Raptor Survey
Willow Springs Connector Trail
Ken-Caryl Ranch Open Space

Prepared for—
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Association
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Introduction

Ken-Caryl Ranch Open Space staff conducted a raptor survey for the Willow Springs Connector Trail Project (Project) to be constructed at Ken-Caryl Ranch Open Space (Figure 1). The Project includes the construction of approximately 1.1 miles of new trail (does not include Willow Springs Open Space section) and an additional 0.27 mile for a potential alternative route on the west end of the project that would replace a portion of the south leg of the alignment. Trail construction would include clearing the trail corridor and establishment of the trail tread. Raptor surveys are recognized as a Best Management Practice in an effort to avoid potential impacts to raptor breeding, nesting, and foraging habitat.

Project Area Description

The project area is in Section 26, Township 5 South, Range 70 West of the 6th Principal Meridian in Jefferson County, Colorado (Figure 1). The coordinates of the approximate center of the project area are 39° 35.581'N, 105° 11.241'W.

The project area is located immediately west of the Hogbacks/Foothills Transition Zone between the Great Plains and the Southern Rocky Mountains provinces. Hogbacks forming the eastern boundary of Ken-Caryl Ranch Open Space are visible to the east, and deeply incised foothills continue to the west. The project area spans from a lower section of Manor House Trail north to the Willow Springs Open Space boundary. The proposed trail begins above a small ephemeral tributary of Dutch Creek; after an initial climb across a small set of switchbacks the trail descends at a shallow grade and crosses the southernmost ephemeral tributary. From this stream crossing the trail continues on a relatively flat grade to a point where it intersects an existing trail. From here the trail climbs slightly to the north, crossing a small bowl shaped basin which forms another ephemeral tributary to Dutch Creek. As the trail leaves this basin it enters a mixed conifer forest covering a north facing slope and follows an old road cut to its last stream crossing on another ephemeral tributary to Dutch Creek. From this point the trail crosses Gambel Oak covered slopes to the boundary between Ken-Caryl Rach and Willow Springs open spaces.

Vegetation across the steep slopes consists of dense Gambel oak (*Quercus gambelii*) thickets mixed with stands of mountain mahogany (*Cercocarpus montanus*). Understory vegetation in the Gambel oak thickets is dominated by smooth brome (*Bromus inermis*). Riparian woodlands, which have an overstory dominated by Douglas fir (*Pseudotsuga menziesii*), Rocky mountain maple (*Acer Glabrum)*, and scattered Choke Cherry (*Prunus Virginia*) .

Survey Methods

Prior to conducting field surveys, staff reviewed raptor species with the potential to occur in the project area. A target list of raptor species (Table 1) was developed based on prior surveys conducted by Colorado Natural Heritage Program (CNHP) in the vicinity of the project area (CNHP 2014), a review of First and Second Colorado Breeding Bird Atlas data for the Morrison SE block (Breeding Bird Atlas Explorer 2015; COBBA II 2015), and aerial imagery.

Surveys were conducted on separate dates (May 24, and June 16, 2017) during the raptor breeding season to maximize observations of early and late breeding species. Survey methods were adapted from

methods used by CNHP (2014) for surveys of the Cougar Trail alignments. Survey transects were established 50 meters on each side of the proposed alignments. Survey stations were generally placed at 150 meter intervals along the transect; however, some stations were eliminated at trail switchbacks and hairpin turns to ensure even survey coverage. Prior to the first survey, the Volunteer Trail Coordinators marked the proposed alignment and staff marked survey stations with flagging tape and pin flags (Figure 2). For the first survey, the surveyor stopped at each survey station for 5 minutes, recording any raptor activity or raptor sign. Snags or other features providing potential perching habitat were also noted. Although the focus of the surveys was on breeding raptors and their nests, other bird species observed were also noted. No raptor observation stations were located on Willow Springs Open Space. Raptor occurrences mapped on Willow Springs Open Space were observed from Ken-Caryl Ranch Open Space.

Table 1. List of target raptor species.

Common Name	Scientific Name	Known to Occur in Project Vicinity	Habitat Present in Project Area
American Kestrel	*Falco sparverius*	X	X
Bald Eagle	*Haliaeetus leucocephalus*	X	X
Cooper's Hawk	*Accipiter cooperii*	X	X
Golden Eagle	*Aquila chrysaetos*	X	X
Northern Goshawk	*Accipiter gentilis*	X	X
Northern Harrier	*Circus cyaneous*	X	X
Prairie Falcon	*Falco mexicanus*	X	X
Red-tailed Hawk	*Buteo jamaicensis*	X	X
Sharp-shinned Hawk	*Accipiter striatus*	X	X
Swainson's Hawk	*Buteo swainsoni*	X	X
Eastern Screech Owl	*Otus asio*		X
Flammulated Owl	*Otus flammeolus*		X
Great Horned Owl	*Bubo virginianus*	X	X
Long-eared Owl	*Asio otus*	X	X
Northern Pygmy Owl	*Glaucidium gnoma*	X	X
Northern Saw-whet Owl	*Aegolius acadicus*		X

Source: Breeding Bird Atlas Explorer 2015; COBBA II 2015; CNHP 2014.

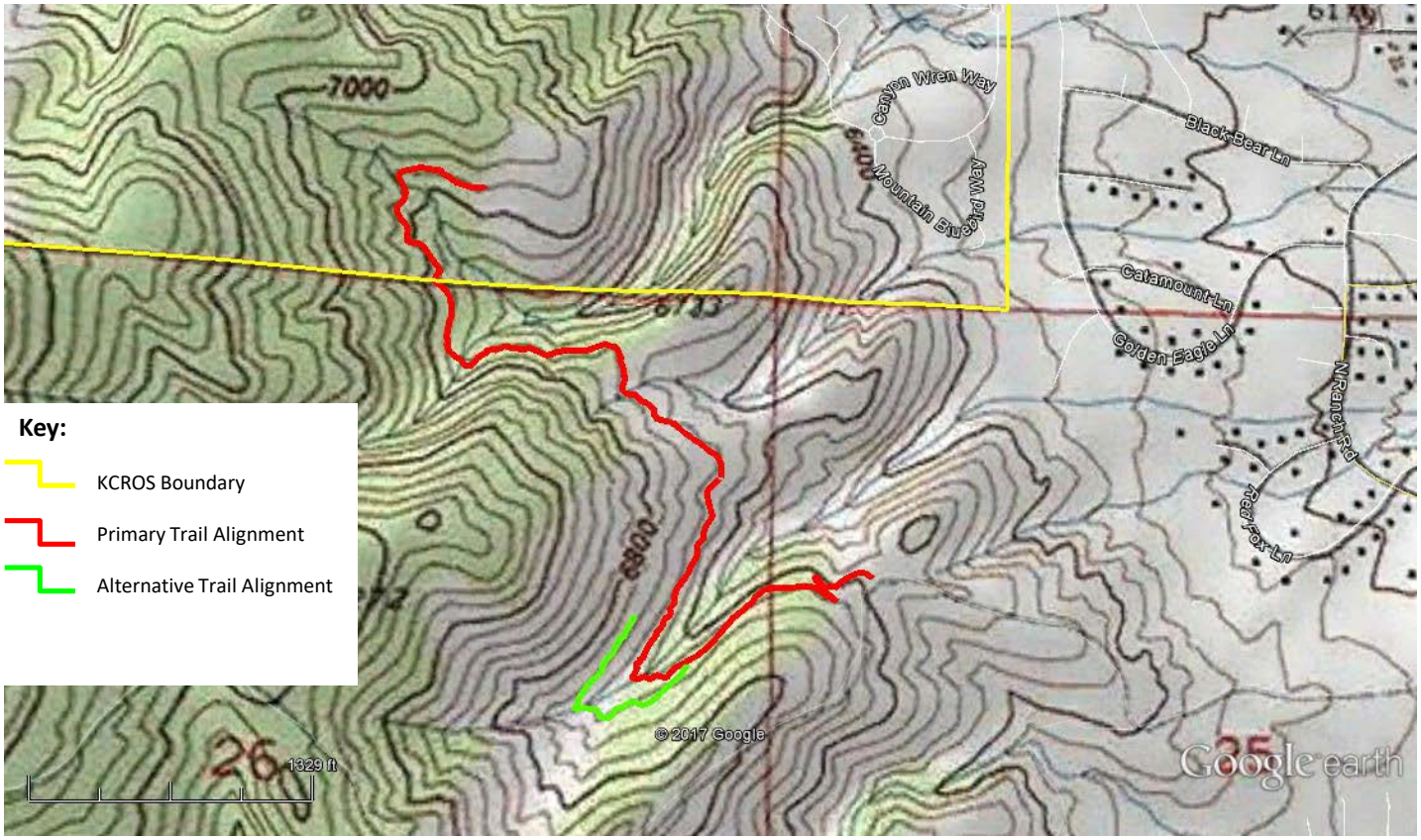

Figure 1

Willow Springs/Ken-Caryl Ranch Connector Trail Biological Survey

Project Area

Summer, 2017

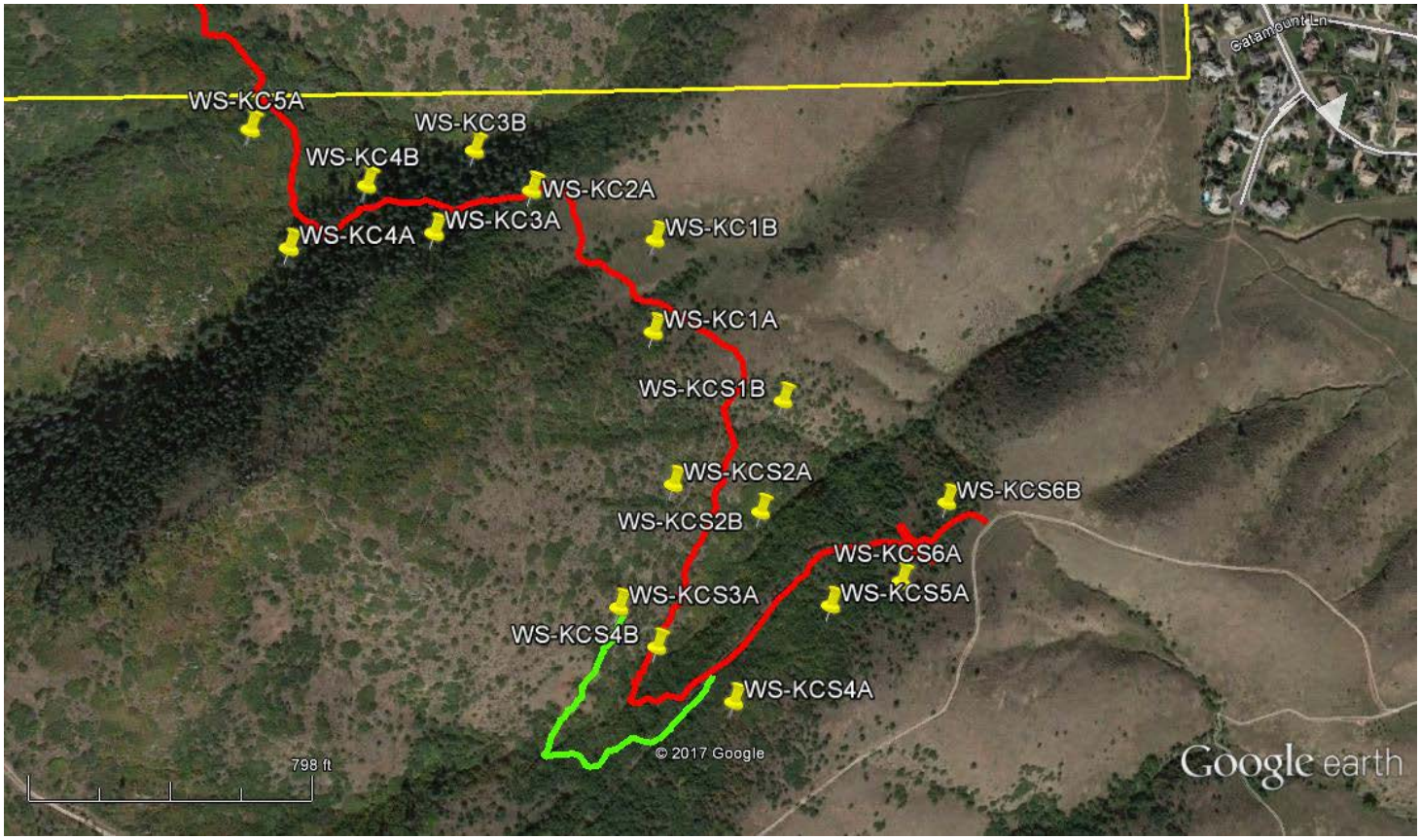

Figure 2

Willow Springs/Ken-Caryl Ranch Connector Trail Biological Survey

Location of Raptor Observation stations

July, 2017

Survey Results

Raptors or raptor perches (snags and areas of whitewash) observed during the surveys are shown on Figure 3. No raptor nests were found during either survey. Based on the number of observations and behavior (especially at station WSKC3A on 6/16/17), it is likely that at least one pair of red-tailed hawks nests in the vicinity of the northwestern portion of the project area. Red-tailed hawks were observed perching in the coniferous forest and flying tight circles above the surveyor at station WSKC3A on 6/16/17. Red-tailed hawks were also observed flying on updrafts north of the project area and in the southwestern area of the project above Manor House Trail. Cooper's hawks were observed flying through or circling above the project area. Detailed raptor survey observations are provided in Appendix A.

Although not the focus of the raptor surveys, ovenbirds (*Seiurus aurocapilla*) were heard at stations 12 and 13 in mixed conifer forest dominated by Douglas-fir (*Pseudotsuga menziesii*) during the second survey. CNHP currently assigns the ovenbird a global rank of G5, indicating that that the species is globally secure with 100 known occurrences worldwide (CNHP 2015). CNHP currently assigns the ovenbird a state rank of S2B, indicating that it is imperiled within Colorado with typically 6 to 20 known occurrences (CNHP 2015). Colorado Breeding Bird Atlas data indicates potential ovenbird breeding in 13 of the 1,745 priority blocks (COBBA II 2016).

Recommendations

In general, nesting raptors are sensitive to human disturbance to some degree. Raptors responses to human disturbance vary by species and individual. As a rule, for example, golden eagles respond at greater distances to human activities than do kestrels. Some individuals within a species also habituate and tolerate human activity at a proximity that would cause the majority of the species to abandon their nests. Other individuals become sensitized to repeated encroachment and react at greater distances. The tolerance of a particular pair may change when a mate is replaced with a less tolerant individual and may cause the pair to react to activities that were previously ignored. Responses will also vary depending upon the reproductive stage and indirect factors such as the availability of prey resources.

Raptors were observed using the project area for foraging and other activities. However, no raptor nests were observed in the project area. While Red-tailed hawks and Cooper's hawks are fairly tolerant of human disturbance, avoiding trail construction during the breeding season is recommended to reduce chances of nest failure. For Red-tailed hawks, Colorado Parks and Wildlife (CPW) recommends seasonal restrictions to human encroachment within a 0.33-mile radius of active nests from February 15 through July 15 (CPW 2008). Some members of this species have adapted to urbanization and may tolerate human habitation to within 200 yards of their nest. Development that encroaches on rural sites is likely to cause abandonment.

All habitat types in the project area provide potential foraging or perching habitat for raptors. Existing trails in the area, i.e., Manor House Trail, Bradford Trail and Hidden Valley Trail are well established and the disturbances and other effects of these trails on raptor habitat seems tolerable to these birds given the level of raptor activity observed. While the effects of trail fragmentation may be more of a concern in an area lacking trails and other development these effects still cause impacts to more developed areas. Potential habitat fragmentation effects of the proposed trail could result in raptor avoidance of areas with trails, disruption of raptor foraging or breeding behavior, and reduced prey densities. Due to their maneuverability, Cooper's and sharp-shinned hawks forage more frequently in dense forest and scrub habitat than other raptors, and would likely be the most affected by fragmentation of large patches of Gambel oak, especially in the south and north portions of the project area, where large thickets occur. However, Cooper's hawks tend to be more tolerant of human disturbance than other forest raptors (Rosenfield et al. 1992) and are apparently increasing in urban and suburban areas in North America (Curtis et al. 2006). Staff believes routing the trail using the western alternative alignment (green line segment on maps) which would utilize 775' of the existing Bradford Trail to connect the south and north sections of the connector trail, would result in less fragmentation and create better separation of the trail and from the riparian area associated with the southernmost ephemeral tributary of Dutch Creek .

The riparian area along the northernmost ephemeral stream crossing and the riparian area downstream of this crossing and adjacent to the Hidden Valley Trail is relatively extensive for these deeply incised foothill canyons and undoubtedly provides high quality habitat to a variety of wildlife. The new trail alignment does a great job of mitigating impacts to this area, where ovenbirds were heard. However, because of the close proximity of Hidden Valley Trail and the fact that its alignment traverses the entirety of this riparian area there should be concern about the accumulated impacts of these two trails in such close proximity. Consideration should be considered to abandoning and restoring this section of Hidden Valley Trail.

Summary of Recommendations Based on Rare Plant and Raptor Survey Findings

1. Avoid Claytonia rubra occurrences. Consider realigning trail so that there is at least 20 meters separation between occurrences and new trail.
2. Schedule trail construction activities outside breeding season for raptors (generally January through July). If Trail construction cannot be avoided during this time, conduct raptor nest survey prior to construction. If nests are found, establish appropriate buffer areas or re-schedule construction of trail sections that have the most impact on active nests.
3. Minimize fragmentation of foothill shrublands and riparian zones by utilizing alternative alignment (green line segments on map) and existing section of Bradford Trail.
4. Consider closing and restoring sections of Hidden Valley Trail that impact riparian habitat and are in proximity to new trail. Work with Willow Springs community to find alternative route For Hidden Valley Trail that preferably uses the new connector trail alignment or other existing trails.

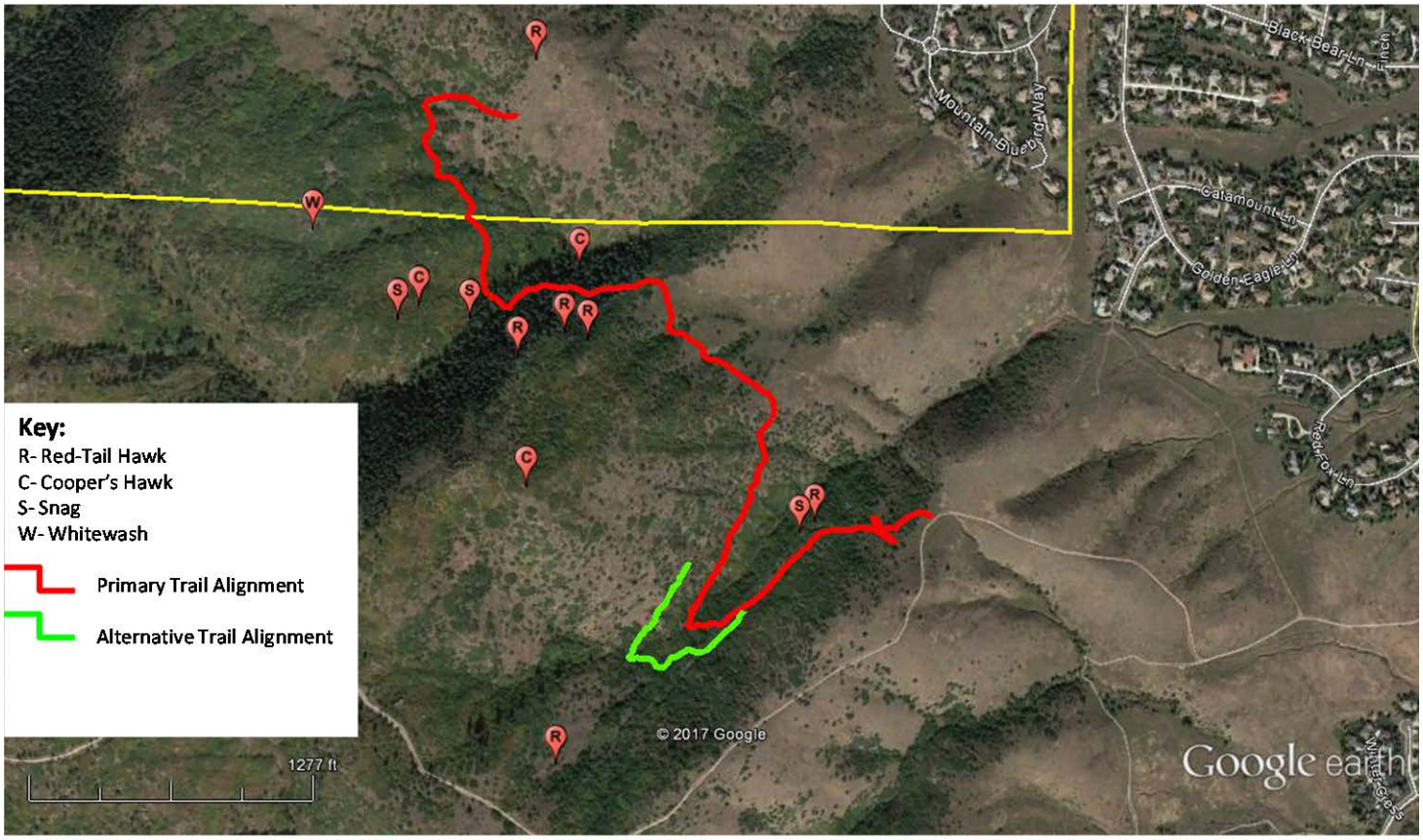

Figure 3

Willow Springs/Ken-Caryl Ranch Connector Trail Biological Survey

Raptor Observations

July, 2017

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Attachments

Date	Transect	Start Time	Stop Time	Observer	Weather	Observations	Notes
24-May-17	WSKC5A	7:49AM	7:54AM	S.WARREN	Clear, cool, calm, 60-65 F	SPTO, AMRO, BTAH	start on north end of transect near willow springs boundary. Trail continues into WS. Transect does not cross boundary. Station on bald spot on ridge w great view looking east down the tributary cyn.
5/24/2017	WSKC4A	8:04AM	8:09AM	S.WARREN	Clear, cool calm, 60-65F	SPTO, STJA	near shaded waterfall feature in stream channel. Large hazelnut bushes
5/24/2017	WSKC3A	8:30AM	8:35AM	S.WARREN	Clear, cool, calm, 70F	SPTO, STJA, DEJU	overgrown talus slope with good view of cyn looking north
5/24/2017	WSKC4B	8:48AM	8:53AM	S.WARREN	Clear, calm, 70F	OVEN	very shaded, multi-layered forest. Lush understory. Near confluence of secondary cyn and main. Large riparian zone
5/24/2017	WSKC3B	9:10AM	9:15AM	S.WARREN	Clear, calm, 70F	OVEN, DEJU, SPTO, AMRO, COHA	Relatively flat upper riparian. Coopers hawk flying 25' off ground in fairly open canopy with tall shrub layer
5/24/2017	WSKC2A	9:22AM	9:27AM	S.WARREN	Clear, warm, 70-75F	BCCH, SPTO, AMRO	on ridge corner of north and east aspect slopes. Emerging from conifer forest
5/24/2017	WSKC1B	9:32AM	9:37AM	S.WARREN	Clear, warm and breezy, 75F	SPTO, SAPH	grassland w isolated oak clumps. Good view of valley and hogbacks
5/24/2017	WSKC1A	10:01AM	10:06AM	S.WARREN	Clear, warm and breezy, 75F	SPTO, BGGN	mixed shrubland. Ridge corner to south aspect
5/24/2017	WSKCS1B	10:15AM	10:20AM	S.WARREN	Clear, warm and breezy, 75F	BGGN, RTHA, VGSW, SPTO	red tailed hawk riding thermal on west horizon
5/24/2017	WSKCS2B	10:35AM	10:40AM	S.WARREN	Clear, warm and breezy,75F	SPTO, BTHU	mature shrubland, ephemeral stream bottom. Southernmost trib of dutch creek, water flowing in channel
5/24/2017	WSKCS4B	10:55AM	11:00AM	S.WARREN	Clear, warm and breezy, 75F	BGGN	Small viewshed. Walked up narrow wet channel. Shooting star everywhere
5/24/2017	WSKCS3A	11:06AM	11:11AM	S.WARREN	Clear, warm and breezy, 75-80F	SPTO, BCCH	next to existing bradford trail. Mixed shrubland. S aspect
5/24/2017	WSKCS2A	11:19AM	11:24AM	S.WARREN	Clear, warm and breezy, 75-80F	SPTO	good view. Above trail.
5/24/2017	WSKCS4A	11:49AM	11:54AM	S.WARREN	Clear, warm and breezy, 75-80F	SOPO	N aspect. Dense oak thicket. DEER/ELK BED. ELK SIGN IN AREA on way to wskcs5a
5/24/2017	WSKCS5A	12:27PM	12:32PM	S.WARREN	Clear, warm and breezy 80ish	AMRO, SPTO, BTHU, BBMA	crickets. Dense oak thicket. N aspect
5/24/2017	WSKCS6A	12:38PM	12:43PM	S.WARREN	Clear, warm and breezy 80ish	SPTO	above manor house trail looking east. Hiker. Good view of valley
5/24/2017	WSKCS6B	12:55PM	1:00PM	S.WARREN	Clear, warm and breezy 80ish	BGGN, SCJA	CLAYTONIA RUBRA growing in understory mature oaks. Lots of jay activity

Date	Transect	Start Time	Stop Time	Observer	Weather	Observations	Notes
6/16/2017	WSKC5A	7:45AM	7:50AM	S.WARREN	Clear, warm 70F	SPTO, OVEN,RTHA, STJA, COHA	Immature Cooper's Hawk perched top of tall snag SW of station. Chased off by Stellar's jay. Red tail hawk calling in forest to south. Stellar's jay in snag near forest
6/16/2017	WSKC4A	7:55AM	8:00AM	S.WARREN	Clear, warm 70F	STJA, RTHA, OVEN	
6/16/2017	WSKC3A	8:15AM	8:20AM	S.WARREN	Clear, warm 70F	blue grouse, RTHA, DEJU, OVEN	Red tailed hawk flying tight circles immediately above observer, very agitated. Second RTHA flew in near first hawk, weaker call maybe immature.
6/16/2017	WSKC4B	8:30AM	8:35AM	S.WARREN	Clear, 70F	OVEN, RTHA, SPTO, STJA, BCCH	RTHA soaring on north horizon
6/16/2017	WSKC3B	8:40AM	8:45AM	S.WARREN	some cloud cover	DEJU, BCCH	station located just south of hidden valley trail
6/16/2017	WSKC2A	8:55AM	9:00AM	S.WARREN	Clear, warm, 80F	BCCH, SPTO, DEJU	DRAGONFLY swarm over grassy slopes to east
6/16/2017	WSKC1A	9:15AM	9:20AM	S.WARREN	Clear, warm 80F	SPTO, BLGN,BTHU	RTHA , call heard
6/16/2017	WSKC1B	9:00AM	9:05AM	S.WARREN	high clouds	SPTO, SCJA	small plane circling overhead. Half dozen small snags on slopes to west
6/16/2017	WSKCS1B	9:30AM	9:35AM	S.WARREN	Clear, warm 80F	RTHA	red tailed hawk perched on power pole near station WSKCS5A. Flew off down valley to east
6/16/2017	WSKCS2B	10:25AM	10:30AM	S.WARREN	Clear, warm 85F	SPTO, BTHU	no stream flow but wet in channel
6/16/2017	WSKCS4B	10:5AM	10:20AM	S.WARREN	humid calm	BTHU, BCCH,MODO	
6/16/2017	WSKCS3A	10:00AM	10:05AM	S.WARREN	humid, calm	BTHU, SPTO	painted lady feeding on sulfur flower
6/16/2017	WSKCS2A	9:45AM	9:50AM	S.WARREN	Clear, warm 85F	SPTO, BTHU, COHA	Coopers hawk riding thermal to north
6/16/2017	WSKCS4A	10:40AM	10:45AM	S.WARREN	Clear, warm 85F	SOPO, MODO, AMRO, STJA	fourth quarter moon setting on ridge to west
6/16/2017	WSKCS5A	10:50PM	10:55PM	S.WARREN	Clear, warm 85F	SPTO	
6/16/2017	WSKCS6A	11:00PM	11:05PM	S.WARREN	Clear, hot	SPTO, BTHU	
6/16/2017	WSKCS6B	11:00PM	11:05PM	S.WARREN	Clear, HOT	SAPH	