler	0.02	0.4	2.2
Canada warbler	0.01	0.2	1.1
Cape May warbler	0.04	0.8	3.3
cerulean warbler	0.03	0.6	3.3
chestnut-sided warbler	0.02	0.4	2.2
hooded warbler	0.11	1.9	8.9
Nashville warbler	0.02	0.4	1.1
ovenbird	0.36	6.1	27.8

Table 3. Mean bird use (number of birds/plot/5-min survey), percent of total use (%), and frequency of occurrence (%) for each bird type and species by season during the breeding bird use surveys at the Rocky Forge Wind Project from May 17, 2015 – June 30, 2015.

Bird Type / Species	Mean Use	% of Use	% Frequency
palm warbler	0.01	0.2	1.1
pine warbler	0.16	2.7	11.1
prairie warbler	0.03	0.6	3.3
prothonotary warbler	0.01	0.2	1.1
Tennessee warbler	0.01	0.2	1.1
worm-eating warbler	0.20	3.4	15.6
Waxwings	*0.14*	*2.5*	*6.7*
cedar waxwing	0.14	2.5	6.7
Corvids	*0.14*	*2.5*	*8.9*
American crow	0.06	1.0	4.4
blue jay	0.09	1.5	5.6
Cuckoos	**0.01**	**0.2**	**1.1**
yellow-billed cuckoo	0.01	0.2	1.1
Swifts/Hummingbirds	**0.01**	**0.2**	**1.1**
ruby-throated hummingbird	0.01	0.2	1.1
Woodpeckers	**0.06**	**1.0**	**5.6**
pileated woodpecker	0.03	0.6	3.3
red-bellied woodpecker	0.01	0.2	1.1
red-headed woodpecker	0.01	0.2	1.1
Overall	**5.83**	**100.0**	

SGCN Species Observations

No federal or state listed threatened or endangered species were observed. The State of Virginia has assigned a tiered ranking score of I to IV to SGCN species based on rarity (Virginia Department of Game and Inland Fisheries 2010), with Tier I being the highest risk of extinction or extirpation due to small population sizes and/or limited geographic ranges and Tier IV being the lowest risk. One Tier II SGCN (Cerulean warbler; *Setophaga cerulean*; n=3) and seven Tier IV SGCN were recorded, including eastern towhee (n=52), eastern wood-pewee (n=27), wood thrush (*Hylocichla mustelina*, n=17), black-and-white warbler (*Mniotilta varia*, n=16), field sparrow (*Spizella pusilla*, n=5), Canada warbler (*Cardellina Canadensis*, n=1), and gray catbird (*Dumetella carolinensis*, n=1). The number of observations of each of these species is provided in Table 4.

Table 4. Summary of SGCN species observed at the Rocky Forge Wind Project during breeding bird surveys (BBS) from May 17, 2015 – June 30, 2015.

Species	Scientific Name	Status	# of grps	# of obs
eastern towhee	*Pipilo erythrophthalmus*	Tier IV	46	52
eastern wood-pewee	*Contopus virens*	Tier IV	26	27
wood thrush	*Hylocichla mustelina*	Tier IV	17	17
black-and-white warbler	*Mniotilta varia*	Tier IV	16	16
field sparrow	*Spizella pusilla*	Tier IV	5	5
cerulean warbler	*Setophaga cerulea*	Tier II	3	3
Canada warbler	*Cardellina canadensis*	Tier IV	1	1
gray catbird	*Dumetella carolinensis*	Tier IV	1	1
Total	**8 species**		**115**	**122**

Species-Specific Breeding Bird Surveys

Golden Winged Warbler Survey

No golden-winged warblers were observed during the general avian use surveys or during the playback surveys or incidentally while the surveyor was travelling between points. These data indicate that impacts to golden-winged warblers are unlikely to occur within the BBS assessment area.

Saw-whet Owl Survey

No northern saw-whet owls were observed during the general avian use surveys or during the playback surveys or incidentally while the surveyor was travelling between points. These data indicate that impacts to northern saw-whet owls are unlikely to occur within the BBS assessment area.

Loggerhead Shrike Survey

No loggerhead shrikes were observed during the general avian use surveys or during the pedestrian survey, playback surveys, or incidentally while the surveyor was travelling between points. No signs of nesting or feeding loggerhead shrikes were observed during the surveys. These data indicate that impacts to loggerhead shrikes are unlikely to occur within the BBS assessment area.

Swainson's Warbler Survey

A Swainson's warbler call was heard during the third playback cycle at survey location 1 (Figure 3). The bird was not observed visually, and no Swainson's warblers were observed at the other survey locations or incidentally while the surveyor was travelling between points. Based upon these results, Swainson's warbler occurs at low density with limited distribution within the BBS assessment area; therefore, impacts to this species are unlikely.

CONCLUSIONS

Survey results are typical of deciduous forest and woodland edges in Virginia. Frequently recorded species of birds within forested habitat included common species such as red-eyed vireo, ovenbird, blue-headed vireo and eastern wood-pewee. Indigo bunting and eastern towhee are also common species within brushy areas and edge habitats adjacent to forested land.

Survey results indicate impact to breeding birds in general is likely to be low and comparable to other Appalachian ridgeline wind energy projects. No federal or state endangered or threatened species were observed during any of the surveys and few Tier I and Tier II SGCN were documented, at very low numbers. Therefore, impacts to breeding birds associated with construction and operation of the Project within the BBS assessment area are unlikely to be significant.

REFERENCES

Dolby and Mellinger, 2006. The Virginia Society of Ornithology 2006 Foray: a focus on the Northern Saw-whet Owl ([Aegolius acadicus].

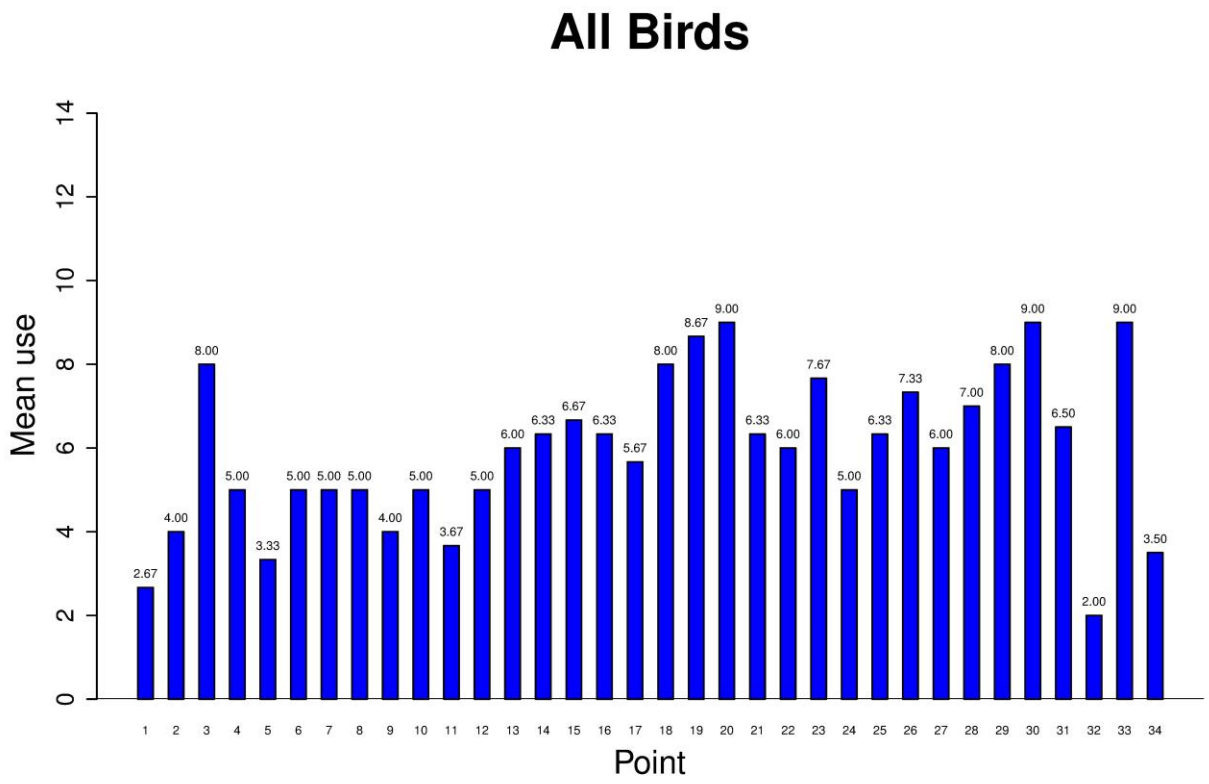
Gross and Brauning, unpublished Pennsylvania Game Commission technical report, *as cited in* Dolby and Mellinger, 2006, The Virginia Society of Ornithology 2006 Foray: a focus on the Northern Saw-whet Owl ([*Aegolius acadicus*]).

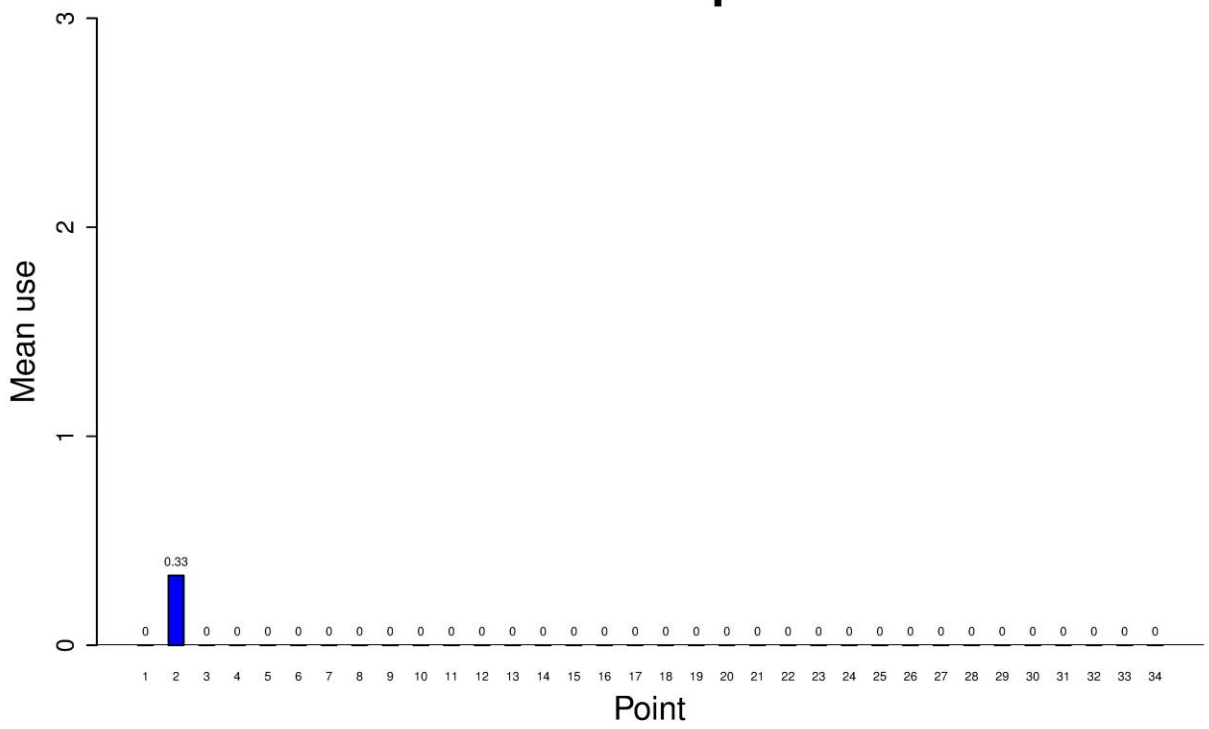
U.S. Environmental Protection Agency (USEPA) 2013.Level II Ecoregions of the Continental United States. National Health and Environmental Effects Research Laboratory, US Environmental Protection Agency.

Virginia Department of Environmental Quality. Virginia Administrative Code Title 9, Agency 15, Chapter 40 Small Renewable Energy Projects (Wind) Permit by Rule (PBR) 9VAC15-40-40 *Analysis of the Beneficial and Adverse Impacts on Natural Resources.* (http://law.lis.virginia.gov/admincode/title9/agency15/chapter40/section40/)

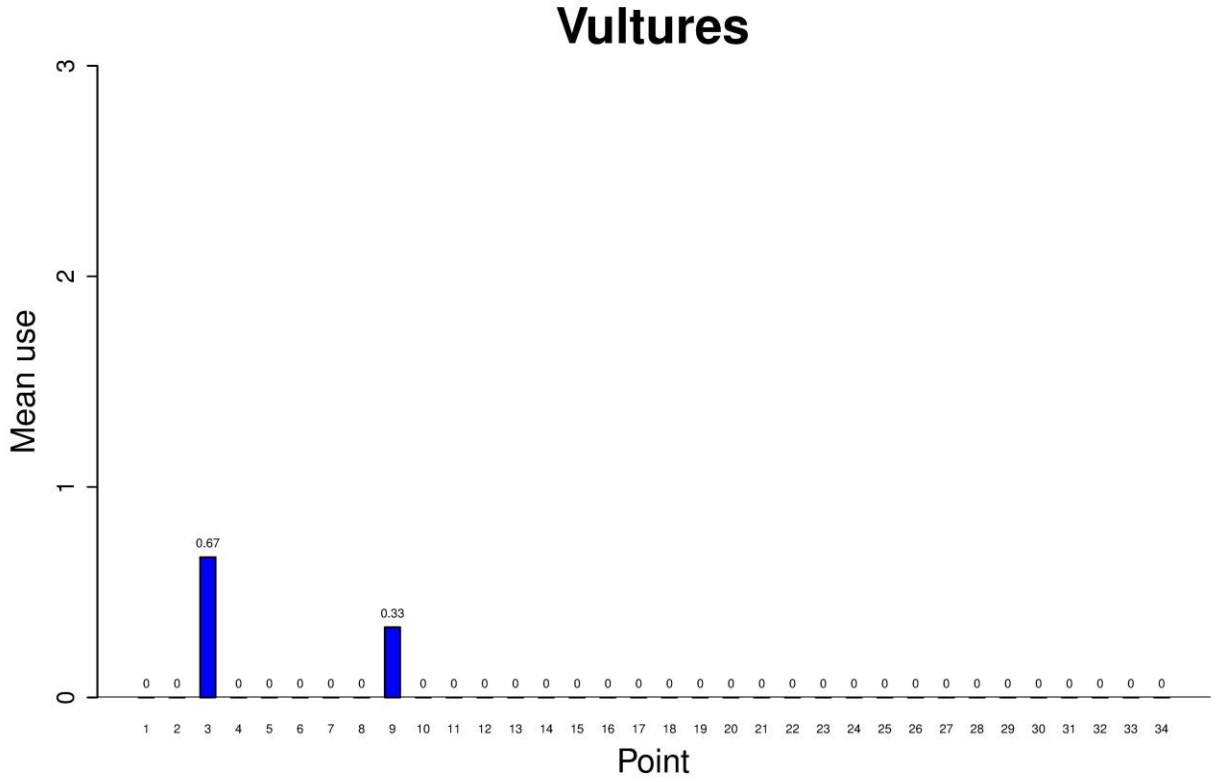
Virginia Department of Environmental Quality, 2013. Virginia PBR Guidance REW2011-01S2. Wind PBR Guidance - Section II: Methodology. (http://townhall.virginia.gov/L/ViewGDoc.cfm?gdid=4495.

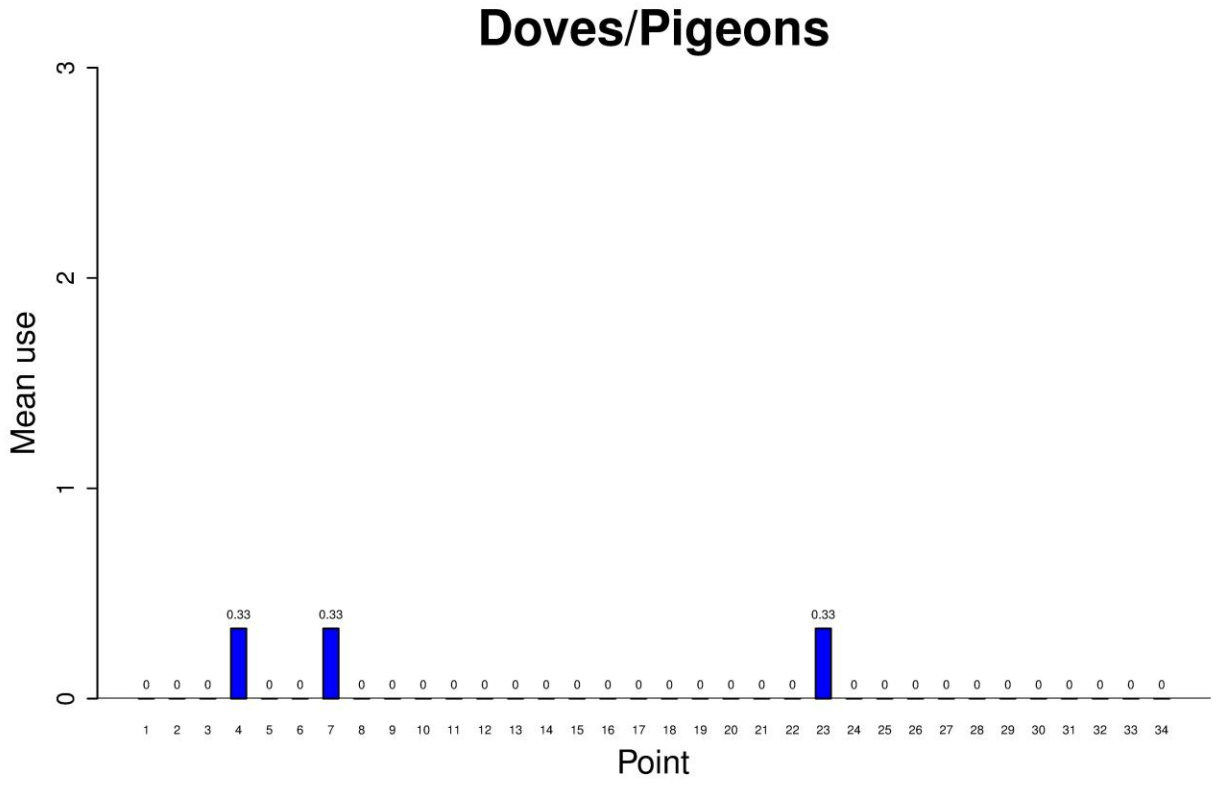
Appendix A. Breeding Bird Survey Use by Point within the Rocky Forge Wind Project, May 17, 2015 – June 30, 2015



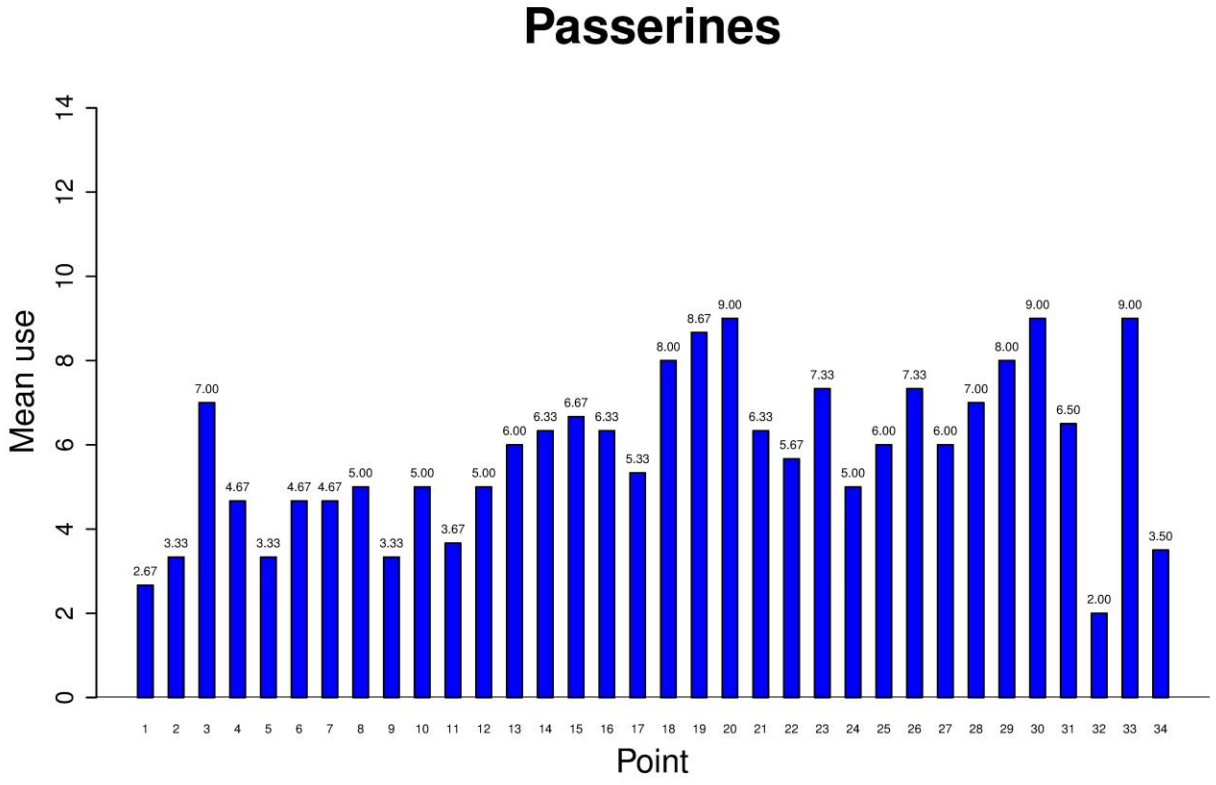


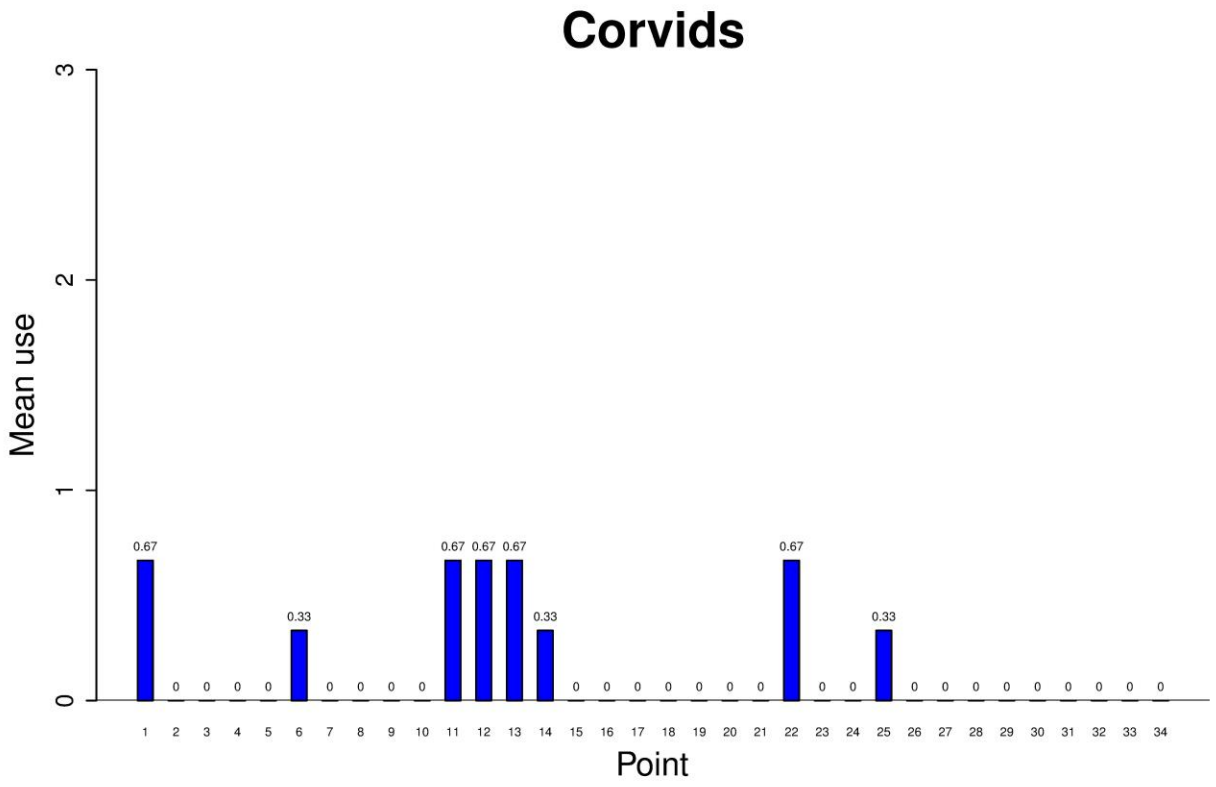
Appendix A. Mean use (number of birds/5-min survey) at each breeding bird survey point for all birds major bird types at the Rocky Forge Wind Project.



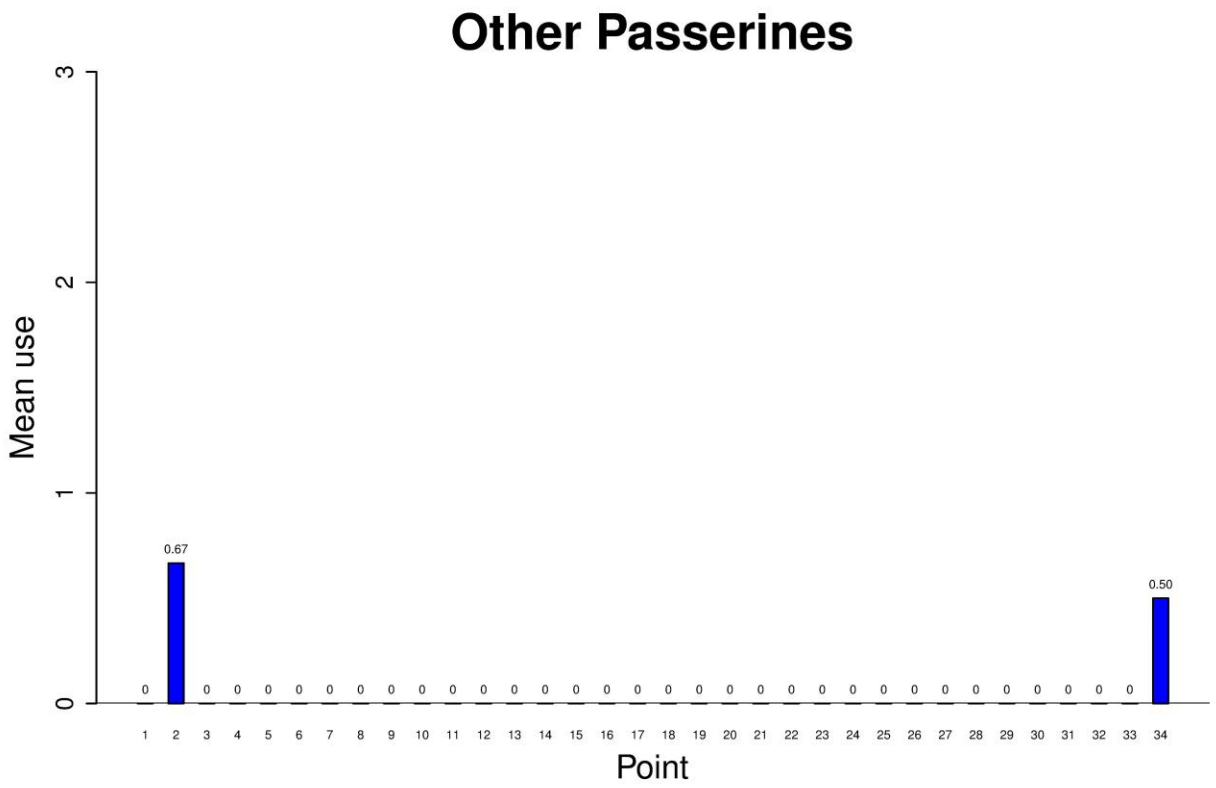


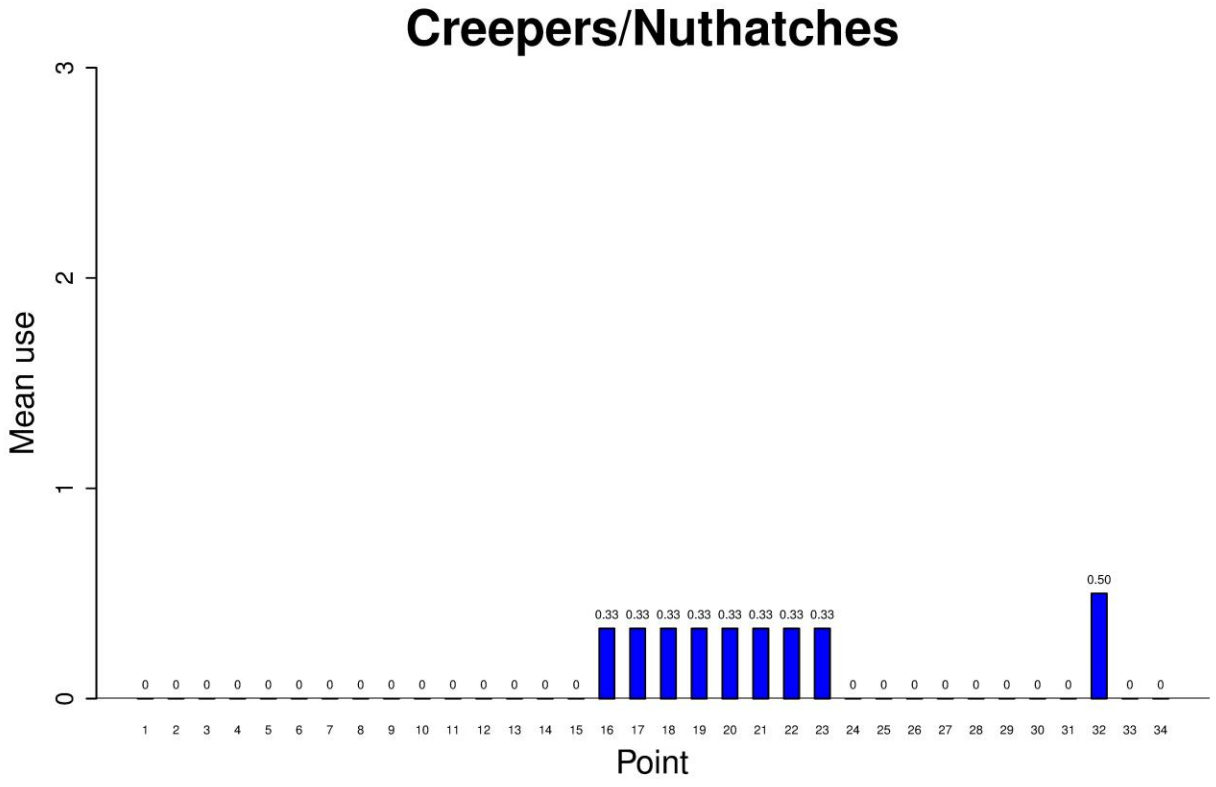
Appendix A (*continued*). Mean use (number of birds/5-min survey) at each breeding bird survey point for all birds major bird types at the Rocky Forge Wind Project.



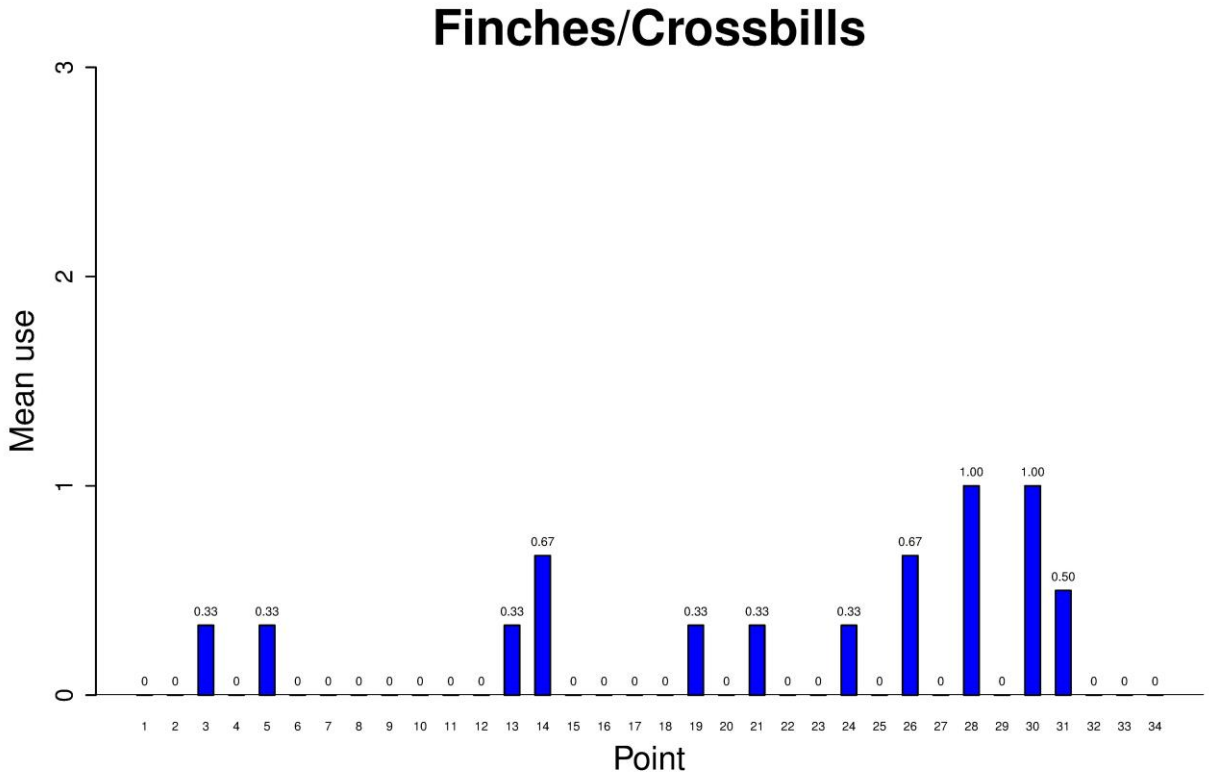


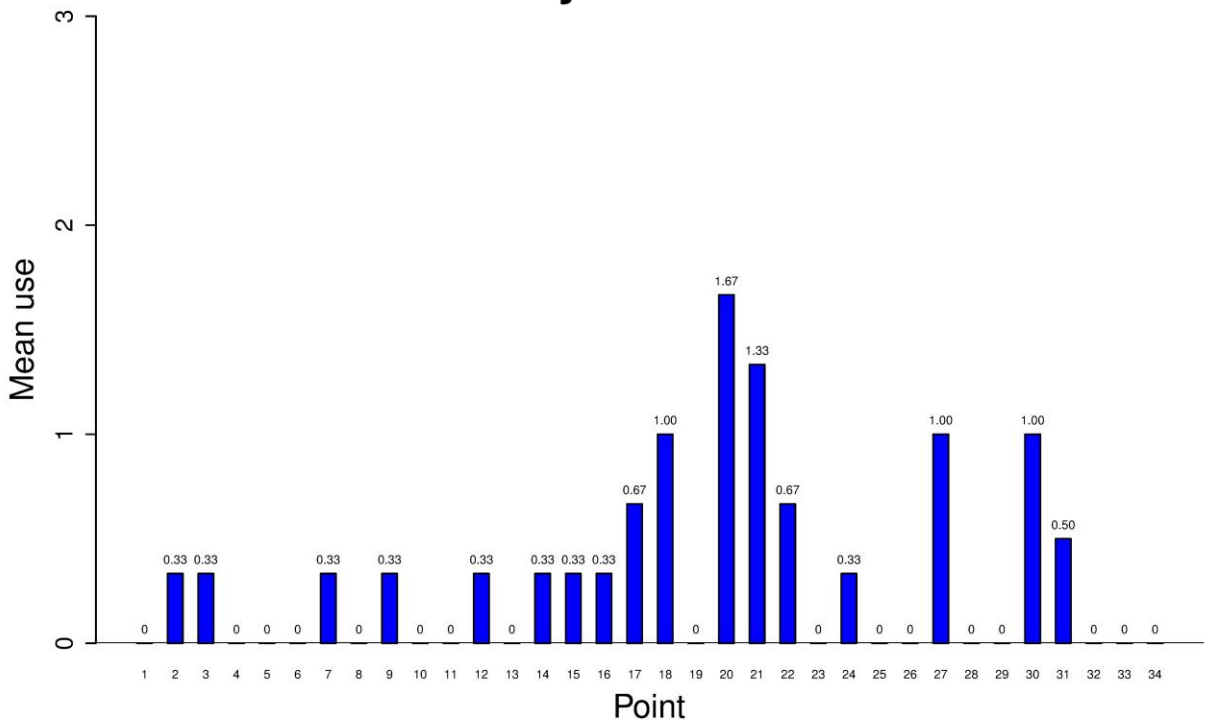
Appendix A (*continued*). Mean use (number of birds/5-min survey) at each breeding bird survey point for all birds and major bird types at the Rocky Forge Wind Project.



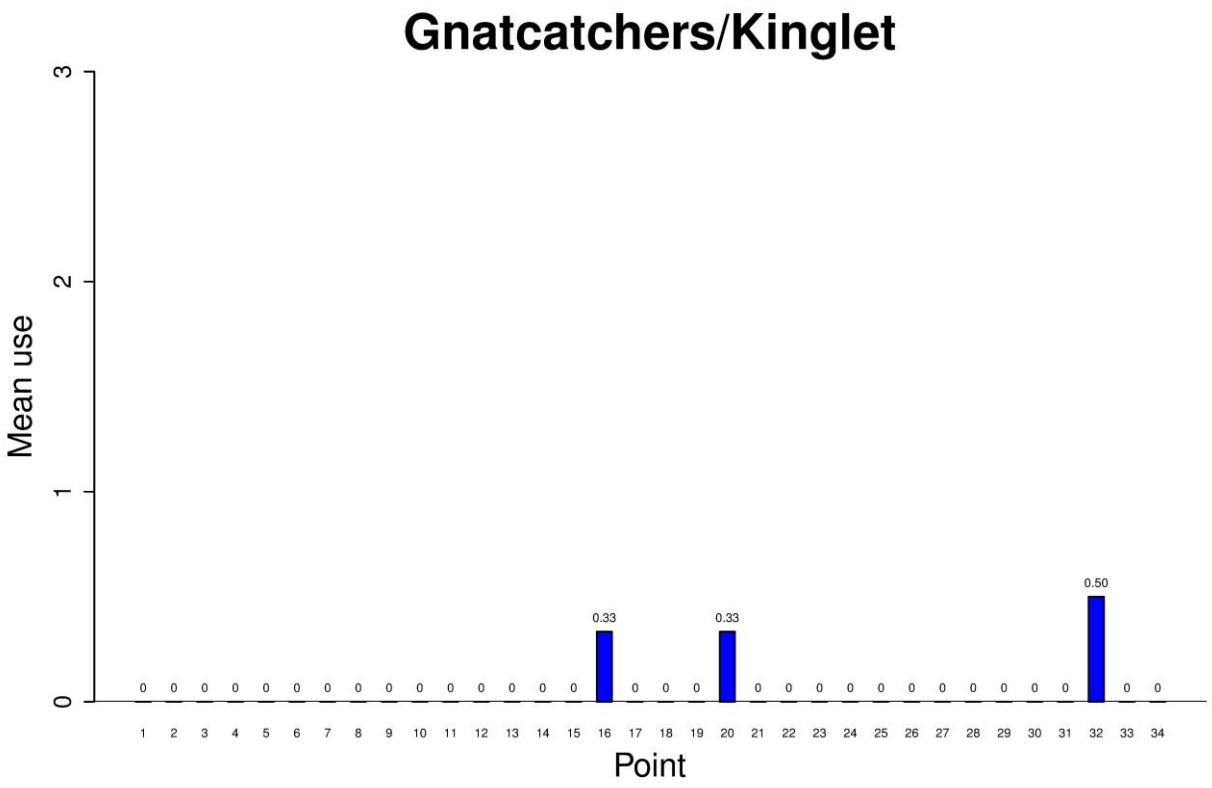


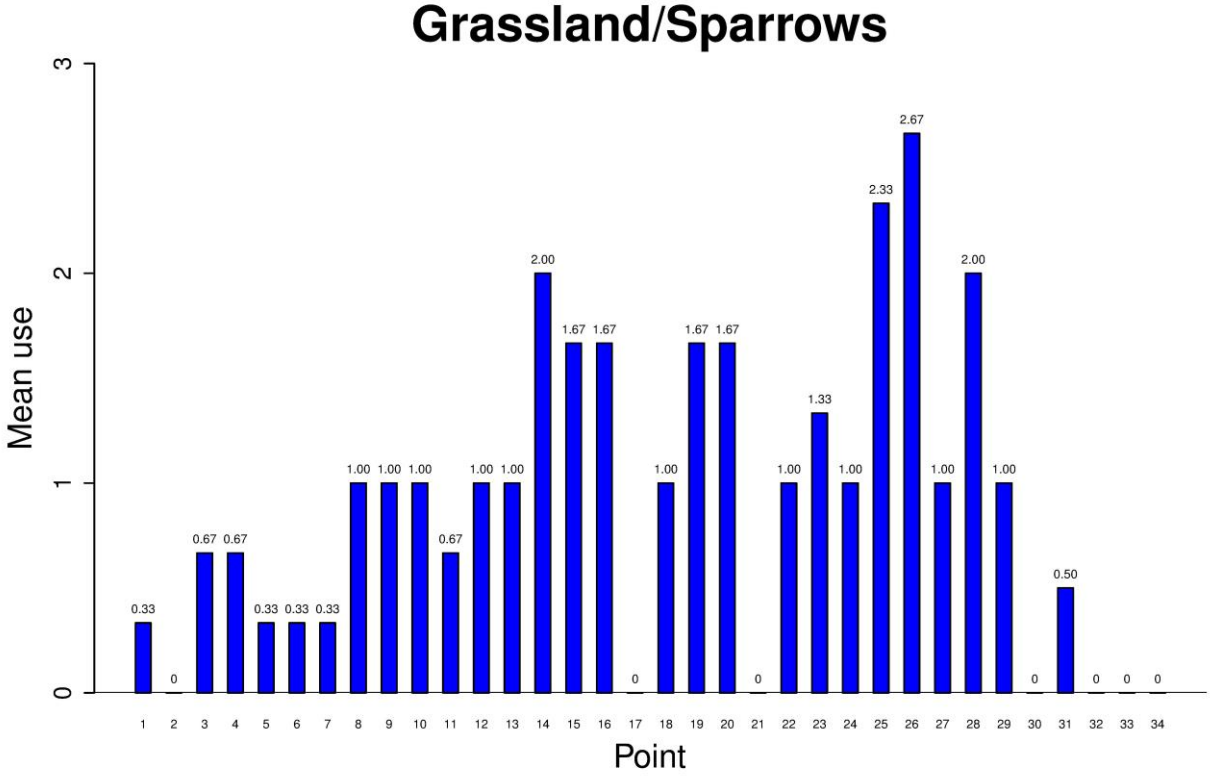
Appendix A (*continued*). Mean use (number of birds/5-min survey) at each breeding bird survey point for all birds and major bird types at the Rocky Forge Wind Project.



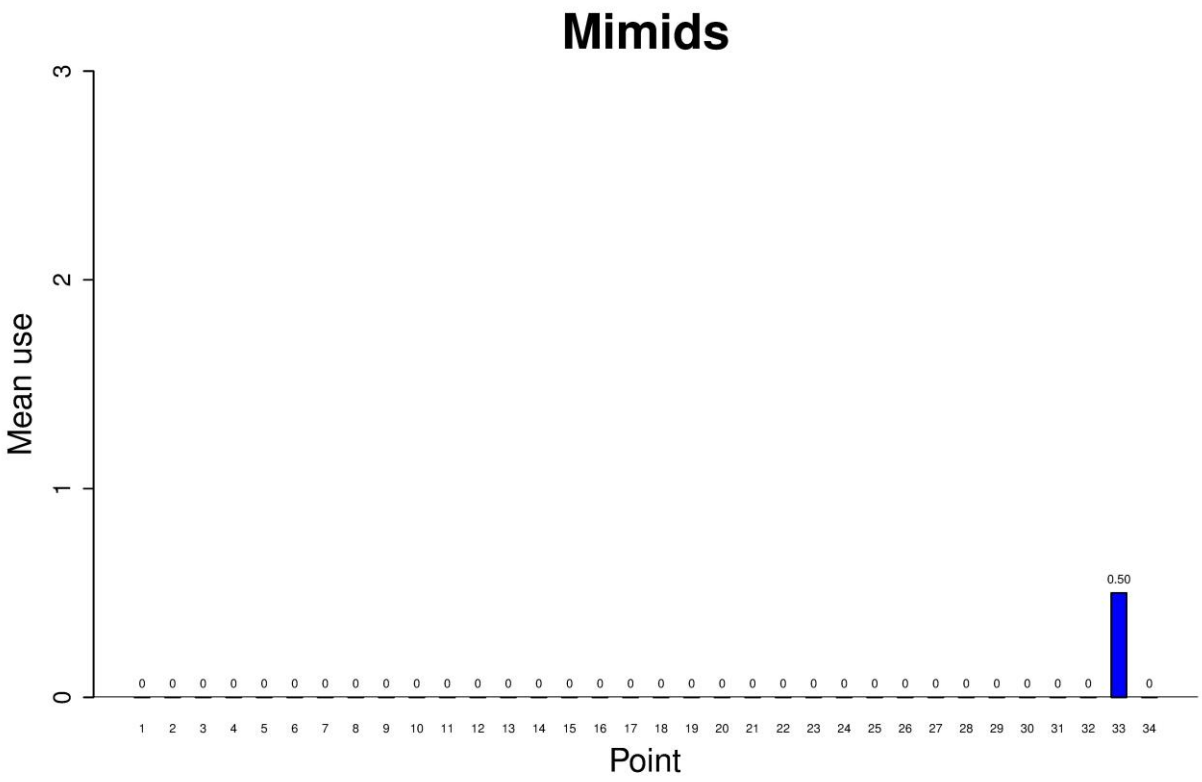


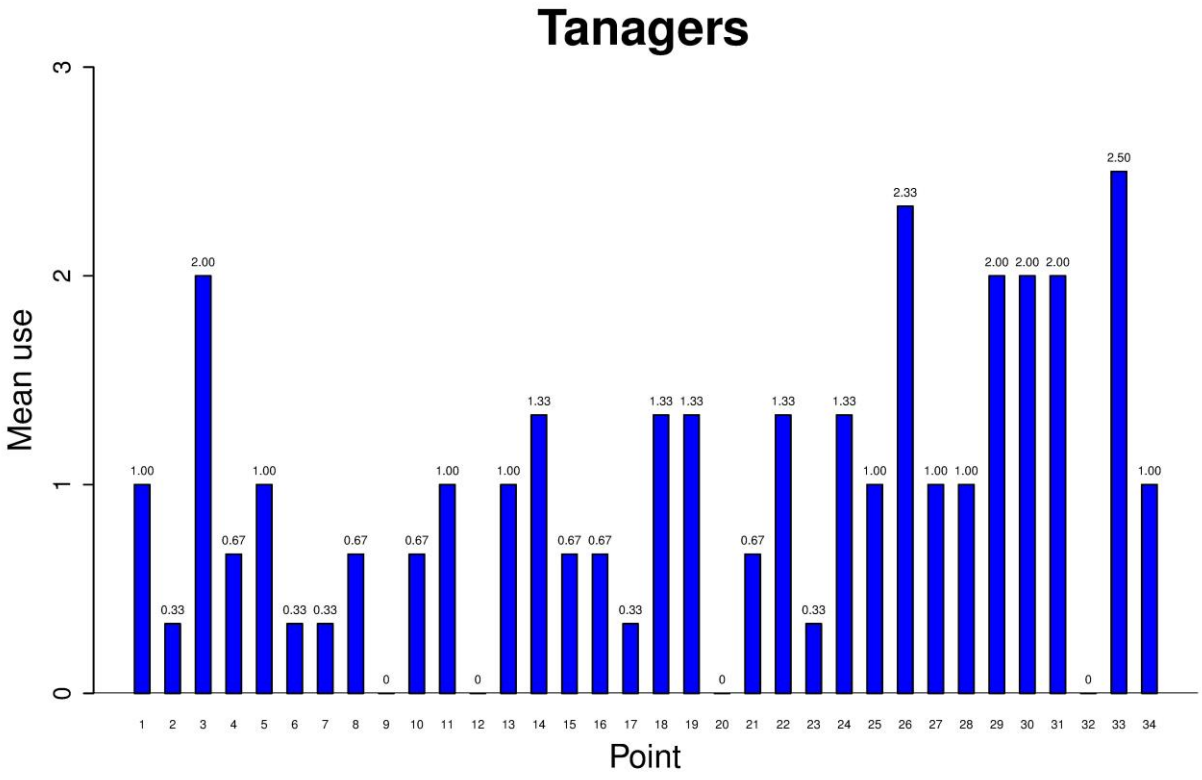
Appendix A (*continued*). Mean use (number of birds/5-min survey) at each breeding bird survey point for all birds and major bird types at the Rocky Forge Wind Project.



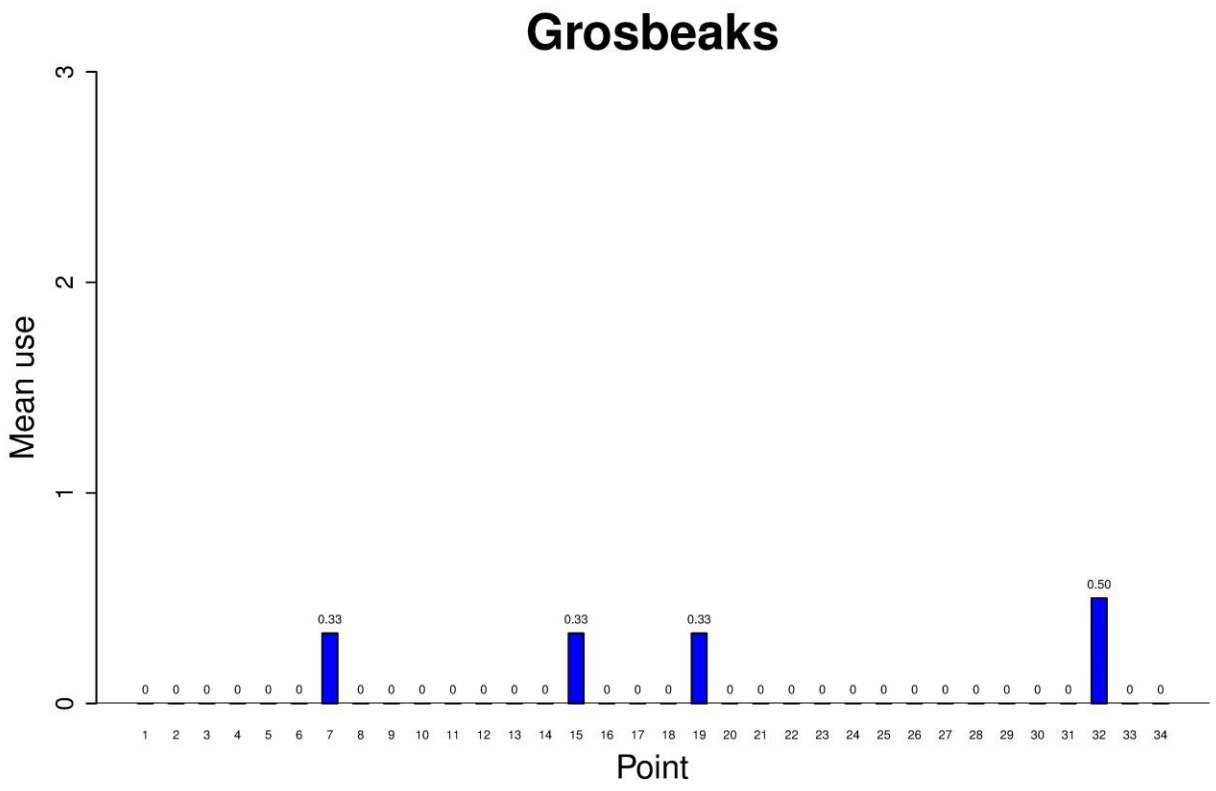


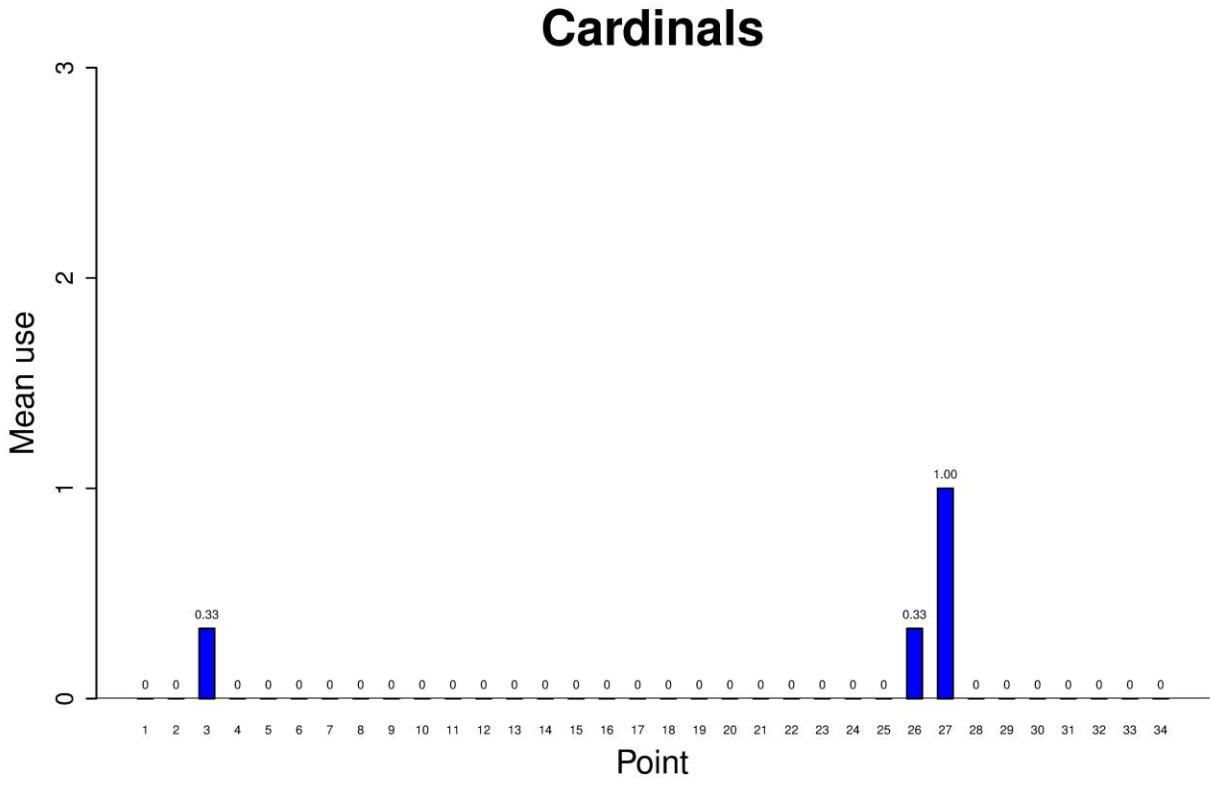
Appendix A (*continued*). Mean use (number of birds/5-min survey) at each breeding bird survey point for all birds and major bird types at the Rocky Forge Wind Project.



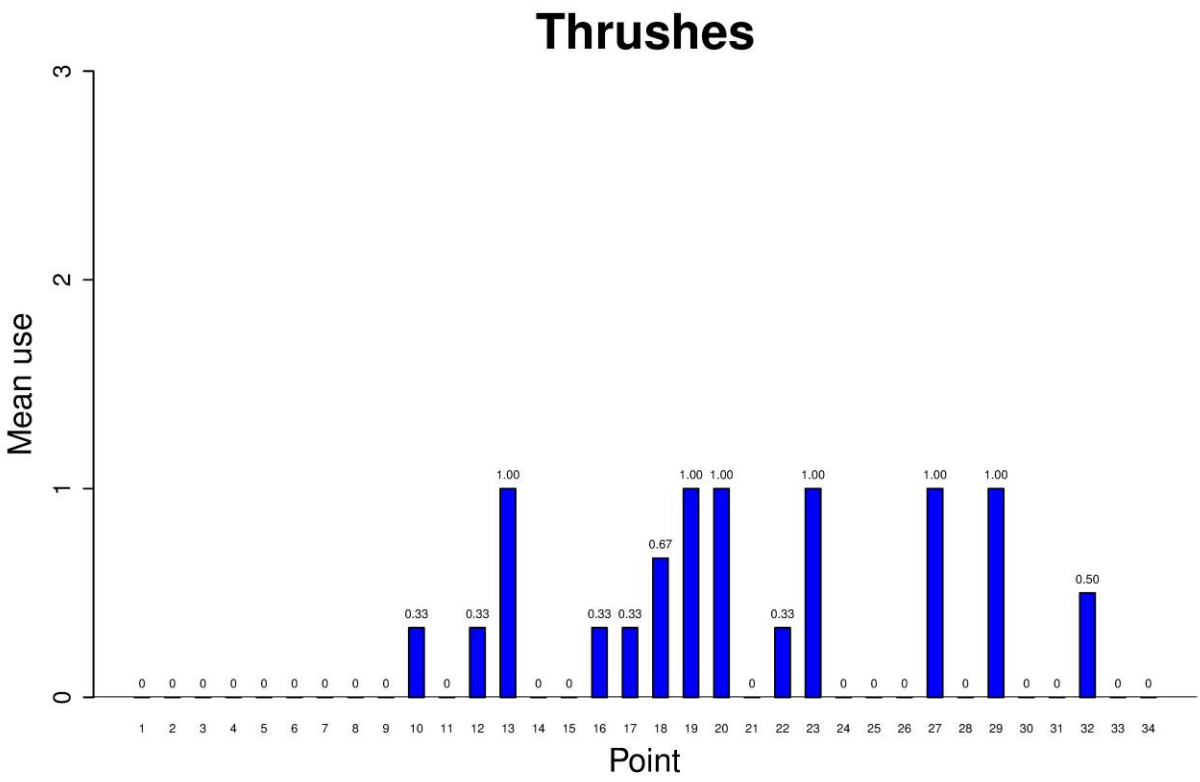


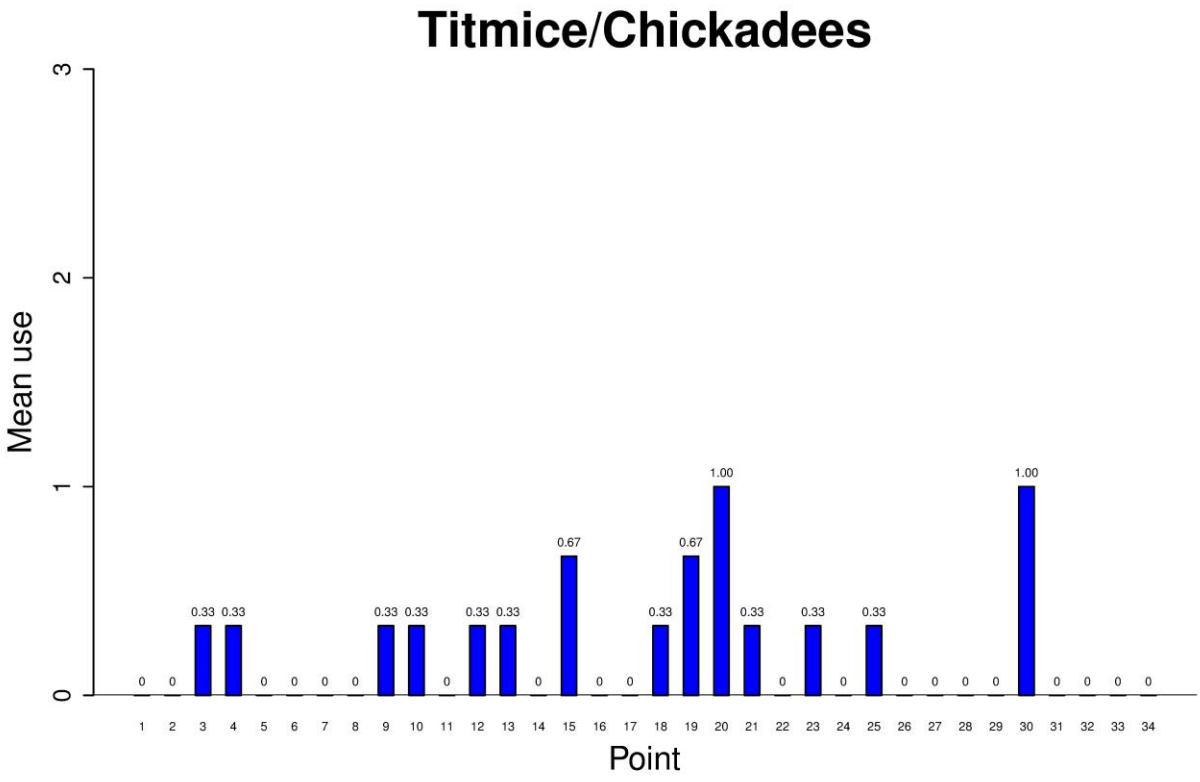
Appendix A (*continued*). Mean use (number of birds/5-min survey) at each breeding bird survey point for all birds and major bird types at the Rocky Forge Wind Project.



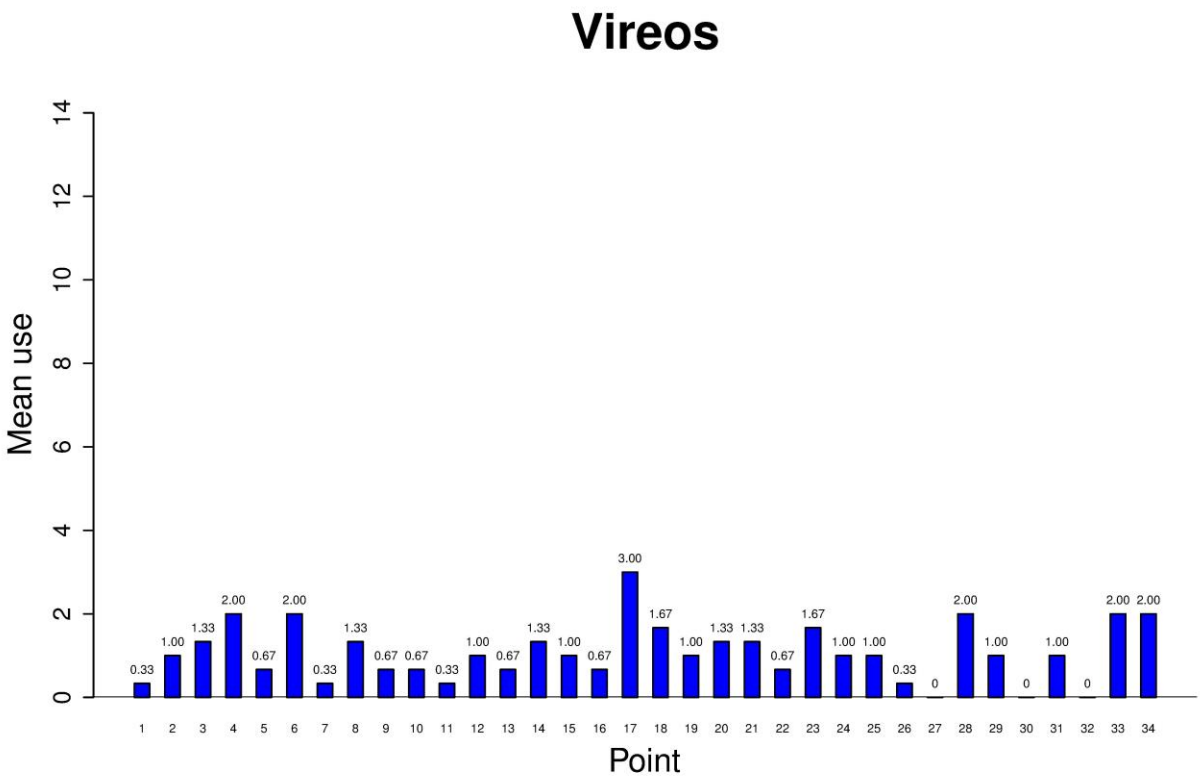


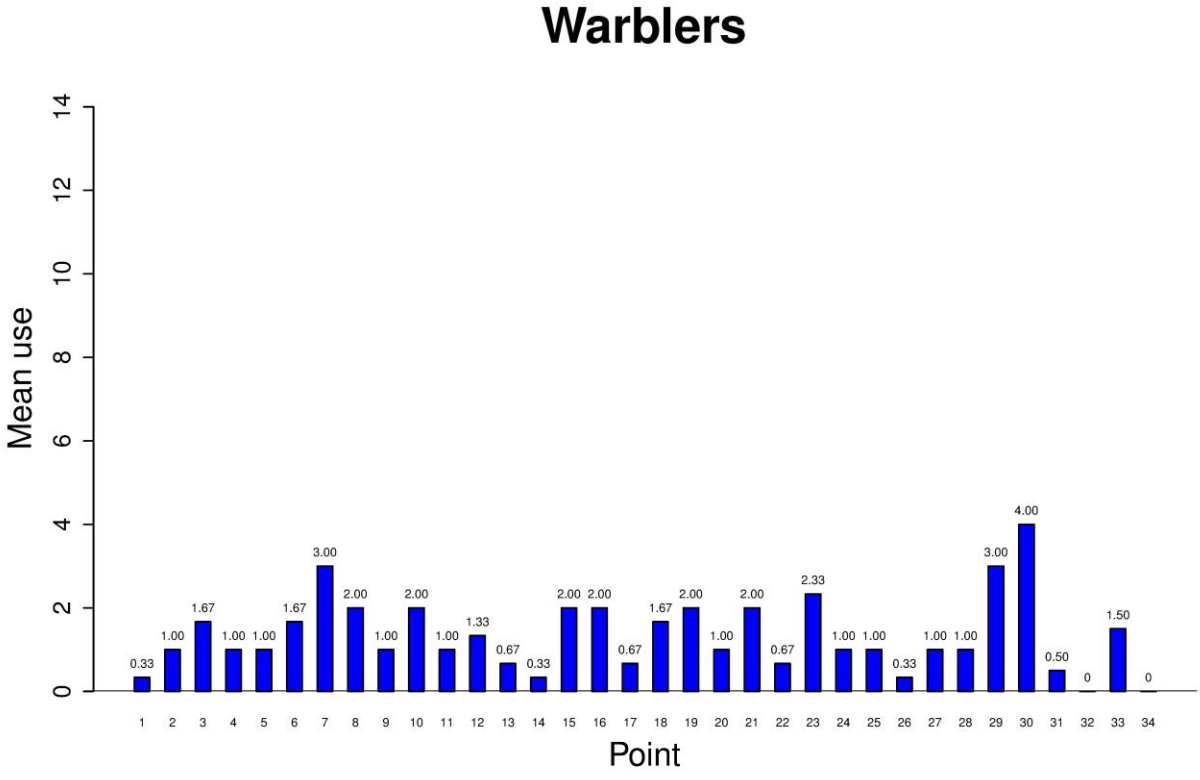
Appendix A (*continued*). Mean use (number of birds/5-min survey) at each breeding bird survey point for all birds and major bird types at the Rocky Forge Wind Project.



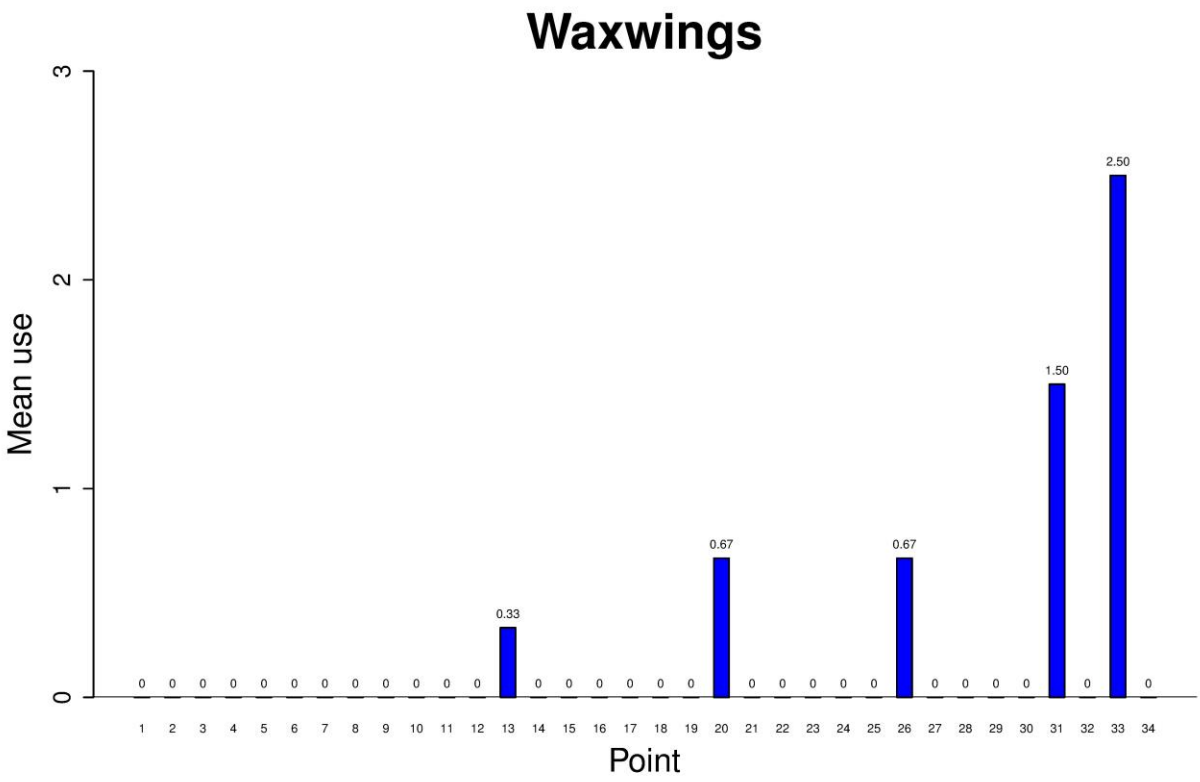


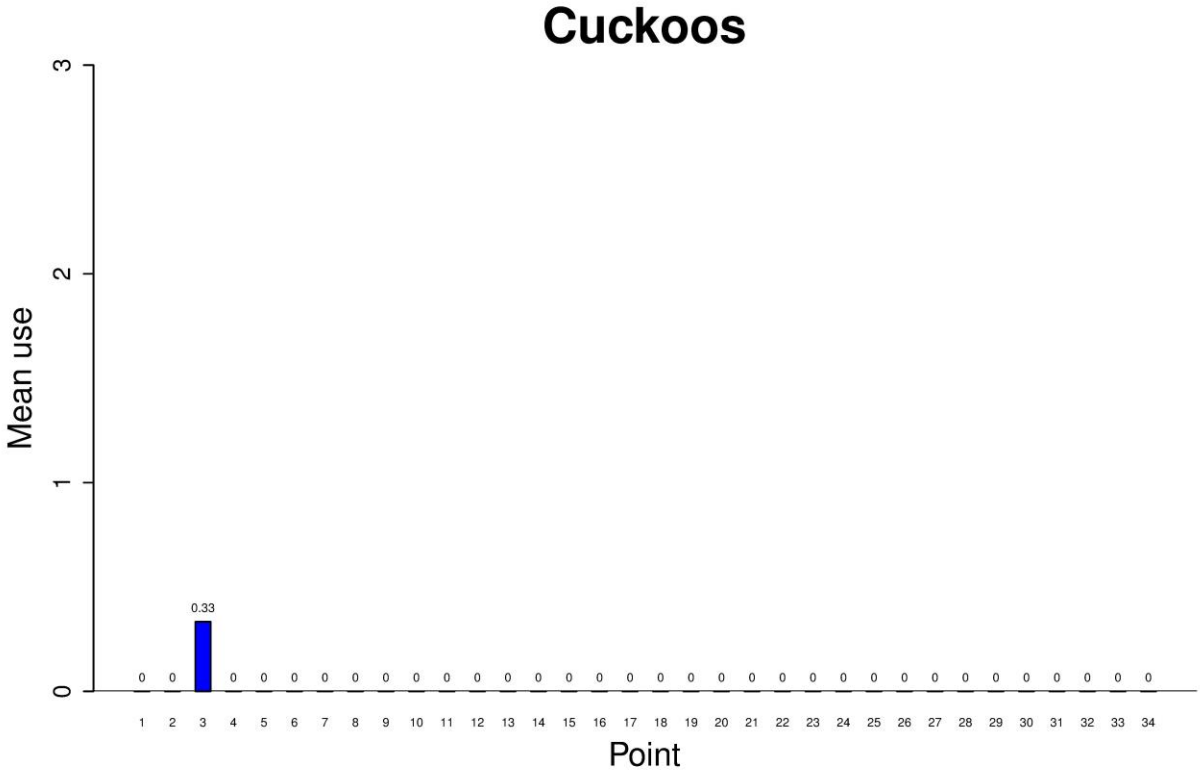
Appendix A (*continued*). Mean use (number of birds/5-min survey) at each breeding bird survey point for all birds and major bird types at the Rocky Forge Wind Project.



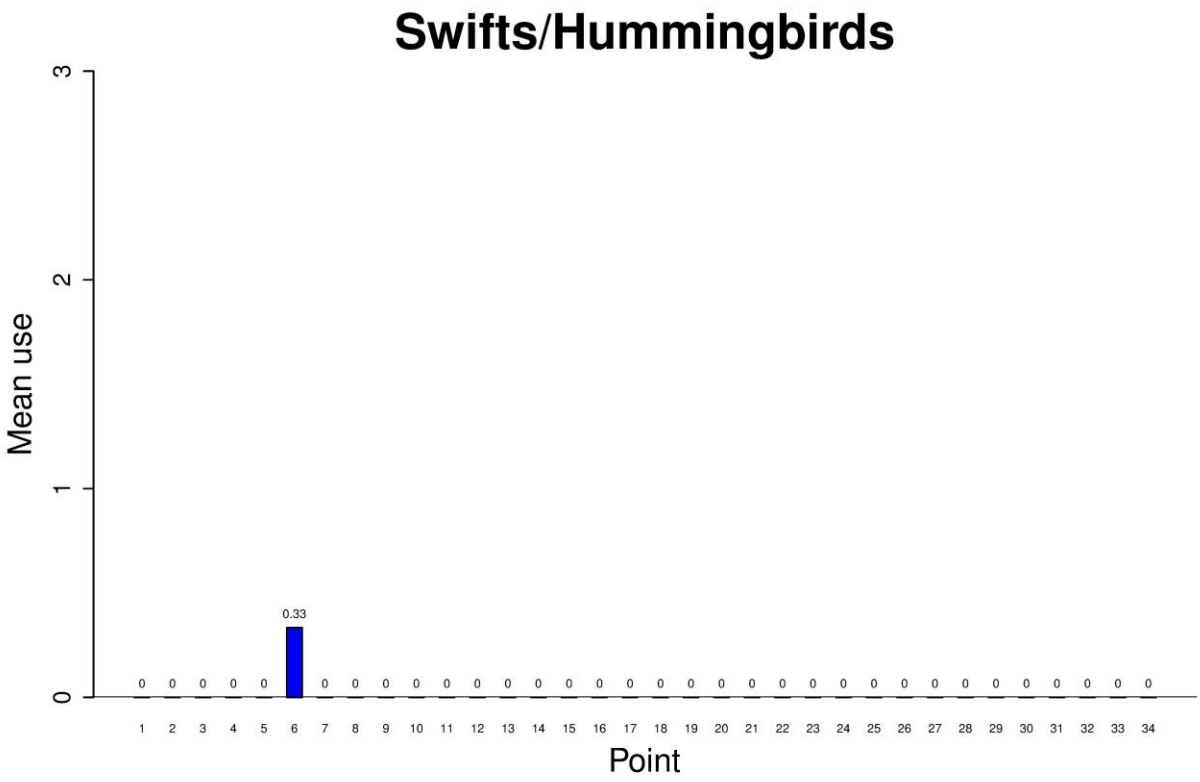


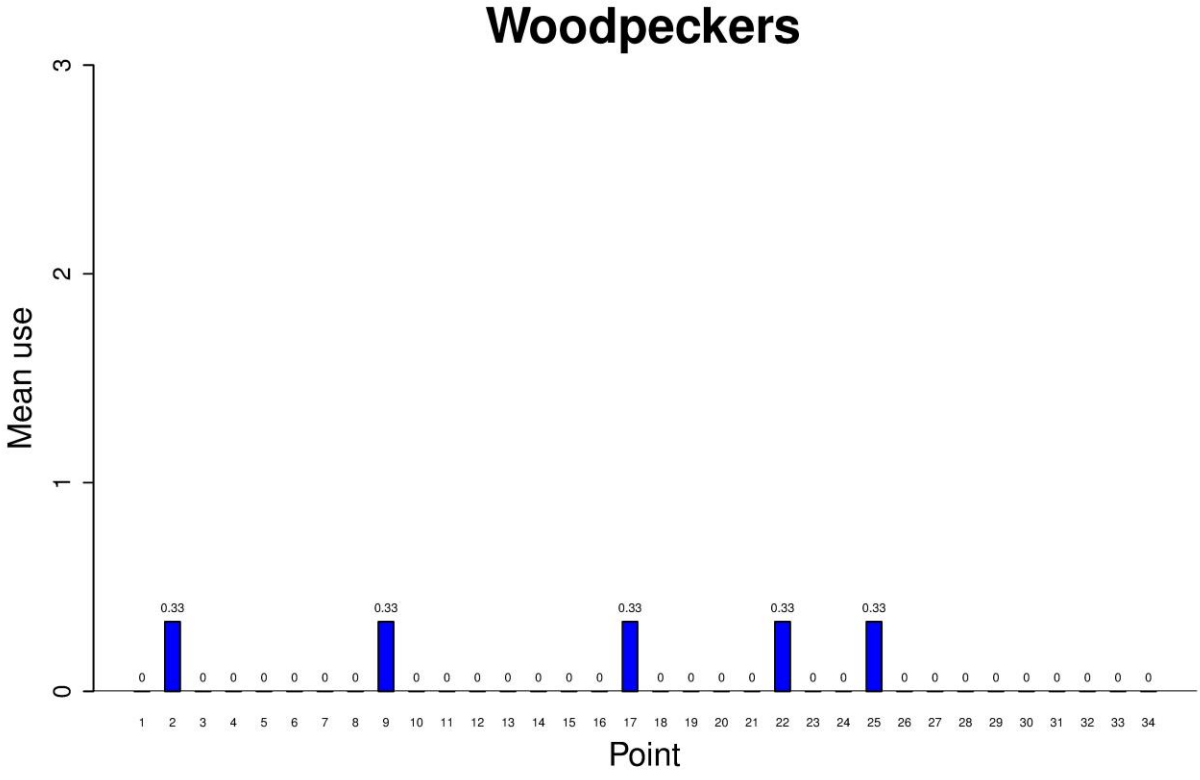
Appendix A (*continued*). Mean use (number of birds/5-min survey) at each breeding bird survey point for all birds and major bird types at the Rocky Forge Wind Project.





Appendix A (*continued*). Mean use (number of birds/5-min survey) at each breeding bird survey point for all birds and major bird types at the Rocky Forge Wind Project.





Appendix A (*continued*). Mean use (number of birds/5-min survey) at each breeding bird survey point for all birds and major bird types at the Rocky Forge Wind Project.

Appendix B. Photographs of potentially suitable Swainson's warbler and loggerhead shrike habitat identified during evaluation of habitat suitability at the Rocky Forge Wind Project


Figure 2a. Loggerhead shrike low potential habitat location 1.


Figure 2b. Loggerhead shrike low potential habitat location 2.



Figure 2c. Loggerhead shrike moderate potential habitat location 3.

.

Figure 3a. Swainson's warbler potential habitat location 1.

Figure 3b. Swainson's warbler potential habitat location 2.

Figure 3c. Swainson's warbler potential habitat location 3.

Figure 3d. Swainson's warbler potential habitat location 4.