Filoha Meadows Nature Preserve Wildlife Monitoring Report – 2022 Field Season

Pitkin County, Colorado

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LIST OF ACRONYMS AND ABBREVIATIONS

BCC	Bird of Conservation Concern
BCR	Bird Conservation Region
CBSD	Common Bird in Steep Decline
BLM	Bureau of Land Management
CNHP	Colorado Natural Heritage Program
COPIF	Colorado Partners In Flight
CPW	Colorado Parks and Wildlife
CWS	Colorado Wildlife Science
DAU	Data Analysis Unit
ESA	Endangered Species Act
FE	Federal Endangered
FT	Federal Threatened
FSM	Forest Service Manual
GMU	Game Management Unit
ILBT	Interagency Lynx Biology Team
IPaC	Information for Planning and Conservation Database
MIS	Management Indicator Species
MSIM	Multi-Species Inventory and Monitoring
OST	Pitkin County Open Space and Trails
PCA	Potential Conservation Area
PIF	Partners In Flight
R2S	USFS Region 2 Sensitive Species
RC	Regional Concern Species
RMBO	Rocky Mountain Bird Observatory
RS	Regional Stewardship Species
SAM	Species Activity Mapping
SC	State Species of Concern
SGCN	Species of Greatest Conservation Needs
SE	State Endangered
Filoha	Filoha Meadows Nature Preserve
ST	State Threatened
TVES	Terrestrial Visual Encounter Survey
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WRNF	White River National Forest

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1.0 INTRODUCTION

This report documents the results of the 2022 periodic wildlife monitoring activities conducted at Filoha Meadows Nature Preserve (Filoha). Filoha provides habitat for a variety of wildlife, some of which are permanent residents while others pass through the area on an occasional or seasonal basis. The interspersion of the biotic (e.g., conifer woodland, grasslands, mixed montane shrubland, riparian forest, juniper woodland, and wetlands) and abiotic (e.g., scree, talus, cliffs, and surface water) habitat types and the intergrades between adjacent habitat types on Filoha result in a relatively rich wildlife community. This habitat diversity provides an abundance of food, cover, and reproduction sites. In addition, the importance of Filoha to wildlife results from its landscape connection to the undeveloped lands of the White River National Forest (WRNF); Filoha is situated such that it provides an important ungulate migration link between summer and winter ranges on the WRNF.

For the purpose of this report, wildlife is defined as free-ranging terrestrial vertebrates (i.e., wild mammals and birds). The wildlife resources of Filoha are listed and described including the results of multi-taxa, mammal, nocturnal and diurnal raptor, and songbird field surveys. This report also addresses species listed and candidates to be listed under the federal Endangered Species Act (ESA) and United States Department of Agriculture (USDA) Forest Service (USFS) Region 2 sensitive species that are known or have the potential to occur on Filoha (also referred to as "the property"). The report concludes with management and monitoring recommendations to be integrated into future adaptive management plans for Filoha. Avian surveys were conducted in early June, 2020, diurnal raptor surveys were completed on June 1, 2022, nocturnal birds were surveyed on May 5 and June 10, 2022, and general wildlife surveys were completed at Filoha on July 26 and August 5, 2022.

2.0 EXISTING MANAGEMENT

Filoha has been managed for ecological integrity, environmental education, and limited recreation (Pitkin County 2008). Through careful planning, ecological inventory and monitoring, habitat restoration and adaptive management, it is the intent of Pitkin County Open Space and Trails (OST) to prioritize biodiversity protection while allowing some public access to the area. OST has successfully implemented management actions at Filoha that have improved ecological conditions since the property was acquired. These actions include cheatgrass (*Bromus tectorum*) control, reducing woodland encroachment into the meadows, and riparian forest restoration. By working to meet the management goals set forth in the management plan, OST continues to emphasize and support research, protection, and enhancement of Filoha's natural processes and communities.

3.0 LITERATURE REVIEW

Prior to conducting field surveys, a variety of published and online resources were reviewed regarding distribution, occurrence, behavior, habitat requisites and other species information. These resources included:

- U.S. Fish and Wildlife Service (USFWS) current list of federally protected species for the Filoha area (U.S. Fish and Wildlife Service 2023);
- Colorado Parks & Wildlife (CPW) Species Activity Mapping (SAM) (Colorado Parks & Wildlife (CPW) 2023);

- 2023 Colorado Natural Heritage Program (CNHP) conservation status data for sensitive wildlife species occurrences and Potential Conservation Areas (PCA) (CNHP 2023);
- Mammals of Colorado (Armstrong et al. 2011);
- Amphibians and Reptiles in Colorado (Hammerson 1999);
- Colorado Breeding Bird Atlas (Kingery 1998, Wickersham 2007);
- The Birds of North America (Poole 2005);
- USFS Rocky Mountain Region Species Conservation Program: Species Conservation Assessments (U. S. Department of Agriculture Forest Service 2006); and
- NatureServe Explorer(NatureServe 2023).

3.1 PITKIN COUNTY OPEN SPACE & TRAILS REPORTS

The following reports were reviewed for information pertaining to wildlife species occurrences and other pertinent information. The only report in Table 1 that provides data on species abundance or estimated population sizes is the Colorado Wildlife Science (CWS) authored 2011 Avian Monitoring Report.

Table 1. OST Reports Reviewed

Report	Author	Year	Description
Vegetation & Wildlife Monitoring Report	Peak Ecological & CWS	2019	Summarizes past actions and various studies that have occurred at Filoha Meadows Nature Preserve over the last decade and includes the results of several new studies conducted in 2018.
Ecological Condition Report	Peak Ecological & CWS	2018	Summarizes the results of the field work conducted in 2017. Details the results of a rapid ecological assessment, provides species lists, describes noxious weeds, and describes the state of the important wildlife habitat. Also recommends future monitoring and protection of ecologically sensitive areas.
OST Avian Monitoring Report: 2000-2008	CWS	2011	Reports results of point-transect monitoring & recommends Management Indicator Species for Filoha Meadows Nature Preserve, Filoha & Seven Star Open Space.
Filoha Meadows Nature Preserve Resource Management Plan: Wildlife Resources	CWS	2005	Summarizes the results of wildlife monitoring conducted in 2004 & recommends management actions to improve conditions for wildlife at Filoha.
Roaring Fork Watershed Biological Inventory 1997-1999	CNHP	1999	Three year effort to identify the locations in the Roaring Fork Watershed with natural heritage significance.

4.0 SPECIAL STATUS SPECIES[1]

4.1 FEDERALLY LISTED SPECIES

The property was submitted to USFWS via the IPaC system (https://ipac.ecosphere.fws.gov/) requesting an official list of Threatened, Endangered, or Candidate species on September 13, 2022

[1] Additional information on special status species is included at Appendix G.

(which was subsequently updated on July 18, 2023) that may occur on or within proximity to the property or may be affected by decisions regarding management of the property. An official list was received and is attached as Appendix A. Species protected under the ESA that may occur on or within proximity to Filoha are listed in Appendix G at Table 22. Three federally protected or candidate species are known or have the potential to occur on or adjacent to Filoha: Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), and monarch butterfly (observed during field studies). No designated critical habitat exists for any listed species within or adjacent to Filoha.

4.1.1 Canada Lynx

Filoha encompasses only marginal habitat for Canada lynx as described above and within the tiered documents. WRNF lynx habitat mapping includes only the Douglas fir forest on the cliffs and talus at the north end of the property as Secondary Habitat (USDA Forest Service 2008b). CPW maps Filoha outside of their most recent Potential Habitat, Predictive Summer Habitat, and Predictive Winter Habitat mapping (CPW 2023).

Photo 1. Milkweed stand at Filoha

4.1.2 Gray Wolf

With the reintroduction of wolves to Colorado underway, it is likely that they will occur in the Crystal River valley and the Redstone/Filoha area. Consequently, OST should consider this species in future management decisions for Filoha.

4.1.3 Monarch Butterfly

A healthy stand of milkweed, the preferred breeding habitat for monarch butterflies (Danaus plexippus), occurs at Filoha Meadows (Photo 1) along the Crystal River south of Penny Hot Springs (Map 1). On August 5, 2022 CWS found two monarch butterfly larvae (i.e., caterpillars) on milkweed leaves within that stand (Photo 2). This was the first documented occurrence of monarch breeding at Filoha. Given the use of this stand by monarchs, it is quite important to protect the milkweed. All weed control staff and/or contractors must be made aware of its presence and strictly prohibited from applying herbicides in its proximity or to otherwise disturb the stand. Future, targeted monarch butterfly surveys should be conducted to improve OST's understanding regarding the distribution and use of Filoha by this important pollinator.

Photo 2. Monarch butterfly larva at Filoha

4.1.4 Federally Listed Species – Extirpated

One of North America's top predators, grizzly bears (*Ursus arctos horribilis*), once roamed the upper

Roaring Fork Valley as recently as the 1950s. Grizzlies (Threatened) are listed under the ESA. The anthropogenic extirpation of these apex predators has had unknown effects on the populations of the Roaring Fork valley's other predators and former prey.

4.2 STATE OF COLORADO THREATENED AND ENDANGERED LIST

The State of Colorado list of Endangered and Threatened species (including Species of Concern) (CPW 2022) was reviewed. Five species on that list could potentially occur at Filoha: bald eagle (*Haliaeetus* leucocephalus), boreal toad (*Anaxyrus boreas boreas*), Colorado River (GB-lineage) cutthroat trout (*Oncorhynchus clarkii pleuriticus*), northern leopard frog (*Lithobates pipiens*), and river otter (*Lontra canadensis*) and one, Townsend's big-eared bat (*Corynorhinus townsendii pallescens*), is known to occur at Filoha.

4.2.1 Townsend's big-eared bat

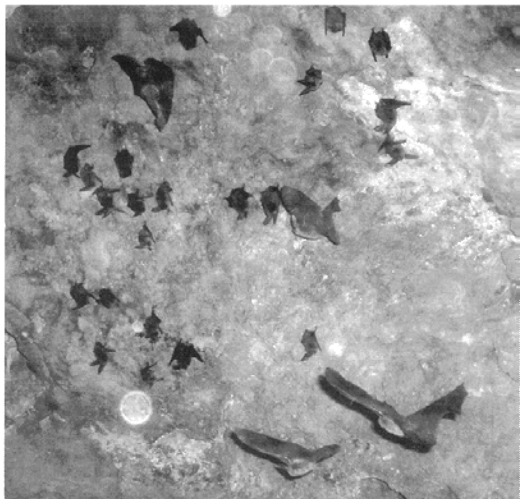


Photo 3. Townsend's big eared bats in the Elephant Mountain mine above Filoha (Photo by Mark Maslyn)

Townsend's big-eared bats are known to occur at Filoha. Townsend's big-eared bats are particularly adapted to and dependent on the property's mosaic of habitats. Although found in a variety of vegetation types, the globally Vulnerable (G3G4 T3T4) and state Imperiled (S2) (NatureServe 2019) Townsend's big-eared bat distribution is limited to areas with adequate roosting sites (e.g., caves, mines) that are proximate to foraging habitat (e.g., wooded streams, forest edges) (Sherwin et al. 2000, Ellison et al. 2003). Townsend's big-eared bats are also a Tier 1 SGCN and USFS Region 2 Sensitive Species. The 2012 U.S. Forest Service Planning Rule defines Species of Conservation Concern (SCC) as "a species, other than federally recognized threatened, endangered, proposed, or candidate species, that is known to occur in the plan area and for which the regional forester has determined that the best available scientific information indicates substantial concern about the species' capability to persist over the long-term in the plan area" (36 CFR 219.9). Although no Townsend's big-eared bats have been confirmed on Filoha during CWS surveys, they are known to occur within similar habitats at the same elevation with mines serving as cave surrogates for hibernacula, maternity roosts, and bachelor roosts (Sherwin et al. 2000, Siemers 2002, Gruver and Keinath 2006). Listed by the State of Colorado as a SGCN, Townsend's big-eared bats have also been reported to use bridges, rock crevices and hollow trees as roost sites (Ellison et al. 2003).

Filoha is a significant conservation site for this imperiled bat. A large Townsend's big-eared bat maternity colony occurs in the Elephant Mountain mine on WRNF lands near Filoha (Photo 3). These colonies form between March and June with pups born between May and July. Maternity colonies choose sites that have warm, stable temperatures for pup rearing. Males remain solitary during the maternity season. Young are born in mid-June with about 90 percent of all females in the nursery colonies producing young. Only one young is born per female. Pups will begin flying at about 3 weeks old. Disturbances to mines and caves, especially those hosting such maternity colonies, are the primary threat to this species. As abandoned mines throughout Colorado are closed for hazard abatement, there is potential for loss of bat roosts. In addition, this species is sensitive to human disturbance and will leave roost sites following human visitation (Pierson et al. 1999, Armstrong et

al. 2011). Disruption of colonies, hibernacula, and/or roosts by recreationists may cause abandonment of maternity sites (Pierson et al. 1999) and the premature expenditure of critical fat reserves during hibernation (Thomas 1995).

According to CPW Terrestrial Biologist Daniel Neubaum regarding the status of this colony, "I am still monitoring the [Elephant Mountain mine] bats year round with the PIT (Passive Integrated Transponder) tags. At this point some adult bats we have hits for … were tagged in 2011 are now at least 13 years old. Based on the numbers of hits we are getting, the colony seems to be strong. We have not done any internal searches or emergence counts since 2019" (D. Neubaum, personal communication, 2023).

4.3 COLORADO NATURAL HERITAGE PROGRAM DATA

Review of the latest CNHP data (CNHP 2023), in combination with the CNHP Roaring Fork Biological Inventory (Spackman et al. 1999) revealed 14 vertebrate species of conservation concern (global or state rank ≤ 3) recorded within proximity to Filoha (Table 4).

Table 2. CNHP element occurrences within proximity to Filoha

Common Name	Latin Name	Global Rank	State Rank
Bald Eagle	*Haliaeetus leucocephalus*	G5	S3B; S3N
Boreal Toad	*Anaxyrus boreas*	G4T1T2Q	S1
Colorado River Cutthroat Trout (GB Lineage)	*Oncorhynchus clarkii pleuriticus*	G5T3	S3
Cooper's Hawk	*Accipiter cooperii*	G5	S3S4B; S4N
Fringed Myotis	*Myotis thysanodes*	G5	S3
Great Blue Heron	*Ardea herodias*	G4	S3B
Hoary Bat	*Lasiurus cinereus*	G3G4	S3S4B
Northern Goshawk	*Accipiter gentilis*	G5	S3B
Northern Leopard Frog	*Lithobates pipiens*	G5	S3
Northern Pygmy-Owl	*Glaucidium gnoma*	G4G5	S3B
Osprey	*Pandion haliaetus*	G5	S3B
Pinyon Jay	*Gymnorhinus cyanocephalus*	G3	S3
Sharp-Shinned Hawk	*Accipiter striatus*	G5	S3S4B,S4N
Townsend's Big-Eared Bat	*Plecotus townsendii pallescens*	G3G4T3T4	S2

5.0 COLORADO PARKS & WILDLIFE CONSULTATION SUMMARY

CPW District Wildlife Manager John Groves was consulted regarding current wildlife use of Filoha and the surrounding area and the status of human-wildlife interactions on the property. In his response, dated December 31, 2023, Mr. Groves stated the following:

> *Overall I believe the current access restrictions for Filoha Meadows are fairly effective. I have seen violations, but generally they are minimal and the local residents are very protective and pay close attention to potential violations. The closure period from October 1 - July 1* adequately protects wildlife that uses the property during the most critical times of the year.*
>
> *The current bighorn sheep population is still struggling, and hovering near 45-50 animals total in the Avalanche Creek herd. Approximately 25± sheep use Filoha Meadows from November through May. Yearly counts are conducted during the winter and spring to help determine the population and document lamb survival. The current management of Filoha is helping with*

CPW's management goal and provides an important foraging area with adequate escape terrain.

*There has been minimal conflicts between hot springs users and the sheep population. The most concerning things I have observed are users swimming across the river, dogs along the river bank barking at the sheep and crossing, and users throwing bottles/cans across the river. A prohibition of dogs being allowed to access the river should be considered.***

I am unaware of any current Peregrine [Falcons] nesting in the Filoha area. There are historical reports but I do not recall anything current. [Terrestrial Biologist] Julie [Mao] may have more info on that as she has been doing some of the monitoring observations.

*I would be hesitant to relax any of the restrictions currently in place for Filoha as they appear to be working fairly well and people are aware of what they are. I think continued habitat manipulation will be important as an ongoing process. Nothing required yearly, but don't let it sit 10-20 years before another treatment is done. There is substantial PJ[Pinyon-Juniper] encroachment in parts of the meadows that should be treated soon, before it grows larger and is more costly to treat.*** It could also be done as a volunteer project in partnership with PCOST, CPW, RMBS, etc.*

Notes:
*OST closure dates are October 1 through June 30, with the property opening on July 1.
** No dogs are allowed at Penny Hot Springs or Filoha Meadows, per OST Management Plans.
***Pinyon and juniper encroachment into the meadows was addressed in the September 2023 mastication project.

6.0 WILDLIFE MONITORING

6.1 PURPOSE OF MONITORING

Monitoring may be defined as the "…measurement of environmental characteristics over an extended period of time to determine status or trends in some aspect of environmental quality" (Suter 1993). In general, monitoring data are intended to detect long term change in ecological systems, provide insights into the ecological mechanisms and consequences of that change, and help decision makers determine if the observed changes dictate a correction to management practices (Noon et al. 1999). Due to financial considerations and the purpose of the monitoring effort, it is not possible or even desirable to embark upon a monitoring regimen that adheres to a statistically valid experimental design. Rather, a few taxonomic groups and single species are monitored as umbrellas using accepted monitoring methods to produce descriptive information that will help guide the adaptive management process.

The primary purpose of the Filoha monitoring effort is to:

1. Determine whether current management affects habitat quality and effectiveness;
2. Document changes in wildlife use of Filoha over time; and
3. Guide adaptive changes in the ecological and recreation management of Filoha.

Monitoring results are intended to be part of the greater adaptive management scheme described in the management plan for the property. Adaptive management incorporates an iterative process that sets management goals and objectives, describes management actions, and monitors and evaluates results. Goals and objectives are then modified, management actions are adjusted, re-implemented, and then results are again monitored and evaluated. This process is implemented on a regular cycle to respond to environmental changes and shifts in community values.

6.2 MONITORING OBJECTIVES

Specifically, the objectives of the 2020-2022 monitoring effort were to:

1. Document spatial and temporal patterns of species occurrence and/or activity;
2. Document species richness for selected indicator species or guilds;
3. Evaluate whether detected changes in species composition and/or activity could potentially result from current management;
4. Determine whether richness, abundance, and community composition patterns of terrestrial vertebrates change over time and explore to what degree that change is due to management decisions or actions; and
5. Determine the effectiveness of current management in balancing human use with protection of biological diversity.

6.3 MONITORING METHODS & RESULTS

A variety of wildlife monitoring surveys were conducted. Survey techniques included Terrestrial Visual Encounter Surveys (TVES); Multiple Species Inventory and Monitoring (MSIM) (Manley et al. 2006) camera trap arrays; diurnal raptor (Kennedy and Stahlecker 1993, Joy et al. 1994, Watson et al. 1999, Balding 2001), and owl broadcast surveys (Takats and Holroyd 1997, Bibby et al. 2000, Barnes and Belthoff 2008, Blakesley 2009); and avian point-transect surveys (CWS 2021). These methods and the results of the surveys are presented below.

6.3.1 General Wildlife Surveys

General wildlife surveys were conducted to determine wildlife species diversity and habitat use. The method used for these surveys was Terrestrial Visual Encounter Surveys (TVES), arranged in consideration of the MSIM configuration (Manley et al. 2006). TVES are general wildlife surveys designed to detect a variety of terrestrial species, especially mammals (e.g., ungulates, lagomorphs, rodents), reptiles, and diurnal raptors (Forys and Humphrey 1997, Weckerly and Ricca 2000), as well as less common or difficult to detect landbirds (Manley et al. 2006). As a result, TVES is a core survey method for all classes of vertebrates as a companion to taxon-specific core survey methods. Sampling areas were contained within a 200 m radius hexagonal area occupying approximately 10 ha (Figure 2). The relatively large area occupied by the sampling hexagon reflects the desire for surveys to encounter the variety of vegetation types and conditions that occur in proximity to the center point, thus increasing the number of species available for detection (Manley et al. 2006). In addition, all visits to the property were considered walking surveys and any direct or indirect wildlife encounters of note were recorded.

6.3.1.1 Survey Methods

Surveys were implemented on the two MSIM TVES hexagons established by CWS in 2018 (PES and CWS 2019). One hexagon was established at the north and the other was placed to the south (Map 1). The hexagons were laid out to sample as many of Filoha's various habitat types as possible while respecting the integrity of the protocol. The TVES were conducted on July 26 and August 5, 2022 between 0700 and 1400 hours. Two qualified observers searched within each hexagon. Observers followed a transect that loops through the hexagon at ~50 m spacing (Figure 1). The length of each

route on each half of the sample unit is approximately 1200 m, for a total of 2400 m and covers approximately 10 hectares (24.7 ac). Observers used pre-established GPS coordinates along the center line and perimeter of the hexagon and a compass to walk the transect lines. All areas within 2 meters of either side of the transect line were surveyed.

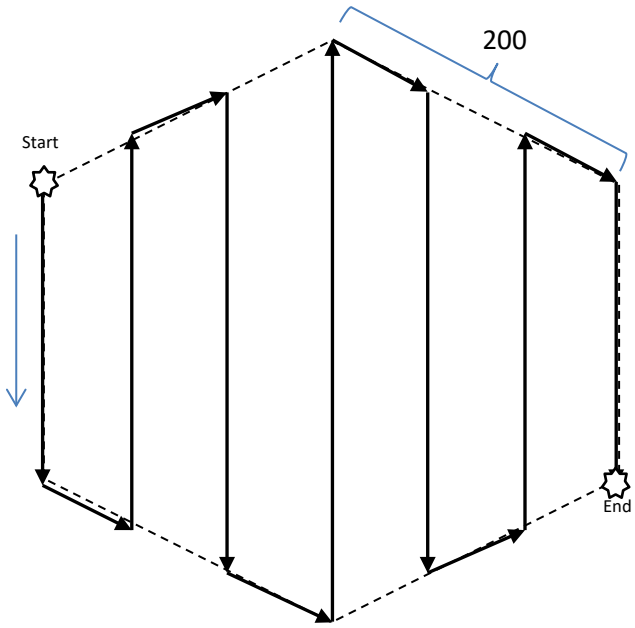


Figure 1. TVES hexagonal sampling unit (from Manley et al. 2006).

6.3.1.2 Results

In 2022, the two TVES at Filoha resulted in 2,522 detections (Table 5) of 12 mammal species[2] and 18 total wildlife species[3]. Sign was detected (e.g., scat, tracks, excavation, foraging, rubs, beds, dens) or direct observation was made of the following mammals (in order of abundance): Rocky Mountain elk (*Cervus canadensis nelsoni*), Rocky Mountain mule deer (*Odocoileus hemionus hemionus*), Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*), American black bear (*Ursus americanus*), coyote (*Canis latrans*), North American moose (*Alces americanus*), mountain cottontail (*Sylvilagus nuttalli*), rock squirrel (*Otospermophilus variegatus*), golden-mantled ground squirrel (*Spermophilus lateralis*), least chipmunk (*Neotamias minimus*), long-tailed weasel (*Mustela frenata*), and Pacific marten (*Martes caurina*).

Table 3. TVES detections at Filoha Meadows Nature Preserve in 2018 & 2022

Species	North Hex		South Hex		Total	
	2018	2022	2018	2022	2018	2022
Rocky Mountain Elk	321	544	475	1,167	796	1,711
Mule Deer	41	235	68	211	109	446
Rocky Mountain Bighorn Sheep	45	175	11	109	55	284
Northern Pocket Gopher	-	-	4	-	4	
Black Bear	1	2	-	31	1	33
Canada Goose	-	2	-	27	-	29
Bullsnake	-	1	-	1	-	2
Coyote	-	1	1	1	1	2
Monarch Butterfly	-	2	-	-	-	2
North American Moose	-	-	-	2	-	2
Mountain Cottontail	1	-	2	2	3	2
Rock Squirrel	-	1	2	1	2	2

[2] It is important to note that this number does not represent the number of individual animals but, rather, each occurrence of sign detected of individual or multiple animals. It should be considered as an index of the activity of wildlife as a whole or of individual species at Filoha.
[3] Including monarch butterflies, raptors, and Galliformes but not songbirds.

Species	North Hex		South Hex		Total	
	2018	2022	2018	2022	2018	2022
Wild Turkey	-	-	-	1	-	2
American Kestrel	-	-	-	1	-	1
Dusky Grouse	-	-	-	1	-	1
Golden-Mantled Ground Squirrel	1	-	-	1	1	1
Least Chipmunk	1	-	1	1	2	1
Long-Tailed Weasel	-	-	-	1	-	1
Pacific Marten	-	1	-	-	-	1
Total	**410**	**964**	**564**	**1,558**	**974**	**3,584**

A total of 13 mammal species have been detected during TVES at Filoha. Eleven mammal species were detected in 2018 (PES and CWS 2019), and 12 in 2022. In 2022, 3 mammal species were detected for the first time via TVES: long-tailed weasel, moose, and Pacific marten (formerly American marten). The only species detected in 2018 that was not detected in 2022 was northern pocket gopher. Although 4 detections of northern pocket gopher sign were recorded in 2018, there were no detections in 2022.

CWS detected the presence of many birds during TVES, but the only detections recorded were those of raptors, Galliformes (e.g., grouse, turkeys, etc.), wading birds, waterfowl, or any occurrence of particular interest (e.g., rare, first detection, etc.). Such birds recorded during the TVES were: American Kestrel (*Falco sparverius*), Dusky Grouse (*Dendragapus obscurus*), and Wild Turkey (*Meleagris gallopavo*). (Songbirds were detections were not recorded since they are monitored at Filoha under a separate monitoring effort [See section 6.3.5].) In addition, two bullsnakes were detected by means of direct observation during TVES for the first time at Filoha in 2022 (Photo 4).

Photo 4. Bullsnake observed at Filoha during TVES on 8/5/2022

Similar to 2018, the greatest number of detections in 2022 were in Filoha's grass-dominated habitat types; in 2022, 1,373 (54.4%) of the detections were in the old hay fields or montane meadows (58.2% in 2018). Although the proportion of detected use of Filoha's grasslands was comparable in the two years, the proportional use of the other major cover types within the study areas was substantially different. While the Gambel oak (*Quercus gambelii*) mixed montane shrublands were used by wildlife substantially more in 2022 (31.0%) than in 2018 (19.4%), there was a greater concentration of wildlife activity within the juniper-oak woodland at the north end of the property in 2018 (17.2%) than in 2022 (7.7%). Although it is difficult to determine the cause of this change, it could be the result of habitat management efforts but could also simply be a stochastic increase to exogenous factors such as weather, snowpack, etc. rather than a trend. Data collected in future years could indicate whether it is the former or the latter.

Table 4. Comparison of TVES detections by cover type at Filoha Meadows Nature Preserve - 2018 & 2022

Cover Type	2018	2022
Native or Non-native Grassland	574 (58.8%)	1,373 (54.4%)
Gambel Oak Mixed Montane Shrubland	190 (19.4%)	783 (31.0%)
Rocky Mountain Juniper – Gambel Oak Woodland	168 (17.2%)	195 (7.7%)
Mountain Big Sagebrush – Rabbitbrush Shrubland	34 (3.5%)	168 (6.7%)
Milkweed	-	3 (0.1%)
Marsh/Wetland	7 (0.7%)	-
Riparian Shrubland	4 (0.4%)	-

Ungulates

Bighorn sheep, elk, and mule deer sign were detected in greater abundance in 2022 than in 2018. There were a total of 1,711 detections of elk, 446 observations of mule deer sign were detected, and 284 detections of bighorn sheep in 2022 as compared to only 796 for elk, 109 for deer, and 54 detections for bighorn sheep in the previous 2018 effort (Figure 2). This is, however, not necessarily indicative of any changes in management or activity but is more likely a result of environmental stochasticity. Variation in weather-related conditions (e.g., timing of snow accumulation/melt, depth of snowpack) may have resulted in all three species using the property for an extended period in winter or during the fall and spring transition periods in 2022. In contrast, animals may have moved through the property over a shorter period in 2018 or had greater access to higher elevations earlier in the spring or later into the fall. SNOTEL data may support these theories: according to that dataset, the 2018 snowpack snow water equivalent peaked on April 10 with 12.4 inches but in 2022, the snowpack was substantially greater with a peak of 16.8 inches on April 4. Whatever the reason, the fact that elk, deer, and sheep sign was encountered in greater numbers and concentrations indicates that current management is not negatively affecting their use of the property. This metric, however, should be tracked over the next few monitoring efforts to determine if there is indeed a trend toward greater elk and mule deer use of the property over time. Future efforts may also benefit from comparisons to environmental conditions in years when surveys occurred.

In 2022, whereas the greatest proportion mule deer detections at Filoha were within the montane shrubland habitat (closely followed by grasslands), bighorn sheep and elk detections were predominantly within the grassland cover types. In 2022, a greater number of elk detections were within the montane shrublands compared to use of this same habitat type in 2018. The second greatest detections for all three species was inconsistent. In 2022, mule deer were detected in the montane shrublands to a greater extent than in 2018 and more than the other species in any year (Figure 3). This is logical given that deer are primarily browsers (i.e., leaves, forbs, woody twigs) while sheep are grazers (i.e., graminoids) and elk can consume either but prefer grass when available. Although this is an expected result, it was not the case for deer in 2018.

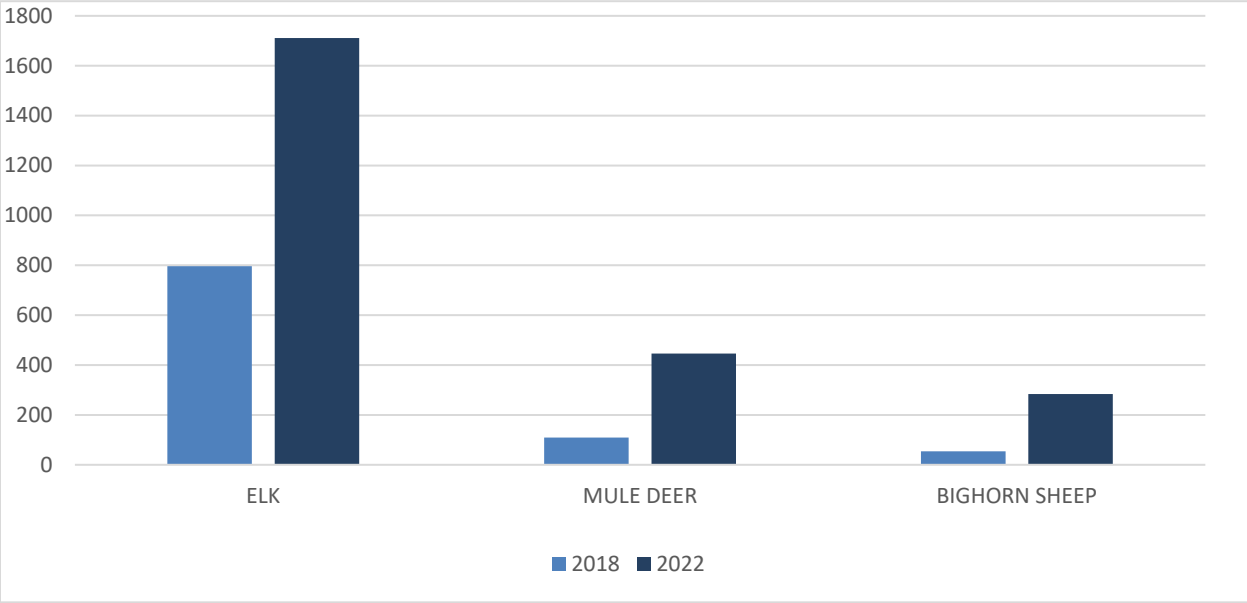


Figure 2. Comparison of bighorn sheep, elk, and mule deer TVES detections at Filoha between 2018 and 2022

Species Diversity and Richness

Species diversity was calculated using the Shannon diversity index (a.k.a. Shannon–Wiener diversity index or Shannon Index). The Shannon Index (Barnes and Spurr 1998) is a popular metric used in ecology. It is based on Claude Shannon's formula for entropy and estimates species diversity. The index takes into account the number of species living in a habitat (richness) and their relative abundance (evenness). The higher the value, the higher the estimated species diversity. Species diversity as measured by the results of the TVES was substantially greater in 2022 than 2018 (Table 7).

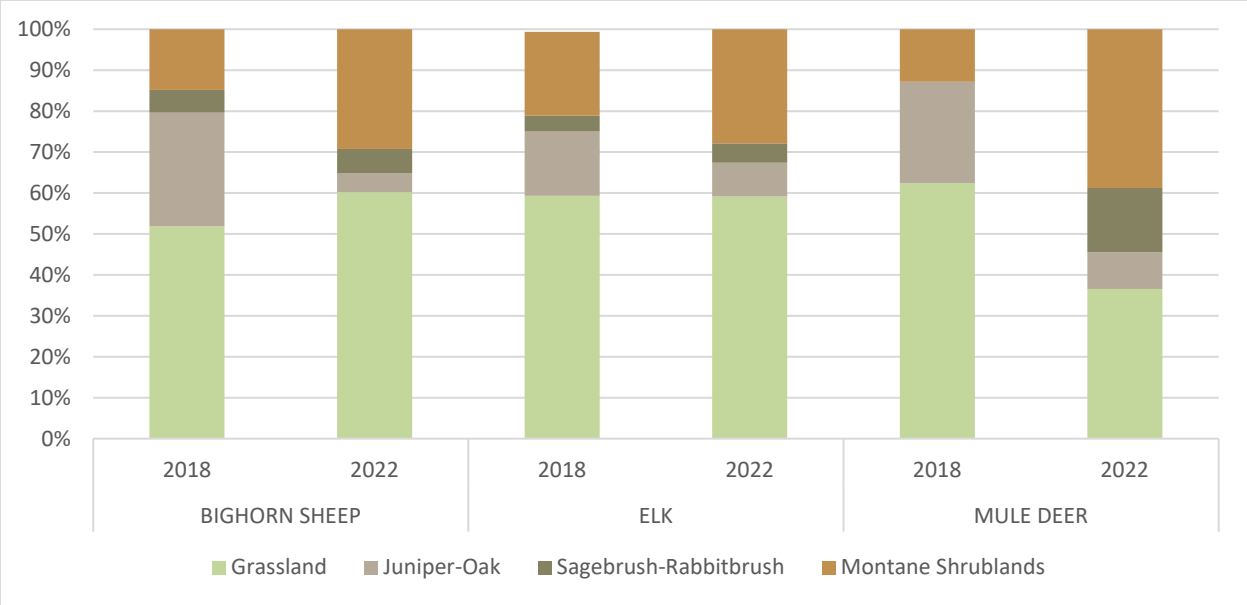


Figure 3. TVES detections of ungulate species by cover type and year at Filoha

Sampling Unit	2018 Species Diversity	2022 Species Diversity
Filoha North & Filoha South TVES Sampling Grids	0.68	0.98

Table 5. Comparison of species diversity (Shannon Index) based on species detected via TVES in 2018 and 2022

We calculated species richness (iChao1 estimator [Chiu et al. 2014]) using SpadeR (Chao et al. 2015) to obtain the rarefaction curves and species richness estimators after randomizing the samples 100 times. The iChao1 estimate of true species richness was chosen as the non-parametric estimator as it performs well on small samples, removes a large portion of the negative bias which was associated with traditional estimators, and has good accuracy and coverage probability for the associated confidence intervals (Chiu et al. 2014).

Sampling Unit	2018 Species Richness (SE)	2022 Species Richness (SE)
Filoha North & Filoha South TVES Sampling Grids	13.748 (1.520)	22.082 (4.047)

Table 6. Comparison of species richness (with Standard Error) based on species detected via TVES

As with estimated species diversity, estimated species richness based on the TVES was greater in 2022 than in 2018 (Table 8). Even when the standard error is considered, these differences are substantial. Two sampling efforts, however, cannot be used to determine whether there is any trend in these metrics. Nonetheless, if we continue to monitor wildlife at Filoha by means of TVES, we can use these metrics as an index of the species diversity and richness at Filoha, and we can track the data over time to determine if there are any trends in the wildlife assemblages detected at Filoha.

6.3.2 Rare and Nocturnal Mammals

6.3.2.1 Survey Methods

Infrared cameras and associated scent stations were used to detect uncommon[4] and nocturnal mammals. Survey locations were generally selected to effectively sample the wildlife occurring within the major habitat types at Filoha. Five camera/scent stations were established across the property (Map 1). At each station, a motion sensitive monitoring camera was used to document species encounters. Bushnell Trophy Cam and/or Browning Recon Force Elite cameras were set up to capture color photos during the day and infrared photos at night. Infrared LED night vision flash was used so that a visible flash would not scare wildlife or disclose the location of the cameras to humans. Each time the sensor detected movement, 3 still photos and 1 brief video were captured. This method, also used in 2018, increased the likelihood that the species was correctly identified and improved our ability to detect and count groups of animals. The camera and infrared detector were attached to a tree or other suitable substrate[5], with the bait no higher than 0.5 m above the ground, and the camera positioned to detect visitation to the base of the bait tree. The camera and sensor are generally arranged vertically on the same tree or on adjacent trees. Cameras and detectors are attached to trees using Slate River EZ-Aim Trail Camera Mounts and to T-posts using EZ-Aim T Post Game Camera Mounts.

Camera stations were baited and set to maximize detections of a variety of species. The primary bait was a Cornish game hen secured to the vertical substrate with wire mesh and baling wire, approximately 0.5-1.5 m from the ground. The camera was positioned such that any visitation to the tree triggered the camera. A mixture of Caven's Gusto brand, a skunk scent gland derivative (a lure

[4] "Rare" in this case refers to animals that are uncommon across the landscape, such as mountain lions and others that have large home ranges.
[5] When no tree was available, a T-post was used and left in place for future monitoring.

for mustelids), Carman's Superior Animal Lures Trails End® Lure (a lure for wild canids and felids), and lanolin was used as a long-distance attractant. The lure mixture was prepared by combining a 1 oz jar of Gusto and 0.5 oz of Trails End with 32 oz of heated lanolin in liquid form. Approximately 1 to 3 tablespoons (T) of the mixture was placed within 4 m of the station on a substrate such as a tree branch. The mixture was applied on the setup day and was not reapplied or removed for the duration of the survey.

Each camera was left in place for a minimum of 14 days. In 2022, the cameras were left through the winter in an attempt to document late fall, winter, and early spring use of the property. Given Filoha's importance to bighorn sheep and elk in the transition periods and in winter, CWS did not replace the batteries or retrieve images until both species had moved to higher elevations in the spring. As a result, some of the batteries died over the winter, one camera was destroyed by a black bear in late October, and one suffered a weather-related malfunction in January 2023. Nonetheless, many images were recorded following the fall closure and successfully documented Filoha's wildlife in winter.

6.3.2.2 Results[6]

Five hundred fifteen occurrences of wildlife were recorded (or "captured") by the 5 monitoring cameras at Filoha in 2022-23. A total of 20 species, including 12 mammals and 7 birds, were captured in 2022 (Table 9). Of these, elk were captured most frequently (Photos 5, 6, 7), followed by bighorn sheep (Photos 5, 9), red fox (*Vulpes vulpes*) (Photos 10, 11, 12), mule deer (Photos 13, 14, 15), black bear (Photos 16, 17, 18), and striped skunk (*Mephitis mephitis*; Photos 19, 20)[7]. Species captured by CWS monitoring cameras for the first time on the property included bighorn sheep, deer mouse (*Peromyscus maniculatus*), long-tailed weasel (*Mustela frenata*; Photo 21), Pacific marten (Photos 22), striped skunk, raccoon (*Procyon lotor*; Photo 23), and Woodhouse's Scrub-Jay (*Aphelocoma woodhouseii*; Photo 24). See Appendix D for sample monitoring photos. Species for which this method was specifically designed to monitor – those that occur at low density on the landscape, are difficult to detect, or nocturnal/crepuscular – captured by the cameras included black bear, long-tailed weasel, Pacific marten, and striped skunk.

Table 7. Occurrences of species of interest by species captured by the monitoring cameras in 2022-23

Species	Species Code	Total Captures
Elk	CECA	144
Red Fox	VUVU	84
Bighorn Sheep	OVCA	80
Mule Deer	ODHE	69
Black bear	URAM	52
Striped Skunk	MEME	15
Steller's Jay	STJA	10
Least Chipmunk	TAMI	7
Woodhouse's Scrub-Jay	WOSJ	4
Pacific Marten	MACA	3
Green-Tailed Towhee	GTTO	2

[6] No comparisons are made between the 2018 and 2022-23 camera data since the survey period in 2022-23 was 6 months longer than in 2018.
[7] Although Black-billed Magpies and American Robins were photo documented in 2022, they are excluded from this analysis given how common they are with no habitat preference.

Species	Species Code	Total Captures
Raccoon	PRLO	2
Black-Capped Chickadee	BCCH	1
Coyote	CALA	1
Long-Tailed Weasel	MUFR	1
Deer Mouse	PEMA	1
Red-Shafted Flicker	RSFL	1

Based on pelage and size, it appears that at least 4 to 5 different bears were documented on the property. Since bears vary in size throughout the year and often grow different color fur from season to season, this determination was made based on captures within the same month or so. Bears with black, brown, and two-tone coats were documented as were individuals that varied in size from a very small, likely yearling to a very large mature bear.

Photo 5. Black bear with a new coat emerging in a different color at Filoha

Two spotted mule deer fawns (Photos 6, 26) were documented (one with its mother) but no spotted elk calves were captured. At least two bighorn sheep lambs were captured (Photo 9) during the winter at Filoha; this is important given the poor recruitment rate in the Snowmass West (S-25) herd.

Interestingly, only 1 coyote was detected by the cameras but the Filoha foxes were detected at a greater rate than in previous efforts. Research has shown that there is somewhat of a direct, inverse relationship between coyotes and red foxes (Gese et al. 1996, Newsome and Ripple 2015); some research has suggested that coyotes may limit other medium-sized predators that are smaller than they are such as foxes (Sargeant and Allen 1989). A few mammals known to occur at Filoha were not detected by cameras including bobcat (*Lynx rufus*), mountain lion (*Puma concolor*)[8], American mink (*Neovison vison*), and mountain cottontail (*Sylvilagus nuttallii*). Given the duration of the survey, however, it is not surprising that these species, some of which occur at low densities on the landscape, were not confirmed by the cameras.

Diel Activity & Seasonal Activity

Although, as described above, this survey method is specifically implemented to document the occurrence of rare, low-density, or nocturnal/crepuscular species, it is also a valuable method to determine diel use by the mammalian community occurring on the property as well as seasonal use of the property by wide ranging and migratory species such as black bears and the ungulates.

Wildlife presence was documented at every hour of the day, but peak wildlife captures by the monitoring cameras was somewhat trimodal with activity peaks occurring in the morning (6:00 AM through 8:00 AM), another in late afternoon to evening (4:00 PM through 9:00 PM), and late night (11:00 PM through 2:00 AM) (Figure 4). This makes sense given that many of these species are considered crepuscular (e.g., elk, mule deer) or nocturnal (e.g., raccoons, red fox, striped skunk).

These diel activity patterns provide managers valuable information regarding wildlife activity at Filoha as well as potential influences of recreational activity on wildlife activity and behavior, and can aid in

[8] A few mountain lions have been captured on OST monitoring cameras in 2023 (e.g., Photo 27).

planning and design of recreational infrastructure.

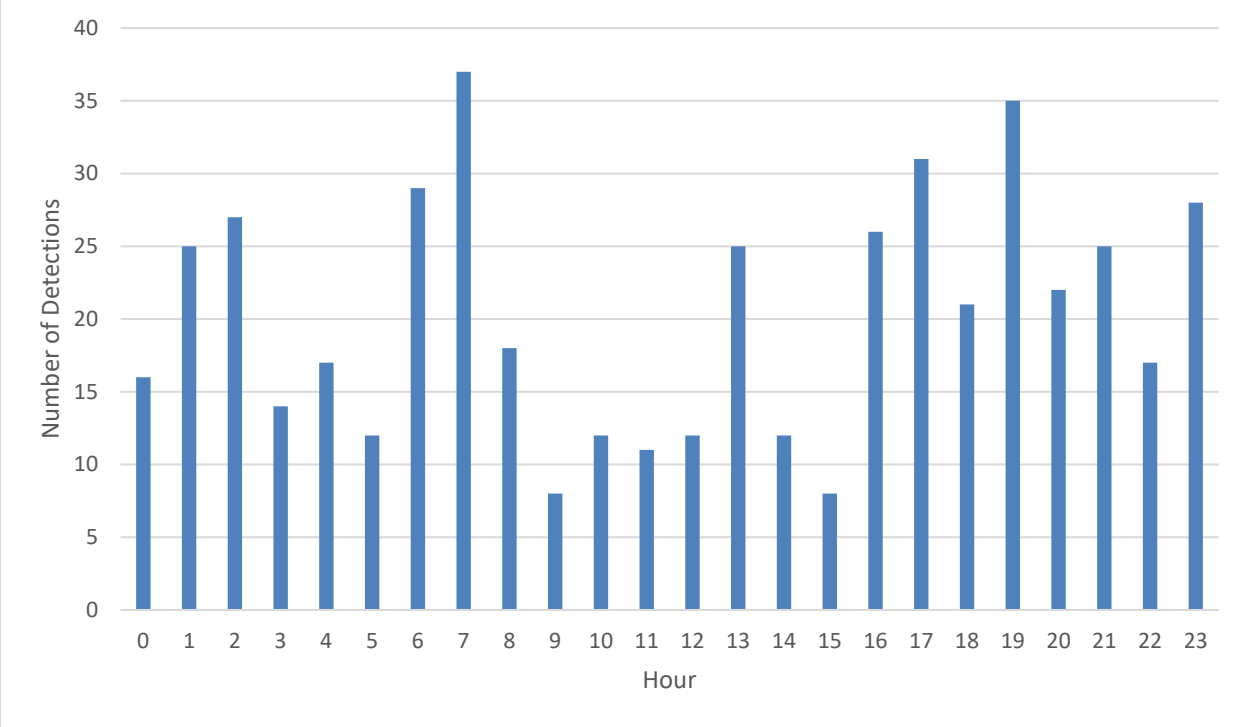


Figure 4. Diel activity patterns detected via cameras at Filoha in 2022-23 (July 2022-April 2023).

Species Richness – Camera Data

As with the TVES data, species richness was calculated for the monitoring camera data using the iChao1 estimate of true species richness. The species richness based on the camera data, 26.24 (SE 5.8) is greater than estimated richness using the TVES data 22.1 (4.1). That is likely due to the greater number of species detectable by means of imaging (e.g., birds) and species that are unlikely to leave a detectable sign of their presence (e.g., deer mouse, striped skunk). The greater richness calculated from the camera data when compared to the TVES data is indicative of the greater thoroughness of the method. In other words, the cameras capture all species including those that either do not leave or create detectable sign such as scat, tracks, or eskers. As a result, the camera data more accurately depict the diversity of species within the wildlife community occurring on the Filoha property complex. Interestingly, the estimated species richness based on the camera data with no birds (i.e., only mammals), 17.1 (SE 7.2), drops below the TVES based estimate. Nonetheless, if we continue to monitor wildlife at Filoha using both the TVES and camera traps, we can use these metrics as an index of the species assemblage at Filoha and we can track the data over time to determine if there are any trends that can be used to inform the iterative adaptive management process at Filoha.

Photo 6. Mule deer doe with spotted fawn

6.3.3 Owls & Other Nocturnal Birds

As top predators, owls play an important trophic role in ecosystems. Consequently, owls are considered good indicators of ecological health. Due to their nocturnal behavior and time of breeding activity, however, owls often go undetected using traditional avian population monitoring methods. Therefore, although nocturnal broadcast surveys do not detect a large number of species per unit effort, they can generate reliable monitoring data on an important group of predators.

6.3.3.1 Survey Methods

In 2021, following the recommended OST protocol (Takats et al. 2001), nocturnal bird surveys (Map 1) were conducted at points established at regular intervals of 500 m such that they maximized representation of the different cover types while minimizing the likelihood of detecting the same owl at multiple stations. Each point was surveyed at the time of year when vocal activity of the majority of owl species is greatest (early June). Owls are strongly territorial during their breeding season, and readily respond to perceived conspecific intruders. Consequently, when a recorded owl calls within an owl's territory, the owl usually responds by calling back and often flying closer to the surveyor/source of recorded call (Fuller and Mosher 1987, Takats et al. 2001). Portions of this protocol were adapted from surveys conducted in western Montana since the mid 1980's (Holt and Hillis 1987).

The calls of all owl species that may occur at Filoha were broadcast in approximate order of increasing size. This is important because some larger species of owls may compete with or prey upon smaller species; thus, smaller owls are less inclined to begin vocalizing if the larger species have already begun to vocalize. Any detection was recorded by the locations of survey points. A compass bearing and distance to the owl was also recorded with the location documented via GPS (RISC 2001, Takats et al. 2001, Blakesley 2009, Kissling and Lewis 2009). All other wildlife encountered was recorded by species and location. Calling equipment consisted of an mp3 player connected to a Cass Creek Big Horn XL© speaker, producing 80-110 dB output at 1 meter. Particular effort was made to note the occurrence of any non-owl nocturnal birds such as nightjars.

6.3.3.2 Results

The 2022 nocturnal bird surveys were conducted on May 5 and June 10 at Filoha. The survey effort detected 2 species of nocturnal birds. A Northern Pygmy Owl (*Glaucidium gnoma*) responded to our broadcast on and between points #1 and #2 (Map 1). The calling owl was likely perched in a Douglas fir on the cliff face east-northeast of the transect. In 2018, a Northern Pygmy Owl similarly responded to the broadcast during the survey at point #2 (PES and CWS 2019). The detection of the same owl species in both survey years and in a similar location may indicate that a pair of these small owls are nesting at Filoha. Although Northern Pygmy Owls are not uncommon birds in conifer forest and deciduous woodland habitat, they are ranked G4S3B by CNHP which means that their breeding status in Colorado is at risk.

The other nocturnal bird detected at Filoha during the course of our surveys was Common Nighthawks (*Chordeiles minor*). These nightjars were detected only during the June 10 survey. Their nasal call was detected at least 14 times throughout the duration of the survey. Nighthawks have not been detected at Filoha during previous surveys. These ground nesting aerial insectivores occur in urban and rural areas throughout the United States and Canada (except for the southwestern United States and Newfoundland), from the northern limit of the forest, down through central Mexico and as far south as Panama and possibly Colombia (Wickersham 2007). This member of the nightjar family is presumed to have a large population size but may be experiencing a slow decline possibly resulting

from habitat loss or pesticide use (NatureServe 2022).

Similar to our 2018 surveys, calls and sounds were documented from at least 8 other species including: American Robins, boreal chorus frogs (*Pseudacris maculata*), Wilson's snipe (*Gallinago delicata*), and Mallards (*Anas platyrhynchos*).

6.3.4 Diurnal Raptor Surveys

Raptors, also known as birds of prey, are a group of birds composed of the orders Falconiformes (i.e., diurnal birds of prey) and Strigiformes (i.e., owls, nocturnal birds of prey). Due to differences in their behavior, raptors are split into diurnal and nocturnal (Section 6.3.3 above) groups for surveying purposes. Specific objectives were to determine the presence and distribution of diurnal raptor species that use Filoha as part of their home range during the breeding season. Although all diurnal raptors are active during the day, they vary in detectability.

Some, such as Red-tailed Hawks, are readily observed when soaring over open fields or shrublands. Others, notably the Accipiters, tend to be more difficult to reliably detect due to their preference for vegetation cover. Inconspicuous diurnal raptors were targeted for inventory purposes using call broadcast surveys. Surveys were conducted during the early summer (June 22 and 28, 2022) to increase the chance of detecting multiple species, which generally vary in their nesting chronology. Accipiter broadcast surveys were combined with informal surveys for all raptors during the other survey methods included in this report (e.g., TVES, owl surveys).

6.3.4.1 Survey Methods

Broadcast survey methods were based on those outlined by Kennedy and Stahlecker (1993) and Joy et al. (1994), with modifications to suit project specific needs. Broadcast stations were established every 250± m along a single 2,122 m transect (Map 1). The survey was limited to this transect since it sufficiently covered the potential nesting habitat for the target species. The spacing between stations was based on the literature (Kennedy and Stahlecker 1993, Joy et al. 1994, Watson et al. 1999) concerning typical spacing of accipiter nesting areas and rough estimates of the broadcast range of the broadcast caller, striving for an interval that would maximize chances of detecting any existing territories. In addition to the broadcast survey, visual nest searches were conducted throughout Filoha to determine whether any inactive nests or non-responsive nesting raptors occurred on the property.

At each station, the observer broadcast alarm calls in four directions, at 45° angles to the transect. Each 10-sec broadcast in a specific direction was followed by 30 sec of scanning and listening for responses. At each station, the observer broadcast Sharp-Shinned Hawk (*Accipiter striatus*), Cooper's Hawk (*A. cooperii*), and Northern Goshawk (*A. gentilis*) alarm calls, in that order, to avoid potential size-related inhibitory effects[9]. If a focal species was detected, the observer was to record the species, age, and sex, when possible; an assessment of the observer's confidence in identifying the responding species (i.e., confident or not confident, as supported by a description of what was heard and/or seen); time of response; time elapsed since first call broadcast; species of call broadcasted immediately preceding the detection; response type (i.e., call, call and approach, call and flyby, silent approach, silent fly-by); estimated distance and bearing to response; station number and location; and general vegetation characteristics surrounding the detection point (i.e., maturity and stature of

[9] Although broadcasts were limited to Accipiter calls, Buteos (e.g., red-tailed hawks) respond to these calls as well. This is likely due to the perceived predator/competitor interaction.

aspen forest)[10].

6.3.4.2 Summary of Results

The 2022 diurnal raptor survey was conducted on June 1, 2022; no raptors were observed or otherwise detected during the survey. Cooper's Hawks, Red-tailed Hawks (*Buteo jamaicensis*), Turkey Vultures (*Cathartes aura*), and American Kestrels (*Falco sparverius*) were visually observed at the property while conducting other surveys in both 2018 and 2022, and Turkey Vultures were captured by the monitoring cameras in 2018. American peregrine falcons (*Falco peregrinus anatum*), Cooper's Hawks, and Golden Eagles (*Aquila chrysaetos*) have been observed at Filoha in prior years.

6.3.5 2020 Avian Point Transects

The avian monitoring program for Pitkin County Open Space and Trails Program (OST) was designed to provide OST managers with information regarding birds and their habitat that can be a tool to evaluate whether management actions are meeting the objectives set forth by a given management plan. In general, birds can be observed closely without harm to the birds or to the humans watching them. Therefore, it is relatively easy to collect large amounts of data in a time and cost effective manner (Davis 1989, Castri et al. 1992). Birds can provide early warning of natural responses to environmental impacts (Noss 1990, Munn 1993, Woodley 1996b, a). Changes in bird species composition and density can be used to assess wildlife habitat quality based on the assumptions that the population density or relative abundance of a single species or suite of species can serve as an index of habitat quality for that species, may indicate habitat suitability for other species, and that species-habitat relationships can be adequately understood. These data are intended to provide information to managers helping to assure proper documentation of the potential effects of management actions on species of conservation concern.

6.3.5.1 Survey Methods

Avian surveys were conducted in 2020 using point transects following the OST protocol originally developed in 1999 based on the Rocky Mountain Bird Observatory's (RMBO, now Bird Conservancy of the Rockies or BCR) Monitoring Colorado's Birds protocol (Leukering et al. 1998) and updated in 2009 (Hanni et al. 2009) and in 2019 (McLaren et al. 2019). The protocol was designed to be statistically rigorous and produce data for analysis of population trends of approximately 159 bird species that breed in Colorado (Leukering and Levad 2000). Observers record all avian species detected at each point. Whereas the RMBO point-transect sampling effort is stratified by habitat, OST modified the protocol to stratify by discrete properties in order to provide information that can be used by OST managers as part of the adaptive management of a given property (CWS 2011).

ArcGIS (ESRI 2014) was used to lay out a grid of systematic point count stations on Filoha, each separated by at least 250 meters (Map 1). Each point has been monumented via GPS. Point transects were performed after all migratory species returned to the area and as early in the season as snowpack permitted (June 2, 2022). Surveys were begun approximately 30 minutes before sunrise and finished before 11am. A minute was allowed for the birds to resume normal behavior, then birds were recorded for five minutes, as suggested by Bibby et al. (2000) and per the protocol. The distance from the observer to the bird was estimated based on its location when first detected. For each bird detected, observers recorded the species, sex, how it was detected (e.g., call, song, other, etc.), and distance from the observation point. In addition, observers also recorded certain species that occur in low density across the landscape (e.g., raptors, woodpeckers, Galliformes) along the line transect

[10] No focal species (per the protocol) were documented.

in between points (Leukering and Levad 2000) and tree squirrels (i.e., red squirrels) were recorded at each point in recognition of their proclivity toward nest predation. Per OST, a complete analysis of results including density estimates and population trends will be completed every 10 years (see CWS 2011). For the purposes of periodic reports, species richness and relative abundance is reported.

6.3.5.2 Results

One hundred sixty-six individuals representing 32 species were detected in 2020. Species richness (iChao1) and species diversity (Shannon Index) was calculated (See Section 6.3.1.2 above). In addition, relative abundance (%) of each bird species detected was determined using the expression n/N x 100 where n is the number of observations for a particular bird species and N is the total number of observations detected for all species.

Species Richness

From 2009 to 2017, the estimate of true species richness for the Filoha point-transect varied from a high of 69.74 in 2010 to a low of 36.65 in 2009. Estimated species richness at Filoha in 2020, however, was only 34.80. Although the linear trend indicates a slight downward trend, only 7% of the variation in species richness can be explained by the model (Figure 5). Since the 95% confidence interval of these estimates overlap (except perhaps in 2020), the differences should not be considered statistically significant. As more data is collected over time, the degree to which these variables influence the data will be reduced.

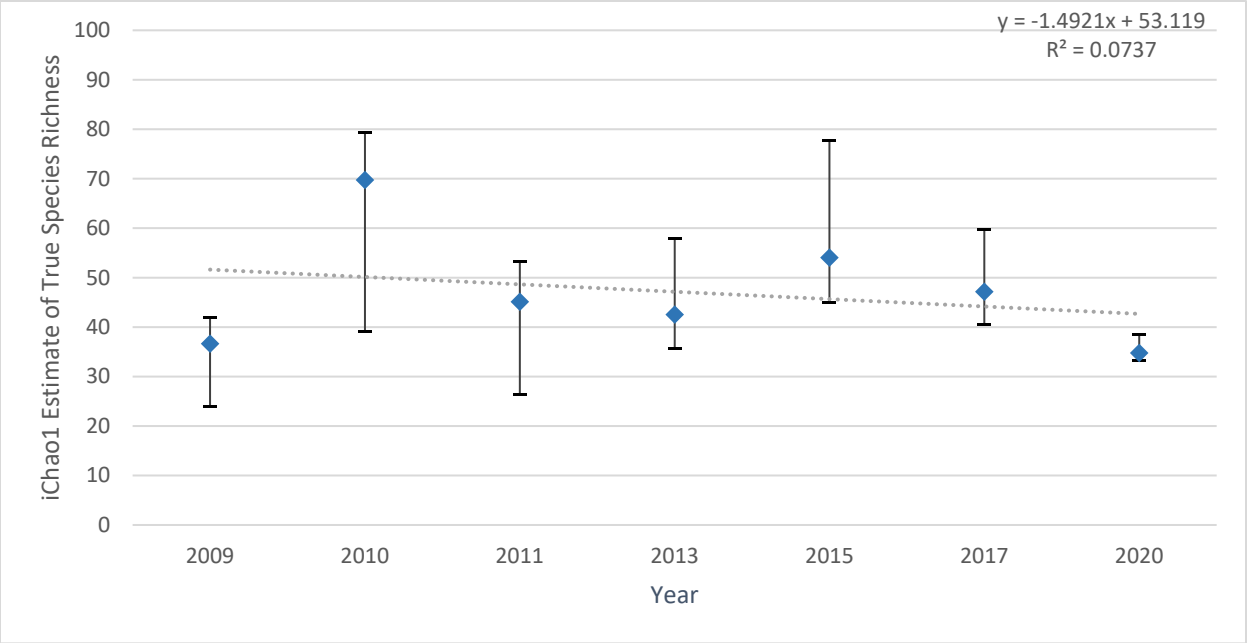


Figure 5. iChao1 estimate of true avian species richness at Filoha 2009-2020

Species Diversity

As discussed above, the Shannon Index is a heterogeneity measure that incorporates species richness index; it is considered sensitive to the addition of rare species (Krebs 1989). The Shannon diversity index combines two quantifiable measures: the species richness (number of species within the community) and species equitability (a measure of how similar the abundances of different species are). Typically the value of the Shannon Index ranges from 1.5 (low species richness and diversity) to 3.5 (high species evenness and diversity), though values beyond these limits may be encountered (Margalef 1972, Magurran 2004). The Shannon Index calculated for 2011 is 3.27, 3.34 in 2015, 3.04

in 2017, and 3.05 in 2020. The avian species diversity in each year is relatively high but, again, between years difference is low. As with species richness, although the linear trend is slightly downward from 2009 to 2020 only 2% of the variation in species richness can be explained by the model (Figure 11) and therefore, the trend is not significant.

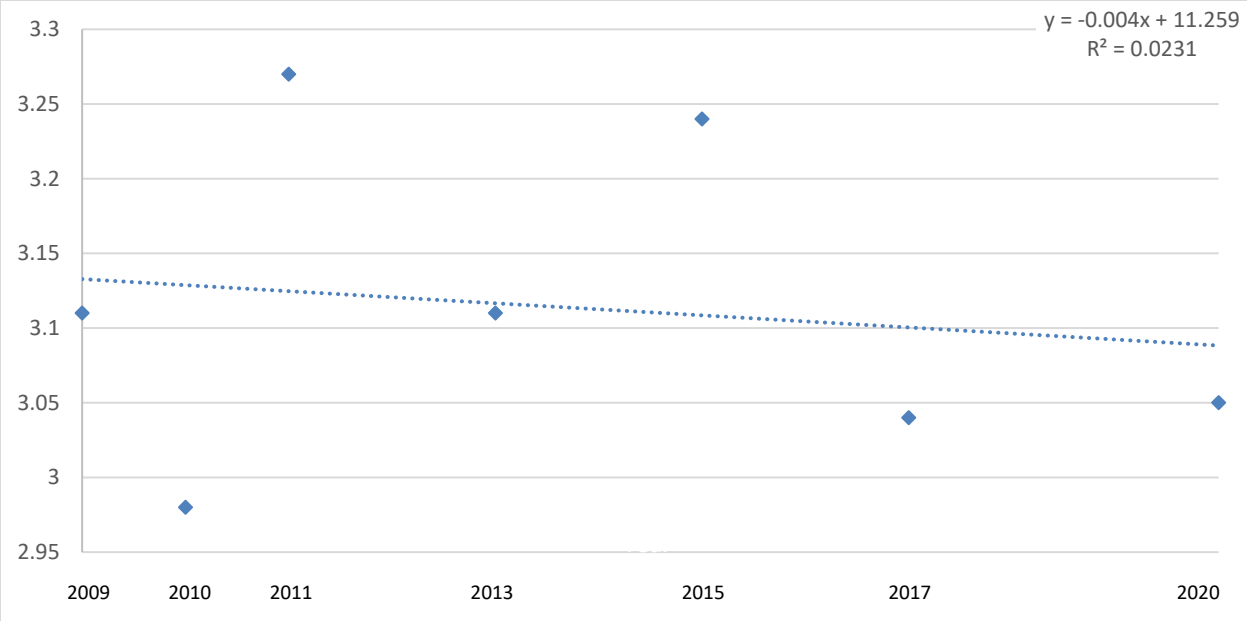


Figure 6. Avian species diversity (Shannon Index) at Filoha 2009-2020

Relative Abundance

In 2020, the 10 most abundant species represented 68.7% of the total individuals detected (Table 10). Green-tailed Towhees were, as in previous monitoring years, the most abundant species detected followed by Violet-green Swallow, Warbling Vireo, Chipping Sparrow, Black-headed Grosbeak, Canada Goose, American Robin, Tree Swallow, Turkey Vulture, and Virginia's Warbler.

Species	n	Relative Abundance
Green-tailed Towhee	21	12.7%
Violet-green Swallow	19	11.4%
Warbling Vireo	16	9.6%
Chipping Sparrow	13	7.8%
Black-headed Grosbeak	11	6.6%
Canada Goose	10	6.0%
American Robin	8	4.8%
Tree Swallow	6	3.6%
Turkey Vulture	5	3.0%
Virginia's Warbler	5	3.0%
White-throated Swift	5	3.0%
Black-billed Magpie	4	2.4%
Song Sparrow	4	2.4%
Western Wood-peewee	4	2.4%
Yellow Warbler	4	2.4%

Table 8. Relative abundance of fifteen most abundant bird species (2020)

Although 32 species were detected, 6 species were represented by only 1 individual, and 8 species were represented by only 2 individuals (Figure 7).

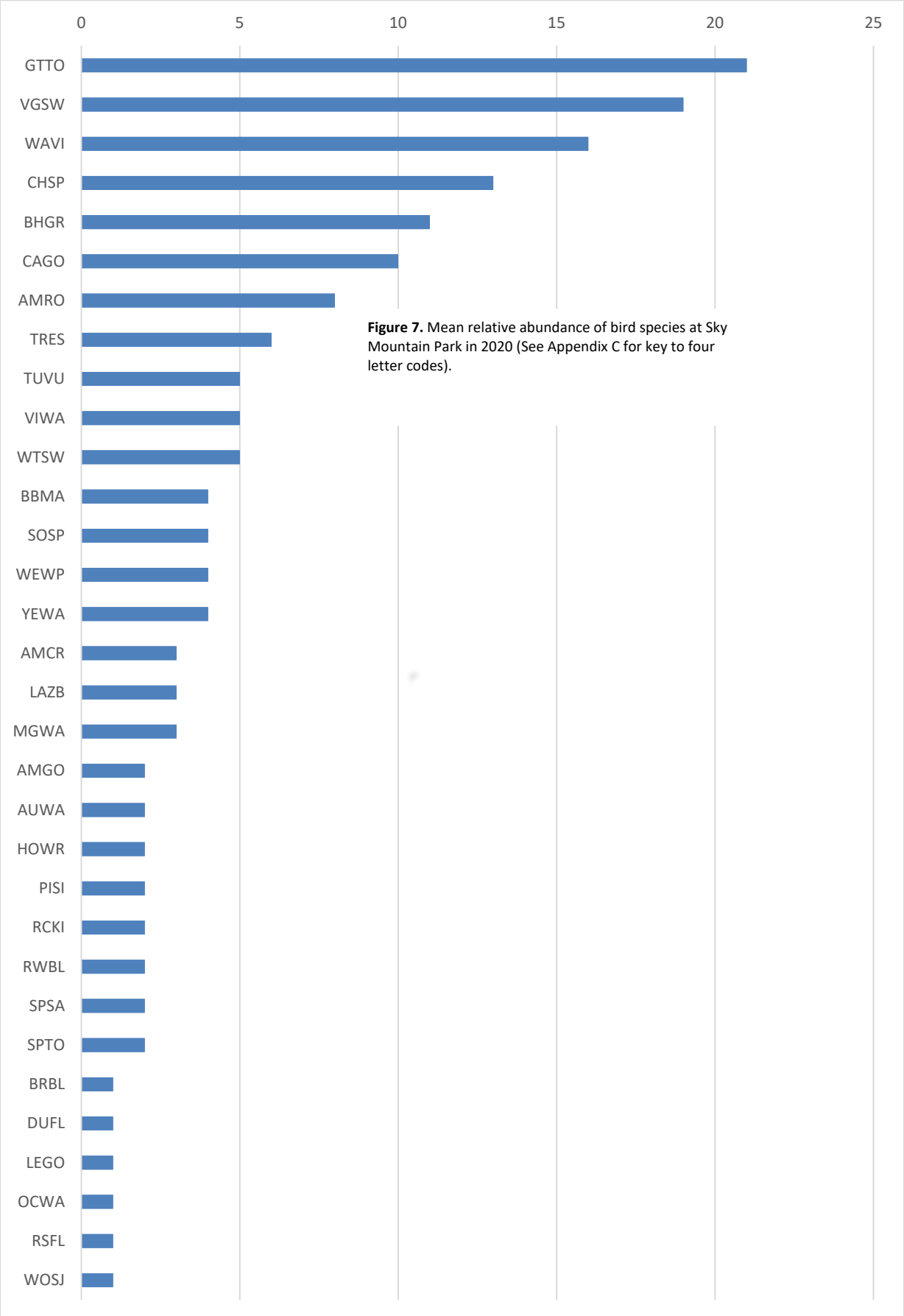


Figure 7. Mean relative abundance of bird species at Sky Mountain Park in 2020 (See Appendix C for key to four letter codes).

6.3.5.3 Species of Concern

There are 19 bird species that were detected at Filoha that are designated by one or more governmental agencies or conservation organizations as having special status or have been found to be in decline (Table 11).

Table 9. List of bird species with special management designation detected at Filoha in 2020

Species	USFS	USFWS	BLM	CPW	T&E	PIF/BCR
Black-billed Magpie						UCS
Brewer's Sparrow	R2S/MIS	BCC	Sens	SGCN/T2		CBSD, RC
Green-tailed Towhee	MIS					RS,UCS
Lazuli Bunting				SGCN/T2		RC,RS,UCS
Mountain Bluebird	MIS					RC,RS,UCS
Pine Siskin						
Plumbeous Vireo						RS,UCS
Violet-green Swallow						UCS
Virginia's Warbler	MIS	BCC		SGCN/T2		RS,UCC,UCS
Warbling Vireo						UCS
White-throated Swift						RC

Special management designations: USFS=United States Forest Service, R2S=Region 2 Sensitive Species, MIS=Management Indicator Species; USFWS=U.S. Fish & Wildlife Service, BCC=Bird of Conservation Concern for Bird Conservation Regions (BCR) 16 & 18; BLM=Bureau of Land Management; CPW=Colorado Parks & Wildlife; SGCN=Species of Greatest Conservation Need; PIF=Partners In Flight Species of Concern for Bird Conservation Region 16; CBSD=Common Bird in Steep Decline; CC=Continental Concern, RC=Regional Concern, CS=Continental Stewardship, RS=Regional Stewardship; T1=species of highest conservation priority in the state; T2=important in light of forestalling population trends or habitat conditions; Sens=BLM Colorado Sensitive Species; SSC=State Special Concern; SE=State Endangered; ST=State Threatened; UCS=U.S.-Canada Stewardship (UCS) Species.

6.3.5.4 Avian Management Indicator Species

Management indicator species (MIS) selected for aspen forest or woodland, riparian shrubland, sagebrush shrubland, mixed montane shrubland, piñon-juniper woodland, and riparian woodland are identified in the 2011 Avian Monitoring Report (CWS 2011) and the 2019 Vegetation & Wildlife Monitoring Report (PES and CWS 2019). These species are discussed in greater detail in the MIS section (8.0) below.

Table 10. MIS detected at Filoha in 2020 by habitat type

Habitat Type	Species	n
Aspen Forest or Woodland	Warbling Vireo	16
Riparian Shrubland	Song Sparrow	4
Mixed Montane Shrubland (mature)	Virginia's Warbler	5
Mixed Montane Shrubland (open)	Green-tailed Towhee	21
Mixed Montane Shrubland (lower elevation)	Lazuli Bunting	3
Riparian Woodland	Cordilleran Flycatcher	0

6.3.5.5 Discussion

Although all of the species detected were expected to occur at Filoha, some species expected to occur were not present and have been in almost every prior survey. Three typically common species at

Filoha, Broad-tailed Hummingbirds, Cordilleran Flycatchers, and Red-shafted Flickers were not detected in 2020. The lack of Cordilleran Flycatchers is particularly concerning given that they are an MIS for montane riparian forest at Filoha. Relative abundance was, more or less, as expected. No new avian first detections occurred in 2020 at Filoha during diurnal surveys.

MIS for all of the major cover types at Filoha, except the aforementioned Cordilleran Flycatcher, were detected in numbers that are proportional to the representation of the habitat for which they are indicators. Three of the species known to be most sensitive to human activity and anthropogenic habitat alteration, Chipping Sparrow, Green-tailed Towhee, and Virginia's Warbler, were detected in substantial numbers in appropriate habitat. In contrast, species known to be synanthropic such as American crow, American Robin, Black-billed Magpie, Brown-headed Cowbirds, European Starling, and House Finch were detected in low numbers (e.g., magpie) or not at all (e.g., cowbird, starling). This is a relatively robust indicator of habitat integrity, suggesting that despite the mixed-use management of Filoha, it continues to provide effective habitat for sensitive bird species.

7.0 SUMMARY

The scope and focus of the wildlife monitoring surveys at Filoha were guided by OST and supported by past studies by OST, CWS, and other resource professionals and ecologists. The following sections summarize each target group.

7.1 MAMMALS

The following conclusions can be made about mammals at Filoha:

- Mammalian MIS for Filoha (see PES and CWS 2019) are bighorn sheep and elk. As discussed above, both species continue to depend on the property. The property provides some of the most important winter and transition habitat for bighorn sheep in the Crystal River valley. The results of the TVES and camera surveys confirm that sheep are present from November through late April in a year with an above average snowpack. Conservation issues and management considerations for bighorn sheep are discussed at length in the PES and CWS 2019 Vegetation & Wildlife Monitoring Report.
    - The planned habitat treatments, particularly the thinning of the juniper encroaching into the grass-dominated areas should substantially improve bighorn sheep habitat at Filoha by improving forage and increasing security due to greater lines of site for predator (i.e., mountain lions) detection.
- Elk use Filoha throughout the year. Elk cows are known to rear their young on the property, which has been confirmed by camera captures of spotted calves on the property in early summer. There may also be a modest amount of calving occurring on the property since CWS has observed possible birthing beds within the riparian forest and the aspen woodland at the southern end of the property. The TVES confirmed the use of the entire property by elk with greatest concentrations of sign within the grass-dominated portions of the property (this is the case for sheep as well). The cameras survey results demonstrate that elk are active at Filoha in every month and every hour but are particularly active during the crepuscular periods in early morning and late evening through the early night.
    - It should be noted that recent CPW telemetry data indicates that elk calve in the mixed montane shrublands of the Roaring Fork Watershed to a greater extent than previously believed (J. Groves, personal communication; K. Tesch, personal communication).

- At this writing, only 1 federally listed mammal species currently has the reasonable potential to occur on or around the property: Canada lynx. Although the property does not provide suitable denning or winter habitat, lynx are known to use the habitat types present on and adjacent to Filoha as they disperse. No lynx or lynx sign has been identified at the property historically or during formal surveys through 2022.
    - It should be noted that as CPW gets close to the mandated reintroduction date for gray wolves (December 31, 2023), this species should be considered in future management of the property (and all OST properties).
- The camera and TVES data also show that Filoha continues to provide valuable mule deer habitat and deer continue to use Filoha throughout the non-winter months in substantial numbers.
    - Although the greatest density of deer at Filoha occurs in late fall and late spring as residents are joined by migrating animals, the cameras captured images of mule deer at Filoha in December and January. Given the considerable snowpack of 2022-23, it is clear that mule deer depend on Filoha as winter range. Filoha does not appear to support large numbers of deer in winter but the property likely provides critical resources for those that do.
    - Filoha provides important transition habitat for mule deer.
    - Mule deer (and elk) should also benefit from the planned habitat treatments at Filoha, especially within the Gambel oak mixed shrublands.
- Three mammal species designated by a state or federal agency or of other conservation concern have the reasonable potential to occur at Filoha: hoary bat, Pacific marten, and Townsend's big-eared bat. Of these species, only Pacific martens were documented at Filoha via sign or direct observation during the 2022 surveys but it is certain that, given the proximity of the Townsend's big-eared bat colony to the property, they forage at Filoha. No bat-specific surveys have been conducted to date at Filoha.
- North American moose occur occasionally at Filoha. Moose were first formally detected at Filoha this season by means of the TVES. As their population size increases, OST should expect more frequent occurrences of moose at Filoha.
- At least 9 mammalian predator species are known to use Filoha as part of their home range but only black bears, coyotes, long-tailed weasels, Pacific martens, red fox, and striped skunks were documented by the 2022 surveys. Bobcats and mountain lions are known to occur on the property but have not been observed or otherwise identified by CWS in 2022 or previous efforts at Filoha.
    - Black bears are abundant at Filoha. The 2022 surveys found that Filoha continues to be used by at least 5 or 6 different bears. Black bears should directly benefit from the shrubland habitat treatments.
- Abundant small mammals (i.e., leporids and rodents) of a variety of species provide an excellent prey base for both mammalian and avian predators. Only deer mouse, least chipmunk, mountain cottontail, and rock squirrel were documented at Filoha during the 2022 surveys. Past small mammal surveys have documented the following additional species: montane vole (*Microtus montanus*) and northern pocket gophers (*Thomomys talpoides*). The

absence of these species among detections in 2022 is likely an anomaly due to weather rather than a true absence of these species at Filoha. It should be noted and the cause further explored if voles and/or pocket gophers are not detected in subsequent monitoring efforts.

7.2 BIRDS

Birds were surveyed at Filoha via breeding season point transects (2020), nocturnal bird surveys (2022), and diurnal raptor surveys (2022). Based on the results of those surveys, in combination with past efforts, the following conclusions can be made about Filoha's avifauna:

- Thirty-five bird species were documented at Filoha by the point transect and camera surveys in 2020-2022. At least 72 bird species have been documented at Filoha by OST or their consultants since 2003 (CWS 2005, Pitkin County 2008, CWS 2011, PES and CWS 2018, PES and CWS 2019).

- Nineteen avian species of conservation concern (Table 12) have been documented at Filoha and 18 of those were documented on the property in 2020.

    - No diurnal raptors were detected during targeted surveys in 2022 and no new raptor nests were discovered.

- Northern Pygmy Owls have been documented within the same general area at Filoha during the breeding season in 2018 and 2022. As such, it is likely that this small owl is breeding on or foraging at Filoha during the breeding season.

- All of the MIS selected for Filoha were documented on the property in their representative habitat during the surveys in 2020 and 2022 except for Cordilleran Flycatchers (Table 14).

7.3 OTHER

Two bullsnakes were observed during TVES at Filoha in 2022 for the first time. Bullsnakes play an important ecological role in helping to limit populations of small mammals. These nonvenomous constrictors mainly eat rodents, but will also eat birds, bird eggs, lizards, smaller snakes, insects, bats, and frogs.

Monarch butterfly larvae were observed within a large milkweed stand near the river in 2022. Monarchs are a candidate species but not yet listed or proposed for listing under the Endangered Species Act. In most of North America the migratory monarch is no longer considered secure due to its severe, recent decline of roughly 90% (NatureServe 2023). As such, OST should consider this species in management decisions, particularly when it comes to weed and vegetation management.

8.0 MANAGEMENT INDICATOR SPECIES

Avian MIS were recommended for Filoha in the 2011 Avian Monitoring Report (CWS 2011) and the 2019 Vegetation & Wildlife Monitoring Report (PES and CWS 2019). These species remain appropriate today and are discussed below. Only raw counts will be reported here[11]. In 2020, avian species were monitored via the OST avian point transect protocol and mammals were monitored by the TVES and camera trap array components of the MSIM effort at Filoha.

[11] Density estimates from distance sampling of avian MIS will be calculated and reported in the 10 year avian monitoring report.

Table 11. Recommended MIS

Habitat	Species	Report(s)	Detections*	
			2017/18	2020/2022
Aspen Forest or Woodland	Warbling Vireo	CWS 2005, 2011; PES & CWS 2019	2	16
Broad-scale Habitat Generalistˣ	Rocky Mountain Elk	CWS 2005, PES & CWS 2019	824	1,855
Cliffs, Scree, Talus, Grass/Meadowˣ	Bighorn Sheep	CWS 2005, PES & CWS 2019	55	364
Mixed Montane Shrubland - Open	Green-tailed Towhee	CWS 2005, 2011; PES & CWS 2019	14	21
Mixed Montane Shrubland - Dense	Virginia's Warbler	CWS 2005, 2011; PES & CWS 2019	9	5
Riparian Forest	Cordilleran Flycatcher	CWS 2005, 2011; PES & CWS 2019	3	0
Riparian Shrubland	Song Sparrow	CWS 2005, 2011; PES & CWS 2019	5	4

* As stated above, two years does not make a trend, two years are shown simply for comparison. Avian species detections are from fieldwork in 2017 and 2020, mammal species detections are from fieldwork in 2018 and 2022.

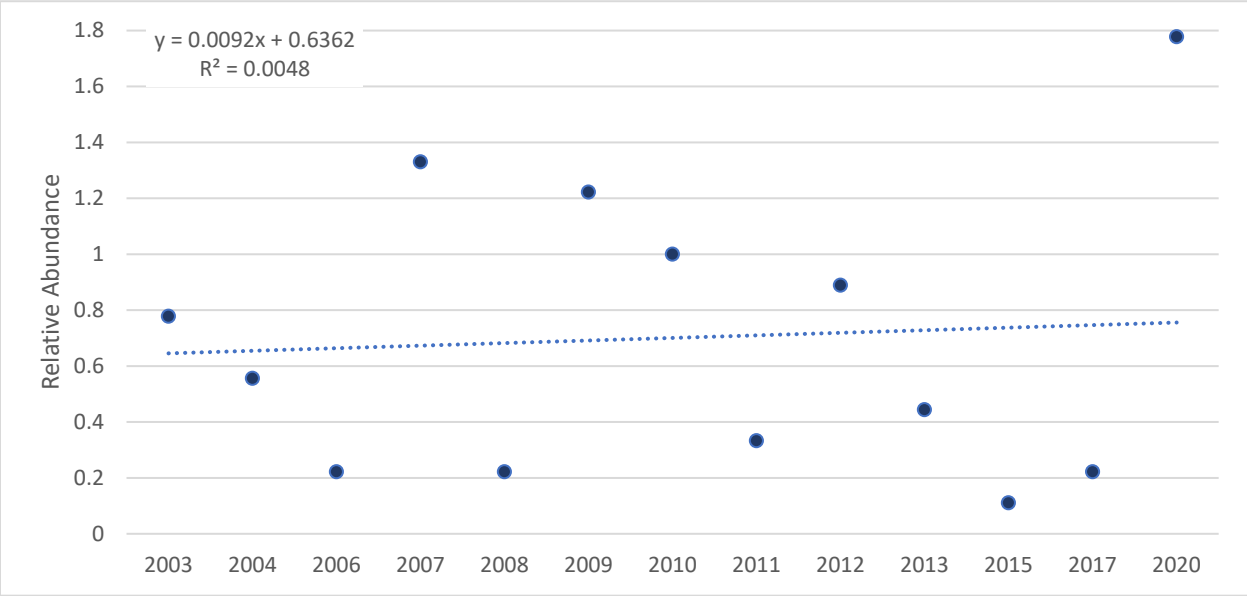
ˣ The 2022 figures include the August 1 through April 27 camera survey vs. just 20 days in 2018.

8.1 ASPEN FOREST OR WOODLAND

Warbling Vireo

In Colorado, the vast majority of Warbling Vireos breed in aspen woodlands of the western mountains (Barrett 1998). They are also commonly found in montane and lowland riparian forests but are rarely found where conifers dominate. In the 13 years that the Filoha point transect (first implemented by OST in 2003) has been surveyed, a mean of 6.3 Warbling Vireos were documented. Warbling Vireo

Figure 8. Warbling Vireo relative abundance over time.



detections varied from a low of 1 in 2015 and a high of 16 in 2020. In addition, relative abundance at Filoha varied from 0.778 in 2003 to a high of 1.778 in 2020. Although there appears to be a slight increase in the trend in relative abundance, without the 2020 outlier the trend is more likely flat to slightly declining. As described by PES and CWS (2019), the aspen-Gambel oak woodland at the southern end of the property is in poor condition largely due to elk herbivory. This is a concern regarding the aspen-dependent species at Filoha and, although there are healthy aspen stands within proximity to the property, it would be wise to consider management actions to improve the health of Filoha's aspen woodlands.

Table 12. Number of Warbling Vireos detected and relative abundance by year.

Year	# Birds Detected	Relative Abundance
2003	7	0.778
2004	5	0.556
2006	2	0.222
2007	12	1.330
2008	2	0.222
2009	11	1.222
2010	9	1.000
2011	3	0.333
2012	8	0.889
2013	3	0.444
2015	1	0.111
2017	2	0.222
2020	16	1.778

8.2 CLIFFS, SCREE, TALUS, GRASS/MEADOW

Rocky Mountain Bighorn Sheep

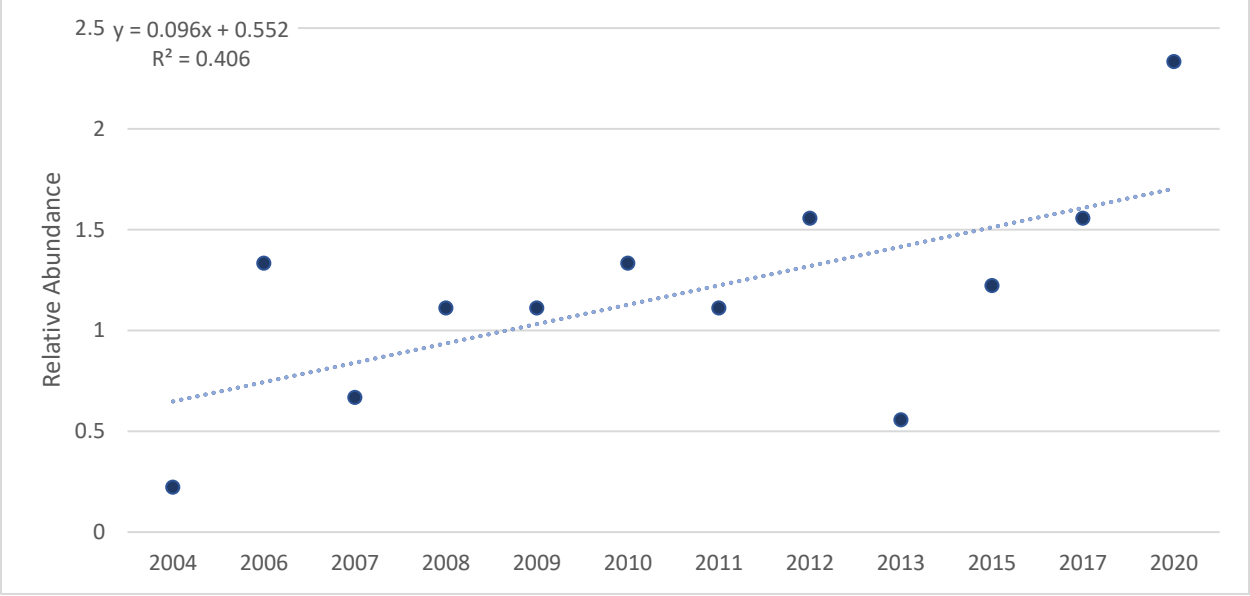
Three hundred sixty-four detections of bighorn sheep were documented in 2022-23 by means of the TVES and camera survey and 55 were detected by the TVES in 2018. Bighorn sheep continue to use Filoha in large numbers during the spring and fall transition periods as well as through the entire winter. Given the above average snowpack of 2022-23, the heavy winter use of Filoha by sheep is indicative of the importance of the property to sheep in normal to severe winters. Again, please refer to the PES and CWS 2019 Vegetation & Wildlife Monitoring Report for more information on the bighorn sheep of the Crystal River valley and Filoha.

8.3 MIXED MONTANE SHRUBLANDS

Green-Tailed Towhee

Twenty-one Green-tailed Towhees were documented at Filoha in 2020, 14 were identified in 2017

Figure 9. Green-tailed Towhee relative abundance over time.



and 11 in 2015. Green-tailed Towhees, which thrive in mixed shrublands, particularly stands with a Gambel oak and sagebrush component, appear to be doing quite well at Filoha. Since 2004, the relative abundance of these ground feeders has, more or less, increased over time. They also occur in pinyon-juniper and sagebrush shrublands. As such, Filoha provides excellent habitat for Green-tailed Towhees and their numbers may increase as the sagebrush continues to re-establish at Filoha. The planned habitat treatments may or may not improve conditions for them so it will be interesting to continue to track their numbers following the project.

Table 13. Number of Green-tailed Towhees detected and relative abundance by year

Year	# Birds Detected	Relative Abundance
2003	5	1.222
2004	2	0.222
2006	12	1.333
2007	9	0.667
2008	10	1.111
2009	10	1.111
2010	12	1.333
2011	10	1.111
2012	14	1.556
2013	5	0.556
2015	11	1.222
2017	14	1.556
2020	21	2.333

Virginia's Warbler

Virginia's Warblers are strongly associated with mature mixed montane shrublands. Relative abundance of detections of this sensitive species may be decreasing over time but since only 26% of the trend is explained by the model, one should be careful in making conclusions or management decisions based on this information. As with Green-tailed Towhees, the juniper and oak treatments

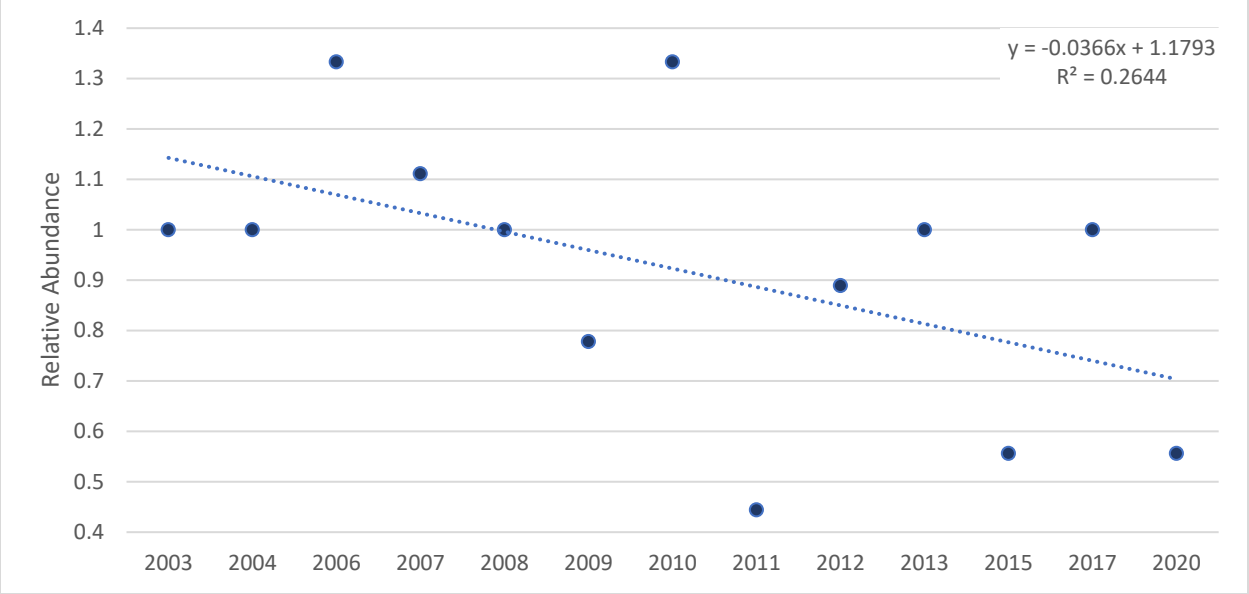


Figure 10. Virginia's Warbler relative abundance over time.

planned at Filoha may or may not be beneficial to this denizen of dense oak shrublands, so it is important to watch detection trends of this declining species especially since habitat fragmentation is one of the factors most effecting population trends across their current distribution (K. V. Rosenberg et al. 2016). It is important to note that landscape matrix is mature, dense oak with only patches cut within that matrix so although oak treatments may reduce Virginia's warbler habitat in small patches, thousands of acres of mature oak shrublands remain intact at Filoha and adjacent WRNF lands.

Table 14. Number of Virginia's Warblers detected and relative abundance by year.

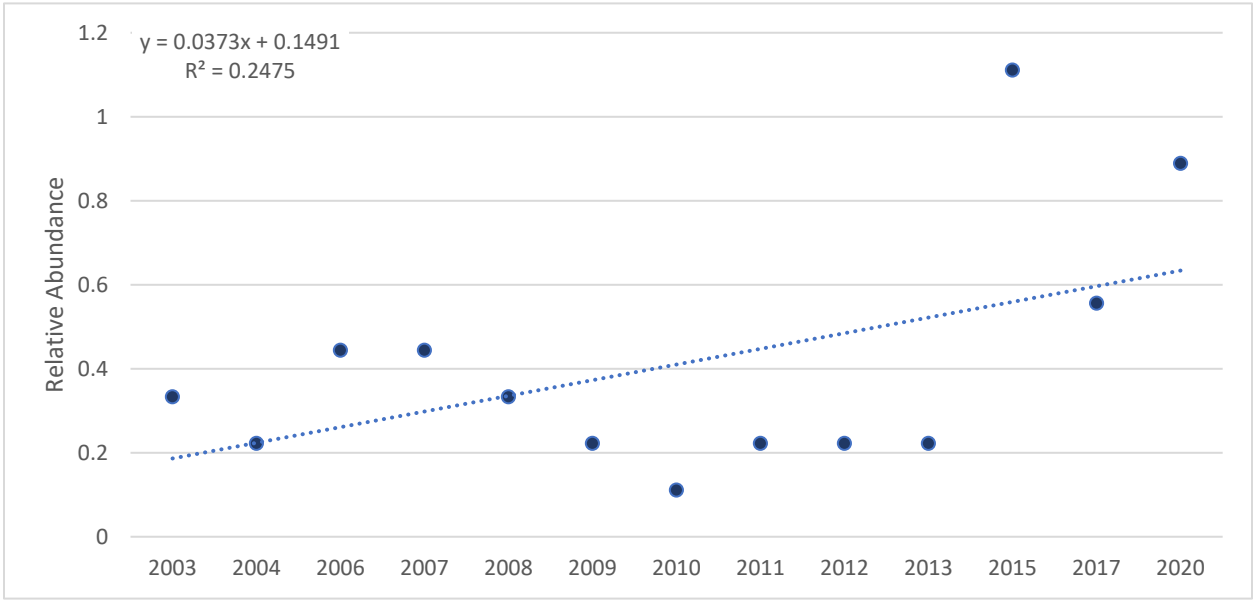
Year	# Birds Detected	Relative Abundance
2003	9	1.000
2004	9	1.000
2006	12	1.333
2007	10	1.111
2008	9	1.000
2009	7	0.778
2010	12	1.333
2011	4	0.444
2012	8	0.889
2013	9	1.000
2015	5	0.556
2017	9	1.000
2020	5	0.556

8.4 RIPARIAN HABITATS

Song Sparrow

Because Song Sparrows are strongly associated with montane willow carrs, montane riparian woodlands, and emergent wetlands (Wickersham 2007), its population trends are considered

Figure 11. Song Sparrow relative abundance over time.



indicative of changes in the types of riparian habitat occurring at Filoha. Relative abundance of detections of this ground nester may be increasing over time but since only 25% of the trend is explained by the model, one should be careful in making conclusions or management decisions based on this information. Nonetheless, the recent increase in detections (i.e., 2015, 2017, 2020) may indicate that the riparian shrublands at Filoha are being successfully managed by OST; continued restoration efforts within this habitat type may improve conditions for Song Sparrows.

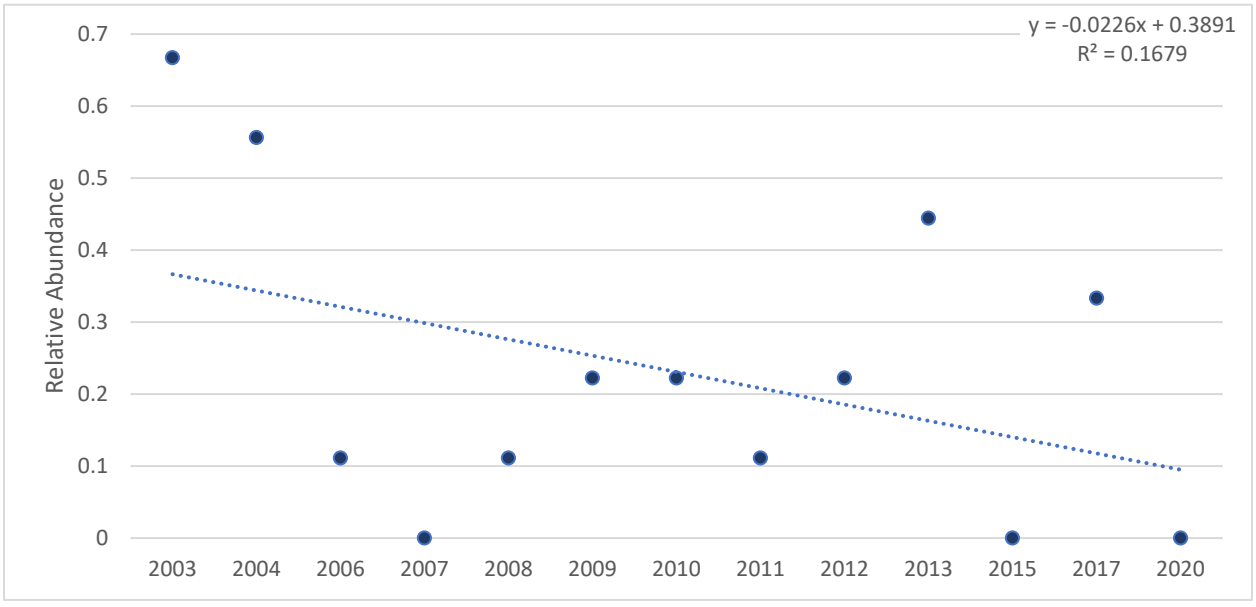
Table 15. Number of Song Sparrows detected and relative abundance by year.

Year	# Birds Detected	Relative Abundance
2003	3	0.333
2004	2	0.222
2006	4	0.444
2007	4	0.444
2008	3	0.333
2009	2	0.222
2010	1	0.111
2011	2	0.222
2012	2	0.222
2013	2	0.222
2015	10	1.111
2017	5	0.556
2020	8	0.889

Cordilleran Flycatcher

Cordilleran Flycatchers were selected as MIS because they are strongly associated with cool coniferous or mixed mountain riparian forests (Wickersham 2007). Such habitats, with both water and gaps of light in the forest, provide not just an abundance of insects and foraging perches but also nest sites for these tree-nesting insectivores. Unlike Song Sparrows which are denizens of the riparian

Figure 12. Cordilleran Flycatcher relative abundance over time.



shrubland layer, relative abundance of detections canopy dwelling Cordilleran Flycatchers may be decreasing over time. Since only 16% of the trend is explained by the model, however, one should be careful in making conclusions or management decisions based on this information. Also, since no Cordillerans were detected in 2007, 2015, and 2020 the trend may not be negative; instead it is more likely more or less stable. Either way, given that they are a strong indicator of the health and integrity of Filoha's riparian forest and woodlands, OST should continue to track this species closely and, if

detections continue to decline, management actions to further protect and/or restore the riparian forest and woodlands at Filoha may be prudent. In addition, the inconsistency in trends for the two riparian habitat MIS is a good example regarding why avian monitoring must be done as consistently and frequently as possible; each year's data is merely a snapshot in time and does not indicate any trend.

Table 16. Number of Cordilleran Flycatchers detected and relative abundance by year.

Year	# Birds Detected	Relative Abundance
2003	6	0.667
2004	5	0.556
2006	1	0.111
2007	0	0
2008	1	0.111
2009	2	0.222
2010	2	0.222
2011	1	0.111
2012	2	0.222
2013	4	0.444
2015	0	0
2017	3	0.333
2020	0	0

8.5 BROAD-SCALE HABITAT GENERALIST

Rocky Mountain Elk

Elk are monitored via the TVES and monitoring camera components of the MSIM effort at Filoha. The 2022 TVES detected 1,711 sets of elk tracks, pellet piles, or other sign. In addition, the cameras captured 144 occurrences of elk at Filoha during the monitoring period. Although the 2022 TVES results are substantially greater than the 796 TVES detections in 2018, these data may not reflect a trend but, rather, may be due to year-to-year variation in weather-related factors such as depth of snowpack, timing of snow melt, etc. At the very least, however, it seems clear that elk continue to use and depend on Filoha and the extended 2022 camera monitoring period indicates that elk are present on the property throughout the entire year. In addition, although elk calving is suspected at Filoha, elk are certainly using the property for rearing.

9.0 GENERAL RECOMMENDATIONS

As discussed above, OST takes an adaptive approach to management of open space properties. Each of the recommended management actions, whether for a specific MIS, or for the general welfare of wildlife on the property, must be evaluated to determine if it is having the desired effect on the target taxa. If the result of management actions is outside the range of desired outcomes, that action should

be discontinued or altered based on sound data resulting from monitoring.

1. Continue TVES, wildlife camera surveys, avian point transects, diurnal raptor surveys, and nocturnal bird surveys on a long-term basis to develop more comprehensive species lists, determine population trends and diel use patterns, and evaluate the effects of management actions on MIS.
    a. These surveys should be conducted at an interval equal to or less than every 3 years in order to produce data that will facilitate the adaptive management process in a cost-effective manner while reducing the influence of annual stochasticity. Surveys that produce statistically robust data (e.g., avian point transects) should be repeated more frequently than methods that merely produce observational data (e.g., TVES).
    b. Avian monitoring should be implemented every other year. From an effective monitoring perspective, every other year is realistically the largest interval that should be used. If done at greater intervals, e.g., every 3 years, and you have a "throw away" year similar to 2015 where late snowy/stormy weather altered migration timing and patterns, then the effective interval is every 6 years with 4 consecutive years of no data.
2. As recommended in every past wildlife report to OST, all old fencing should be removed (Photos 28, 29). There remains plenty of down barbed wire fence on the property which pose a substantial threat to wildlife. Although deer, elk, and moose are all capable of jumping fences, in a variety of situations they can become injured or entangled. Downed wire strands can readily snag animals and tangle legs, especially if wires are loose or spaced too closely together.
3. Implement the oak shrubland and juniper treatments as planned. This would help achieve the habitat management objectives set forth in the Filoha management plan. Specifically, by staggering treatments repeatedly every 10 to 15 years and across the Filoha complex of properties, OST can maintain a mosaic of shrubland types in different age classes which in turn will support greater wildlife species diversity and numbers of individuals.
    a. Schedule habitat manipulations and/or prescribed burning in early spring before resident birds begin nesting and migratory birds arrive or in the late summer or fall after nestlings have fledged.
    b. Senescent, decadent, or diseased oak should be prioritized for treatment.
    c. Healthy, arborescent stands should be maintained.
    d. Lop and scatter techniques are not acceptable for bighorn sheep habitat improvements since the scattered material is an impediment to movement. Mastication or cut and burn methods are preferred for this reason.
    e. Plan future treatments (i.e., cutting dead/dying trees, ripping root systems to encourage suckering (See 2020 Sky Mountain Park Vegetation & Wildlife Monitoring Report Update for information on methods) within the aspen dominated vegetation types at Filoha which will benefit species strongly associated with aspen forest and woodland as well as many generalist species.
        1) Consider elk exclosures within some aspen stands as controls to evaluate browsing pressure within the aspen forest.
4. Preserve standing dead trees; the loss of snags reduces nesting sites.

5. Evaluate the progress of the riparian restoration project to determine whether it is on a trajectory to achieve management goals.
6. For major habitat or recreation development projects, targeted surveys (e.g., nest searches) should be conducted prior to implementation and for a few years following completion to determine effects on wildlife communities and MIS.
7. Continue the seasonal recreation closures, dog prohibition, and closed areas within the nature preserve to protect ungulate migration, winter, and reproduction activity on Filoha. According to OST Rangers, violations of the seasonal closures and dog restrictions are not common but they do occur. Some of the violators are caught directly by OST Rangers but also by OST game cameras.
    a. Consider prohibiting recreation on the east side of the Crystal River within 100 meters of bighorn winter range from October 1st through May 15th. This closure should include the area from the southern edge of the summer range shown in Map 2 (CPW Mapped Bighorn Sheep Habitat) to the northern property boundary.
8. Identify and protect milkweed stands on the property to preserve monarch butterfly breeding habitat.
9. OST should develop a grey wolf policy for all of its properties. Educational materials and interpretation about wolves should be made available to people visiting OST properties and trails. Such a policy should include potential management actions if the following occurs:
    a. A solitary wolf is observed on or within proximity to an OST property;
    b. More than one wolf is observed on or within proximity to an OST property indicating the presence of a pack; or
    c. A den is established on or within proximity to a property.

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Appendix A. USFWS Consultation Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Western Colorado Ecological Services Field Office
445 West Gunnison Avenue, Suite 240
Grand Junction, CO 81501-5711
Phone: (970) 628-7180 Fax: (970) 245-6933

In Reply Refer To: July 18, 2023
Project Code: 2023-0105985
Project Name: Filoha Meadows Nature Preserve Wildlife Monitoring Report

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

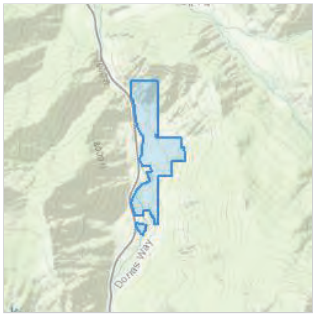
This species list is provided by:

Western Colorado Ecological Services Field Office
445 West Gunnison Avenue, Suite 240
Grand Junction, CO 81501-5711
(970) 628-7180

PROJECT SUMMARY

Project Code: 2023-0105985
Project Name: Filoha Meadows Nature Preserve Wildlife Monitoring Report
Project Type: Scientific Research/Monitoring
Project Description: Filoha Meadows Nature Preserve Wildlife Monitoring Report
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@39.226133899999994,-107.22226961178583,14z



Counties: Pitkin County, Colorado

ENDANGERED SPECIES ACT SPECIES

There is a total of 11 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 5 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Canada Lynx *Lynx canadensis* Population: Wherever Found in Contiguous U.S. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3652	Threatened
Gray Wolf *Canis lupus* Population: U.S.A.: All of AL, AR, CA, CO, CT, DE, FL, GA, IA, IN, IL, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, ND, NE, NH, NJ, NV, NY, OH, OK, PA, RI, SC, SD, TN, TX, VA, VT, WI, and WV; and portions of AZ, NM, OR, UT, and WA. Mexico. There is **final** critical habitat for this species. This species only needs to be considered under the following conditions: ▪ Lone, dispersing gray wolves may be present throughout the state of Colorado. If your activity includes a predator management program, please consider this species in your environmental review. Species profile: https://ecos.fws.gov/ecp/species/4488	Endangered

BIRDS

NAME	STATUS
Mexican Spotted Owl *Strix occidentalis lucida* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8196	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

FISHES

NAME	STATUS
Bonytail *Gila elegans* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Water depletions in the upper Colorado River basin adversely affect this species and its critical habitat. Effects of water depletions must be considered even outside of occupied range. Species profile: https://ecos.fws.gov/ecp/species/1377	Endangered
Colorado Pikeminnow *Ptychocheilus lucius* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Water depletions in the upper Colorado River basin adversely affect this species and its critical habitat. Effects of water depletions must be considered even outside of occupied range. Species profile: https://ecos.fws.gov/ecp/species/3531	Endangered
Humpback Chub *Gila cypha* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Water depletions in the upper Colorado River basin adversely affect this species and its critical habitat. Effects of water depletions must be considered even outside of occupied range. Species profile: https://ecos.fws.gov/ecp/species/3930	Threatened
Razorback Sucker *Xyrauchen texanus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Water depletions in the upper Colorado River basin adversely affect this species and its critical habitat. Effects of water depletions must be considered even outside of occupied range. Species profile: https://ecos.fws.gov/ecp/species/530	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate
Silverspot *Speyeria nokomis nokomis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2813	Proposed Threatened

FLOWERING PLANTS

NAME	STATUS
Ute Ladies'-tresses *Spiranthes diluvialis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2159	Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

07/18/2023 1

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Cassin's Finch *Carpodacus cassinii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9462	Breeds May 15 to Jul 15
Clark's Nutcracker *Nucifraga columbiana* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Jan 15 to Jul 15
Evening Grosbeak *Coccothraustes vespertinus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 15 to Aug 10

NAME	BREEDING SEASON
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Dec 1 to Aug 31
Lewis's Woodpecker *Melanerpes lewis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30
Olive-sided Flycatcher *Contopus cooperi* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Virginia's Warbler *Vermivora virginiae* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9441	Breeds May 1 to Jul 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12

(0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

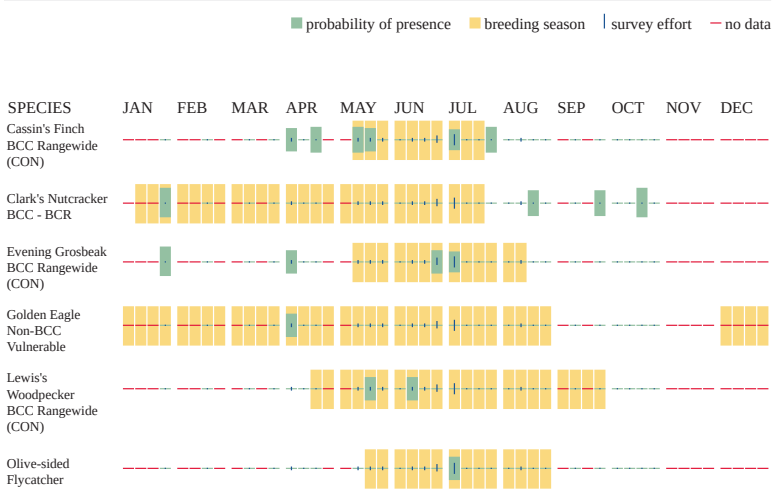
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

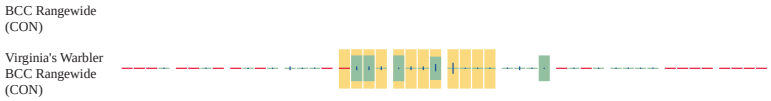
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

MIGRATORY BIRDS FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.
Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?
The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

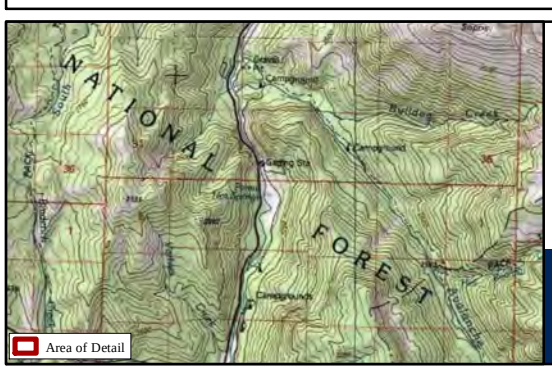
Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

IPAC USER CONTACT INFORMATION

Agency:	County of Pitkin
Name:	Jonathan Lowsky
Address:	Colorado Wildlife Science, LLC
Address Line 2:	0100 Elk Run Drive STE 128
City:	Basalt
State:	CO
Zip:	81621
Email	jonathan@coloradowildlifescience.com
Phone:	9706184740

Appendix B. Maps

Milkweed Stand



Filoha Meadows Nature Preserve

Pitkin County, CO

Wildlife Monitoring Report

Map 1. 2020 and 2022 Wildlife Surveys

Legend:

- Property Boundary
- 2018 Northern Pygmy Owl Detection
- 2022 Northern Pygmy Owl Detection
- TVES Survey Leg
- 3 — Avian Monitoring Point
- 3 — Camera Survey Point
- 3 — Raptor/Owl Broadcast Point
- Raptor/Owl Transect

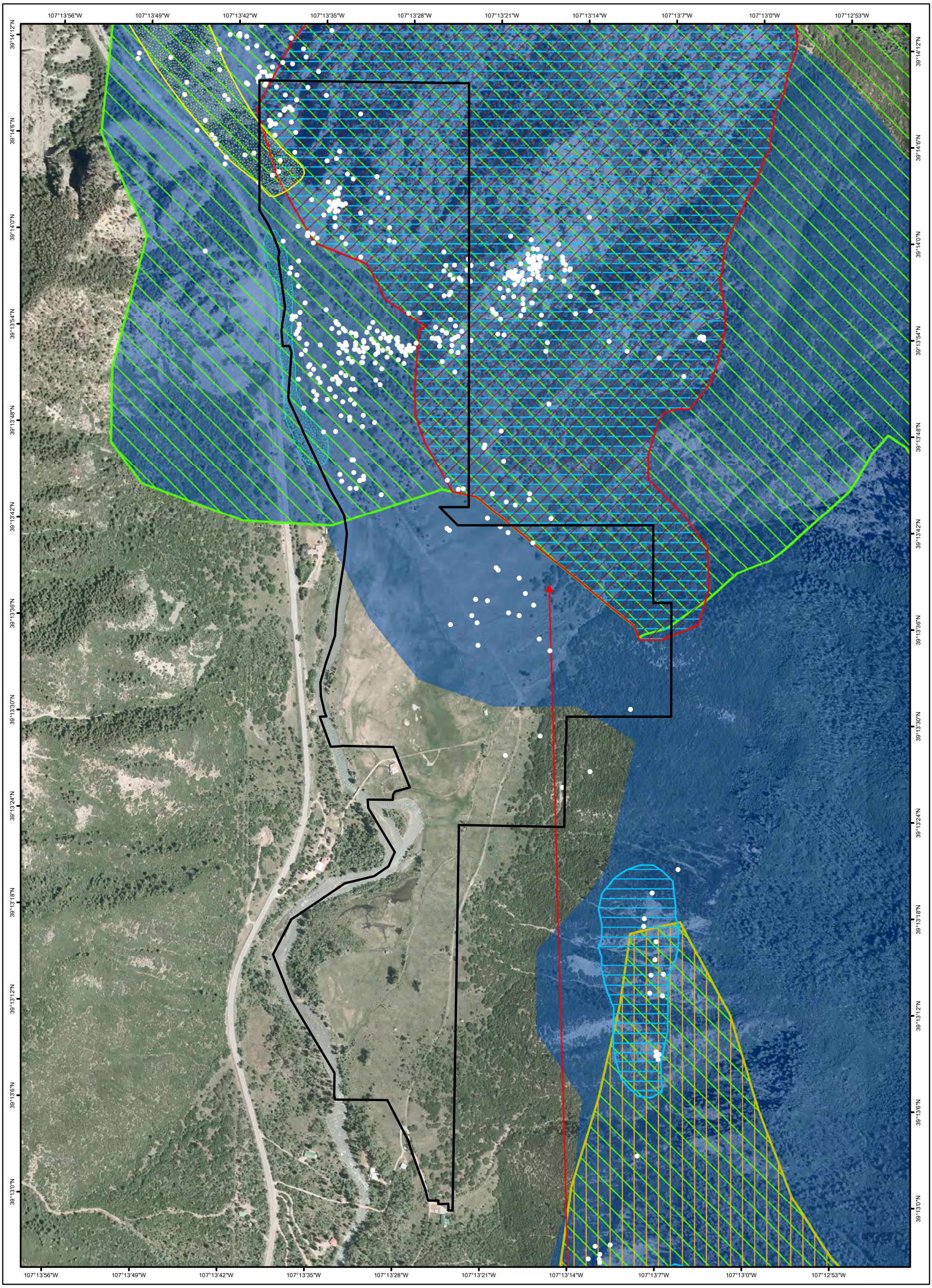
0 25 50 100 150 200 Meters

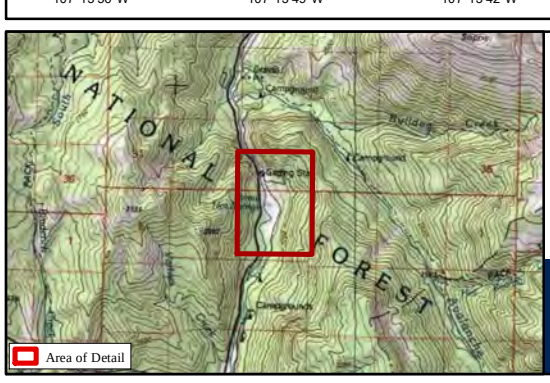
1 in = 168 meters

NOTE: Boundaries are approximate.

Base Layer Source:
Pitkin County GIS
2022 Digital Orthophotos

COLORADO WILDLIFE SCIENCE
Wildlife & Wildfire Research, Management & Consulting
0100 Elk Run Dr, Ste 128, Basalt, CO 81621
970.618.4740
www.coloradowildlifescience.com





Filoha Meadows Nature Preserve

Pitkin County, CO

Wildlife Monitoring Report

Figure 2. CPW Mapped Bighorn Sheep Habitat

Legend:

- Winter Range
- Severe Winter Range
- Winter Concentration Area
- Migration Corridors
- Property Boundary
- Production Area
- Summer Range
- Migration Patterns
- Mineral Lick
- CPW Telemetry Location

N

0 50 100 200 Meters

1:6,542

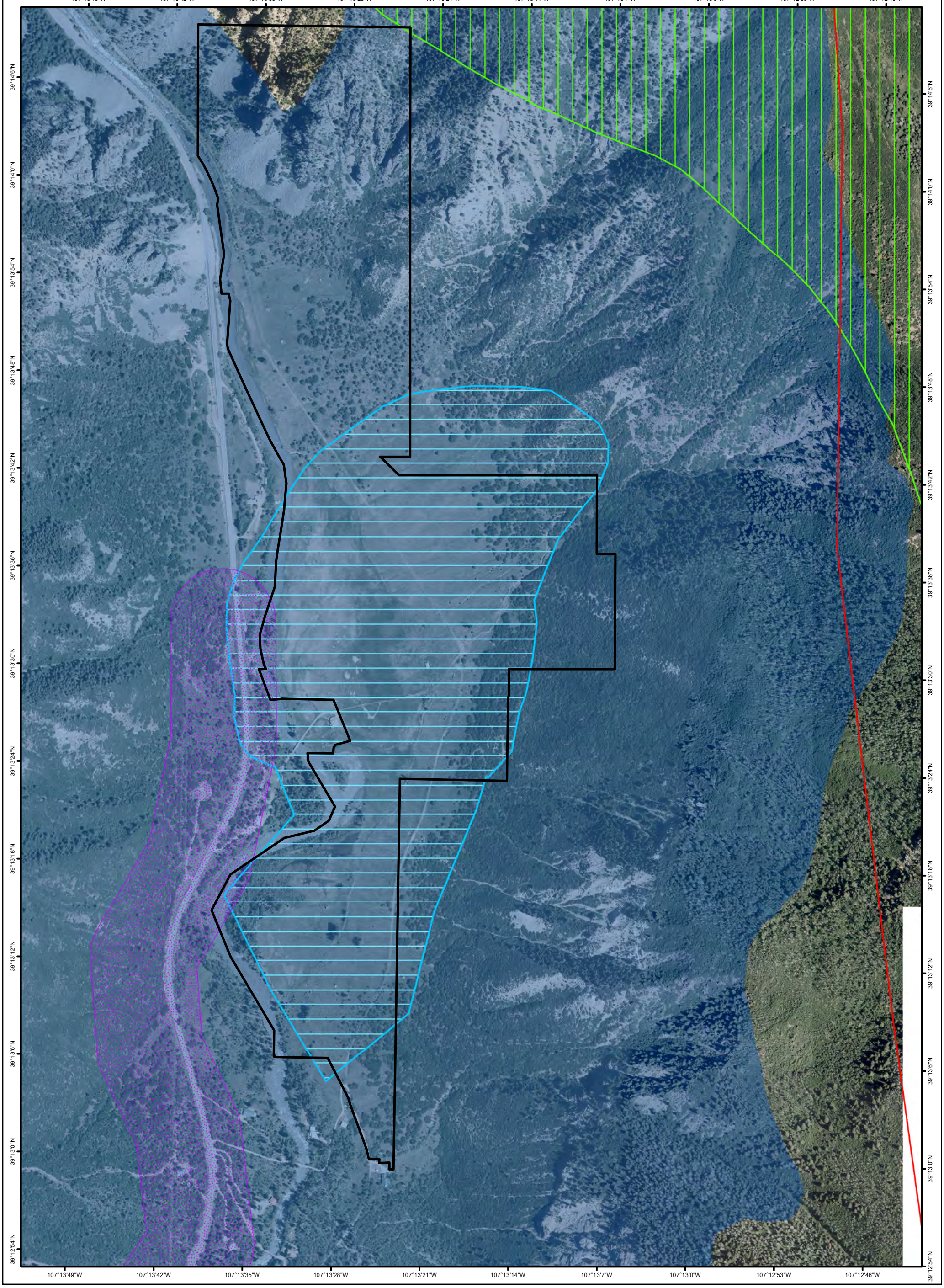
NOTE: Boundaries are approximate

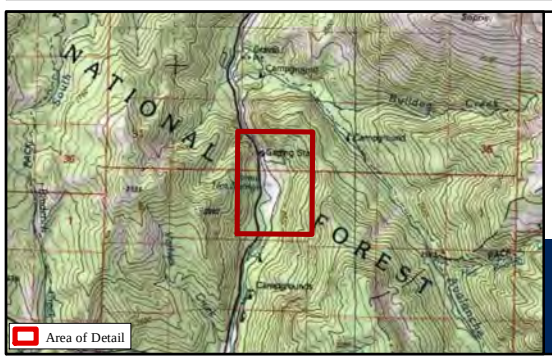
Base Layer Source:
Pitkin County GIS
2022 Digital Orthophotos

COLORADO WILDLIFE SCIENCE
Wildlife & Wildfire Research, Management & Consulting
0100 Elk Run Dr, Ste 128, Basalt, CO 81621
970.618.4740
www.coloradowildlifescience.com

107°13'49"W 107°13'42"W 107°13'35"W 107°13'28"W 107°13'21"W 107°13'14"W 107°13'7"W 107°13'0"W 107°12'53"W 107°12'46"W

39°14'6"N 39°14'0"N 39°13'54"N 39°13'48"N 39°13'42"N 39°13'36"N 39°13'30"N 39°13'24"N 39°13'18"N 39°13'12"N 39°12'54"N





Filoha Meadows Nature Preserve

Pitkin County, CO

Wildlife Monitoring Report

Figure 3. CPW Mapped Elk Habitat

Legend:

- Winter Range
- Severe Winter Range
- Winter Concentration Area
- Property Boundary
- Production Area
- Summer Range
- Migration Patterns
- Highway Crossing

N

0 50 100 200 Meters

1:6,542

NOTE: Boundaries are approximate

Base Layer Source:
Pitkin County GIS
2022 Digital Orthophotos

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Appendix C. List of bird species detected during avian monitoring 2003-2020

Common Name	Scientific Name	4-Letter Code
American Crow	*Corvus brachyrynchos*	AMCR
American Dipper	*Cinclus mexicanus*	AMDI
American Goldfinch	*Spinus tristis*	AMGO
American Kestrel	*Falco sparverius*	MAKE
American Robin	*Turdus migratorius*	AMRO
Band-tailed Pigeon	*Patagioenas fasciata*	BTPI
Belted Kingfisher	*Megaceryle alcyon*	BEKI
Black-billed Magpie	*Pica hudsonia*	BBMA
Black-capped Chickadee	*Poecile atricapillus*	BCCH
Black-headed Grosbeak	*Pheucticus melanocephalus*	BHGR
Blue-gray Gnatcatcher	*Polioptila caerulea*	BGGN
Brewer's Blackbird	*Euphagus cyanocephalus*	BRBL
Broad-tailed Hummingbird	*Selasphorus platycercus*	BTLH
Brown-headed Cowbird	*Molothrus ater*	BHCO
Canada Goose	*Branta canadensis*	CANG
Chipping Sparrow	*Spizella passerina*	CHSP
Common Raven	*Corvus corax*	CORA
Cooper's Hawk	*Accipiter cooperi*	COHA
Cordilleran Flycatcher	*Empidonax occidentalis*	COFL
Dark-eyed Junco	*Junco hyemalis*	DEJU
Dusky Flycatcher	*Empidonax oberholseri*	DUFL
Eurasian Collared-Dove	*Streptopelia decaocto*	EUCD
Eurpean Starling	*Sturnus vulgaris*	EUST
Fox Sparrow	*Passerella iliaca*	FOSP
Golden Eagle	*Aquila chrysaetos*	GOEA
Great Blue Heron	*Ardea herodias*	GBHE
Gray Catbird	*Dumetella carolinensis*	GRCA
Gray Jay	*Perisoreus canadensis*	CAJA
Green-tailed Towhee	*Pipilo chlorurus*	GTTO
Hairy Woodpecker	*Picoides villosus*	HAWO
Hermit Thrush	*Catharus guttatus*	HETH
House Wren	*Troglodytes aedon*	HOWR
Killdeer	*Charadrius vociferus*	KILL
Lazuli Bunting	*Passerina amoena*	LAZB
Lesser Goldfinch	*Spinus psaltria*	LEGO
Lincoln's Sparrow	*Melospiza lincolnii*	LISP
MacGillivray's Warbler	*Geothlypis tolmiei*	MGWA
Mallard	*Anas platyrynchus*	MALL
Mountain Bluebird	*Sialia currucoides*	MOBL

Common Name	Scientific Name	4-Letter Code
Mountain Chickadee	*Poecile gambeli*	MOCH
Mourning Dove	*Zenaida macroura*	MODO
Northern Goshawk	*Accipiter gentilis*	NOGO
Orange-crowned Warbler	*Oreothlypis celata*	OCWA
Peregrine Falcon	*Falco peregrinus*	PEFA
Pine Siskin	*Carduelis pinus*	PISI
Plumbeous Vireo	*Vireo plumbeus*	PLVI
Red-naped Sapsucker	*Sphyrapicus nuchalis*	RNSA
Red-shafted Flicker	*Colaptes auratus cafe*	RSFL
Red-tailed Hawk	*Buteo jamaicensis*	RTHA
Red-winged Blackbird	*Agelaius phoeniceus*	RWBL
Ruby-crowned Kinglet	*Regulus calendula*	RCKI
Song Sparrow	*Melospiza melodia*	SOSP
Spotted Sandpiper	*Actitis macularia*	SPSA
Spotted Towhee	*Pipilo maculatus*	SPTO
Steller's Jay	*Cyanocitta stelleri*	STJA
Swainson's Thrush	*Catharus ustulatus*	SWTH
Townsend's Solitaire	*Myadestes townsendi*	TOSO
Tree Swallow	*Tachycineta bicolor*	TRES
Turkey Vulture	*Cathartes aura*	TUVU
Vesper Sparrow	*Pooecetes gramineu*	VESP
Violet-green Swallow	*Tachycineta thalassina*	VGSW
Virginia's Warbler	*Oreothlypis virginiae*	VIWA
Warbling Vireo	*Vireo gilvus*	WAVI
Western Tanager	*Piranga ludoviciana*	WETA
Western Wood-pewee	*Contopus sordidulus*	WEWP
White-breasted Nuthatch	*Sitta carolinensis*	WBNU
White-crowned Sparrow	*Zonotrichia leucophrys*	WCSP
White-throated Swift	*Aeronautes saxatalis*	WTSW
Wild Turkey	*Meleagris gallopavo merriami*	WITU
Wilson's Snipe	*Gallinago delicata*	WISN
Woodhouse's Scrub-jay	*Aphelocoma woodhouseii*	WOSJ
Yellow Warbler	*Setophaga petechia*	YEWA

Table 17. List of bird species detected during avian monitoring 2003-2020

Appendix D. Vertebrates known or with the potential to occur at Filoha

Common Name	Species	CPW SGCN Priority Tier	Federal Status	State Status	USFS Sensitive Species	BLM Sensitive Species	USFWS Birds of Conservation Concern	PIF US-Canada Watch List	CNHP/ NatureServe Global	CNHP/ NatureServe State	Declining Trend[1]
HERPETOFAUNA											
Boreal chorus frog	*Pseudacris maculata*								G5	S5	
Bullsnake (syn. Gopher snake)	*Pituophis catenifer*								G5	S5	
Smooth green snake	*Liochlorophis vernalis*								G5	S4	
Tiger salamander	*Ambystoma tigrinum*								G5	S5	
Western terrestrial garter snake	*Thamnophis elegans*								G5	S5	
BIRDS											
American Coot	*Fulica americana*								G5	S5B,S4N	
American Crow	*Corvus brachyrhynchos*								G5	S5	
American Dipper	*Cinclus mexicanus*								G5	S5	
American Kestrel	*Falco sparverius*								G5	S5B	
American Robin	*Turdus migratorius*								G5	S5	
Bald Eagle	*Haliaeetus leucocephalus*	Tier 2		SC	X	X	X		G5	S1B,S3N	
Band-tailed Pigeon	*Patagioenas fasciata*	Tier 1							G4	S4B	
Bank Swallow	*Riparia riparia*								G5	S5	
Belted Kingfisher	*Megaceryle alcyon*								G5	S5B	
Black-billed Magpie	*Pica hudsonia*								G5	S5	
Black-capped Chickadee	*Poecile atricapillus*								G5	S5	
Black-headed Grosbeak	*Pheucticus melanocephalus*								G5	S4B	
Cinnamon Teal	*Spatula cyanoptera*								G5	S5B	
Dusky Grouse	*Dendragapus obscurus*								G5	S5	
Blue-gray Gnatcatcher	*Polioptila caerulea*								G5	S5B	
Broad-tailed Hummingbird	*Selasphorus platycercus*								G5	S5	
Brown Creeper	*Certhia americana*								G5	S5	
California Scrub-Jay	*Aphelocoma californica*								G5	S5	
Cassin's Finch	*Carpodacus cassinii*	Tier 2					X		G5	S5	X
Cedar Waxwing	*Bombycilla cedrorum*								G5	S5	

Common Name	Species	CPW SGCN Priority Tier	Federal Status	State Status	USFS Sensitive Species	BLM Sensitive Species	USFWS Birds of Conservation Concern	PIF US-Canada Watch List	CNHP/ NatureServe Global	CNHP/ NatureServe State	Declining Trend[1]
Chipping Sparrow	*Spizella passerina*								G5	S4B,S5N	
Clark's Nutcracker	*Nucifraga columbiana*								G5	S5	
Cliff Swallow	*Petrochelidon pyrrhonota*								G5	S5B	
Common Nighthawk	*Chordeiles minor*								G5	S5	
Common Poorwill	*Phalaenoptilus nuttallii*								G5	S5	
Common Raven	*Corvus corax*								G5	S5	
Cooper's Hawk	*Accipiter cooperii*								G5	S3S4B,S4N	
Cordilleran Flycatcher	*Empidonax occidentalis*								G5	S5B	
Dark-eyed Junco	*Junco hyemalis*								G5	S5	
Downy Woodpecker	*Picoides pubescens*								G5	S5	
Dusky Flycatcher	*Empidonax oberholseri*								G5	S5B	
Eurasian Collared-Dove*	*Streptopelia decaocto*								G5	S5	
European Starling*	*Sturnus vulgaris*								G5	S5	
Flammulated Owl	*Otus flammeolus*	Tier 2			X		X	X	G4	S4	
Fox Sparrow	*Passerella iliaca*								G5	S4B	
Gadwall	*Mareca strepera*								G5	S5B	
Golden Eagle	*Aquila chrysaetos*	Tier 1					X		G5	S3S4,S4N	
Gray Jay	*Perisoreus canadensis*								G5	S5	
Great Blue Heron	*Ardea herodias*								G5	S3B	
Great Horned Owl	*Bubo virginianus*								G5	S5	
Green-winged Teal	*Anas crecca*								G5	S5B,S4N	
Green-tailed Towhee	*Pipilo chlorurus*								G5	S5	X
Hairy Woodpecker	*Picoides villosus*								G5	S5	
House Wren	*Troglodytes aedon*								G5	S5	
Killdeer	*Charadrius vociferus*								G5	S5	
Lazuli Bunting	*Passerina amoena*	Tier 2							G5	S5B	X
Lesser Goldfinch	*Spinus psaltria*								G5	S4B	

Common Name	Species	CPW SGCN Priority Tier	Federal Status	State Status	USFS Sensitive Species	BLM Sensitive Species	USFWS Birds of Conservation Concern	PIF US-Canada Watch List	CNHP/ NatureServe Global	CNHP/ NatureServe State	Declining Trend[1]
Lincoln's Sparrow	*Melospiza lincolnii*								G5	S5B	
MacGillivray's Warbler	*Geothlypis tolmiei*								G5	S4B	X
Mallard	*Anas platyrynchyus*								G5	S5	
Mountain Bluebird	*Sialia currucoides*								G5	S5	
Mountain Chickadee	*Poecile gambeli*								G5	S5	
Mourning Dove	*Zenaida macroura*								G5	S5	
Northern Flicker	*Colaptes auratus*								G5	S5	
Northern Goshawk	*Accipiter gentilis*	Tier 2			X	X			G5	S3B	
Northern Pygmy-Owl	*Glaucidium gnoma*								G4G5	S3B	?
Northern Saw-whet Owl	*Aegolius acadicus*								G5	S5	
Olive-sided Flycatcher	*Contopus cooperi*	Tier 2			X			X	G4	S3S4B	X
Orange-crowned Warbler	*Oreothlypis celata*								G5	S5	?
Peregrine Falcon	*Falco peregrinus anatum*	Tier 2		SC	X	X	X		G4T4	S2B	
Pine Siskin	*Carduelis pinus*								G5	S5	
Plumbeous Vireo	*Vireo plumbeus*								G5	SNRB	
Red-breasted Nuthatch	*Sitta canadensis*								G5	S5	
Red-naped Sapsucker	*Sphyrapicus nuchalis*								G5	S5	
Red-tailed Hawk	*Buteo jamaicensis*								G5	S5	
Rock Pigeon*	*Columba livia*								G5	SNA	
Ruby-crowned Kinglet	*Regulus calendula*								G5	S5B	
Rufous Hummingbird	*Selasphorus rufus*								G5	SNA	
Sharp-shinned Hawk	*Accipiter striatus*								G5	S3S4B,S4	
Song Sparrow	*Melospiza melodia*								G5	S5	
Sora	*Porzana carolina*								G5	S3S4B	
Spotted Sandpiper	*Actitis macularius*								G5	S5	
Spotted Towhee	*Pipilo maculatus*								G5	S5	
Steller's Jay	*Cyanocitta stelleri*								G5	S5	

Common Name	Species	CPW SGCN Priority Tier	Federal Status	State Status	USFS Sensitive Species	BLM Sensitive Species	USFWS Birds of Conservation Concern	PIF US-Canada Watch List	CNHP/ NatureServe Global	CNHP/ NatureServe State	Declining Trend[1]
Swainson's Thrush	*Catharus ustulatus*								G5	S5B	
Townsend's Solitaire	*Myadestes townsendi*								G5	S5	
Tree Swallow	*Tachycineta bicolor*								G5	S5	
Turkey Vulture	*Cathartes aura*								G5	S4B	
Violet-green Swallow	*Tachycineta thalassina*								G5	S5	
Virginia Rail	*Rallus limicola*								G5	S4B	
Virginia's Warbler	*Oreothlypis virginiae*	Tier 2						x	G5	S5	
Warbling Vireo	*Vireo gilvus*								G5	S5B	
Western Kingbird	*Tyrannus verticalis*								G5	S5B	
Western Screech-Owl	*Megascops kennicottii*								G4G5	S4B	
Western Tanager	*Piranga ludoviciana*								G5	S4B	
Western Wood-Pewee	*Contopus sordidulus*								G5	S5	
White-breasted Nuthatch	*Sitta carolinensis*								G5	S5B,S4N	
White-throated Swift	*Aeronautes saxatalis*								G5	S5B	
Wild Turkey	*Meleagris gallopavo*								G5	S5	
Williamson's Sapsucker	*Sphyrapicus thyroideus*								G5	S4B	x
Wilson's snipe	*Gallinago delicata*								G5	S5	
Yellow Warbler	*Dendroica petechia*								G5	S5	
Yellow-rumped Warbler	*Setophaga coronata*								G5	S5	
MAMMALS											
Pacific marten	*Martes caurina*	Tier 2			x				G4G5	S4	
Big brown bat	*Eptesicus fuscus*								G5	S5	
Black bear	*Ursus americanus*								G5	S5	
Bobcat	*Lynx rufus*								G5	S5	
Bushy-tailed woodrat	*Neotoma cinerea*								G5	S5	
Common porcupine	*Erethizon dorsatum*								G5	S5	
Coyote	*Canis latrans*								G5	S5	

Common Name	Species	CPW SGCN Priority Tier	Federal Status	State Status	USFS Sensitive Species	BLM Sensitive Species	USFWS Birds of Conservation Concern	PIF US-Canada Watch List	CNHP/ NatureServe Global	CNHP/ NatureServe State	Declining Trend[1]
Deer mouse	*Peromyscus maniculatus*								G5	S5	
Dwarf shrew	*Sorex nanus*	Tier 2							G4	S2	
Fringed myotis	*Myotis thysanodes*								G4	S3	x
Golden-mantled ground squirrel	*Spermophilus lateralis*								G5	S5	
Hoary bat	*Lasiurus cinereus*	Tier 2							G5	S5B	
Least chipmunk	*Tamias minimus*								G5	S5	
Little brown myotis	*Myotis lucifugus*								G3	S5	x
Long-eared myotis	*Myotis evotis*								G5	S4	x
Long-legged myotis	*Myotis volans*								G4G5	S5	x
Long-tailed vole	*Microtus longicaudus*								G5	S5	
Long-tailed weasel	*Mustela frenata*								G5	S5	
Masked shrew	*Sorex cinereus*								G5	S5	
Montane shrew	*Sorex monticolus*								G5	S5	
Montane vole	*Microtus montanus*								G5	S5	
Moose	*Alces americanus*										
Mountain cottontail	*Sylvilagus nuttallii*								G5	S5	
Mountain lion	*Felis concolor*								G5	S5	
Mule deer	*Odocoileus hemionus hemionus*								G5	S5	
Northern pocket gopher	*Thomomys talpoides meritus*								G5	S5	
Raccoon	*Procyon lotor*								G5	S5	
Red squirrel	*Tamiasciurus hudsonicus*								G5	S5	
Pygmy shrew	*Sorex hoyi*	Tier 2			X				G5T3T4	S2	
Red fox	*Vulpes vulpes*								G5	S5	
Rock squirrel	*Spermophilus variegatus*								G5	S5	
Rocky Mountain elk	*Cervus canadensis nelsoni*								G5	S5	
Silver-haired bat	*Lasionycteris noctivagans*								G3G4	S5	X
Southern red-backed vole	*Myodes gapperi*	Tier 2							G5	S5	

Common Name	Species	CPW SGCN Priority Tier	Federal Status	State Status	USFS Sensitive Species	BLM Sensitive Species	USFWS Birds of Conservation Concern	PIF US-Canada Watch List	CNHP/ NatureServe Global	CNHP/ NatureServe State	Declining Trend[1]
Striped skunk	*Mephitis mephitis*								G5	S5	
Townsend's big-eared bat	*Plecotus townsendii pallescens*	Tier 1		SC	X	X			G3G4	S2	
Uinta chipmunk	*Neotamias umbrinus*								G5	S5	
Water shrew	*Sorex palustris*								G5	S5	
Western heather vole	*Phenacomys intermedius*								G5	S5	
Western jumping mouse	*Zapus princeps*								G5	S5	
Western small-footed myotis	*Myotis ciliolabrum*								G5	S4	
Wyoming ground squirrel	*Spermophilus elegans*								G5	S5	
Yellow-bellied marmot	*Marmota flaviventris*								G5	S5	

[1]CPW State Wildlife Action Plan

Appendix E. Photos

Photo 7. Spike bull elk

Photo 8. Cow elk

Photo 9. Young of year elk (calf born previous spring)

Photo 10. Bighorn ram

Photo 11. Bighorn lamb with ewes

Photo 12. One of the red foxes captured on camera in 2022

Photo 13. Red fox with prey

Photo 14. Red fox in the snow

Photo 15. Mule deer buck in velvet

Photo 16. Another buck in the fall

Photo 17. Mule deer does

Photo 18. One of the black bears at the Camera 5 bait station

Photo 19. A different black bear

Photo 20. Yet another black bear at Camera 4

Photo 21. Striped skunk

Photo 22. Another capture of a striped skunk

Photo 23. Long-tailed weasel at the Camera 2 bait station

Photo 24. Pacific marten at Camera 2

Photo 25. Raccoon at Camera 2 (in the cottonwood riparian woodland)

Photo 26. Woodhouse's Scrub-Jay

Photo 27. Young mule deer fawn at Camera 3

Photo 28. Mule deer fawn with its mother

Photo 29. Mountain lion captured by OST monitoring camera on February 21, 2023 (Courtesy of OST)

Photo 30. Example of the loose and down wire at Filoha that poses a threat to wildlife

Appendix E. CPW Moose, Mule Deer, Bighorn Sheep, & Elk Seasonal Habitat Definitions

MOOSE

CONCENTRATION AREA: That part of the range of a species where densities are 200% higher than the surrounding area during a specific season.

OVERALL RANGE: The area which encompasses all known seasonal activity areas within the observed range of a population of moose.

SUMMER RANGE: That part of the overall range where 90% of the individuals are located during the summer months. This summer time frame will be delineated with specific start/end dates for each moose population within the state (ex: May 1 to Sept 15). Summer range is not necessarily exclusive of winter range.

WINTER RANGE: That part of the overall range where 90 percent of the individuals are located during the winter months. This winter time frame will be delineated with specific start/end dates for each moose population within the state (ex: November 15 to April 1).

MULE DEER

CONCENTRATION AREA: That part of the overall range where higher quality habitat supports significantly higher densities than surrounding areas. These areas are typically occupied year round and are not necessarily associated with a specific season. Includes rough break country, riparian areas, small drainages, and large areas of irrigated cropland.

HIGHWAY CROSSING: Those areas where mule deer movements traditionally cross roads, presenting potential conflicts between mule deer and motorists.

MIGRATION CORRIDORS: A specific Mappable site through which large numbers of animals migrate and loss of which would change migration routes.

OVERALL RANGE: The area which encompasses all known seasonal activity areas within the observed range of a mule deer population.

RESIDENT POPULATION: An area that provides year-round range for a population of mule deer. The resident mule deer use all of the area all year; it cannot be subdivided into seasonal ranges although it may be included within the overall range of the larger population.

SEVERE WINTER: That part of the overall range where 90% of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten. SUMMER RANGE: That part of the overall range where 90% of the individuals are located between spring green-up and the first heavy snowfall. Summer range is not necessarily exclusive of winter range; in some areas winter range and summer range may overlap.

WINTER CONCENTRATION: That part of the winter range where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten.

WINTER RANGE: That part of the overall range where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site specific period of winter as defined for each DAU.

ROCKY MOUNTAIN BIGHORN SHEEP

MIGRATION CORRIDORS: A specific mappable site through which large numbers of animals migrate and loss of which would change migration routes.

MINERAL LICK: Specific natural sites known to be utilized by bighorn sheep for obtaining minerals to meet basic nutritional needs.

OVERALL RANGE: The area which encompasses all known seasonal activity areas within the observed range of a bighorn sheep population.

PRODUCTION AREA: That part of the overall range of bighorn sheep occupied by pregnant females during a specific period of spring. This period is May 1 to June 30 for Rocky Mountain bighorn sheep and February 28 to May 1 for desert bighorn sheep.

SEVERE WINTER: That part of the overall range where 90% of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten.

SUMMER CONCENTRATION: Those areas where bighorn sheep concentrate from mid-June through mid-August. High quality forage, security, and lack of disturbance may be characteristic of these areas to meet the high energy demands of lactation, calf rearing, antler growth, and general preparation for the rigors of fall and winter.

SUMMER RANGE: That part of the overall range where 90% of the individuals are located between spring green-up and the first heavy snowfall. Summer range is not necessarily exclusive of winter range; in some areas winter range and summer range may overlap.

WATER SOURCE: Water sources known to be utilized by bighorn sheep in dry, water scarce areas. Up to a 1.6km radius should be described around a point source, and up to a 1.6km band be drawn along a river or stream.

WINTER CONCENTRATION: That part of the winter range where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten.

WINTER RANGE: That part of the overall range where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site specific period of winter as defined for each Data Analysis Unit (DAU).7

ROCKY MOUNTAIN ELK

HIGHWAY CROSSING: Those areas where elk movements traditionally cross roads, presenting potential conflicts between elk and motorists.

MIGRATION CORRIDORS: A specific Mappable site through which large numbers of animals migrate and loss of which would change migration routes.

OVERALL RANGE: The area which encompasses all known seasonal activity areas within the observed range of an elk population.

PRODUCTION AREA: That part of the overall range of elk occupied by the females from May 15 to June 15 for calving. (Only known areas are Mapped and this does not include all production areas for the DAU).

RESIDENT POPULATION: An area used year-round by a population of elk. Individuals could be found in any part of the area at any time of the year; the area cannot be subdivided into seasonal ranges. It is most likely included within the overall range of the larger population.

SEVERE WINTER: That part of the range of a species where 90 percent of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten. The winter of 1983-84 is a good example of a severe winter.

SUMMER CONCENTRATION: Those areas where elk concentrate from mid-June through mid-August. High quality forage, security, and lack of disturbance are characteristics of these areas to meet the high energy demands of lactation, calf rearing, antler growth, and general preparation for the rigors of fall and winter.

SUMMER RANGE: That part of the range of a species where 90% of the individuals are located between spring green-up and the first heavy snowfall, or during a site specific period of summer as defined for each DAU. Summer range is not necessarily exclusive of winter range; in some areas winter range and summer range may overlap.

WINTER CONCENTRATION: That part of the winter range of a species where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten.

WINTER RANGE: That part of the overall range of a species where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site specific period of winter as defined for each DAU.

Source: CPW 2023

APPENDIX F. Coordinates of monitoring sites

STATION	LATITUDE	LONGITUDE
1	39° 13' 31.55" N	107° 13' 31.58" W
2	39° 13' 14.94" N	107° 13' 33.55" W
3	39° 13' 7.50" N	107° 13' 26.14" W
4	39° 13' 16.49" N	107° 13' 23.46" W
5	39° 13' 25.39" N	107° 13' 19.65" W
6	39° 13' 36.31" N	107° 13' 19.60" W
7	39° 13' 45.73" N	107° 13' 23.49" W
8	39° 13' 53.30" N	107° 13' 28.28" W
9	39° 13' 59.19" N	107° 13' 36.52" W

Table 18. Avian monitoring station locations with ID number and Lat/Long (DMS) location

STATION	LATITUDE	LONGITUDE
1	39° 13' 54.97" N	107° 13' 36.35" W
2	39° 13' 47.46" N	107° 13' 32.80" W
3	39° 13' 40.85" N	107° 13' 26.78" W
4	39° 13' 34.14" N	107° 13' 20.93" W
5	39° 13' 26.72" N	107° 13' 19.46" W
6	39° 13' 18.95" N	107° 13' 22.55" W
7	39° 13' 10.98" N	107° 13' 24.04" W
8	39° 14' 2.44" N	107° 13' 39.96" W
9	39° 13' 4.63" N	107° 13' 26.96" W
10	39° 13' 14.12" N	107° 13' 34.58" W

Table 19. Diurnal raptor / nocturnal bird broadcast points

STATION	LATITUDE	LONGITUDE
1	39° 14' 30.85" N	106° 55' 32.41" W
2	39° 14' 30.32" N	106° 55' 17.23" W
3	39° 14' 18.00" N	106° 55' 32.91" W
4	39° 14' 30.53" N	106° 55' 49.23" W
5	39° 14' 42.42" N	106° 55' 33.96" W

Table 20. Monitoring camera stations

GRID	LATITUDE	LONGITUDE
North	39° 13' 48.25" N	107° 13' 26.95" W
South	39° 13' 36.82" N	107° 13' 16.53" W

Table 21. TVES hexagon center points

APPENDIX G. Special Status Species

FEDERALLY LISTED SPECIES

As described above, the property was submitted to USFWS via the IPaC system requesting an official list of Threatened, Endangered, or Candidate species on September 13, 2022 (which was subsequently updated on July 18, 2023) that may occur on or within proximity to the property or may be affected by decisions regarding management of the property. Species protected under the ESA that may occur on or within proximity to Filoha are listed below in Table 1. Three federally protected or candidate species are known or have the potential to occur on or adjacent to Filoha: Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), and monarch butterfly.

Table 22. Threatened, Endangered, or Candidate species that occur at Filoha, have the potential to occur at Filoha, or be affected by management of Filoha

Common Name *Latin Name*	Occurrence Habitat	Status‡	Potential Habitat on the Property
BIRDS			
Mexican Spotted Owl *Strix occidentalis lucida*	Occurs in forested mountains and canyonlands throughout the SW U.S. & Mexico. Ranges from UT, CO, AZ, NM & western portions of TX, south into several states of Mexico. Does not occur uniformly throughout its range. Instead, it occurs in disjunct areas that correspond with isolated mountain ranges and canyon systems. Complex forest or rocky canyons that contain uneven-aged, multi-level and old-aged, thick forests below 9,500 feet elevation. Nests in standing snags and hollow trees (Rinkevich et al. 1995)	FT, ST	No
Western Yellow-Billed Cuckoo *Coccyzus americanus*	In CO west of the Continental Divide, probably never common (Bailey and Niedrach 1965, Kingery 1998) & now extremely rare (Kingery 1998). One confirmed nesting observation occurred along Yampa River near Hayden during the Breeding Bird Atlas surveys conducted from 1987-1994 (Kingery 1998) & one cuckoo, representing a probable nesting pair in surveyed lowland river riparian habitat along 6 rivers in west-central CO (Dexter 1998). Nest almost exclusively in low to moderate elevation riparian woodlands with native broadleaf trees and shrubs that are 20 hectares (ha) (50 acres (ac)) or more in extent within arid to semiarid landscapes (Laymon 1980, Gaines and Laymon 1984, Kingery 1998). Feed on grasshoppers, caterpillars, beetles, and other insects.	FT, SC	No
MAMMALS			
Canada Lynx ***Lynx canadensis***	**Colorado is the southern limit of the North American distribution of the species, and the population is considered isolated from those in the Northern Rockies (McKelvey et al. 2000).** **Found primarily within the subalpine and upper montane forests zones typically from 8,000 to 12,000 feet in elevation. Early successional spruce/fir and lodgepole pine forests used for foraging, mature and old growth spruce/fir and lodgepole pine containing large downed woody debris used for denning. Riparian areas, mixed aspen/conifer, mature spruce/fir, and shrublands to forested lynx habitat also used for foraging.**	**FT, SE**	**Yes**
Gray Wolf[12] ***Canis lupus***	**CO is part of the gray wolf's native range, but wolves were eradicated by the 1940s. Individual wolves have ventured into CO from WY. Two packs have established in NW CO but have since disappeared; others may persist. It is possible that wolves from the south may do so someday as well. As the result of a statewide voter-led initiative passed in November 2020, CPW is responsible for reintroducing wolves in a portion of the species' historical range in Colorado no later than December 31, 2023.** **No particular habitat preference. In Minnesota and Wisconsin, usually occurs in areas with few roads, which increase human access and incompatible land uses (Thiel 1985, Mech et al. 1988, Mech 1989) but can occupy semi-wild lands if ungulate prey are abundant and if not killed by humans (Mladenoff et al. 1997). Young are born in an underground burrow that has been abandoned by another mammal or dug by wolf. In Minn., dens usually were not near territory boundaries; den use was traditional in most**	**FE, SE**	**Yes**

[12] This species only needs to be considered under the following conditions (See Appendix A: Lone, dispersing gray wolves may be present throughout the state of Colorado. This species should only be considered in an environmental review if the proposed activity includes a predator management program.

Table 22. Threatened, Endangered, or Candidate species that occur at Filoha, have the potential to occur at Filoha, or be affected by management of Filoha

Common Name *Latin Name*	Occurrence: Habitat	Status‡	Potential Habitat on the Property
	denning alpha females studied for more than 1 year; possibly the availability of a stable food supply source helped determine den location (Ciucci and Mech 1992).		
FISH			
Colorado pikeminnow *Ptychocheilus lucius*	Large, swift-flowing muddy rivers with quiet warm backwaters in the Green, Yampa, White, Colorado, Gunnison, San Juan, and Dolores Rivers.	FE, ST	No
Razorback sucker *Xyrauchen texanus*	Often associated with sand, mud, and rock substrate in areas with sparse aquatic vegetation, where temperatures are moderate to warm within the Colorado River system.	FE, SE	No
Humpback chub *Gila cypha*	Prefers deep, fast-moving, turbid waters often associated with large boulders and steep cliffs in the Green, Yampa, and Colorado Rivers.	FE, ST	No
Bonytail chub *Gila elegans*	Large, swift-flowing waters of the Colorado River system.	FE, SE	No
INVERTEBRATES			
Monarch butterfly *Danaus plexippus*	**The monarch is globally distributed throughout 90 countries. They are well known for their long-distance migration in the North American populations. Descendants of these migratory monarch populations expanded from North America to other areas of the world where milkweed (*Asclepias* spp.; their larval host plant) was already present or introduced. The monarch is widely distributed across the United States.**	**FC**	**Yes**
	Monarchs occur in a variety of urban & rural habitat types especially those that have milkweed, *Gomphocarpus* spp., and *Calotropis* spp. (closely related genera), and other flowering forbs that are foraged upon for nectar. Monarchs lay eggs on plants in the milkweed family (*Asclepiadaceae*) and larvae feed only on milkweeds, primarily those in the genus *Asclepias*, of which monarchs are known to use more than 30 species in the wild (deRoode 2015)		
Silverspot butterfly *Speyeria nokomis nokomis*	Total historic range approximately 200,000 sq km in the southwestern U. S., but only one Colorado occurrence has been documented within the past 20 years. Selby (following Miller and Brown 1981) interprets the historic range as eastern Utah, western Colorado, northeastern Arizona and northern New Mexico (2007).	FC	No
	Streamside meadows and open seepage areas with an abundance of violets in generally desert landscapes.		

‡Status: T = Threatened; E = Endangered; P = Proposed; FC = Candidate for federal listing; SC = State species of concern

Canada Lynx

Current Distribution, Status, and Trend

Status

Federal: Threatened, State: Threatened, Region: Threatened

Canada lynx were listed as threatened on March 24, 2000 (Federal Register: March 24, 2000 [Volume 65, Number 58]).

Distribution

The primary range of the Canada lynx is found in the boreal forests of Alaska and Canada. The Southern Rocky Mountains represent the southern margin of the lynx's geographic range. However, the Southern Rockies is considered a provisional core area by the US Fish and Wildlife Service (Interagency Lynx Biology Team 2013). Currently, lynx are documented as permanently inhabiting the White River National Forest (WRNF), with confirmed breeding activity. These lynx are from the 2000 and 2003 CDOW lynx release projects in southern Colorado.

Lynx Analysis Unit

A Lynx Analysis Unit (LAU) is an area of at least the size used by an individual lynx, from 25 – 50 square miles. An LAU is the unit for which the effects of a project are analyzed (USDA Forest Service 2009). Filoha does not occur within a WRNF LAU.

Southern Rockies Lynx Amendment

This document discloses information specific to analyzing projects under the Southern Rockies Lynx Amendment (SRLA; USDA Forest Service 2008a), which amended the Land and Resource Management Plans on eight Region 2 National Forests. The SRLA adds consistent management direction to promote conservation of the Canada lynx on National Forest Service (NFS) land in the Southern Rocky Mountains. The aim is to help ensure that the appropriate information is used in the effects analysis and provided to the USFWS, thus streamlining consultations on SRLA projects.

The management direction is designed to strike a reasonable balance in providing for the conservation of lynx habitat while also allowing appropriate levels of human uses to occur. The decision adds one goal, 13 objectives, 7 standards, and 34 guidelines related to all activities (ALL), vegetation management (VEG), grazing management (GRAZ), human uses (HU), and linkage areas (LINK). Goals are general descriptions of desired results; objectives are descriptions of desired resource conditions; standards are management requirements designed to meet the objectives; and guidelines are recommended management actions that will normally be taken to meet the objectives, but are not required.

Under this decision, standards are applied only to vegetation management activities that have the potential to directly affect snowshoe hare (*Lepus americanus*) prey and thus may impact lynx at the population level. Other activities that may have possible adverse effects on individual lynx are subject to guidelines. Any deviations from guidelines would be considered only after analysis of site-specific conditions, and in compliance with ESA Section 7 consultation requirements.

Life History

Lynx are temperate forest dwelling carnivores. In Colorado they are mostly dependent upon snowshoe hare for prey; red squirrels (*Tamiasciurus hudsonicus*) are probably secondary in importance (Shenk and Kahn 2010, Ivan and Shenk 2016). They also have been documented preying upon other mammals, grouse, and ptarmigan during the summer months. Hares not only determine where lynx are found, but also influence how many lynx may occupy an area. In the northern portions of their geographic range they undergo dramatic fluctuations in population based on the ten-year cycle of hare abundance. In the southern portions of their range (Colorado), these population fluctuations are not as evident and lynx populations appear similar to those occurring during the hare population lows in the northern portions of their ranges (Dolbeer and Clark 1975, Wolff 1980, Koehler and Brittell 1990).

In the southern Rocky Mountains, lynx are predominately found above 8,000 feet in Engelmann

spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*), and lodgepole pine (*Pinus contorta*) forests. They typically use areas during winter where low topographic relief creates continuous forest communities of varying stand ages and provides moist forest floor conditions to support hares. Typically, lynx require a mosaic of forested habitats in which to den, forage, rest, and travel. Riparian and wetland shrub communities found in valleys, drainages, wet meadows, and moist timberline locations may support important prey resources (Ruediger et al. 2000).

The status of Canada lynx, along with life history information (e.g., general ecology, prey relationships, characteristics of foraging, denning, and security habitat, landscape connectivity, movement patterns, and the effects of recreational activities on lynx) may be found in Koehler and Aubry (1994), Ruggiero et. al (2000), Squires et. al (2011), Interagency Lynx Biology Team (2013), Shenk (2009), and Squires et al. (2010). This analysis tiers to these documents and to the SRLA Environmental Impact Statement (USDA Forest Service 2008b), Record of Decision (2008a), Supplemental Biological Assessment (USDA Forest Service 2008c), and Implementation Guide (2009). The SRLA provides Objectives, Standards, and Guidelines at the Forest level to provide for the habitat needs of Canada lynx. The lynx baseline data contained in these documents represents the best and most current scientific information available.

Status of Canada Lynx in Colorado

In an effort to restore a viable population of Canada lynx to the southern portion of their former range, the Colorado Division of Wildlife (now CPW) reintroduced 218 individuals into Colorado from 1999-2006. In 2010, CPW determined that the reintroduction effort had met all the benchmarks of success, and that a viable, self-sustaining population of Canada lynx had been established (Ivan 2012).

Within areas of high use in southwestern Colorado, mature Engelmann spruce-subalpine fir forest stands with 42-65% canopy cover and 15-20% conifer understory cover has been the forest community most commonly used by lynx in southwestern Colorado (Shenk 2009). Little difference in aspect, slope, or elevation were detected for long beds, travel, and kill sites. Den sites, however, were located at higher elevations on steeper and more commonly north-facing slopes with a dense understory of coarse woody debris.

Monitoring by the CPW suggests two primary areas of use by reintroduced and monitored lynx. The first is the core research area and a secondary core area centered in the Collegiate Peaks Wilderness. High use is also documented for the area east of Dillon, both north and south of 1-70, and the area north of State Highway 50 centered around Gunnison and then north to Crested Butte. These last two high use areas are smaller in extent than the two core areas.

Habitat Use by Lynx

Shenk (2009) reported the results of radio/satellite telemetry investigation into landscape-scale habitat use by Colorado lynx. Her results were based on 10,935 aerial locations collected from 1999 - 2008. Throughout the year, Engelmann spruce / subalpine fir was the dominant cover used by lynx. A mixed Engelmann spruce / subalpine fir - aspen forest was the second most common cover type used throughout the year. Various riparian and riparian-mix areas were the third most common cover type where lynx were found during the daytime flights. Use of Engelmann spruce / subalpine fir forests and Engelmann spruce / subalpine fir-aspen forests was similar throughout the year. There was a trend in increased use of riparian areas beginning in July, peaking in November, and dropping off December through June.

Site-scale habitat data collected from CPW snow-tracking efforts confirms that, at the level of

individual sites used by lynx for daily activities, Engelmann spruce and subalpine fir are the most common forest stands used by lynx during the winter in southwestern Colorado (Shenk 2009). Comparisons were made among sites used for long beds[13], dens, travel, and where they made kills. Little difference in aspect, slope, or elevation was detected for long beds, travel and kill sites. At these three types of sites, lynx typically used gentler slopes at a mean elevation of 10,410' AMSL, and varying aspects with a slight preference for north facing slopes. Mean percent total overstory was higher for long bed and kill sites than travel or den sites.

Engelmann spruce provided a mean of 36%± overstory for kills and long beds, with travel sites averaging 28% and den sites having the lowest mean percent overstory of 23%. Willow overstory was highly variable and no dens were located there. In contrast, the most common understory species were Engelmann spruce, subalpine fir, willow, and aspen. Various other species such as ponderosa pine, lodgepole pine, cottonwood, birch, and others were also found in less than 5% of the habitat plots. If present, willow provided the greatest percent cover within a plot followed by Engelmann spruce, subalpine fir, aspen and coarse woody debris for long beds, kills and travel sites.

Den sites had significantly higher percent understory cover, in comparison with long-beds, travel, and kill sites (Shenk 2009). Understory at den sites was primarily made up of coarse woody debris. The most common tree species was Engelmann spruce. Subalpine fir and aspen were also present in >35% of the plots. Most habitat plots were vegetated with trees of DBH < 6". As DBH increased, percent occurrence decreased within the plot. Although decreasing in abundance as size increased, most lynx-use sites had trees in each of the DBH categories, indicating mature forest stands except for dens.

Habitat used by lynx varies seasonally, most likely due to the greater diversity of prey species available in summer versus winter (Ivan and Shenk 2016). During winter, lynx select for mature multi-story stands dominated by large Engelmann spruce and subalpine fir with dense horizontal cover (Squires et al. 2010). During summer, lynx broaden their resource use to select younger forests with high horizontal cover, abundant total shrubs, abundant small-diameter trees, and dense saplings, especially spruce-fir saplings.

Mortality

Reported causes of lynx mortality vary between studies. The most commonly reported causes include starvation of kittens (Quinn and Parker 1987, Koehler 1990), human-caused mortality, mostly fur trapping (Norman and Thompson 1987, M. P. Ward and Krebs 2011). Of the total 218 adult lynx released, there were 115 known mortalities as of May 25, 2009. Starvation was a significant cause of mortality in the first year of releases only. Mortalities occurred throughout the areas through which lynx moved. The primary known causes of death included 30.4 percent human-induced deaths, which were confirmed or probably caused by collisions with vehicles or gunshot. Malnutrition and disease/illness accounted for 18.3 percent of the deaths. Other mortality factors included predation or probable predation by mountain lions (*Puma concolor*), bobcat (*Lynx rufus*), and lynx, as well as other trauma-caused deaths. An additional 37.4 percent of known mortalities were from unknown causes (Shenk 2009).

Lynx Home Range & Movement

Canada lynx home range size varies by the animal's gender, abundance of prey, season, and density of lynx populations (Koehler and Aubry 1994, Poole 1994, Slough and Mowat 1996, Ruediger et al.

[13] Long beds are sites where a lynx lays in the snow for an extended period, characterized by having an iced surface.

2000, Steury and Murray 2004). Lynx maintain large home ranges, averaging 8 to 800 km^2 (Koehler and Aubry 1994, Ruediger et al. 2000, Squires and Laurion 2000). The size of their home range varies depending on abundance of prey, gender, age, season, and the density of lynx populations. When densities of prey decline, lynx enlarge their home ranges to obtain sufficient amounts of food to survive and reproduce. Males tend to have larger home ranges than females.

Three types of lynx movements are relevant with respect to habitat connectivity, all of which must be maintained at the project level for an action to be considered consistent with the ALL S1 Standard of the SRLA (USDA Forest Service 2008c). During their daily movements, lynx select continuous forest and frequently use ridges, saddles, and riparian areas. They typically avoid large openings in the forest canopy (greater than 100 meters) and normally use coniferous or deciduous vegetation greater than 6 feet in height with a closed canopy for traveling (Koehler and Aubry 1994). Daily movements range from a low of 1.2 miles for female lynx with kittens, to a high of 3.3 miles during periods of low hare abundance (Interagency Lynx Biology Team 2013). One study observed a female lynx to have movements of up to 6.2 miles per day during the summer and 5.3 miles per day during the winter.

Lynx landscape-level movements include exploratory movements[14] and dispersal movements[15]. Exploratory movements have been documented to range from 9 up to 452 miles (Interagency Lynx Biology Team 2013). Dispersal distances have been detected up to 620 miles. Despite the large distances covered during landscape-level movement, the distances traveled each day are similar to normal daily movements within the lynx's home range. Dispersal and movements of transients can occur year-round, while male, breeding season movements generally occur from January into April, peaking in February and March.

There is some evidence that lynx inhabiting the more fragmented Southern Rockies may cross larger openings somewhat more freely than their northern counterparts. For example, Thompson and Halfpenny (1989) reported that they backtracked a lynx that crossed a 4,400 foot wide subalpine grassland within the Vail Ski Area. Another of the lynx released in Colorado by the CPW traveled as far as Nebraska prior to being shot. Poole and Mowat (cited with no date in Ruediger et al. 2000) reported observing lynx crossing several hundred-meter-wide openings, frozen lakes and rivers greater than 1 km wide during their investigations in the Northwest Territories. These movements, at the present time, are considered atypical and/or movements associated with dispersal.

Permeability of transportation corridors to lynx movements is central to their persistence in Colorado given the large spatial extent of transportation networks and the high mobility of lynx. Baigas et al. (2015) investigated the degree to which highways were permeable to movements of resident Canada lynx in the Southern Rocky Mountains based on highway crossings (n = 593) documented with GPS telemetry. All lynx crossed highways when present in home ranges at an average rate of 0.6 crossings per day. Lynx mostly crossed highways during the night and early dawn when traffic volumes were low. Five of 13 lynx crossed highways less frequently than expected when compared to random expectation, but even these individuals crossed highways frequently in parts of their home range. At the fine scale, lynx selected crossings with low distances to vegetative cover and higher tree basal area; they found no support that topography or road infrastructure affected lynx crossing. At the landscape scale, lynx crossed highways in areas with high forest canopy cover in drainages on primarily north-facing aspects. The predicted crossing probabilities generated from their landscape-scale RSF model across western Colorado were successful in identifying known lynx crossing sites as

[14] Exploratory movements are long-distance movements beyond identified home range boundaries, in which the animal returned to its original home range.
[15] Dispersal is the permanent movement of an animal to a new home range.

documented with independent snow-tracking and road-mortality data. Connectivity of lynx habitat has been identified as an important consideration for the southern Rockies, because of the extreme topographic relief juxtaposed with human developments such as highways and residential communities. In the Remanded Rule (Federal Register Vol. 68, p. 400786), the FWS concluded that the population-level threat to lynx attributable to high traffic volume on roads that bisect suitable lynx habitat and associated suburban developments is low. The FWS, however, recognized that a higher risk exists in Colorado than elsewhere in the range of the lynx (Interagency Lynx Biology Team 2013).

In the SRLA (USDA Forest Service 2008c), 38 linkage areas were identified in Colorado and southern Wyoming. Management direction for these areas is to maintain connectivity of habitat and facilitate lynx movements. Some of these linkage areas, however, may be located in proximity to existing human developments or may not currently contain the conditions or structures needed to provide habitat connectivity. Ski resort development, a growing and affluent population, and telecommuting capabilities have converged to spur rapid growth in some mountain valleys. Transportation corridors continue to be modified and expanded to handle increasing volumes of traffic and speeds, altering historical movement patterns of wide-ranging species and creating barriers to movement. These and other factors, both historical and current, have eliminated or degraded some landscape linkages, which increases the importance of remaining linkage areas.

Landscape Linkages

As a result of the patchy, discontinuous nature of lynx habitat in Colorado, the maintenance of habitat connectivity is thought to be critical to the maintenance of a viable population. Linkage areas occur both within and between geographic areas where blocks of lynx habitat are separated by intervening areas of non-lynx habitat such as basins, valleys, agricultural lands, or where lynx habitat naturally narrows between blocks (USDA Forest Service 2008c). Connectivity provided by linkage areas can be degraded or severed by human infrastructure such as high-use highways, subdivisions, or other developments.

Any continuous forested corridor between and/or across mountain ranges that provide lynx habitat may provide such connectivity. Narrow forested mountain ridges or shrub-steppe plateaus may provide a linkage between more extensive areas of lynx habitat. Wooded riparian communities may provide travel cover across otherwise open valley floors between mountain ranges, or lower elevation ponderosa pine or pinyon-juniper woodlands may link high elevation spruce-fir forests (Ruediger et al. 2000).

The closest and most relevant linkage area identified in the SRLA Environmental Impact Statement (USDA Forest Service 2008b) is the Dowd Junction linkage area near Eagle-Vail which is roughly 36 miles northwest of the property.

Lynx Habitat Baseline

As discussed above, preferred habitat for lynx is classic boreal forest and subalpine (i.e., Engelmann spruce – subalpine fir) forest. Of greater importance is the presence of snowshoe hares, their main food source. Lynx can be found in spruce-fir, lodgepole pine, Douglas fir (*Pseudotsuga menziesii*), and aspen forests especially when snowshoe hares are present. The distribution of that habitat on the WRNF is conveyed in the 2017 Forest-wide GIS lynx mapping coverage developed in collaboration with USFWS. Although this mapping omits private property, one can infer the habitat classification given the mapping of adjacent types on the WRNF. Habitat in this dataset is mapped as follows (USDA Forest Service 2008b):

Primary Vegetation: Primary vegetation consists of Engelmann spruce, subalpine fir, aspen-conifer mix and lodgepole pine that occurs on spruce-fir habitat types (seral lodgepole pine).

Secondary Vegetation: Other cool moist habitat types that are not included in the primary vegetation definition above may provide lynx habitat when they are interspersed with primary vegetation. Secondary vegetation was identified by selecting vegetation polygons that were within 300 meters from primary vegetation polygons.

Unsuitable: Currently unsuitable vegetation refers to vegetation that is in the stand initiation structural stage. The SRLA defines this generally as trees that are less than 10 to 30 years old that have not grown tall enough to protrude above the snow during winter.

Non-Habitat: Non-lynx vegetation is any vegetation that is not primary, secondary, or currently unsuitable and can include non-vegetated cover types (alpine, rock, or water) or other vegetated cover types. Non-lynx vegetation includes climax lodgepole pine or dry aspen types (not within 300 meter buffer of primary vegetation), ponderosa pine, pinyon-juniper, grass, forb, riparian – dominated by grass/forb, cottonwood, and other shrub species.

Gray Wolf

Colorado and the Roaring Fork Watershed are part of the gray wolf's historic distribution but wolves were eradicated in the state by the 1940s. Over the past decade, the USFWS restored gray wolves in Wyoming, Idaho, Montana, New Mexico and Arizona and there are now wolves known within Colorado. Over the past decade, CPW has confirmed or has had probable wolf dispersals that occurred in 2004, 2006, 2009, and 2015. In the summer of 2019, a wolf from the Snake River Pack (a pack in Wyoming) was located in Jackson County, Colorado (CPW 2022). CPW received reports in January 2020 of six large canids that were seen near the Wyoming and Utah borders. CPW staff were able to locate and visually confirm the presence of the pack.

Most recently, CPW staff placed GPS tracking collars on wolves in the north-central part of the state. A male wolf's presence was confirmed in late January 2021 when it was seen with the wolf from the Snake River pack (Eric Odell, personal communication). In June 2021, staff observed pups with this pair, becoming the first documented breeding pair in the state in several decades. In February 2022, one of these pups was fitted with a GPS collar. While these collars are no longer active, sightings by staff confirm some animals remain in the area at the time of this update.

CPW has subsequently developed a Colorado Wolf Restoration and Management Plan (CWRMP) to guide fulfillment of the planning components of the statutory requirements of CRS 33-2-105.8. The CWRMP should be consulted for information regarding Colorado wolf reintroduction and legal status.

Monarch Butterfly

A petition to list the monarch butterfly as threatened pursuant to the ESA was submitted to USFWS on August 26, 2014 (CBD et al. 2014). On December 31, 2014, USFWS issued a 90-day finding that the petition presented substantial scientific or commercial information indicating that the petitioned action may be warranted and initiated a review of the status of the subspecies to determine if the petitioned action was warranted (USFWS 2014). A Species Status Report on the monarch was published by USFWS in September 2020 (USFWS 2020b) and the 12-month finding on the species was published on December 17, 2020 (USFWS 2020a). USFWS's determination in the 12-month finding was as follows: "After a thorough review of the best available scientific and commercial information, we find that listing the monarch butterfly as an endangered or threatened species is warranted but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and

Plants." USFWS added the species to the list of candidate species and the agency will continue to evaluate the species as new information becomes available (USFWS 2020a). Candidate species are defined as, "plants and animals for which USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities."

A thorough analysis of the habitat use of the monarch, status of the species, and threats affecting the monarch's viability can be found in the petition to list the species (CBD et al. 2014), the 90 day and 12-month findings, and the Species Status Review (USFWS 2014, 2020b, a). The review and analysis contained herein is based primarily on those documents.

The monarch is a species of butterfly globally distributed throughout 90 countries, islands, and island groups. These butterflies are well known for their long-distance migration in the North American populations. Descendants of these migratory monarch populations expanded from North America to other areas of the world where milkweed (their larval host plant) was already present or introduced.

The monarch is widely distributed across the United States, occurring in a variety of urban and rural habitat types especially those that have milkweed (Asclepias spp.), Gomphocarpus spp., and Calotropis spp. (closely related genera), and other flowering forbs that are foraged upon for nectar. Monarchs lay eggs on plants in the milkweed family (Asclepiadaceae) and larvae feed only on milkweeds, primarily those in the genus Asclepias, of which monarchs are known to use more than 30 species in the wild (deRoode 2015).

The primary drivers affecting the health of the North American migratory populations are loss and degradation of habitat, continued exposure to insecticides, disease and predation, and effects of climate change. Availability, spatial distribution, and quality of milkweed and nectar resources (breeding) and use of insecticides are most responsible for their decline. The availability of milkweed is essential to monarch reproduction and survival. Reductions in milkweed is cited as a key driver in monarch declines. A majority of the milkweed loss has occurred in agricultural lands, where intensive herbicide usage for weed control has resulted in widespread milkweed eradication.

During breeding and migration, adult monarch butterflies require a diversity of blooming nectar resources, which they feed on throughout their migration routes and breeding grounds (spring through fall). Monarchs also need milkweed embedded within this diverse nectaring habitat for both oviposition and larval feeding. The correct phenology, or timing, of both monarchs and nectar plants and milkweed is important for monarch survival. The position of these resources on the landscape is important as well. In western North America, nectar and milkweed resources are often associated with riparian corridors, and milkweed may function as the principal nectar source for monarchs in more arid regions. Additionally, many monarchs use a variety of roosting trees along the fall migration route.

U.S. FOREST SERVICE SENSITIVE SPECIES

The current USFS Region 2 Sensitive Species list is dated July 13, 2018 (R2 Supplement FSM 2600, Chapter 2670, Supplement No. 2670-2018-1). Potential habitat for only 2 USFS Region 2 sensitive wildlife species occurs on or within proximity to the site. Table 3 identifies the USFS sensitive wildlife species considered and evaluated in this report.

Table 23. U. S. Forest Service, Rocky Mountain Region Sensitive Species and their potential to occur at Filoha

Species	Suitable Habitat on Filoha	Basic Habitat Description
BIRDS		
American Bittern *Botaurus lentiginosus*	No	Eastern plains & mountain parks. Inhabits larger (≥7½ ac) cattail marshes with tall emergent vegetation; occasional in adjacent wet meadows, "rarely breeds on wetlands smaller than 3 ha" (Wiggins 2006).
Black Swift *Cypseloides niger*	No	Nests behind or next to waterfalls & wet cliffs. Forages over forests & open areas.
Black Tern *Chlidonias niger surinamensis*	No	Nest & forage in marshes & edges of lakes, rivers with emergent vegetation historically in North Park, San Luis Valley, South Platte & Arkansas river valleys.
Black-backed Woodpecker *Picoides arcticus*	No	Coniferous forests. Does not occur in CO.
Boreal Owl *Aegolius funereus*	No	Mature spruce/fir & mixed conifer forested areas with preference for wet situations (bogs or streams) for foraging.
Brewer's Sparrow *Spizella breweri*	No	Higher quality sagebrush shrublands; may be found in alpine willow stands.
Burrowing Owl *Athene cunicularia*	No	Open grasslands with available small mammal burrows.
Cassin's Sparrow *Peucaea cassinii*	No	Heavily grazed eastern plains.
Chestnut-collared Longspur *Calcarius ornatus*	No	Tallgrass prairie of northern plains.
Columbian Sharp-tailed Grouse *Tympanachus phasianellus columbianus*	No	Mid elevation mountain sagebrush/grassland habitat usually adjacent to forested areas, potential habitat on NW corner of WRNF Blanco District, NE Eagle County.
Ferruginous Hawk *Buteo regalis*	No	Open grassy prairies & shrub steppe communities. Nests in trees or shrubs along streams or on steep slopes. Highly dependent on prairie dogs & jackrabbits as prey.
Flammulated Owl *Psiloscops flammeolus*	No	Depends on cavities for nesting, open forests for foraging, brush for roosting. Occupy open ponderosa pine or forests with similar features (dry montane conifer or aspen, with dense saplings).
Grasshopper Sparrow *Ammodramus savannarum*	No	Open grasslands of eastern plains.
Greater Prairie-Chicken *Tympanuchus cupido*	No	Sagebrush & grassland habitat in northeastern CO.
Greater Sage-grouse *Centrocercus urophasianus*	Yes (Extirpated)	Large sagebrush shrublands in northwestern CO including Routt & northern Eagle County.
Harlequin Duck *Histrionicus histrionicus*	No	Relatively rapid streams of moderate size, typically surrounded by undisturbed forest. Extirpated in CO.
Lesser Prairie-chicken *Tympanuchus pallidicinctus*	No	Mixed grass-dwarf shrub communities on sandy soils; principally the sand sagebrush-bluestem association in CO, KS, OK, TX & NM. Leks occur on knolls or ridges with relatively short &/or sparse vegetation.
Lewis's Woodpecker *Melanerpes lewis*	**Yes**	**Open pine forests, burnt over areas with snags & stumps, riparian & rural cottonwoods, & pinyon-juniper woodlands.**
Loggerhead Shrike *Lanius ludovicianus*	**Yes**	**Sagebrush shrublands, mountain parks; may be found in willow stands. Nests in shrubs or small trees, preferably thorny such as hawthorn. Most common at 4,000 to 6,000 ft elevation.**

Species	Suitable Habitat on Filoha	Basic Habitat Description
Long-billed Curlew *Numenius americanus*	No	Forages predominately in grasslands, but also uses wet meadows & agricultural habitats including plowed & active crop fields.
McCown's Longspur *Rhynchophanes mccownii*	No	Shortgrass prairie.
Mountain Plover *Charadrius montanus*	No	Grassland/cropland on eastern plains.
Northern Goshawk ***Accipiter gentilis***	**Yes**	**Mature forest generalist. Often found in mixed conifer/aspen and pure aspen stands. Nests primarily in mature aspen & pine trees. Throughout WRNF nesting above 7,500 ft to 11,000 ft.**
Northern Harrier ***Circus cyaneus***	**Yes**	**Rare summer resident in mountain marshes & wetlands. In alpine tundra in fall migration. Uses shrublands for foraging. Documented in Garfield, Eagle, Pitkin, & Rio Blanco Counties, generally ranges up to 10,000 ft in summer.**
Olive-sided Flycatcher ***Contopus cooperi***	**Yes**	**Mature spruce/fir or Douglas-fir forests with preference for natural clearings, bogs, stream & lakeshores with water-killed trees, forest burns & logged areas with standing dead trees. Generally from 7,500 to 11,000 ft.**
Purple Martin *Progne subis*	No	Nests in decadent aspen trees or snags from 8,000 to 9,000 ft. near streams or water. In Garfield, Eagle, Pitkin, Mesa, & Rio Blanco Counties.
Sagebrush Sparrow *Artemisiospiza nevadensis*	No	Sagebrush shrublands, found in Garfield County & western Eagle County up to ~6,500 ft.
Short-eared Owl *Asio flammeus*	No	Grasslands, marshes, & agricultural areas on eastern plains & mountain parks.
Trumpeter Swan *Cygnus buccinator*	No	Shallow lake & wetlands from Alaska east across w. Canada to Hudson Bay lowlands of Manitoba, Ontario, Quebec & east to Nova Scotia, New Brunswick, & Newfoundland. Casual fall & early winter migrant on eastern plains.
White-tailed Ptarmigan *Lagopus leucurus*	No	Alpine tundra, high-elevation willow thickets, krummholz, spruce-fir (winter).
MAMMALS		
American Hog-nosed Skunk *Conepatus leuconotus*	No	Canyons, mesas, & riparian valleys, with additional observations from grasslands through parts of Arizona, New Mexico, SE Colo.
Pacific Marten ***Martes caurina***	**Yes**	**Spruce/fir & mixed conifer forests with complex physical structure.**
Black-Tailed Prairie Dog *Cynomys ludovicianus*	No	Historically inhabits the eastern third of CO below 6,000 ft.
Desert Bighorn Sheep *Ovis canadensis nelsoni*	No	Rocky desert environments.
Fringed Myotis ***Myotis thysanodes***	**Yes**	**Conifer, oak shrublands; caves, mines, building roosts, western WRNF including Rio Blanco, Garfield, & Mesa up to 7,500'.**
Gunnison's Prairie Dog *Cynomys gunnisoni*	No	Shortgrass & mid-grass prairie, grass-shrub habitats in low valleys, & mesic, high elevation sites on the CO Plateau in SE UT, SW CO, northern AZ, & NW, west-central, & central NM.
Hoary Bat ***Lasiurus cinereus cinereus***	**Yes**	**Conifer & deciduous tree cavities or cliffs on edge of clearings up to 9,500 ft.**
Kit Fox *Vulpes macrotis*	No	Found in desert scrublands of western CO.
North American Wolverine *Gulo gulo luscus*	No	Occupy high elevations with deep, persistent, & reliable spring snow cover.

Species	Suitable Habitat on Filoha	Basic Habitat Description
Pygmy Shrew *Sorex hoyi montanus*	No	In subalpine spruce-fir forest edges that are adjacent to wetlands, fens, or standing water habitats. Documented on WRNF Sopris District above 9,500 ft.
River Otter ***Lontra canadensis***	**Yes**	**Riparian habitats that traverse a variety of other habitats. Mainly larger river systems.**
Rocky Mountain Bighorn Sheep ***Ovis canadensis canadensis***	**Yes**	**Rocky, steep, or rugged terrain for escape cover with open grass-dominated habitats nearby for foraging. Summer range at high elevation & winter range in valley bottoms or where snow depth is minimal.**
Spotted Bat *Euderma maculatum*	No	Cliff/Rock/Scree in arid Douglas-fir or Ponderosa Pine canyons associated with water, 6-8,000'.
Swift Fox *Vulpes velox*	No	Grassland prairies of the Great Plains in a variety of habitats including shortgrass & mid-grass prairies, plowed fields & fencerows, & sagebrush.
Townsend's Big-eared Bat ***Corynorhinus townsendii townsendii***	**Yes**	**Forages in semi-desert shrublands, pinyon-juniper woodlands & open montane forests. Rare to uncommon during summer. Roosts in caves, mines & mature forests. Generally not found above 10,500 ft.**
White-tailed Prairie Dog *Cynomys leucurus*	No	Desert scrublands; most records are below 8,500 ft.
Wyoming Pocket Gopher *Thomomys clusius*	No	Dry, gravelly, shallow-soil ridge tops only in Sweetwater & Carbon counties in WY with some indication occurrences in northern CO.
AMPHIBIANS & REPTILES		
Black Hills Redbelly Snake *Storeria occipitomaculata pahasapae*	No	Wet meadows, woodlands, & forest-meadow edge habitats in eastern North America west to the eastern borders of OK, KS, & SD.
Boreal Toad ***Anaxyrus boreas boreas***	**Yes**	**Subalpine forest habitats with marshes, wet meadows, streams, beaver ponds, & lakes, 7000-12,000 ft.**
Canyon Treefrog *Hyla arenicolor*	No	Found in western desert & south eastern CO.
Columbia Spotted Frog *Rana luteiventris*	No	Coniferous or mixed forests, grasslands, & riparian areas of sage-juniper brushlands in AK through BC & western AB & WA, OR, ID, MT, WY, UT, & NV.
Desert Massasauga *Sistrurus catenatus edwardsii*	No	Shortgrass prairie habitat with abundant sand sage, buffalograss, & blue grama in CO.
Great Basin Spadefoot *Spea intermontana*	No	Found in western CO at elevations below 7,000 ft.
Longnose Leopard Lizard *Gambelia wislizenii*	No	Occurs in west-central CO & southwestern CO at elevations below 5,200 ft.
Milk Snake *Lampropeltis triangulum taylori*	No	Occurs throughout most of eastern, southern, & western CO at elevations primarily below 7,800 ft.
Midget Faded Rattlesnake *Crotalus oreganus concolor*	No	Occurs in desert & semi-desert habitats. Records for CO restricted to Garfield, Mesa, & San Miguel Counties.
Northern Leopard Frog ***Lithobates pipiens***	**Yes**	**Riparian & wetland areas, rarely above 8,500 ft.**
Plains Leopard Frog *Lithobates blairi*	No	All types of water bodies & frequently wander far from water on the eastern plains.
Wood Frog *Lithobates sylvaticus*	No	Sedge wetlands with adjoining grassy meadows, willow bogs, coniferous forests, & aspen in north-central CO.

Species	Suitable Habitat on Filoha	Basic Habitat Description
Sources for species occurrence & habitat association include the following: Adams (2003), Armstrong et al. (2011), Hammerson (1999), Kingery (1998), & unpublished information provided by FS staff (P. Nyland pers. comm. 2017) & CO Parks & Wildlife (CPW) staff (J. Logan pers. comm. 2017; K. Bakich pers. comm. 2017)		

COLORADO NATURAL HERITAGE PROGRAM DATA

Review of the latest CNHP data (CNHP 2023), in combination with the CNHP Roaring Fork Biological Inventory (Spackman et al. 1999) revealed 14 vertebrate species of conservation concern (global or state rank ≤ 3) recorded within proximity to Filoha (Table 4).

Table 24. CNHP element occurrences within proximity to Filoha

Common Name	Latin Name	Global Rank	State Rank
Bald Eagle	*Haliaeetus leucocephalus*	G5	S3B; S3N
Boreal Toad	*Anaxyrus boreas*	G4T1T2Q	S1
Colorado River Cutthroat Trout (GB Lineage)	*Oncorhynchus clarkii pleuriticus*	G5T3	S3
Cooper's Hawk	*Accipiter cooperii*	G5	S3S4B; S4N
Fringed Myotis	*Myotis thysanodes*	G5	S3
Great Blue Heron	*Ardea herodias*	G4	S3B
Hoary Bat	*Lasiurus cinereus*	G3G4	S3S4B
Northern Goshawk	*Accipiter gentilis*	G5	S3B
Northern Leopard Frog	*Lithobates pipiens*	G5	S3
Northern Pygmy-Owl	*Glaucidium gnoma*	G4G5	S3B
Osprey	*Pandion haliaetus*	G5	S3B
Pinyon Jay	*Gymnorhinus cyanocephalus*	G3	S3
Sharp-Shinned Hawk	*Accipiter striatus*	G5	S3S4B,S4N
Townsend's Big-Eared Bat	*Plecotus townsendii pallescens*	G3G4T3T4	S2