

Bird and Vegetation Monitoring at Bobcat Ridge Natural Area



2018 TECHNICAL REPORT



Connecting People, Birds and Land

Bird Conservancy of the Rockies

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Technical Report: I-Bobcat-FCNAP-18

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Vision: *Native bird populations are sustained in healthy ecosystems*

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2. **Education** is critical to the success of bird conservation.
3. **Stewardship** of birds and their habitats is a responsibility we all share.

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Educating people of all ages to instill an awareness and appreciation for birds and a conservation ethic.

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EXECUTIVE SUMMARY

Bobcat Ridge Natural Area is a 2,606-acre property owned and managed by the City of Fort Collins Natural Areas Program (FCNAP) that is open to the public for recreational horseback riding, mountain biking, hiking, and wildlife viewing. There are historic structures and cultural artifacts on the property as well, adding to the value of the Natural Area for a variety of visitors.

This Natural Area supports an impressive diversity of wildlife including at least 103 bird species associated with grassland, foothills shrubland, riparian and pine forest habitats. The Natural Area is also home to several species of mammals including black bear, mountain lion, bobcat, mule deer and elk.

Bird Conservancy has conducted surveys across the property annually since 2016 using a grid of points spaced 250m apart. This year surveys were completed June 1 – June 15, 2018 across the same grid. The three years of avian assessments serve to record bird species presence and habitat use across Bobcat Ridge Natural Area in all habitat types.

During the 2018 season we conducted avian point count surveys at all 172 stations. At each station we also surveyed vegetation and recorded observations of other wildlife. During 11 survey days in 2018, two observers detected 2,583 individual birds of 84 species. For the purposes of this report we estimated densities of 21 common breeding bird species across the study area and compared estimates to those generated in past years. We also provide estimated population sizes on the property for those species, and maps of species' habitat use.

The most common birds within the 2018 study area were Western Meadowlark, Spotted Towhee, Cliff Swallow, Mourning Dove, House & Rock Wren, and Broad-tailed Hummingbird. Highlights this year were the discovery of Eastern Bluebird and Lewis's Woodpecker nests. 2018 marked the first detections of Cedar Waxwing, Bushtit, Common Poorwill, and a Great-horned Owl pair on the property.

Surveys occurred in optimal breeding season in 2018 and 5 new species were observed. We are getting very good precision (%CV < 50%) in our results to be able to effectively monitor changes in the bird populations in Bobcat Ridge for at least 21 species.

Bobcat Ridge offers the City of Fort Collins Natural Areas Program and the general public an exceptional opportunity for recreation and outdoor education as well as the opportunity to protect and steward a significant ecological resource containing a variety of plants and wildlife. Management issues that affect birdlife at Bobcat ridge include the widespread occurrence of non-native vegetation like smooth brome, cheatgrass and mullein, as well as conservation of remaining patches of mature ponderosa forest.

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INTRODUCTION

The Bobcat Ridge Natural Area is a 2,606-acre property purchased by the City of Fort Collins Natural Areas Program (FCNAP) in 2003 and lies in close proximity to several other conserved public lands. Located just west of Masonville in Larimer County, Colorado it adjoins with USFS Roosevelt National Forest to the west, and adds to the protection and conservation of the few remaining un-fragmented landscapes along the Colorado Front Range.

The goal of monitoring the birds at Bobcat Ridge is to document the abundance, distribution, and habitat requirements of breeding birds on the property, and assess how they respond to management efforts over time, to help the FCNAP conserve the biodiversity of this unique Natural Area of northern Colorado.

This report highlights the findings of Bird Conservancy of the Rockies' 2018 bird monitoring on Bobcat Ridge Natural Area, and compares findings to previous monitoring efforts.

STUDY AREA

The 2,606-acre property is flanked on the east side by tall red sandstone hogback cliffs running northwest–southeast with 2 drainages breaking up the cliff face. In those drainages grow narrowleaf cottonwood (*Populus angustifolium*) wax currant (*Ribes cereum*), and willow spp. (*Salix spp.*).



Figure 1: Looking south across the valley floor at Bobcat Ridge (photo ENY)

There is a valley at the western base of the hogback cliffs also expanding from the northwest to the southeast, bordered on each side by mountain mahogany (*Cercocarpus montanus*), and is dominated by smooth brome grass (*Bromus inermis*) on the valley floor (Fig 1). The west side of the

valley sweeps up into rolling hillsides where there are small stands of rabbitbrush (*Ericameria nauseosus*), mountain mahogany and skunkbush (*Rhus trilobata*).



Figure 2: The dense understory in a drainage in Bobcat Ridge NA

The hillsides transition steeply to meet larger and denser patches of mountain mahogany and mixed conifer forest. Several springs have created narrow ravines and drainages in the western half of the property with a dense understory of willow (*Salix spp.*) chokecherry (*Prunus virginiana*), Rocky Mountain maple (*Acer glabrum*) and a few aspen trees (*Populus tremuloides*) (Fig 2).

More than half of the property burned in 2000 during the Bobcat Ridge Fire (which gave its namesake to the natural area), leaving downed logs and standing snags.

The steeper higher elevation rocky hillsides are spotted with yucca (*Yucca glauca*), skunkbush and wild raspberry bushes (*Rubus occidentalis*). The higher elevations and hilltops in the northwest part of the property have sparse stands of mature ponderosa pine forest (*Pinus ponderosa*).



Figure 3: Steeper hillside in the West portion of Bobcat Ridge NA

METHODS

Between June 1st and June 15th of 2018, we conducted avian and vegetation point count surveys on Bobcat Ridge Natural Area in Larimer County of northern Colorado. Point count stations were determined using a systematic 250-m grid of points created in Arc Map 9.3.1 (Fig 4) to generate 172 points across the entire property.

Avian Point Count Surveys

Point count surveys started one half-hour before sunrise and ended by 11a.m., often earlier. We navigated to point count locations on foot using a handheld GPS unit. We recorded atmospheric data (temperature, cloud cover, precipitation, and wind speed) and time of day at the start and end of each daily survey effort. All GPS data were logged in Universal Transverse Mercator (UTM) North American Datum 1983.

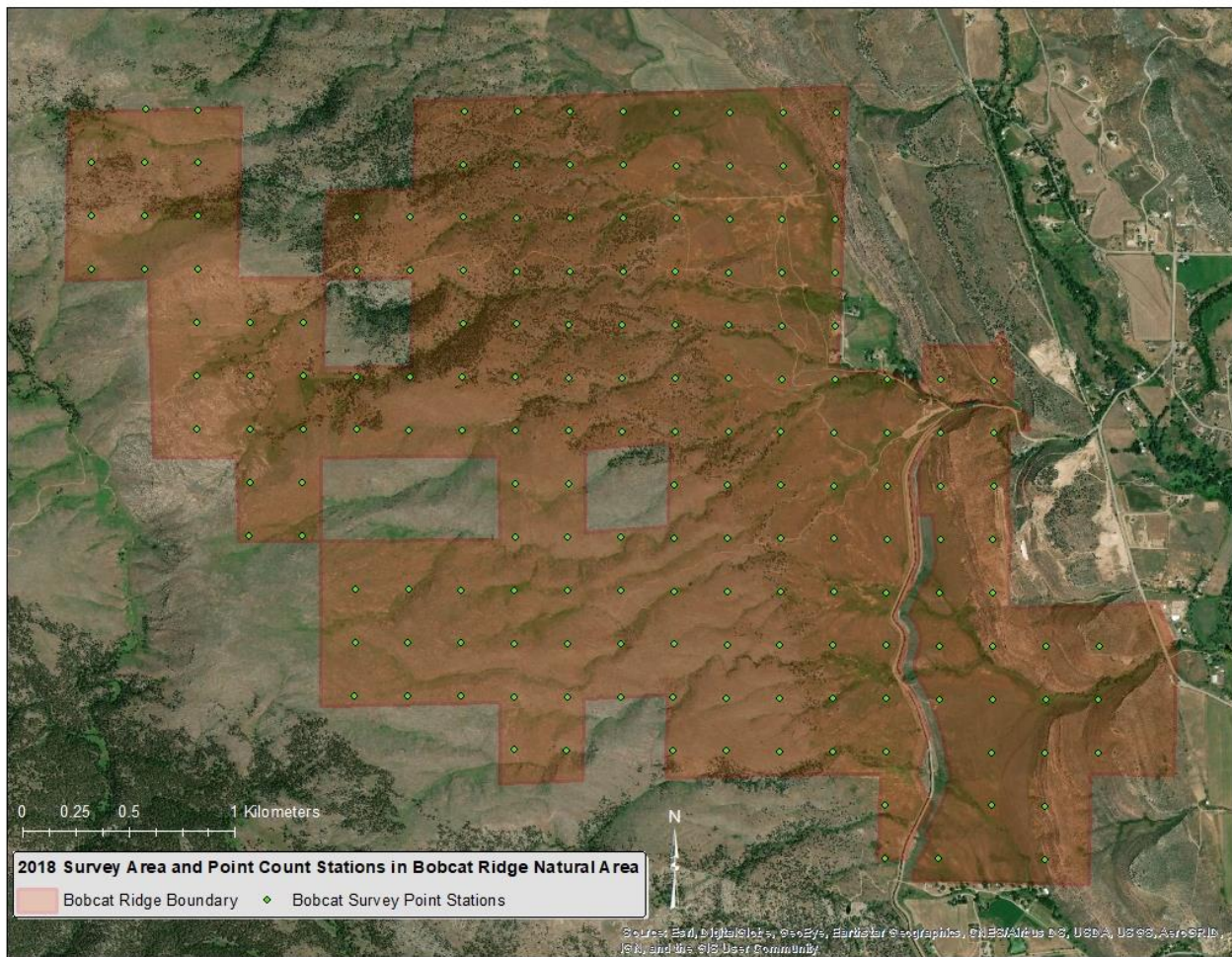


Figure 4: 2018 Survey area and point count stations on Bobcat Ridge Natural Area.

At each station, we conducted a 6-minute point count survey consisting of six consecutive 1-minute intervals. For each bird detected, observers recorded species, sex, how it was detected (call, song, visual, wing beat, other), distance from observer at time of detection, and the 1-minute interval in which it was detected. When possible to measure exactly to each bird, we used a Nikon ProStaff 550 laser rangefinder, and estimated distances to the nearest object with help of a rangefinder when not possible to measure the distance to the bird. Point counts were not conducted during

periods of heavy snow, rain, or wind greater than 10 mph. This protocol, which is described more fully by Hanni et al. (2016), uses Distance sampling (Buckland et al. 2001) with removal (Farnsworth et al. 2002).

Between point count surveys, we recorded the presence of high-priority and other rare or unusual bird species, but we did not use these observations in our analyses. We also noted the presence of any other wildlife.

Vegetation Surveys

After completing each avian point count survey, we completed a rapid ocular vegetation habitat survey at each point by estimating several vegetation parameters within 5m of each point, including percent cover of grasses, forbs, bare ground, exotic/non-native plants, cactus, low woody plants, animal scat, rock, and 'other cover' to the nearest 1%. 'Other cover' included minor ground cover types such as lichen, litter, or categories defined in the notes (i.e. fallen logs & pine cones). Also within a 5-m radius we measured average grass height with a ruler to the nearest cm and listed the dominant grass species. Within 50m of each station we documented shrub (height >30cm) and over-story (height >3m) tree species and estimated percent cover to the nearest 1%, and the average height (in meters) of each.

Analyses

We estimated bird species density using Program Distance 6.0 release 2 (Thomas et al. 2010) and selected among Half-normal cosine, Hazard-rate cosine, and Uniform cosine detection function models to determine the best fit model for each species. We pooled all point count data since 2015 to generate species-specific detection functions, and then post-stratified density estimates by year. Although species' density estimates calculated with less than 75 observations may be unreliable representations of true populations (Buckland et al. 2001), we present estimates for all species with $n \geq 50$.

RESULTS

Avian Surveys

In 2018 we detected 2,583 birds at all 172 point count surveys, and observed 84 species within the study area (Appendix A). There were 5 new species detected in 2018, including Great-horned Owl, Bushtit, Common Poorwill, Cooper's Hawk and Cedar Waxwing. Blue-gray Gnatcatcher, Western Wood-peewee, and Mourning Dove are all showing upward trends since 2015, and Broad-tailed Hummingbird continues their upward trend with over 100 detected this year. Cliff Swallows are showing a steady decline, as are Vesper Sparrows. There was a sudden drop in American Robin numbers this year, and Northern Flickers. We estimated density and population size for 21 breeding bird species with ≥ 50 pooled detections for analyses (Table 1).

Table 1: Density estimates 2015-2017 (n = truncated # of detections, D = # of birds/ km²) with Estimated population size (property wide = 10.55 km²), % coefficient of variation and 95% lower (LCL) and upper (UCL) confidence limits.

Species	Year	n	D	%CV	LCL	UCL	Est pop size
American Robin	2015	21	7.1349	35.89	3.58	14.19	75.27
	2016	24	7.6801	37.03	3.78	15.58	81.03
	2017	35	11.266	34.37	5.82	21.81	118.86
	2018	29	2.3853	18.34	1.67	3.42	25.16
Black-billed Magpie	2015	77	3.7878	12.98	2.94	4.88	39.96
	2016	32	1.4826	19.6	1.01	2.17	15.64
	2017	48	2.237	15.97	1.64	3.06	23.60

	2018	32	1.7072	33.42	0.89	3.26	18.01
Blue-gray Gnatcatcher	2015	22	13.902	27.76	8.1241	23.788	146.67
	2016	29	17.26	30.04	9.6704	30.805	182.09
	2017	21	12.571	30.53	6.981	22.639	132.62
	2018	50	36.099	22.87	23.111	56.385	380.84
Brewer's Blackbird	2015	0	0	0	0	0	-
	2016	25	9.653	30.12	5.4012	17.252	101.84
	2017	40	15.535	28.88	8.8932	27.138	163.89
	2018	39	16.62	28.77	9.5177	29.023	175.34
Broad-tailed Hummingbird	2015	55	45.417	11.92	35.933	57.403	479.15
	2016	24	18.666	21.26	12.33	28.259	196.93
	2017	35	27.38	19.1	18.848	39.775	288.86
	2018	101	92.186	20.09	62.243	136.54	972.56
Bullock's Oriole	2015	60	21.04	20.58	14.086	31.425	221.97
	2016	31	10.239	26.69	6.1102	17.156	108.02
	2017	28	9.3018	26.6	5.5603	15.561	98.13
	2018	39	12.675	27.52	7.4223	21.643	133.72
Cliff Swallow	2015	46	43.428	32.32	23.326	80.851	458.17
	2016	40	35.568	38.71	17.047	74.208	375.24
	2017	22	19.677	36.31	9.8416	39.34	207.59
	2018	18	9.2118	48.57	3.6845	23.031	97.18
Green-tailed Towhee	2015	8	1.8208	38.69	0.87227	3.8009	19.21
	2016	65	13.934	22.52	8.9883	21.601	147.00
	2017	22	4.7437	31.47	2.5899	8.6887	50.05
	2018	64	6.8712	20.52	4.6012	10.261	72.49
House Wren	2015	32	11.603	20.51	7.7774	17.312	122.41
	2016	58	19.809	17.11	14.177	27.676	208.98
	2017	86	29.543	14.49	22.247	39.232	311.68
	2018	114	18.818	15.9	13.785	25.687	198.53
Lark Sparrow	2015	21	16.071	28.79	9.2151	28.026	169.55
	2016	32	23.065	29.74	12.997	40.931	243.34
	2017	10	7.2499	37.73	3.5331	14.877	76.49
	2018	34	12.557	52.96	4.6194	34.136	132.48
Lazuli Bunting	2015	63	20.118	15.95	14.726	27.485	212.24
	2016	61	18.347	16.72	13.233	25.438	193.56
	2017	37	11.194	22.89	7.1713	17.472	118.10
	2018	61	17.847	17.84	12.591	25.297	188.29
Mourning Dove	2015	35	3.0188	18.58	2.1006	4.3382	31.85
	2016	30	2.4371	21.01	1.6188	3.669	25.71
	2017	89	7.2723	14.74	5.4501	9.7038	76.72
	2018	153	8.4374	11.8	6.694	10.634	89.01
Northern Flicker	2015	20	1.885	30.71	1.0429	3.407	19.89
	2016	29	2.5744	28.07	1.495	4.4331	27.16

	2017	24	2.143	29.7	1.2079	3.8019	22.61
	2018	15	0.55763	49.62	0.21296	1.4601	5.88
Rock Wren	2015	14	2.1074	30.6	1.168	3.8023	22.23
	2016	67	9.4991	15.42	7.0257	12.843	100.22
	2017	91	12.977	14.02	9.8626	17.076	136.91
	2018	102	8.321	26.62	4.9628	13.952	87.79
Red-winged Blackbird	2015	55	8.8484	30.14	4.9471	15.827	93.35
	2016	19	2.879	37.89	1.3998	5.9215	30.37
	2017	17	2.591	39.93	1.2149	5.5258	27.34
	2018	7	2.6993	110.83	0.38553	18.898	28.48
Spotted Towhee	2015	155	41.016	10.14	33.618	50.043	432.72
	2016	182	45.361	11.62	36.12	56.966	478.56
	2017	166	41.615	11.27	33.36	51.912	439.04
	2018	158	32.593	16.59	23.564	45.08	343.86
Vesper Sparrow	2015	144	27.489	9.76	22.686	33.31	290.01
	2016	19	3.4162	31.36	1.8665	6.2524	36.04
	2017	17	3.0745	28.67	1.7653	5.3544	32.44
	2018	28	2.4264	31.03	1.329	4.4298	25.60
Western Kingbird	2015	43	12.074	37.17	5.9092	24.668	127.38
	2016	13	3.4379	46.4	1.4385	8.2163	36.27
	2017	15	3.9901	43.59	1.7504	9.0954	42.10
	2018	14	0.95555	43.9	0.40786	2.2387	10.08
Western Meadowlark	2015	421	33.295	16.59	24.095	46.008	351.26
	2016	205	15.27	18.31	10.693	21.806	161.10
	2017	324	24.275	17.57	17.24	34.181	256.10
	2018	341	11.132	8.08	9.499	13.045	117.44
Western Wood-Pewee	2015	13	2.4576	34.16	1.2777	4.7272	25.93
	2016	39	6.9443	27.09	4.1103	11.732	73.26
	2017	59	10.567	25.34	6.4608	17.282	111.48
	2018	87	8.999	20.89	5.9809	13.541	94.94
Yellow-breasted Chat	2015	22	4.5616	22.83	2.9254	7.113	48.12
	2016	41	8.0069	19.47	5.4767	11.706	84.47
	2017	52	10.214	19.18	7.0255	14.851	107.76
	2018	58	7.3352	21.72	4.8007	11.208	77.39



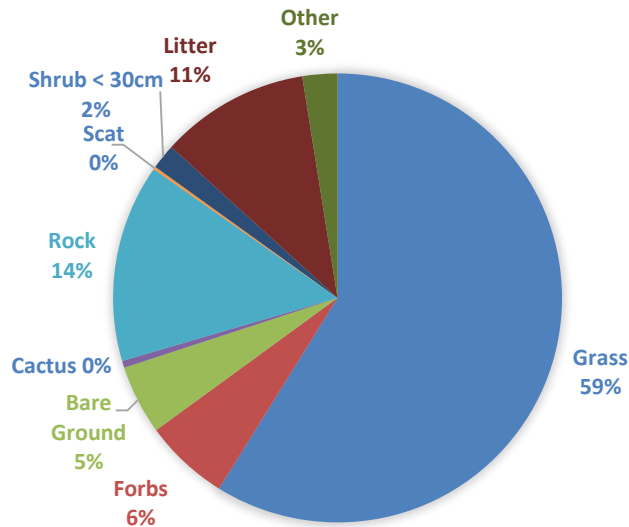
Figure 5: Yellow-breasted Chat in riparian area of Bobcat Ridge (Photo by Andy Bankert)

Lewis's Woodpecker is considered a species of "Continental Importance" by Partners in Flight (PIF), meaning these species should be monitored closely to clarify population trends and identify undetected declines that may trigger additional actions. Six species detected on the property in 2018 are considered birds of "Regional Concern": Common Nighthawk, Lewis's Woodpecker, Lazuli Bunting, Common Poorwill, Brewer's Sparrow, and Mountain Bluebird. Thirteen species (including 3 of the aforementioned) are on the PIF list of birds of "Regional Stewardship Importance to Bird Conservation Region 16" (Southern Rockies Colorado Plateau) meaning they are "flagship" species characteristic of, and largely limited to, this biome, which therefore bears the primary responsibility for conserving these species. Focusing on population and habitat goals for these species at a local scale contributes to range-wide conservation efforts to reverse population declines. Those species in Bobcat Natural Area are: Lewis's Woodpecker, Mountain Bluebird, Lazuli Bunting, Dusky Grouse, Cooper's Hawk, Broad-tailed Hummingbird, Northern Flicker, Cordilleran Flycatcher, Plumbeous Vireo, Pygmy Nuthatch, Rock Wren, Virginia's Warbler, and Green-tailed Towhee. A few species detected are also considered "Common Birds in Steep Decline" continentally: Common Nighthawk, Northern Flicker, Brewer's Sparrow, and Rock Wren (Appendix A).

Vegetation

Grass was the dominant ground cover type in both 2017 (59%) and 2018 (41%), but notably decreased in 2018 with an increase of litter (20%), bare ground (9%), and forbs (15%) compared to 2017. 'Other' cover remained consistent at 3% made up mostly of fallen dead woody material, but also pine cones, lichen, etc. (Fig 6)

2017 AVERAGE % GROUND COVER



2018 AVERAGE % GROUND COVER

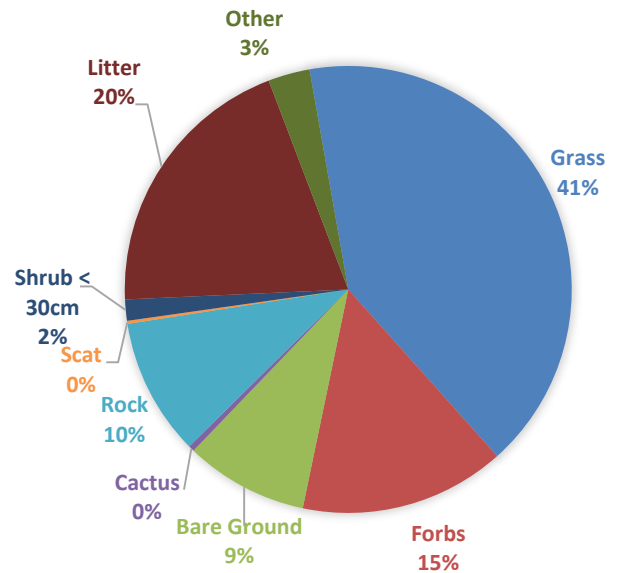


Figure 6: Average percent ground cover in Bobcat Ridge Natural Area in 2017 (left) compared to 2018 (right)

Overstory (anything over 3m in height) on 50% of the points had 1-5% cover, followed by points with no overstory, which includes grassland, shrubland and cliff areas (Fig 7A). The densest overstory (26 – 45%) occurred in the lowest percentage of points (2%). Of the points that had overstory, the most common type was live ponderosa pine (69%), followed by burned conifer (17%), and then equal percentages of Juniper, Lodgepole pine, and deciduous trees (all 4%) (Fig 7B).

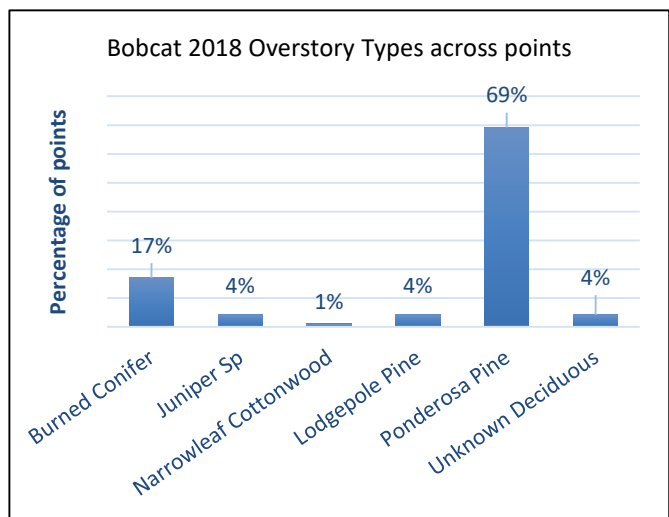
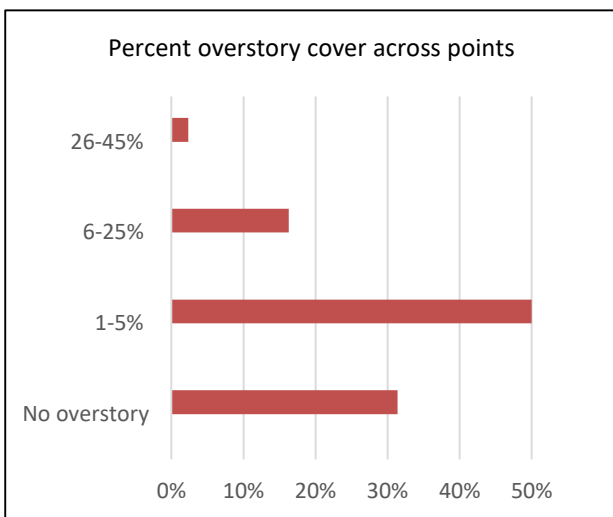


Figure 7: A: Percent overstory and B: Overstory types on Bobcat Ridge NA

The dominant shrub cover type (shrubs > 30cm) was skunkbush (*Rhus trilobata*) at 28%, followed closely by mountain mahogany (*Cercocarpus montanus*) at 27% and rabbitbrush (*Ericameria nauseosus*) at 26%. Shrub cover in the 50-m radius at each survey point was documented at 165 out of 172 points in 2017, with an average shrub cover of 9% at those points. (Fig 8).

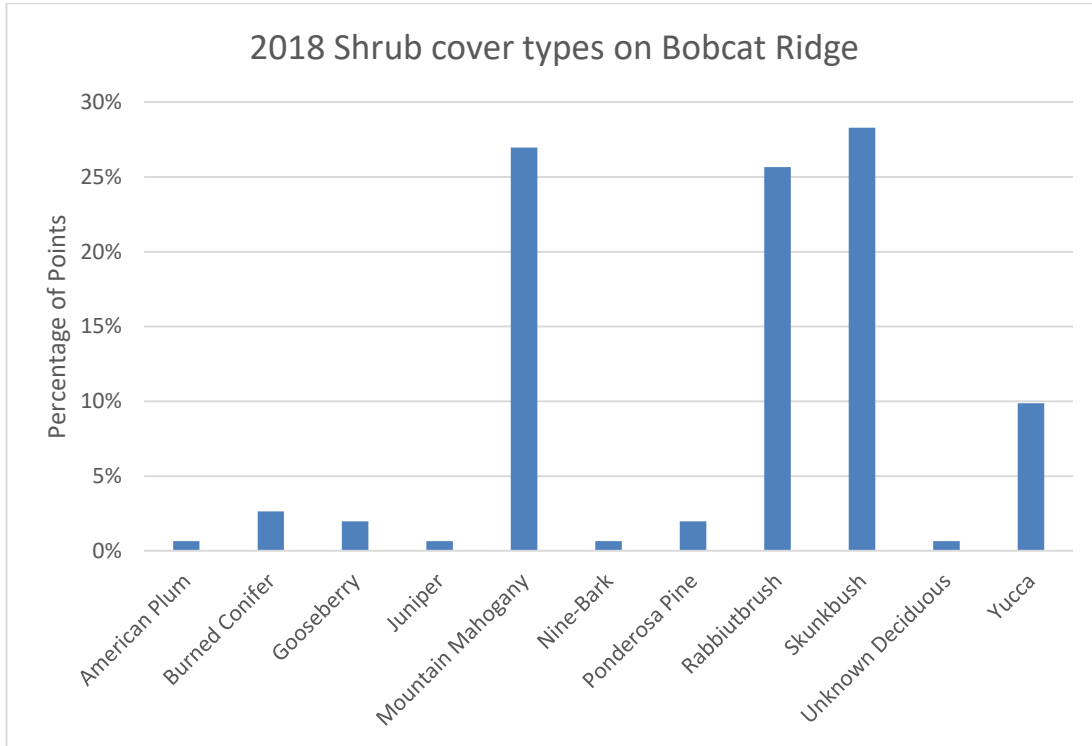


Figure 8: Shrub cover on Bobcat Ridge

DISCUSSION

This was the 4th consecutive year of monitoring, and a total of 103 breeding bird species have been detected within the Bobcat Ridge Natural Area. We are starting to see trends in the populations of resident breeding species.

New birds detected in 2018 included Cedar Waxwing, Common Poorwill, Bushtit, Great-horned Owl, and Cooper’s Hawk. These birds were detected in areas of mature pine and mixed forest, indicating that the remaining patches of Ponderosa forest on the property are attractive to those species, in addition to a variety of other forest birds such as Western Tanager, Plumbeous Vireo, Hammond’s Flycatcher, Western Wood-Pewee and Dusky Grouse, and thus are important for the overall biodiversity of the property.

It was a good year for Broad-tailed hummingbirds, with over double the estimated population size from 2015. Perhaps due to the notable increase in forbs/ pollinator-friendly plants. Birds that appear to be decreasing in numbers are Northern Flickers, Cliff Swallows, American Robins, Western Kingbirds, and we’re still seeing a decrease in Vesper Sparrows, a native grassland/ shrubland species. It would be worth investigating the treatment effects of the vegetation on the insect populations of Bobcat Ridge, as that is a major food source for the birds that are showing a decreasing trend. Several specialist species have shown a fairly stable population trend; Yellow-

breasted Chat, Western Wood-Pee-wee, Bullock's Oriole, Green-tailed and Spotted Towhee, Rock Wren, Lark Sparrow and Lazuli Bunting (up from last year). Common birds that have remained common are; Western Meadowlark, House Wren, Black-billed Magpie, Brewer's & Red-winged Blackbird.

Other flora & fauna sightings included mule deer, elk, coyote, monarch butterflies, and a beautiful milk snake (Fig 9).

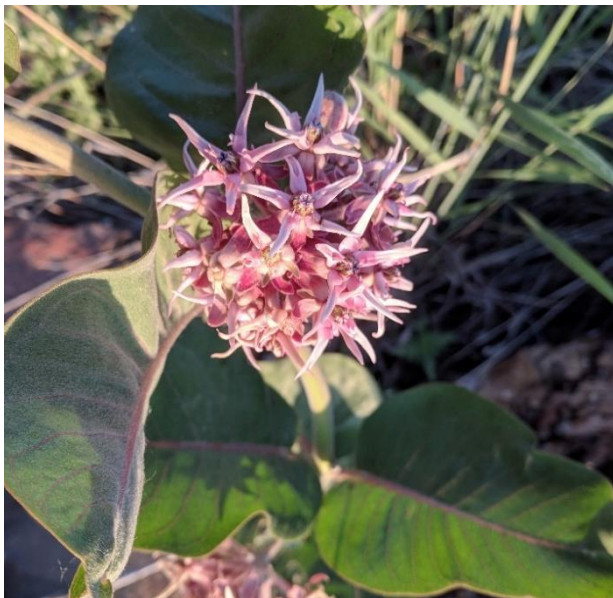


Fig 9: Other flora/ fauna observed **Top:** Milk Snake (*Lampropeltis triangulum*) **Left:** Milkweed flower on Bobcat Ridge, **Right:** Mule Deer foraging in the burn area

Prescribed fire and grazing treatments in the smooth brome grass in the valley is slowly creating the structural mosaic that many grassland birds prefer for foraging, breeding and nesting, including variable height and density of grasses and forbs, and areas of bare ground.

The cheatgrass has decreased in the former burn area and a proliferation of flowering forbs has taken its place, but continues to be a problem in the transitional shrub/open valley habitat (Fig 10).



Figure 10: Cheat grass invading the rabbitbrush and hillsides on the west side of Bobcat Ridge NA

MANAGEMENT RECOMMENDATIONS

Management should continue to create heterogeneity of near-ground vegetation through prescribed grazing, burning and restoration of native grass species, and reduce the occurrence of non-natives like smooth brome, cheatgrass, field bindweed, sweet clover and mullein.

In the previously burned areas, the treatments for cheatgrass have been somewhat successful to encourage the growth of native grasses and forbs, but further treatment is needed as this is a difficult grass species to manage. We recommend leaving any remaining standing snags in the burn areas to serve as potential nesting habitat for cavity nesters such as bluebirds, swallows, nuthatches, chickadees, owls and woodpeckers. Eastern Bluebirds were observed nesting in a snag this year, which is a rare bird this far west, and a testament to the importance of such structure as that species has struggled to maintain populations due to habitat loss and introduced cavity nesting species. The more cavities that can be provided will only aid in their recovery.

It is important to minimize catastrophic fire hazard and other disturbance where intact ponderosa forest patches still exist, as those areas currently serve as breeding refugia for Western Tanager, Western Wood-pewee, and Plumbeous Vireo. As the area has experienced several severe fires eliminating the previous contiguous forest, these remaining stands are essential to maintaining populations of these birds that rely on mature forest habitat.

Bobcat Ridge Natural Area continues to conserve a signature Front Range foothills ecosystem with numerous high priority bird species. Continued monitoring can further help the FCNAP better understand the full avian community composition and response to management actions as evidenced by additional species detected annually over the past 3 years. Long-term monitoring can document population dynamics in response to changes in vegetation recovery post-fire, post treatments, and post vegetation restoration activities. Grassland restoration in the valley area of the property could be very successful in attracting sensitive grassland bird species. Replacing the smooth brome in the valley with native tall and mid-height grasses will attract bird species of concern like Grasshopper Sparrow, which already occur in the Front Range in areas with suitable habitat. The discovery of nesting Lewis's Woodpecker and Eastern Bluebird is attributed to the occurrence of the burned and standing snags. As those features disappear, so might those bird species that rely on them. Overall, informed understanding of what is happening over time with bird populations, which are known to be indicators of ecological health, can be helpful to guide land use and management decisions.

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APPENDIX (A): BIRD SPECIES DETECTIONS IN BOBCAT RIDGE NATURAL AREA (2015-2018)

All un-truncated detections by species each year. **Bold Names** Indicate species of conservation concern on the Partners In Flight watch list.

* Indicate PIF Regional Stewardship Species

† Indicate continentally common birds in steep decline

Common Name	Scientific Name	2015	2016	2017	2018	TOTAL
Canada Goose	<i>Branta canadensis</i>	8		25		33
Gadwall	<i>Anas strepera</i>			3		3
Mallard	<i>Anas platyrhynchos</i>	5		2	3	10
Dusky Grouse*	<i>Dendragapus obscurus</i>			2	4	6
Wild Turkey	<i>Meleagris gallopavo</i>	1		14		15
Great Blue Heron	<i>Ardea herodias</i>	2			3	5
Turkey Vulture	<i>Cathartes aura</i>	22	11	15	11	59
Cooper's Hawk*	<i>Accipiter cooperii</i>				1	1
Sharp-shinned Hawk	<i>Accipiter striatus</i>			1		1
Red-tailed Hawk	<i>Buteo jamaicensis</i>	3	11	11	13	38
American Kestrel	<i>Falco sparverius</i>	1	18	12	17	48
Prairie Falcon	<i>Falco mexicanus</i>		1			1
Killdeer	<i>Charadrius vociferus</i>	1				1
Rock Pigeon	<i>Columba livia</i>	2	3			5
Eurasian Collared-Dove	<i>Streptopelia decaocto</i>	20	1	1	2	24
Mourning Dove	<i>Zenaida macroura</i>	39	33	113	162	347
Great Horned Owl	<i>Bubo virginianus</i>				3	3
Common Nighthawk†	<i>Chordeiles minor</i>		2	6	13	21
Common Poorwill	<i>Phalaenoptilus nuttallii</i>				1	1
White-throated Swift	<i>Aeronautes saxatalis</i>			2	1	3
Broad-tailed Hummingbird*	<i>Selasphorus platycercus</i>	61	22	36	106	225
Lewis's Woodpecker*	<i>Melanerpes lewis</i>		3	6	2	11
Downy Woodpecker	<i>Picoides pubescens</i>		5	3	2	10
Hairy Woodpecker	<i>Picoides villosus</i>	2		1	1	4
Northern Flicker*†	<i>Colaptes auratus</i>	22	30	28	17	97
Western Wood-Pewee	<i>Contopus sordidulus</i>	16	41	73	92	222
Hammond's Flycatcher	<i>Empidonax hammondi</i>		1		4	5
Least Flycatcher	<i>Empidonax minimus</i>			1		1
Dusky Flycatcher	<i>Empidonax oberholseri</i>		4	1	3	8
Cordilleran Flycatcher*	<i>Empidonax occidentalis</i>			3	2	5
Say's Phoebe	<i>Sayornis saya</i>	5	4	2	7	18
Western Kingbird	<i>Tyrannus verticalis</i>	52	6	23	16	97
Eastern Kingbird	<i>Tyrannus tyrannus</i>	3		8	3	14
Plumbeous Vireo*	<i>Vireo plumbeus</i>		9	18	27	54
Warbling Vireo	<i>Vireo gilvus</i>		1	3	15	19
Steller's Jay	<i>Cyanocitta stelleri</i>	2	8	9	3	22
Blue Jay	<i>Cyanocitta cristata</i>	10		2		12
Western/ Woodhouse's Scrub-Jay	<i>Aphelocoma californica</i>	4	1		3	8
Clark's Nutcracker	<i>Nucifraga columbiana</i>			2		2

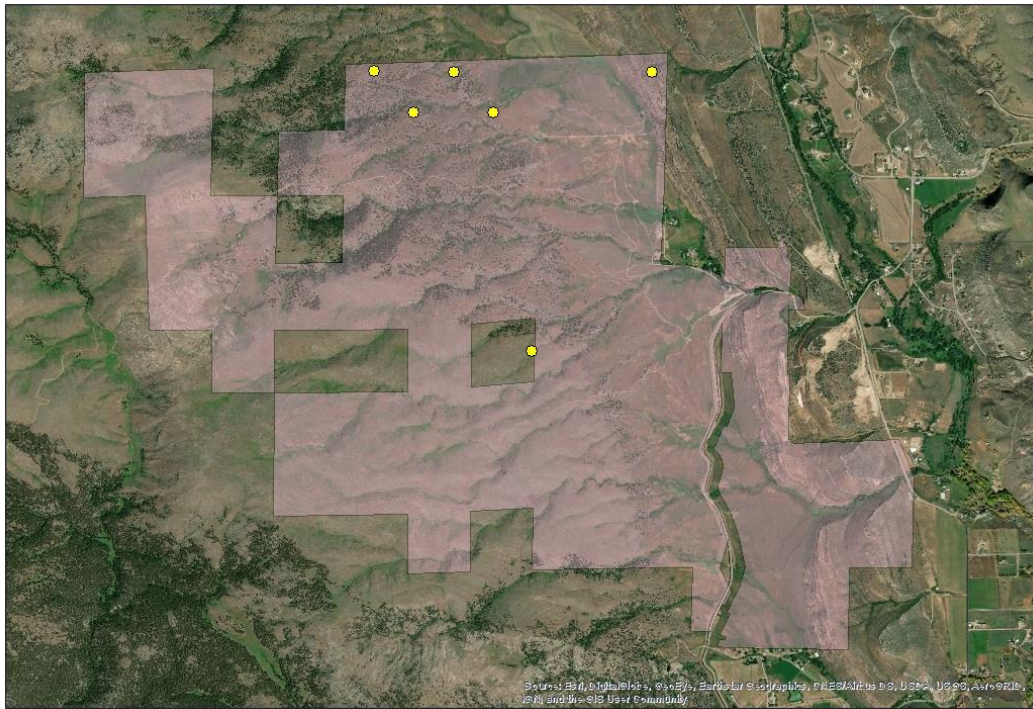
Common Name	Scientific Name	2015	2016	2017	2018	TOTAL
Black-billed Magpie	<i>Pica hudsonia</i>	96	26	61	52	235
American Crow	<i>Corvus brachyrhynchos</i>	3				3
Common Raven	<i>Corvus corax</i>	13	5	31	30	79
Tree Swallow	<i>Tachycineta bicolor</i>	9	21	19	10	59
Violet-green Swallow	<i>Tachycineta thalassina</i>	16	1	3	7	27
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	247	45	321	176	789
Barn Swallow	<i>Hirundo rustica</i>	22	3	12	10	47
Bushtit	<i>Psaltriparus minimus</i>				3	3
Black-capped Chickadee	<i>Poecile atricapillus</i>	4	1	6	1	12
Mountain Chickadee	<i>Poecile gambeli</i>		5			5
Red-breasted Nuthatch	<i>Sitta canadensis</i>			1		1
White-breasted Nuthatch	<i>Sitta carolinensis</i>	2	4	5	9	20
Pygmy Nuthatch*	<i>Sitta pygmaea</i>			6	7	13
Rock Wren*†	<i>Salpinctes obsoletus</i>	15	71	96	120	302
Canyon Wren	<i>Catherpes mexicanus</i>			7	5	12
House Wren	<i>Troglodytes aedon</i>	45	67	94	127	333
Ruby-crowned Kinglet	<i>Regulus calendula</i>			1		1
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	22	28	25	58	133
Western Bluebird	<i>Sialia mexicana</i>		1	4	3	8
Mountain Bluebird*	<i>Sialia currucoides</i>		10	14	5	29
Swainson's Thrush	<i>Catharus ustulatus</i>			1		1
American Robin	<i>Turdus migratorius</i>	29	33	55	55	172
Gray Catbird	<i>Dumetella carolinensis</i>		2		1	3
Northern Mockingbird	<i>Mimus polyglottos</i>		1		1	2
Sage Thrasher	<i>Oreoscoptes montanus</i>		2			2
Brown Thrasher	<i>Toxostoma rufum</i>			1	1	2
Cedar Waxwing	<i>Bombycilla cedrorum</i>				11	11
European Starling	<i>Sturnus vulgaris</i>	101		2	5	108
Virginia's Warbler*	<i>Vermivora virginiae</i>	3	13	4	18	38
Yellow Warbler	<i>Setophaga petechia</i>	5	13	8	10	36
Yellow-rumped Warbler	<i>Dendroica coronata</i>		3	1	3	7
MacGillivray's Warbler	<i>Oporornis tolmiei</i>		1	3	3	7
Common Yellowthroat	<i>Geothlypis trichas</i>			4	1	5
Yellow-breasted Chat	<i>Icteria virens</i>	24	39	67	73	203
Western Tanager	<i>Piranga ludoviciana</i>		39	28	57	124
Green-tailed Towhee*	<i>Pipilo chlorurus</i>	9	67	29	67	172
Spotted Towhee	<i>Pipilo maculatus</i>	187	188	198	187	760
Chipping Sparrow	<i>Spizella passerina</i>		23	11	32	66
Clay-colored Sparrow	<i>Spizella pallida</i>	5				5
Brewer's Sparrow†	<i>Spizella breweri</i>	2	7		2	11
Vesper Sparrow	<i>Pooecetes gramineus</i>	149	22	29	31	231
Lark Sparrow	<i>Chondestes grammacus</i>	24	34	13	57	128
Savannah Sparrow	<i>Passerculus sandwichensis</i>	3				3

Common Name	Scientific Name	2015	2016	2017	2018	TOTAL
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	3	7		2	12
Song Sparrow	<i>Melospiza melodia</i>		2	6	6	14
Lincoln's Sparrow	<i>Melospiza lincolnii</i>		4			4
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	1				1
Dark-eyed Junco	<i>Junco hyemalis</i>			1	1	2
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>			11	6	17
Blue Grosbeak	<i>Passerina caerulea</i>	12	6	8	13	39
Lazuli Bunting*	<i>Passerina amoena</i>	66	61	46	88	261
Dickcissel	<i>Spiza americana</i>		2			2
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	77	26	24	34	161
Western Meadowlark	<i>Sturnella neglecta</i>	454	197	393	367	1411
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>		57	68	82	207
Common Grackle	<i>Quiscalus quiscula</i>	33	10	3	6	52
Brown-headed Cowbird	<i>Molothrus ater</i>	26	15	19	23	83
Bullock's Oriole	<i>Icterus bullockii</i>	67	27	41	53	188
House Finch	<i>Carpodacus mexicanus</i>	14	1	1	2	18
Red Crossbill	<i>Loxia curvirostra</i>			80	8	88
Pine Siskin	<i>Carduelis pinus</i>			1		1
Lesser Goldfinch	<i>Carduelis psaltria</i>		14	55	73	142
American Goldfinch	<i>Carduelis tristis</i>	22	8	10	33	73
House Sparrow	<i>Passer domesticus</i>	7	1			8
Total	103	2098	1428	2353	2572	8451

APPENDIX (B): BIRD SPECIES LOCATION MAPS

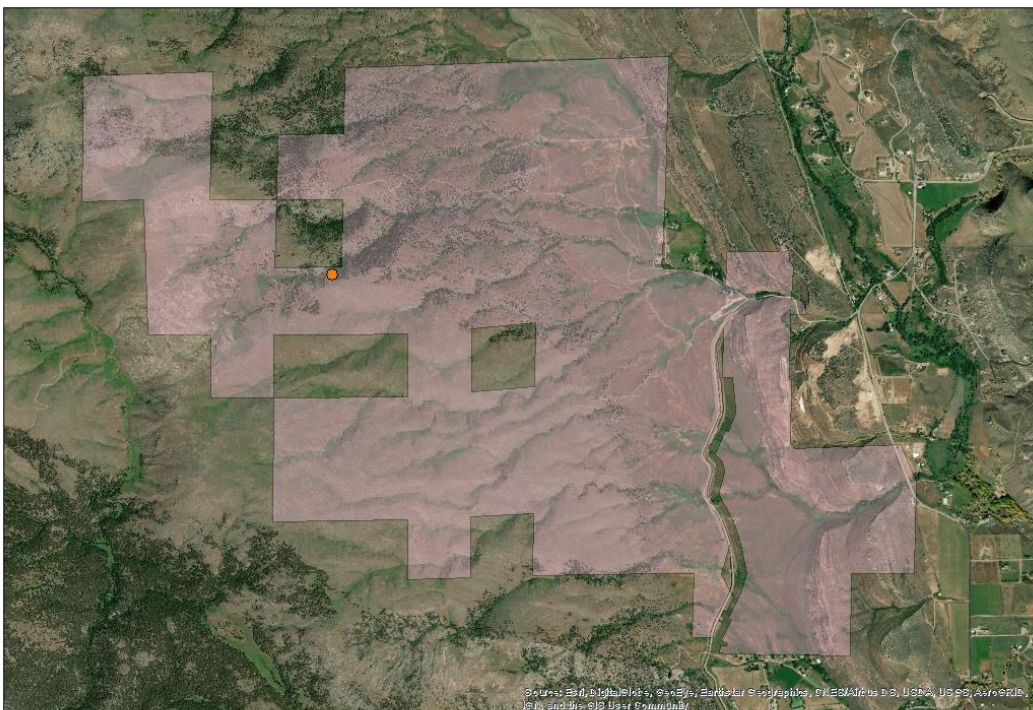
Locations of species at point count stations on Bobcat Ridge Natural Area

1. Five new species in 2018: Cedar Waxwing, Common Poorwill, Bushtit, Great-horned Owl, and Cooper's Hawk.



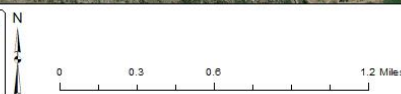
Cedar Waxwing Detections on Bobcat Ridge in 2018

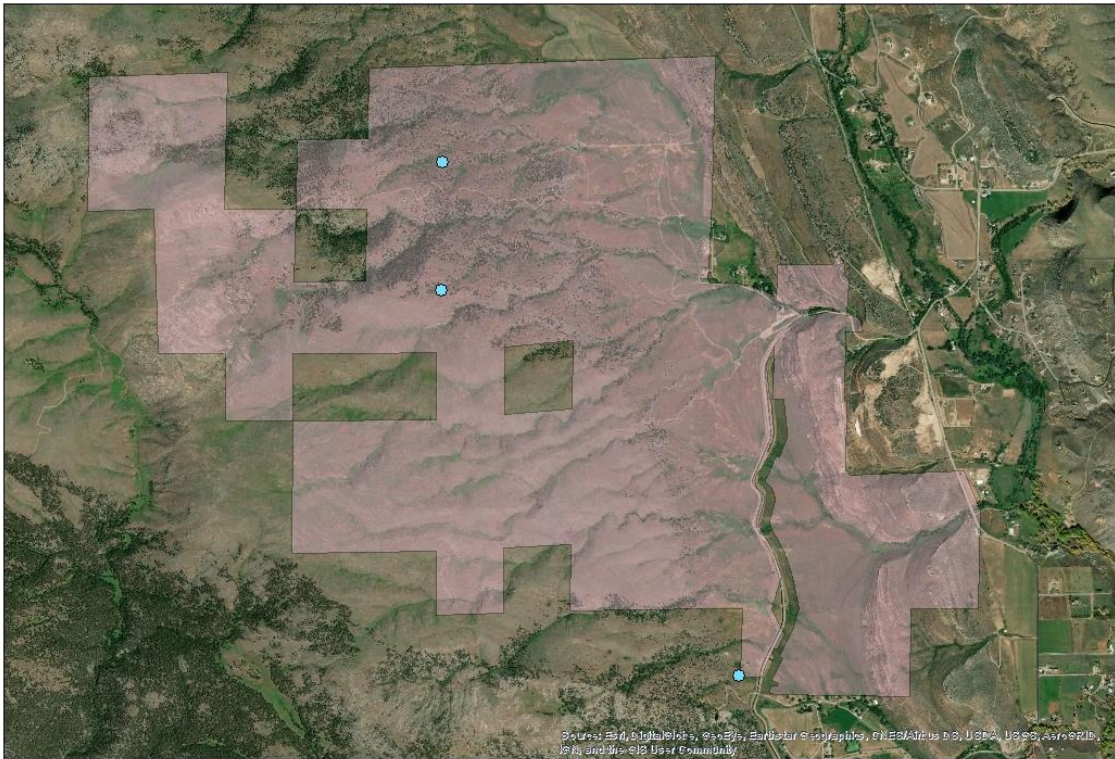
- Cedar Waxwing Detections
- Bobcat Ridge Natural Area Boundary



Common Poorwill Detections on Bobcat Ridge in 2018

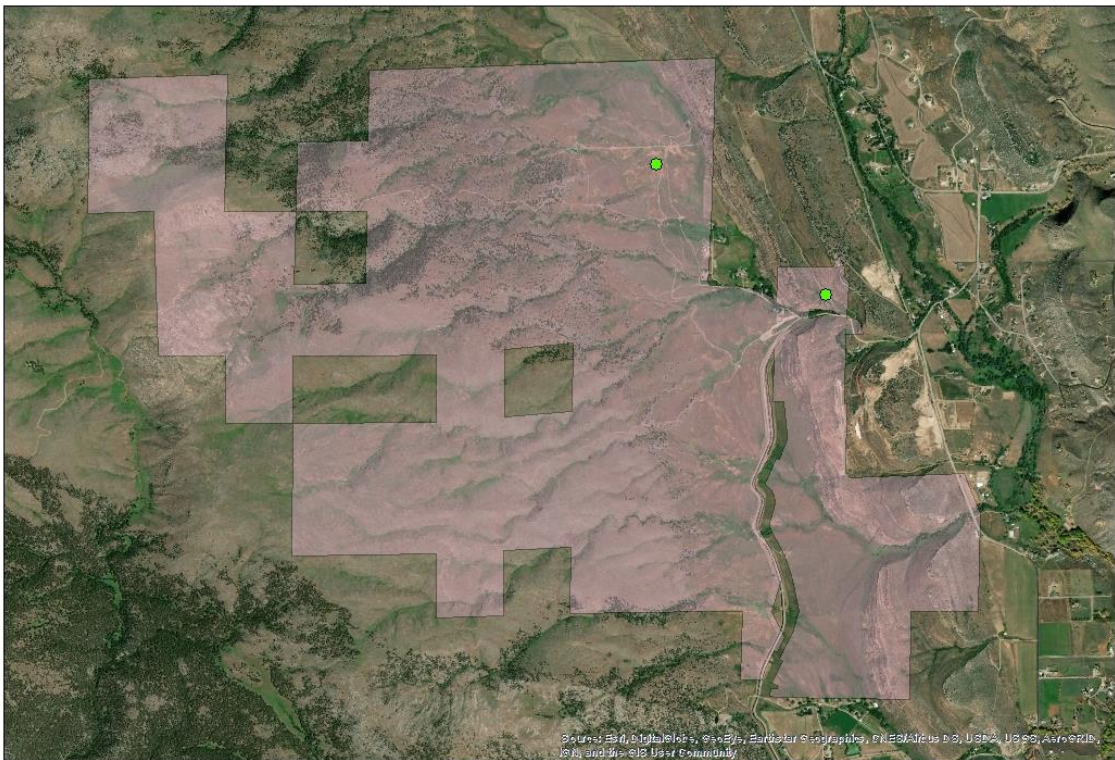
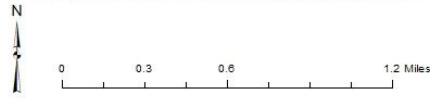
- Common Poorwill Detections
- Bobcat Ridge Natural Area Boundary





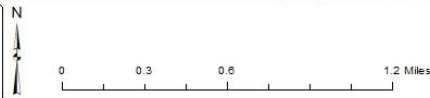
Bushtit Detections on Bobcat Ridge in 2018

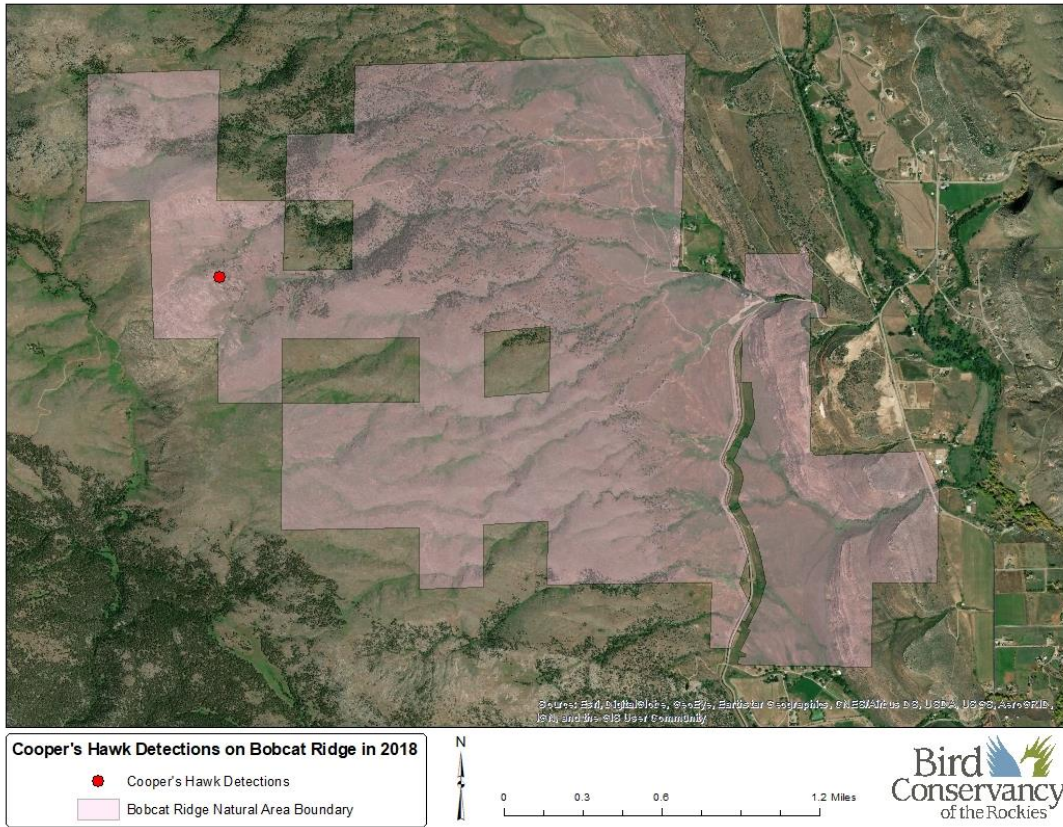
- Bushtit Detections
- Bobcat Ridge Natural Area Boundary



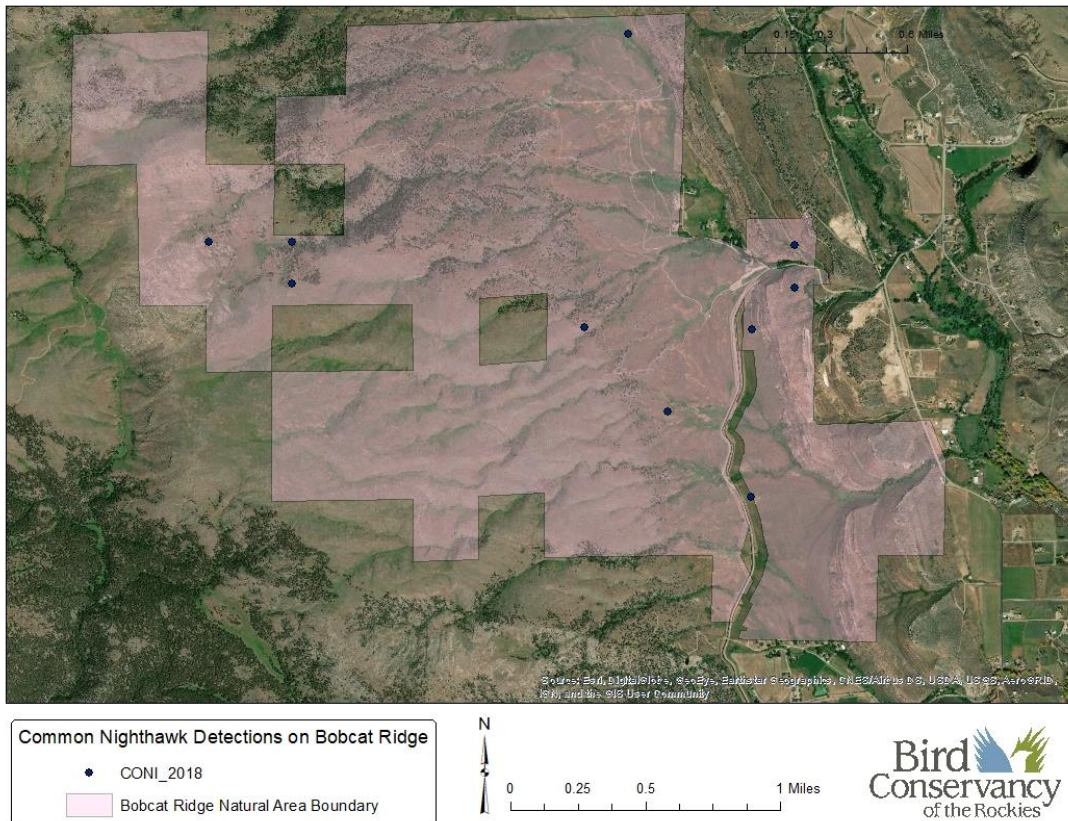
Great-horned Owl Detections on Bobcat Ridge in 2018

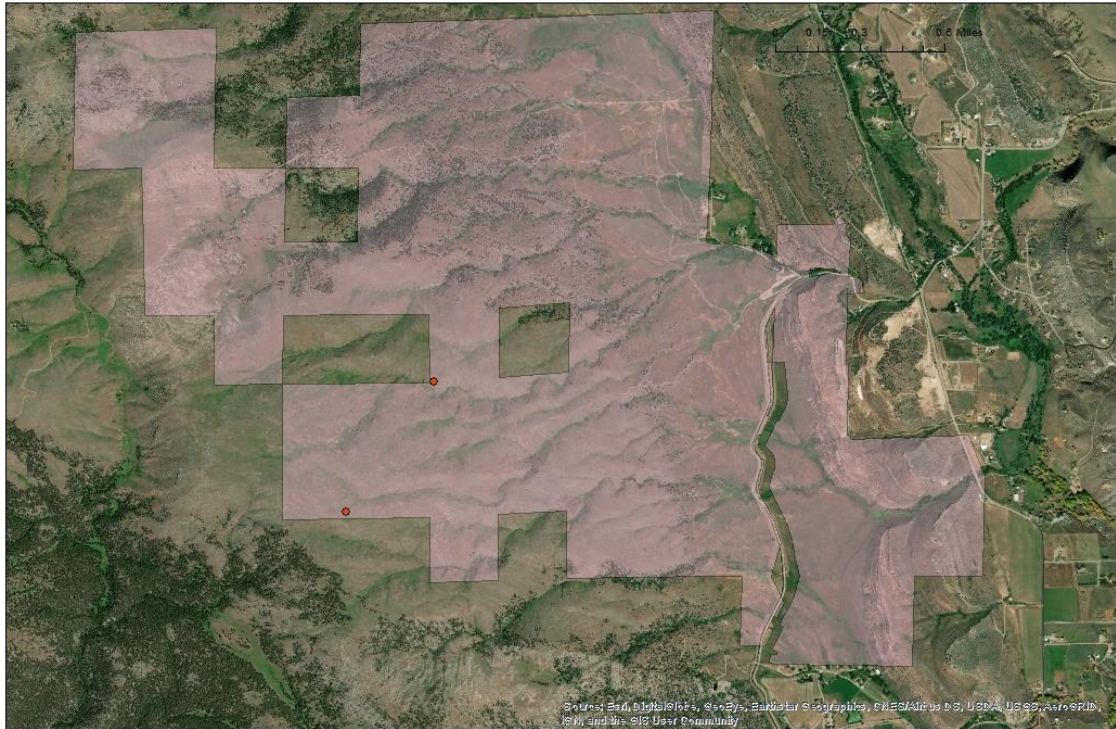
- Great-horned Owl Detections
- Bobcat Ridge Natural Area Boundary





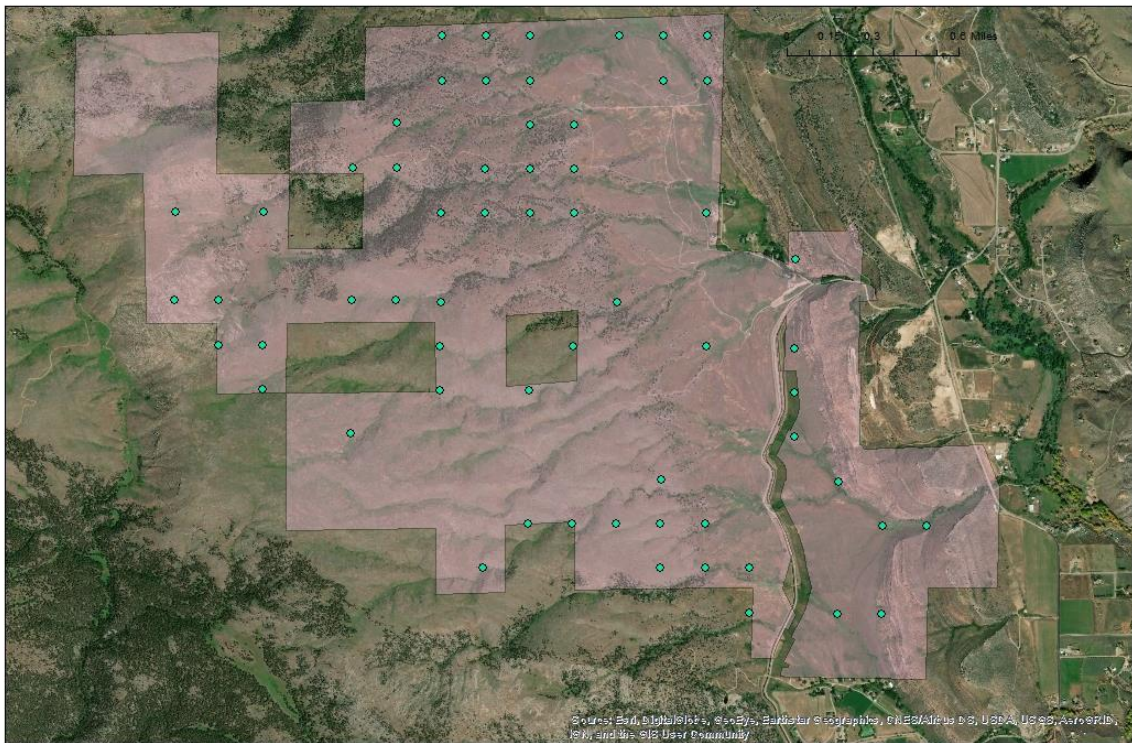
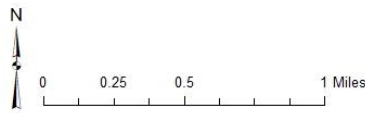
2. Species of Regional Concern (not mapped above): Common Nighthawk, Lewis's Woodpecker, Lazuli Bunting, Brewer's Sparrow, and Mountain Bluebird.





Lewis's Woodpecker Detections on Bobcat Ridge

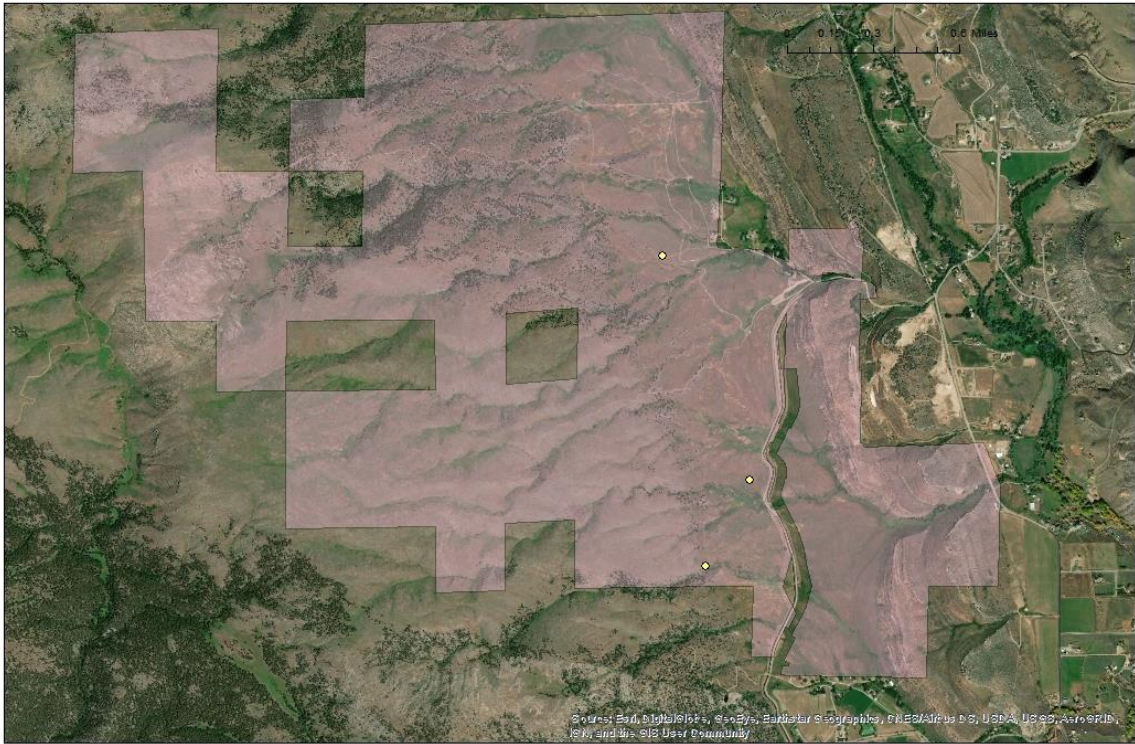
- LEWO_2018
- Bobcat Ridge Natural Area Boundary



Lazuli Bunting Detections on Bobcat Ridge

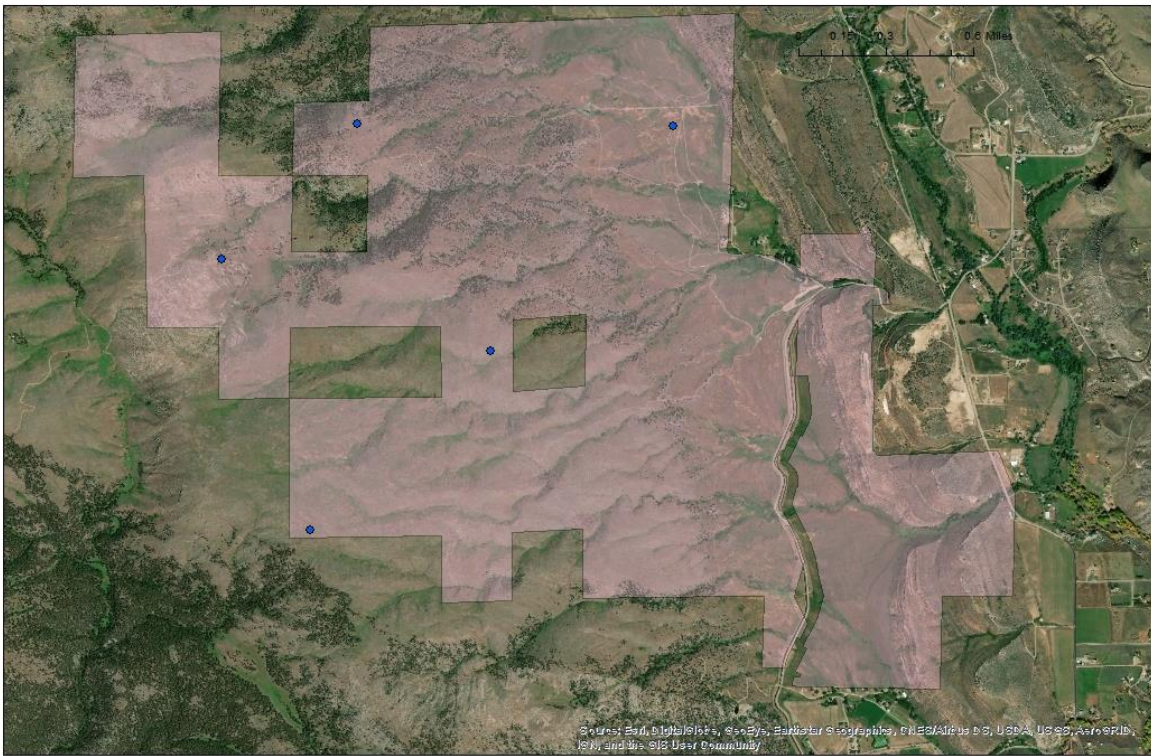
- LAZB_2018
- Bobcat Ridge Natural Area Boundary





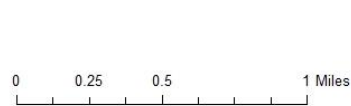
Brewer's Sparrow Detections on Bobcat Ridge

- ◊ BRSP_2018
- Bobcat Ridge Natural Area Boundary

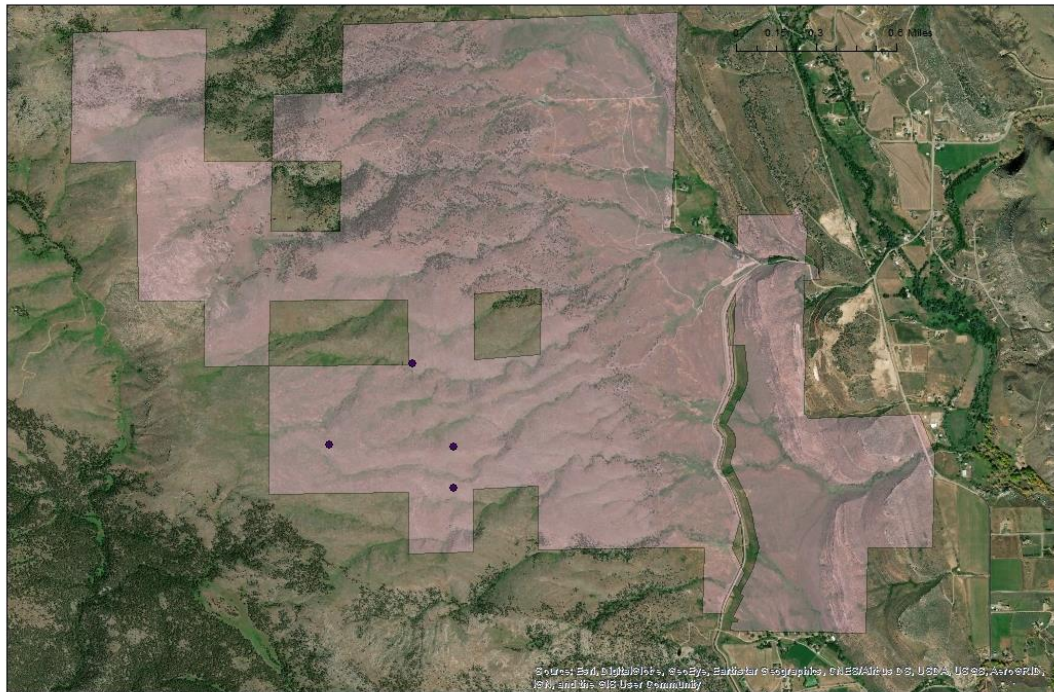


Mountain Bluebird Detections on Bobcat Ridge

- ◆ MOBL_2018
- Bobcat Ridge Natural Area Boundary

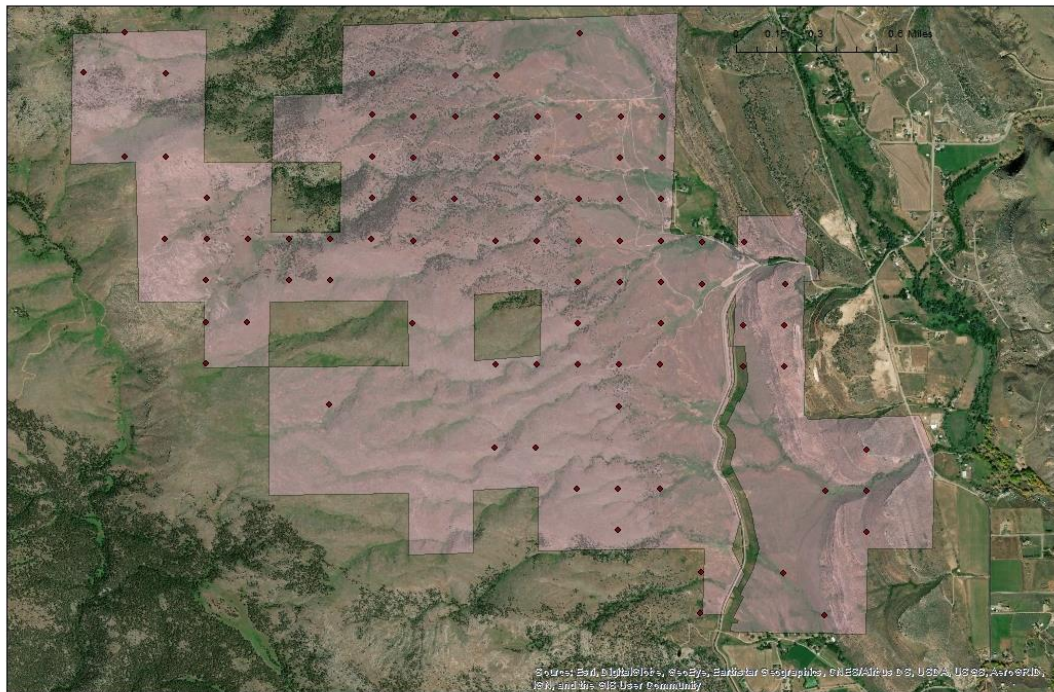
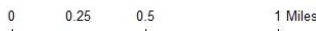


3. Species of Regional Stewardship Importance (not already mapped above): Dusky Grouse, Broad-tailed Hummingbird, Northern Flicker, Cordilleran Flycatcher, Plumbeous Vireo, Pygmy Nuthatch, Rock Wren, Virginia's Warbler, and Green-tailed Towhee.



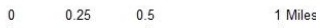
DuskyGrouse Detections on Bobcat Ridge

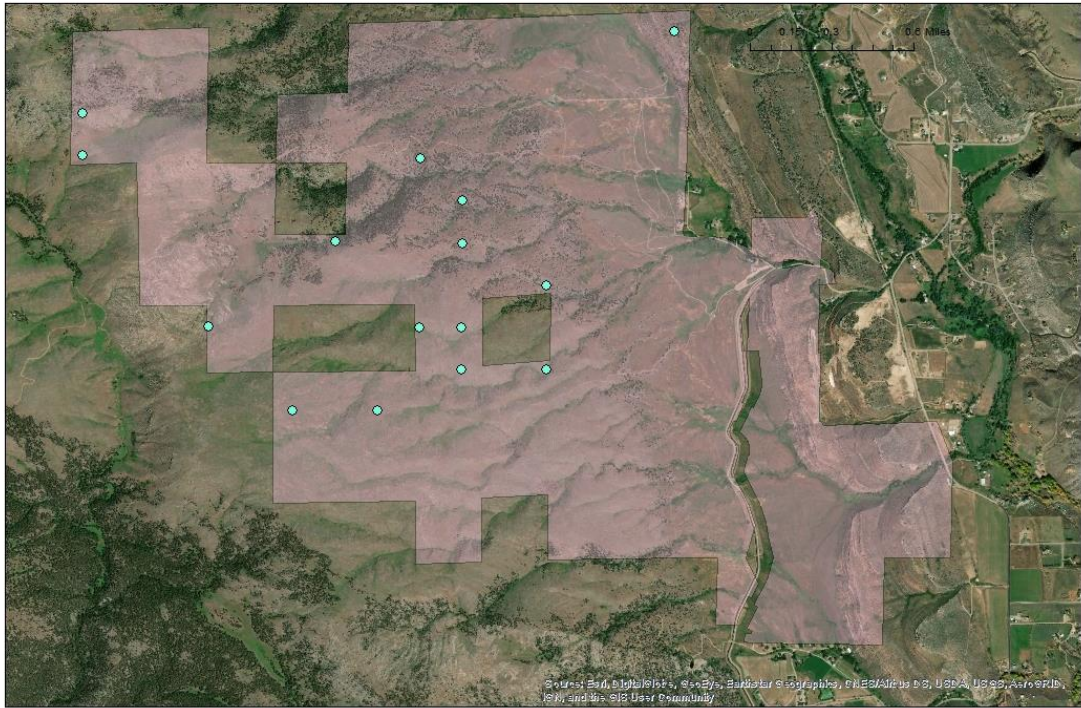
- DUGR_2018
- Bobcat Ridge Natural Area Boundary



Broad-Tailed Hummingbird Detections on Bobcat Ridge

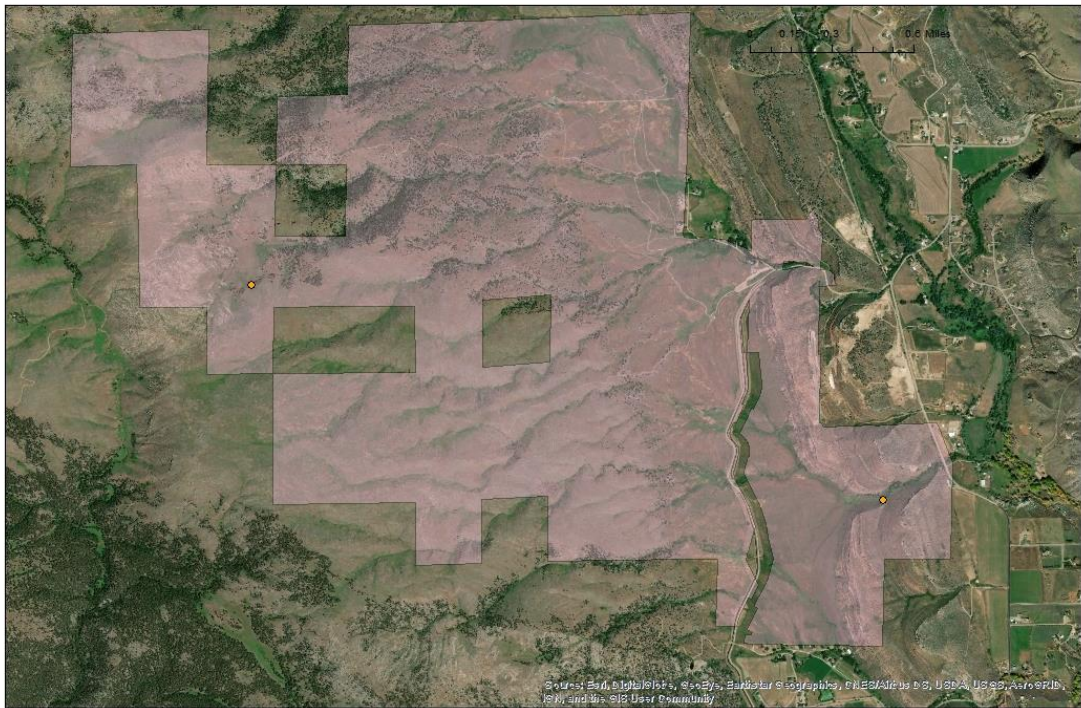
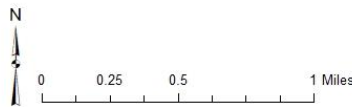
- BTLH_2018
- Bobcat Ridge Natural Area Boundary





Northern Flicker Detections on Bobcat Ridge

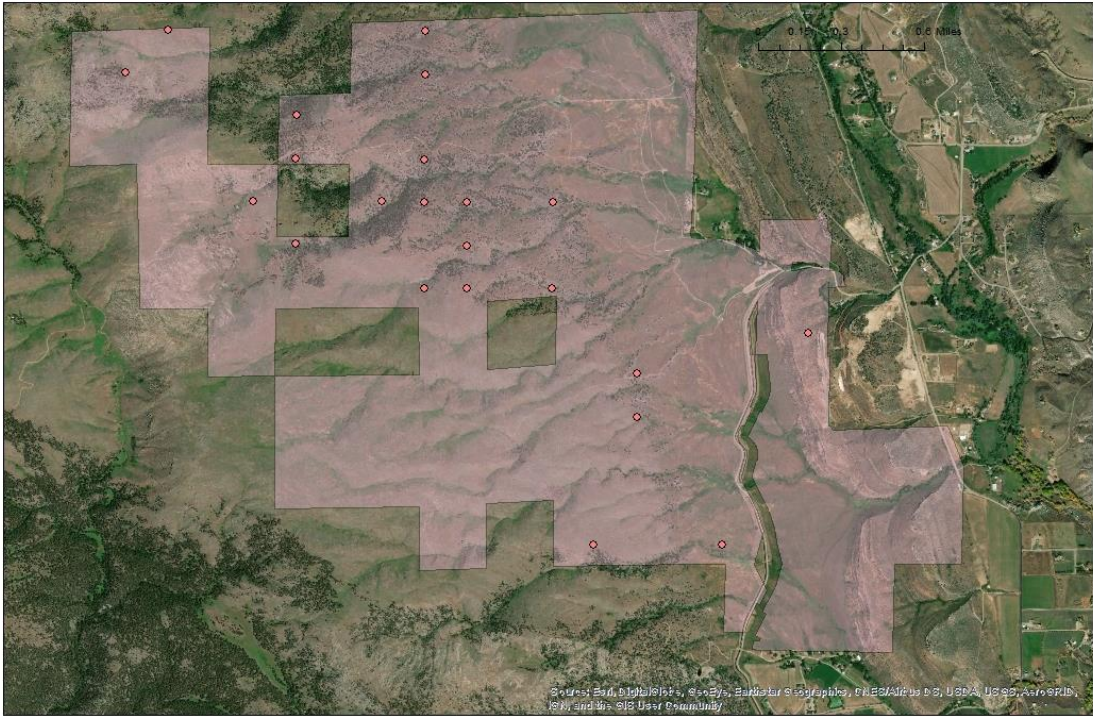
- NOFL_2018
- Bobcat Ridge Natural Area Boundary



Cordilleran Flycatcher Detections on Bobcat Ridge

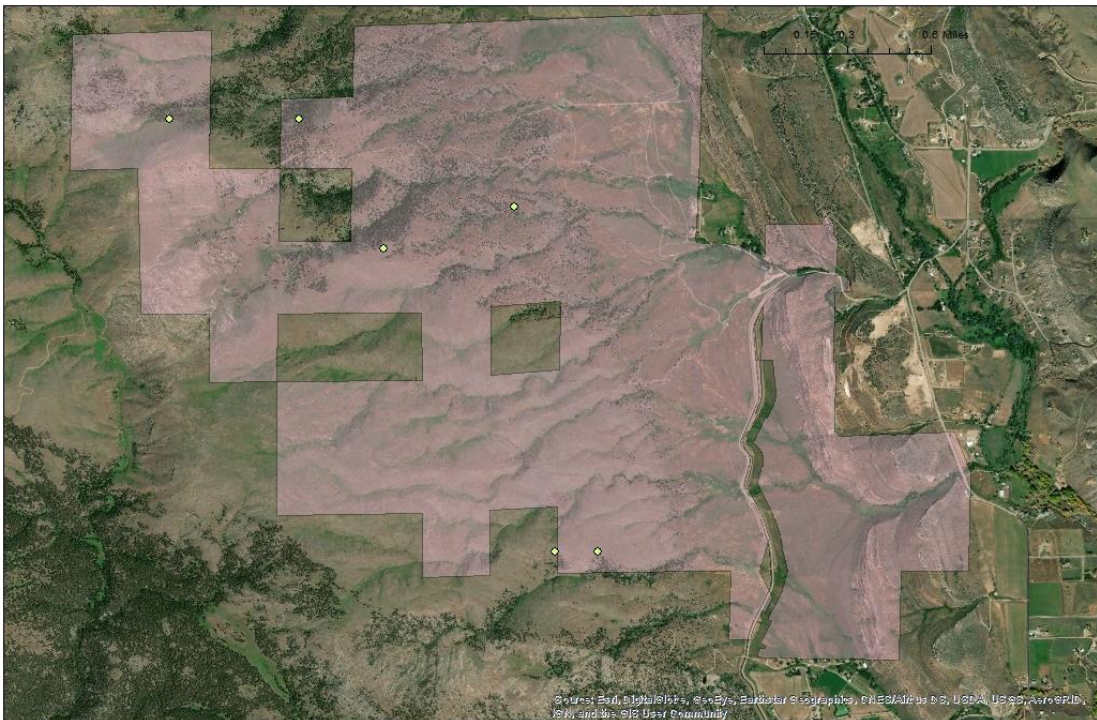
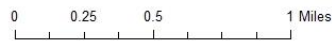
- COFL_2018
- Bobcat Ridge Natural Area Boundary





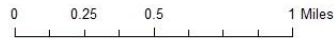
Plumbeous Vireo Detections on Bobcat Ridge

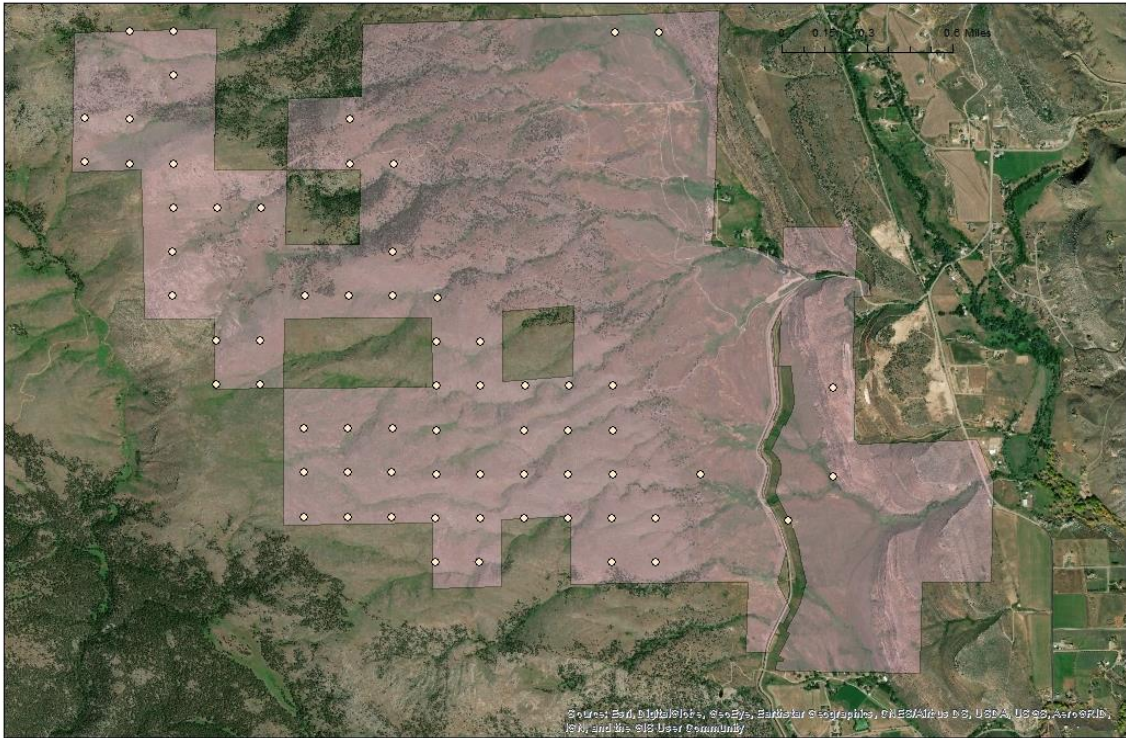
- ◆ PLVI_2018
- Bobcat Ridge Natural Area Boundary



Pygmy Nuthatch Detections on Bobcat Ridge

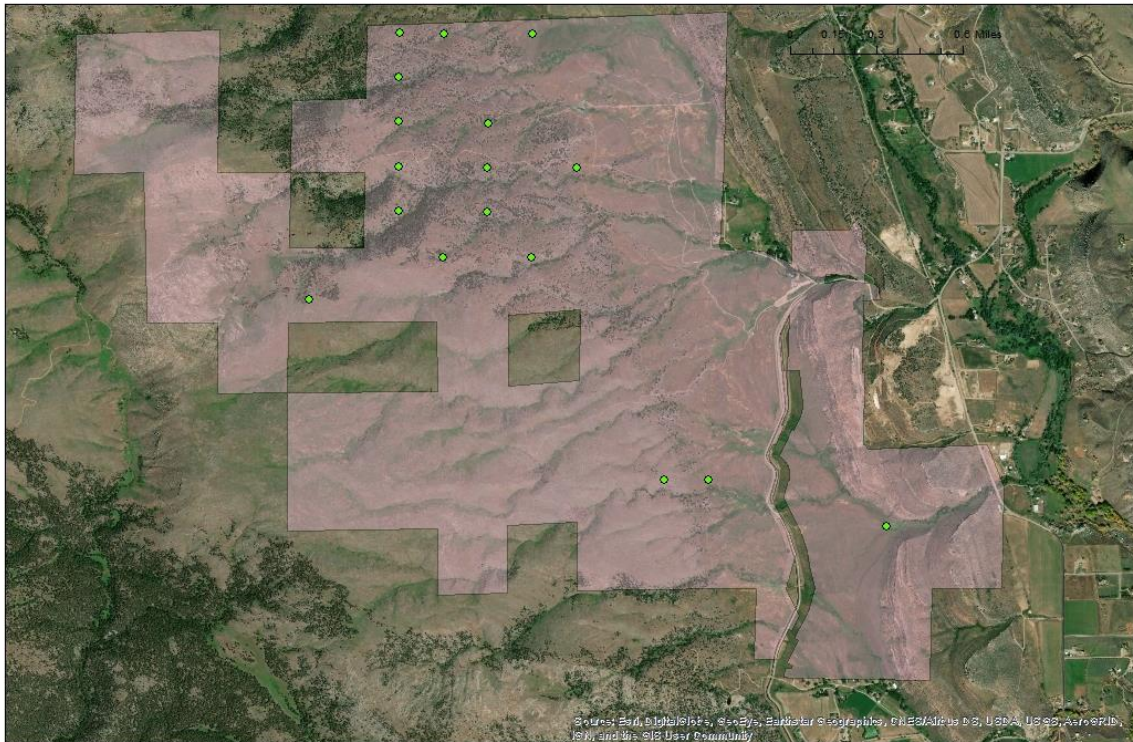
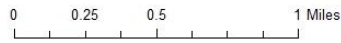
- ◆ PYNU_2018
- Bobcat Ridge Natural Area Boundary





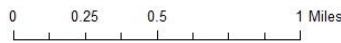
Rock Wren Detections on Bobcat Ridge

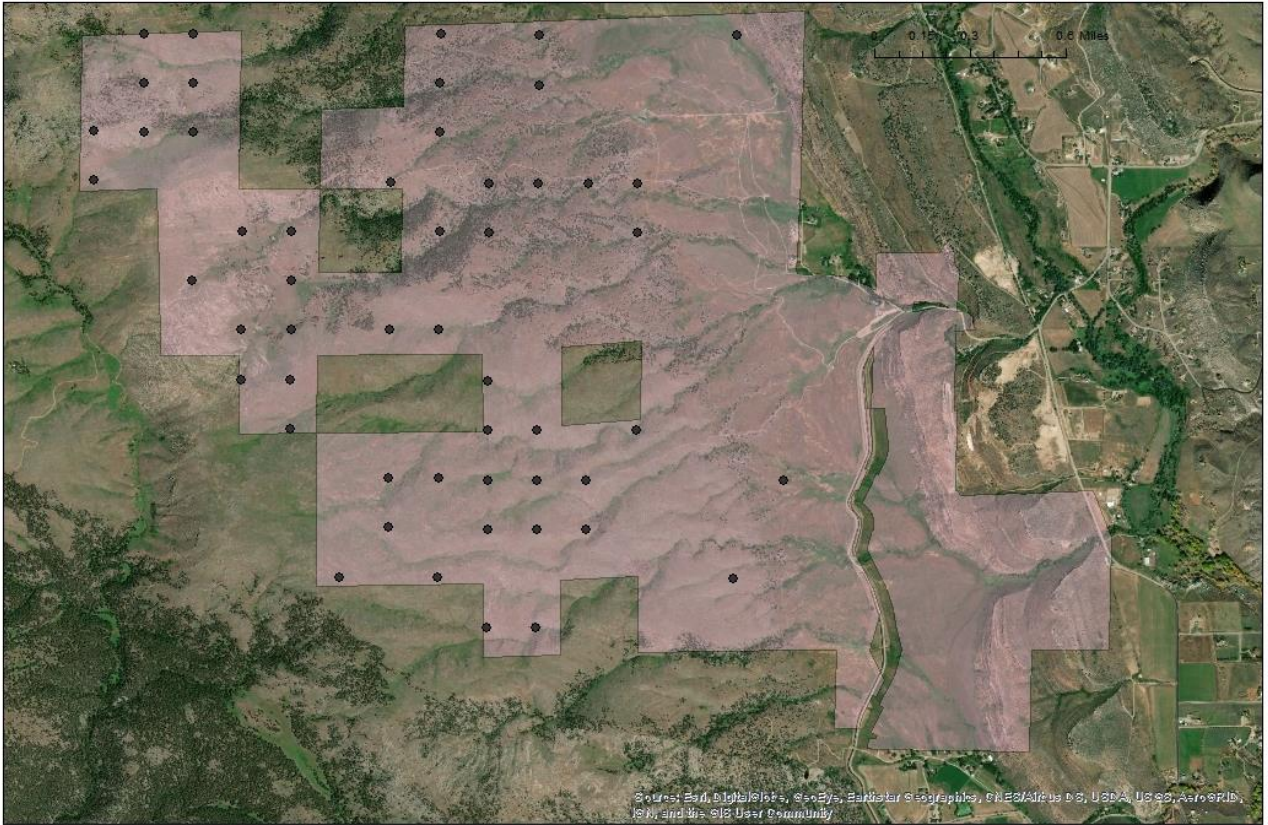
- ◊ ROWR_2018
- Bobcat Ridge Natural Area Boundary



Virginia's Warbler Detections on Bobcat Ridge

- ◊ VIWA_2018
- Bobcat Ridge Natural Area Boundary





Green-Tailed Towhee Detections on Bobcat Ridge

- GTTO_2018
- Bobcat Ridge Natural Area Boundary

