

**CITY OF LONGMONT  
PARKS & NATURAL RESOURCES DIVISION  
FUNDED RESEARCH PROGRAM**

*Investigating Mammal Activity and Use of Button Rock Preserve, Lyons, Colorado.  
Can the Local Populations Coexist with Increased Recreation?*

**Final Report**

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## **i. Abstract**

The City of Longmont Natural Resources Department manages Button Rock Preserve (BRP) in Lyons, Colorado. The primary purpose for this 3,000 acre preserve is to provide the City of Longmont with a high quality drinking water supply and supports hiking, fishing, and wildlife habitat. BRP faces management pressures from multiple perspectives. These include watershed enhancements, fuels management and fire mitigation, and a strong desire for recreational expansion both by City entities and the community. Cameras were deployed June 5th through October 17th 2021 for a total of 2,822 trap nights. Mountain lions (*Puma concolor*) were detected at 3 different locations previously unknown to be utilized by mountain lions. Locations with low recreation impact showed the most lion activity. Other prey and predator species of interest caught on trail cameras, including bobcats (*Lynx rufus*), black bears (*Ursus americana*), and elk (*Cervus canadensis*), provide a better picture of the ecosystem within the preserve, providing evidence that wildlife use the preserve and should be managed and protected.

## **ii. Introduction and Statement of Objectives and Hypothesis**

Through volunteer efforts by Westview Middle School students and monitoring by the Colorado Natural Heritage Program (CNHP) at BRP in Lyons, Colorado, there is documentation [1] of female mountain lions raising kittens within the preserve, and it is assumed the area can support denning and hunting habitat for adult mountain lions. Little is known about the population, spatial occupancy, or fecundity of this mountain lion community.

The objectives of this study were to expand upon the understanding of where and how mountain lions and other wildlife are utilizing the preserve. This research intended to discover trends in wildlife occupancy in areas of heavy use by humans versus more remote areas of the preserve. Although it is difficult to determine behavioral trends through photos alone, patterns of

use by certain wildlife could show avoidance of human activity, or alternatively, if wildlife activity patterns are positively influenced by trails and show little avoidance of human-use areas.

### iii. Methods

The study area was a mix of forested habitat and alpine meadows with rocky outcrops, providing lots of transitional habitat and a good line of sight for camera activity. Forest areas are predominantly made up of lodgepole pines (*Pinus contorta*) and meadows consist of native grasses, lupines (*Lupinus argenteus*), and prickly pear cactus (*Opuntia spp.*). Ralph Price Reservoir at the center of the preserve ensures a consistent water source for wildlife.

19 Spec Ops Elite HP4 Browning trail cameras, plus 3 cameras maintained by Westview Middle School, collected data around BRP in areas of interest identified by resource managers, in high traffic recreation areas, and places with obvious game trail signs. Each camera was given the same delay settings and placed approximately 3ft up from the base of a tree. It is assumed each camera had an equal opportunity to capture activity, but varying locations, camera angles, and species behaviors influence the capture probability for different species.



For the purpose of distinguishing between heavily trafficked and lightly trafficked areas of the preserve, BRP was “divided” as East and West side, as it is often referred to by managers. The East side of the preserve contains the area East of the reservoir, including the South Cove area and the East North Shore trail. The West side of the preserve is identified by the North side of the inlet to the Western boundary gate adjacent the private properties North of the preserve, including the West North Shore proposed wildlife closure. The cameras were almost equally divided with 10 cameras collecting on the West side and 9 cameras collecting on the East side.

**iv. Results**

This research project was conducted on site from May 11, 2021 to October 17, 2021. Initial visits to the site were with BRP Senior Ranger Pryce Hadley to discuss access and possible camera locations. The first camera was deployed on June 5, 2021 and the last camera was pulled from the site on October 17, 2021. The maximum length of time a camera was deployed was 133 days and the minimum length of time was 90 days. This resulted in a total of 2,822 camera trap nights. A cumulative 23,503 photos were harvested from the 19 cameras Spec Ops Elite HP4 Browning trail cameras. Of these photos, 13 distinct species of mammals and 3 bird species were detected.

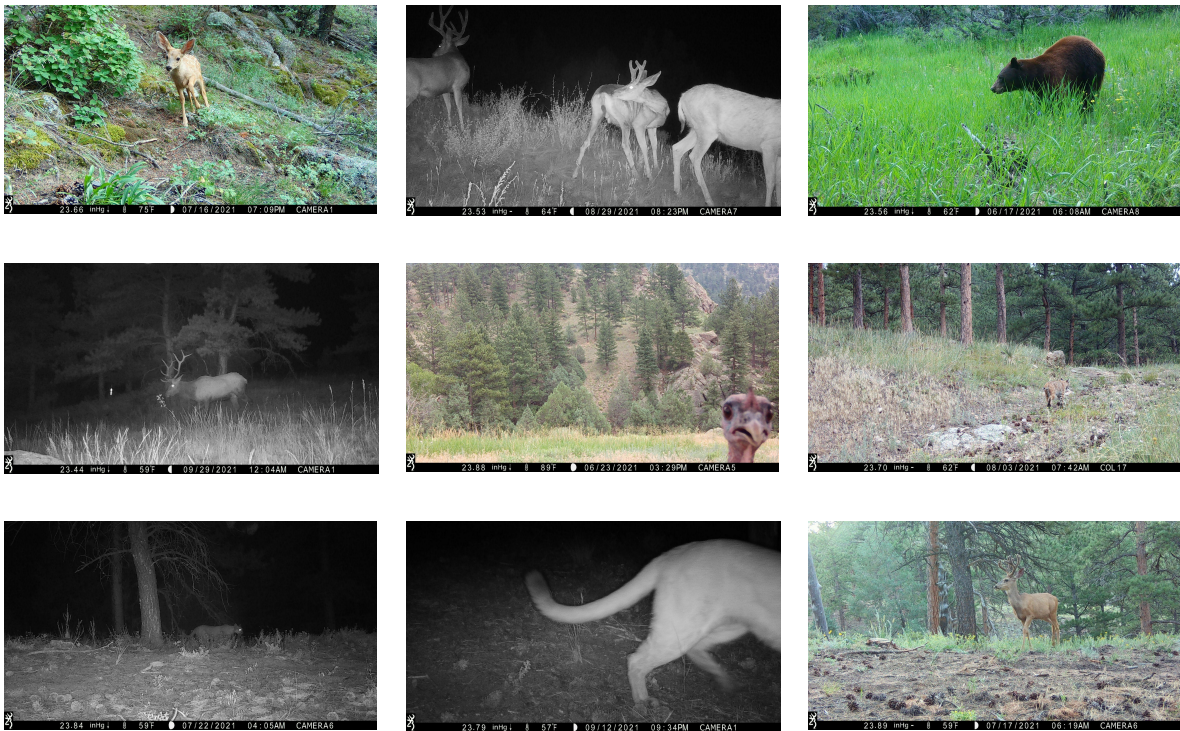
**Table 1. Total Wildlife Capture Events per Camera at Button Rock Preserve, Lyons, Colorado. June - October, 2021**

Camera	Camera #	Location Name	Location	Deployment Date	Pull Date	Wildlife Captures
1	1	[REDACTED]	[REDACTED]	6/5/2021	10/15/2021	170
2	2	[REDACTED]	[REDACTED]	6/5/2021	10/15/2021	0
3	3	[REDACTED]	[REDACTED]	6/5/2021	10/15/2021	59
4	4	[REDACTED]	[REDACTED]	6/5/2021	10/15/2021	4
5	5	[REDACTED]	[REDACTED]	6/5/2021	10/16/2021	4
6	6	[REDACTED]	[REDACTED]	6/12/2021	10/16/2021	43

7	7	[REDACTED]	[REDACTED]	6/12/2021	10/16/2021	36
8	8	[REDACTED]	[REDACTED]	6/12/2021	10/16/2021	16
9	9	[REDACTED]	[REDACTED]	6/12/2021	10/16/2021	9
10	10	[REDACTED]	[REDACTED]	6/12/2021	10/16/2021	6
11	13	[REDACTED]	[REDACTED]	6/6/2021	10/17/2021	36
12	14	[REDACTED]	[REDACTED]	6/6/2021	10/17/2021	2
13	15	[REDACTED]	[REDACTED]	6/6/2021	10/17/2021	0
14	16	[REDACTED]	[REDACTED]	7/10/2021	10/16/2021	16
15	17	[REDACTED]	[REDACTED]	7/10/2021	10/16/2021	20
16	18	[REDACTED]	[REDACTED]	7/10/2021	10/16/2021	37
17	19	[REDACTED]	[REDACTED]	7/10/2021	10/16/2021	38
18	20	[REDACTED]	40 228734 -105 408643	7/18/2021	10/16/2021	11
19	21	[REDACTED]	[REDACTED]	7/11/2021	10/17/2021	14

<b>Total Wildlife Captures East</b>	289
<b>Total Wildlife Captures West</b>	232

**Figure 2. Sample Photos of Wildlife Captures At Button Rock Preserve, Lyons, Colorado. June - October, 2021**



## **v. Discussion**

Each camera successfully provided insight on wildlife distribution throughout the BRP landscape. The primary objective of this research was to identify the presence of mountain lions in the preserve and to try and identify if there were negative impacts by human activity which inhibit mountain lions from utilizing or moving throughout the preserve. After speaking with Project Managers in the area, a secondary objective was determined to research what areas actually support wildlife populations that may need protection. Because a camera is unbiased in the species captured (not to be confused with bias in camera placement), both objectives could be investigated simultaneously. The rate of photo captures as well as the probability of obtaining a photograph of a given species at a given location are a function of the abundance of a species in a given location, and its likelihood of being photographed at that location (detection probability) [2]. This report attempts to address the species of interest detected on camera to give managers a well rounded approach to ecosystem preservation within BRP.

It is important to acknowledge BRP's role in providing a substantially sized habitat that is largely unfragmented besides the few private developments on the North side of the preserve. Managing or conserving solitary mammalian carnivores is intrinsically difficult because they exist at low population densities, occupy relatively large ranges, are difficult to detect, and vulnerable to direct persecution by humans [4]. The results of this camera trapping effort were able to confirm the persistence of mountain lions within BRP and are a positive indicator that BRP's ecosystems are functioning well enough to support a large predator and keystone species.

Also of importance for future management, and in support of CNHP data, elk were identified within the preserve. Rangers are aware of the presence of elk due to tracks and scat signs, but photo evidence further reinforces the argument that the area holds value, and is currently active, to the elk population in and around BRP.

Raptor habitat is suitable when trees are less than 100ft tall, or on cliff sides and in tree or cliff cavities, and near suitable hunting and foraging opportunities. BRP supports terrestrial and aquatic food resources for raptors, therefore various hawk species and ospreys (*Pandion haliaetus*) are most likely to be nesting or hunting in the preserve. Due to the high density and structure of ponderosa pine forests, it is unlikely that bald eagles (*Haliaeetus leucocephalus*) would establish a nesting territory at BRP. It is possible bald eagles could establish a winter night roost (WNR) in the future, but an existing WNR is not currently identified. Golden eagles (*Aquila chrysaetos*) would be better suited due to the availability of cliffs. No eagles were observed at BRP during the study or on camera. One photo did capture a hawk flying close to the substrate, but from the picture the species is unidentifiable (Fig. 3). It is most likely a Northern goshawk (*Accipiter gentilis*), Peregrine falcon (*Falco peregrinus*), or Cooper's hawk (*Accipiter cooperii*).

**Figure 3. Unidentified raptor, September 19, 2021**



The management recommendation would be to survey for raptor nests or roost areas and to determine the species so that the correct buffer zone can be implemented per the recommendations by Colorado Parks and Wildlife (CPW) [5]. A buffer zone for the suspected raptor specie(s) ranges from ¼ to ½ mile around the nest. If managers feel confident in preserving the habitat integrity in that area without having visual confirmation of nests or roost sites, a ½ mile buffer from human

encroachment from February 15th to September 15th would adequately protect any hawk or osprey utilizing the territory.

Black bears and bobcats exhibited a high capture probability across the preserve which could be indicative of a healthy population of each species. It will be important to consider these species in future management plans to avoid declines in their abundance, and also to consider the safety risks of human-wildlife conflict if these species' territories overlap recreation areas.

Contrasting to the high detection rates of black bears and bobcats, no coyotes (*Canis latrans*) were detected at any point during the project. Although it is hard to determine the reasons why coyotes appear not to use BRP as a homerange, one theory could be the proximity of the preserve to rural and urban interfaces, as coyotes have readily colonized urban areas and learned to consume the resources found in those areas [3]. Additionally the pressure to compete for prey resources given the variety of predators at BRP could influence coyotes to find easier means to forage and protect their offspring.

The South Cove area of the preserve on the trail and the extension trail produced low capture probabilities for larger mammal species. This could be due to the steep sloping, sandy terrain that may be less navigable to deer and elk. The species identified on the South Cove in dense forests with low undergrowth were mainly small game species and turkey (*Meleagris gallopavo*). Based on the findings of this project there is little potential for conflict with larger species in this area, but more monitoring should be conducted.

The majority of visitation at BRP happens in the sunny summer months and cooler fall temperatures. The proposed timeline for this project was to begin in the spring (March - April) to identify changes in wildlife movement as human activity increased but due to delays the project began as soon as equipment could be purchased, and the spring window was missed. Wind was a major source of miscapture, an often unavoidable bycatch on trail cameras. Occasionally cameras



would not capture any images for a week or two at a time, and the reason for the lack of data collection during those times is currently unexplained. In one or two situations, wildlife or weather conditions shifted the angle of the camera and limited the ability for the camera to capture smaller and medium sized species.

Distinctions between capture probability on the East or West side of the preserve were harder to confidently report than anticipated because of the inability to identify specific individuals. Although some animals will have a scar or a marking which renders them uniquely identifiable, no such individuals were observed. Because of this, a camera on the East side could have 12 photos of one individual mule deer (*Odocoileus hemionus*), while a camera on the West side could have 12 photos of 12 individual mule deer, and it would be nearly impossible to differentiate between these occurrences.

It is highly recommended that this camera data and project continues to better identify patterns annually, seasonally, and hyper locally. In an effort to assist the Project Managers at BRP with more monitoring efforts, 5 cameras were reset and left out to be collected in the spring. The locations of these cameras were mostly in areas of critical importance for further observation and include the proposed wildlife closures, the inlet where mountain lions were detected, and on the Sleepy Lion trail where high density of recreation occurs and several large mammal species were observed.

The City of Longmont BRP management program will be outfitted with 10 cameras (and all supporting accessories) thanks to the funding provided to purchase equipment. Using a variety of camera setting techniques could drastically influence the results of wildlife images captured at BRP. Now that there is a solid baseline inventory of mammal species inside the preserve, determining camera variables that increase detection will help managers tailor their camera placements for their desired management objectives. One example of a future study would be to

compare deliberately placed camera locations with randomized or stratified camera locations to see how bias of camera placement influences the detection of wildlife.

The continued collection of data from the cameras that remain out through the winter will likely provide a more complete picture from the data collected during this 6 month research project. This should aid managers in determining which future wildlife detections coincide with habitat conservation that aligns with state conservation efforts.

## **vi. Conclusion**

It can be concluded through the results of this study that BRP stands as a functioning, dynamic wildlife area with 13 mammal species frequenting trails and remote areas despite increased human activity and pressures. The size of the preserve and the habitat it supports are unique from the other properties owned and managed by the City of Longmont and therefore it is recommended that the area should be protected. Further development of trails and access into the preserve would limit the current ability wildlife has to escape some of the human encroachment by retreating to the West side of the preserve. Although visitors still make it to the West side via Forest Service land or from the BRP trailhead, the numbers pale in comparison to the traffic that is seen on the utility road and Sleepy Lion trail areas.

Study design reflected the objectives of this research by attempting to correlate recreation and human presence with wildlife activity which influenced the placement of all 19 cameras at BRP. However, the role of more subtle factors on detection such as small scale local habitat features, within and across species, has been unclear. [2] The equipment purchased through the grant program is the tool that managers have to understand positive and negative influences within the preserve that current staffing needs and abilities do not provide for the area.

Currently mountain lions are still able to use BRP as a corridor for their overall larger territory and with a high detection of mule deer there is ample prey for mountain lions to hunt.

This standard of habitat integrity should be maintained or enhanced by managers. Elk should also be considered in management objectives moving forward as the wintering habitat identified for this species is relatively small but a closure could provide a high quality habitat for the few elk that do visit BRP in their home range.

### **vii. Bibliography**

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# Camera Data Summary

## All Cameras - 2021

### Cameras/Photos

Cameras Set: 19      Cameras Retrieved: 19      Average Photos: 1,237      Total Photos: 23,503

### Set/Pull Dates

Earliest Set: 6/5/2021    Latest Set: 7/18/2021    Earliest Pull: 10/15/2021    Latest Pull: 10/17/2021  
Total Effort: 2822.53    Minimum Effort: 92.10    Maximum Effort: 651.79    Average Effort: 148.55  
Minimum Days: 90    Maximum Days: 133    Average Days: 119

Species	Photos
Black Bear	15
Bobcat	9
Chipmunk	2
Cottontail	47
Elk	4
Fox Squirrel	9
Grey Fox	2
Mountain Lion	4
Mule Deer	306
Rat	75
Raven	4
Red Fox	11
Scrub Jay	11
Stoat	1
Striped Skunk	7
Turkey	14

## Button Rock - 2021

### Cameras/Photos

Cameras Set: 19      Cameras Retrieved: 19      Average Photos: 1,237      Total Photos: 23,503