



Parks and Open Space

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Memorandum

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To: Ernst Strenge, POS Resource Planner

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Subject: Wildlife baseline report results, discussion and recommendations for Betasso Management Planning

Benjamin Topography and Habitat Features

The geomorphology of the Benjamin property is characterized by several densely vegetated drainages running south to north, separated by well-defined ridges with rocky outcrops. On the north end of the property, Arkansas Gulch, which is intermittent, runs west to east and joins Fourmile creek, which is perennial.

These drainages provide variable habitat components. The west and north facing slopes of the drainages provide dense, forested stands with cool, moist conditions below the canopy. These stands are ideal for species such as pine squirrel and hermit thrush. Additionally, these stands provide both summer and winter thermal cover for mule deer, and winter thermal cover for elk. All of these species were detected during surveys, and of particular note was the high density/size of pine squirrel middens. The pine squirrel is an important prey species for several predators including American marten and Cooper's hawk, both of which are also present on the property.

Alternately, the east and south facing slopes of the drainages provide open stands of ponderosa pine interspersed with grassy areas. Due to this aspect, these areas remain snow free for much of the winter, and provide important forage for mule deer and elk, as well as nesting, foraging and travel areas for Abert's squirrels. Additionally, having an open flyway directly adjacent to a densely forested stand provides ideal habitat for nesting accipiter species. During surveys, Abert's squirrel nests were located, a Cooper's hawk nesting stand was identified, and sharp-shinned hawks were detected.

The topography of these drainages provides relatively distinct, isolated habitat areas. It is likely that this allows for easily defined and defended territories for species that utilize smaller areas of varied habitat types for breeding, such as the western tanager.

The densely vegetated riparian areas within the drainages provide habitat for riparian bird species such as MacGillivray's warbler, yellow warbler and Wilson's warbler. They also provide travel corridors and habitat for species such as mink. The multiple drainages within the Benjamin property provide water sources, although all are intermittent, including

Arkansas Gulch. However, there is a permanent spring located within one drainage on the western end of the property, which has high value for wildlife.

Along the ridgelines between drainages, rocky outcrops provide potential habitat for bat roosts or hibernacula. The potential for bat maternity roosts on the Benjamin property is increased due to the permanent water source mentioned above; female bats require easy access to water sources while lactating. Additionally, American marten utilize rocky formations for resting and natal dens. Marten were detected via remote camera, and snowtracking in an area close to rocky outcrops. Further, the ridges provide important travel corridors for wide-ranging mammal species, such as mountain lions.

Thus, the entire property contains a mosaic of important habitat types. This juxtaposition of various habitat types within Benjamin makes it valuable for a high diversity of wildlife species. With the exception of Reynolds Ranch, this attribute of steep north facing densely forested habitat with significant riparian value is found only on the Benjamin property among Boulder County Open Space properties. This large parcel of public land buffers the surrounding low-density exurban development and is the only substantial protected habitat in this area, as it does not connect with Forest Service land. These factors give it unique, intrinsic value as wildlife habitat.

Benjamin Survey Effort-2008

Introduction

Boulder County Parks and Open Space purchased the Benjamin property in May of 2007. Due to its historical use, and community interest, the County determined that creation of a master plan in a short timeframe was in the public's best interest. As a result, County resource specialists were tasked with conducting surveys with limited time.

In order to document current information on wildlife species present within the 391-acre Benjamin property, wildlife staff at Boulder County Parks and Open Space conducted a remote camera survey and avian point count surveys.

Remote Camera Surveys

Methods

The basic methodology for the use of remote cameras involves the deployment of units throughout an area to document the diversity of species. This survey technique was selected for the Benjamin property due to its noninvasive nature, as remote cameras surveys allow for detection of species with limited impact. Also, as our goal was to inventory Benjamin comprehensively, we selected this process due to the fact that the data is unambiguous and captures multiple species, including predators and prey. Further, the photographs provide a permanent record, and the images are often captivating which is valuable for public outreach.

Wildlife staff, with the assistance of resource protection staff, systematically placed remote cameras in areas of interest based on landscape features such as rocky outcrops, drainages,

travel corridors and the permanent spring. Additionally, we sampled areas of potential trail construction (i.e.: the narrow area connecting the Betasso property to the Benjamin property).

We utilized four remote cameras designed by Cam Trak South Incorporated. The unit model was the Digital Ranger W-50 RB, which is heat-motion triggered. All the units were new upon the commencement of the study. We operated the cameras with a twenty- second delay on continuous data collection with a 1 GB memory card. All cameras were installed between eighteen and thirty-five feet from the bait, and were situated either facing southeast or north. All vegetation was removed from the conical sensor area in front of the unit.

Each station was baited at the commencement of the survey with chicken and scent lure (Zielinski and Kucera 1995). We chose this bait type to attract forest carnivores such as weasels, small felines and foxes, as well as larger bodied carnivores such as mountain lions, coyotes and bears. From experience, we expected that this bait and lure combination would also attract rodent and avian species. Additionally, by choosing placements near travel corridors, we expected to detect large herbivores such as mule deer.

The bait was placed in a 12” by 12” mesh cage, which allowed for measurement of individual animals. Each station was conspicuously labeled with the station identification for ease of data organization. Bait cages were placed approximately 5 feet from the ground. This height was selected specifically with canine species in mind; the animals are attracted to the bait, but cannot remove it.

To obtain a temporal sampling across seasons, we targeted winter, spring and summer months for our survey time period. Each season holds unique challenges and benefits for this survey process; winter is typically excellent due to a lack of alternate food sources, and the fact that damage to the cameras by bears is a non-issue. The presence of snow in winter also allows for track identification. Spring and summer are challenging as bears are present, and wasps eat bait surprising quickly.

The duration of our survey periods varied, but we chose fourteen days as a minimum time, and thirty-four days for a maximum. Recent studies have shown that fourteen days yielded a detection probability above 50% and thirty days yielded a detection probability of 75% for most target species (Gompper et al. 2006, Campbell 2004). Our study thus generally concurred with the recommendations that surveys of approximately two weeks will detect most species present, but that approximately one month is required for exhaustive inventories (Moruzzi et al. 2002).

Results and Discussion

Species detected via the remote camera survey include: American marten, gray fox, red fox, black bear, pine squirrel, Abert’s squirrel, Steller’s jay (STJA), common raven (CORA), American crow (AMCR), black-billed magpie (BBMA), mule deer, and domestic dog.

Table 1- Remote Camera Survey Effort and Results

Round 1	Camera 1	Camera 2	Camera 3	Camera 4
Date Set	2/15/08	2/15/08	2/21/08	2/21/08
Date Retrieved	3/3/08	3/3/08	3/6/08	3/6/08
Total Days	17	17	14	14
Results	No detections	Red fox (2 individuals), pine squirrel	Pine squirrel	American marten

<u>Round 2</u>	Camera 1	Camera 2	Camera 3	Camera 4
Date Set	4/21/08	4/24/08	4/18/08	4/18/08
Date Retrieved	5/20/08	5/20/08	5/20/08	5/20/08
Total Days	31	28	34	34
Results	Black bear, mule deer	Black bear (2 individuals), pine squirrel	Gray fox, red fox, STJA, CORA, Abert's squirrel, dog	No detections, camera malfunction

Round 3	Camera 1	Camera 2	Camera 3	Camera 4
Date Set	6/16/08	6/16/08	6/17/08	6/17/08
Date Retrieved	7/15/08	7/15/08	7/15/08	7/15/08
Total Days	31	31	30	30
Results	AMCR, Black bear	Black bear, mule deer	CORA, BBMA	Red fox, pine squirrel

With habitat assessment, and general knowledge of species life histories, all species detected were expected to be present on the property with the exception of the American marten and gray fox. These species are discussed below:

American marten (*Martes americana*)

The marten is an inhabitant of subalpine spruce-fir and lodgepole pine forest, alpine tundra and occasionally montane forests (Yeager and Remington 1956). They utilize tree cavities, logs, rock piles, and scree slopes for resting and natal den sites (Kucera 1996). Marten occur from 5,500 ft to 10,000 ft in elevation, but more typically occur above 7,200 ft (Buskirk and Zielinski 1997, Cablk and Spaulding 2002). Marten select stands with 40 to 60 percent canopy closure for both resting and foraging and avoid stands with less than 30 percent canopy closure (Spencer et al. 1983). Martens generally avoid habitats that lack overhead cover, presumably because these areas do not provide protection from avian predators (Allen 1982, Bissonette et al. 1988, Buskirk and Powell 1994, Spencer et al. 1983).

Their prey consists of rodents, insects and vegetation (C. Gordon 1986). Of particular importance is the presence of pine squirrels and their middens with food storage. Pine

squirrels are captured in their arboreal retreats and their middens are used as resting and den sites, presumably because of the insulative properties of the woody material (Buskirk 1984, Spencer 1987, Martin and Barrett 1991, Bull and Heater 2000). Marten will eat the squirrels' food storage, and the additional small rodents attracted to the middens (Pearson and Ruggerio 2001).

An American marten was detected at an elevation of 7,080 feet during the winter round of the survey. This was in typical montane forest conditions near rocky outcrops. This detection occurred at the lower end of the typical elevation range of the species. The great abundance of pine squirrels and their associated middens, as well as many areas of rocky outcrops, likely explains this occurrence on the Benjamin property. Additionally, contiguous closed canopy exists throughout the property, providing travel corridors and foraging and resting opportunities for marten. These habitat properties are uncommon in general at this elevation, and are created by the north facing drainages that are cooler, with closed canopies dominated by Douglas fir. These facts further qualify that the habitat contained within this property has unique and intrinsic value to wildlife.

Gray fox (*Urocyon cinereoargenteus*)

In the west, gray fox populations range from northern Colorado south throughout the rest of the southern Rocky Mountains, thus Boulder County is at the northern end of their distribution. They do not occur at higher elevations, but are predominately found in the foothills within a narrow habitat niche. Competition with red foxes may influence gray fox distribution in many areas of the West where they seem to occupy habitats in between those preferred by other species.

Gray foxes prefer riparian habitat and their dens are usually located near water (Wood et al. 1958). The same den may be used for many generations (Stanley 1963), and are located in rocky outcrops, hollow trees or snags, or in heavy brush (Trapp and Hallberg 1975). Dens are less conspicuous than those of red fox (Failor 1969). In Western North America, gray foxes preferred brushy vegetation in association with rocky, broken terrain (Leopold, 1959). In California, Fuller (1978) noted that gray foxes used riparian and old field habitat margins near water.

Gray foxes are secretive and mostly nocturnal. They occupy relatively small home ranges. Trapp (1978) reported female home ranges of 279 acres and male home ranges of 252 acres while Yearsley and Samuel (1980) found home ranges to vary from 30 to 450 acres. Overlap of individual ranges was found in both studies.

Gray foxes are the only canine species with the ability to climb trees (Leopold, 1959). They utilize this ability for hunting, escape and to locate resting sites (Carr, 1945). Their diet includes voles, mice, insects, squirrels, rabbits, vegetation and berries. Of note, juniper berries have been found to be an important source of food for gray fox, especially in early spring and winter (Small 1971).

A gray fox was detected at an elevation of 7,280 feet in early spring. This location was in mixed conifer at the edge of an open saddle area on a north facing slope. There was only one detection of this individual, which differs from our detections of red fox. Red fox typically allowed several pictures to be taken while they investigated the bait, but the gray fox allowed

only one picture, and then was not detected again during the survey. Red fox are typically more adaptable and tolerant of disturbance, whereas grey fox are known for their secretive nature.

As gray fox home ranges do not usually exceed 450 acres, it is highly likely that the individual detected is a permanent resident of the area. The habitat within Benjamin is highly suitable for gray fox, with rocky outcrops, several riparian areas and the juniper tree component. As gray fox habitat is limited in general, maintaining this relatively undisturbed, highly suitable area would help ensure their continued existence on the Benjamin property.

Avian Point Count Surveys

For the 2008 avian breeding season, six point count stations were established on the Benjamin property. These survey stations were systematically placed to coincide with variable habitat including edge, closed canopy, riparian areas, and meadows. Also, stations were placed in an attempt to spatially sample the entire property.

The Rocky Mountain Bird Observatory Point Transect Protocol (Leukering et al. 2006) was followed for the avian inventory of the Benjamin property. Surveys were conducted beginning one half hour before sunrise. All points were surveyed for a five minute period and all bird species and number of individuals were recorded within three distance categories; 0-50m, 50-100m and >100m. Environmental conditions were recorded at the commencement of each survey and included wind speed, precipitation, cloud cover and temperature.

In addition to conducting scheduled protocol surveys, all avian species detected during general exploratory trips through the property were recorded. This allowed for a general census during the time period outside of the protocol season.

Results:

During protocol surveys and general observations, a total of 37 species were detected on the Benjamin property.

Species detected during point count surveys:

American crow, American robin, blue-gray gnatcatcher, black-headed grosbeak, broad-tailed hummingbird, chipping sparrow, common flicker, Cooper's hawk, common raven, dark-eyed junco, dusky flycatcher, Hammond's flycatcher, hermit thrush, MacGillivray's warbler, mountain bluebird, mountain chickadee, mourning dove, pine siskin, plumbeous vireo, pygmy nuthatch, red-breasted nuthatch, ruby-crowned kinglet, red crossbill, Steller's jay, Virginia's warbler, white-breasted nuthatch, Western tanager, Western wood peewee, yellow-rumped warbler.

Species detected during habitat assessment visits:

Northern goshawk, orange-crowned warbler, dusky grouse, golden eagle, Clark's nutcracker, Cordilleran flycatcher, lesser goldfinch, wild turkey.

Discussion:

A total of 37 species indicates high diversity, and is attributable to variable habitat components on the Benjamin property.

Species detected that are on the Boulder County Avian Species of Special Concern are discussed below:

The Boulder County Nature Association (BCNA) created the Boulder County Avian Species of Special Concern list. This list combines local (BCNA), state (Colorado Natural Heritage Program [CNHP], Division of Wildlife, Department of Natural Resources), regional (U.S. Forest Service) and national (Partners In Flight [PIF], U.S Fish and Wildlife Service) assessments of avian species, but focuses on their local status in Boulder County. Avian species are placed on the list due to factors influencing their populations such as general declines, rareness, and/or habitat restrictions. Other species on the list are “watch listed”. This generally indicates that these species may be fairly abundant in the County but, due to concerns in the state or region (population declines, threats or habitat restrictions), they should be monitored.

Northern goshawk:

The U.S Forest Service designates this species as a management indicator species and a sensitive species. Additionally, it is watch listed by the CNHP, and the BCNA categorizes it as having rare or restricted populations, and needing research.

Northern goshawk use of the Benjamin property was determined by finding physical evidence. A probable kill site and a goshawk feather were located on the property. It is unlikely that nesting by this species went undetected however, as general surveys were conducted, and habitat assessed for suitable nesting stands. In addition, a Cooper’s hawk nesting stand was located on the property, and these two accipiter species typically do not tolerate one another within nesting territories. It is likely however, that the Benjamin property is used for foraging by this species. This is not unexpected due to the fact that the property is isolated, has significant prey availability and is relatively undisturbed.

Pygmy nuthatch:

The U.S. Forest Service has designated this species as a management indicator species and a sensitive species. Additionally, it is categorized by the BCNA as having rare or restricted populations.

Pygmy nuthatches were detected on the Benjamin property by sight and sound during the avian point count surveys. This species is a year-round resident of Ponderosa pine dominated foothills areas, and thus occupies a limited habitat niche. Pygmy nuthatches are dependent on the existence of cavities that they use for nesting and thermal regulation. As snags of appropriate size are limited on the landscape in general, and this species must compete for secondary use of existing cavities, its presence on the property is significant. This species should be monitored for its continued existence on the property.

MacGillivray's Warbler:

Partners in Flight has designated this species as a Type 1D in their system. Type 1 signifies that this species merits on-the-ground conservation actions because of downward population trends (D). Partners in Flight evaluates 7 variables on a 1-5 priority scale using range maps, Breeding Bird Survey data and opinions of a Prioritization Technical Committee.

This uncommon species was detected on the Benjamin property during the avian point count surveys. MacGillivray's warblers are neotropical migrants and the significant loss of mature tropical forest wintering habitat has led to population declines. Presence of this species during the breeding season signifies intact riparian habitat, as MacGillivray's warblers nest in dense thickets along riparian areas, often at the edge of mixed conifer stands (Hutto 1981).

This species occurred on the Benjamin property in moist, closed canopy near an intermittent drainage. MacGillivray's warbler habitat is limited, and its presence on the property is significant. It should be monitored for its continued existence on the property.

Western tanager:

Partners in Flight has designated this species as a Type 1D in their system. Type 1 signifies that this species merits on-the-ground conservation actions because of downward population trends (D).

Western tanagers were detected on the Benjamin property during the avian point count surveys. This species is a neotropical migrant, and as with MacGillivray's warblers, loss of mature tropical forest wintering habitat, has led to population declines. Breeding habitat occurs on the Benjamin property, as the Western tanager prefers mixed conifer stands, often associated with drainages or canyons, in mountainous areas. This species should be monitored for its continued existence on the property, as its presence is significant.

Other significant observations:

An active Cooper's hawk nesting stand was located on the Benjamin property during the avian point count surveys. This species requires dense canopy stands with open flyways nearby for nesting. Often, Cooper's hawks prefer to nest near riparian areas. They are typically intolerant of disturbance close to their nests, and will react aggressively towards intruders. This raptor species is uncommon, and every effort should be made to maintain undisturbed, suitable habitat for their nesting on the Benjamin property.

The detections of ruby-crowned kinglets and hermit thrushes during the surveys were unexpected, as these species typically occur at higher elevation. Again, the presence of these species on the property signifies the cool conditions created by the north-facing, Douglas fir dominated slopes, coupled with riparian habitat.

Other Monitoring

The Colorado Division of Wildlife is conducting a study of Front Range cougar activity. In the period from June 2007-August 2008 four different adult cougar home ranges included the Betasso area. Three of these were adult females, which should then include offspring in some years. This corroborates local knowledge of cougars with kittens. All of the home ranges were significantly larger than the Betasso property. This monitoring did not pinpoint any special areas or den sites, nor did any of the POS staff field visits or random trail camera monitoring. However, the DOW study is a long-term effort that should reveal important areas via continuous monitoring.

In addition to the standardized trail camera monitoring protocol above, cameras were placed along trails/ridges and at Bear Claw Spring (which was later included in the standardized protocol). This monitoring revealed bear and cougar use at locations and along likely corridors. Bear Claw Spring is an important, permanent water source. The wetland area and railroad grade along Fourmile Creek also serves as a movement corridor for large mammals.

The POS Riparian Assessment will also classify the two primary riparian stretches on the property: Bummer's Gulch and Fourmile Creek. The goal of the assessment is to categorize the functionality of all POS riparian areas and to identify potential improvements. The assessment is a modification of the BLM Proper Functioning Condition system and should occur in 2009.

Management Recommendations:

The combined field efforts of wildlife staff and contractors, and those of the plant ecology staff and their contractors described several important habitat factors, key sites, and rare plant associations. The bulk of these are proscribed in four large polygons (see map), all contained in what was the newly-acquired Benjamin purchase. These four polygons range from 13-acre to 50-acres. Due to the juxtaposition of these polygons and the general topography it is best to consider these areas as a whole; one 202-acre block. The sum of the values contained in the block (polygon) recommends it for remaining undisturbed and closed to public access. These values include: riparian areas, rare or unique plant associations, springs, mines, densely-timbered north-facing Douglas fir dominated slopes, travel corridors, a skyline ridge, raptor nests, and rocky outcrops. Additionally, the large block is further-valued by its large, undisturbed, insular nature. This condition exists in very few locations in the county below 8000' in elevation.

Further, independent support for this recommendation comes ERO Resources, which was retained by Boulder County Parks and Open Space to conduct a rapid resource assessment of the Benjamin property and 54 acres in the northern portion of the Betasso Preserve. The purpose of this independent assessment was to summarize the physical and ecological characteristics of the property, as well as to document and record the existing conditions and open space values. Also, BCPOS requested that ERO Resources identify management needs and opportunities. ERO Resources submitted their assessment to BCPOS on August 1, 2007.

Results from this assessment, as far as recommendations for habitat protection were as follows: "From a regional perspective, this study area is one of the largest patches of

contiguous habitat in the Boulder foothills. Two of the existing trails and other disturbances are on the periphery of the study area, leaving a piece of central core habitat area that is unfragmented by roads and trails and sees little, if any, human disturbance. This area is known to support habitat for black bear and mountain lion, in addition to many other wildlife species. While the long-term conservation of the Benjamin Property will protect habitat values from development, the management of habitat, trails, and public use should seek to maintain the integrity and continuity of the core habitat area. In particular, any future trail planning should avoid Arkansas Gulch as much as possible to minimize longterm wildlife impacts.”

The assessment continues with: “The known natural resource values in Benjamin property warrant the need for natural resource surveys to be conducted in the future, so a more accurate picture of the wildlife and vegetation resources are known for responsible property management.” As stated in the above report, intensive surveys were subsequently conducted by BCPOS wildlife staff, and the results lead to the recommendation of a core area closure.

Also to note, the Colorado Division of Wildlife through its NDIS site (Natural Diversity Information Source) has assessed the Benjamin property to contain the following designations: Elk severe winter and winter range, mule deer winter range, black bear fall concentration area, mountain lion habitat, turkey winter range and Canada lynx potential habitat. These designations are based on landscape scale analysis of topography, vegetation type, riparian corridors, connectivity, and specific known habitat requirements for species. It is readily apparent that the Benjamin property contains highly important structural and temporal habitat value for several species.

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