TOWN OF BRECKENRIDGE
OPEN SPACE & TRAILS

Breckenridge Open Space Advisory Commission
October 30, 2023
Council Chambers in Town Hall
150 Ski Hill Road, Breckenridge, CO 80424

THE TOWN OF BRECKENRIDGE IS NOW HOLDING HYBRID MEETINGS. THIS MEETING WILL BE HELD IN PERSON AT BRECKENRIDGE TOWN HALL. ALL MEMBERS OF THE PUBLIC ARE INVITED TO ATTEND. IN PERSON ATTENDEES MUST NOT ACCESS THE VIRTUAL MEETING WHILE IN COUNCIL CHAMBERS.

This meeting will also be broadcast live over Zoom. Log-in information is available in the calendar section of our website: www.townofbreckenridge.com. Questions and comments can be submitted prior to the meeting to websiteopenspace@townofbreckenridge.com.

5:30 pm	***Call to Order***	
5:35 pm	***Discussion/Approval of Minutes***	***1***
	• September 25, 2023 Draft BOSAC Meeting Minutes	
5:40 pm	***Discussion/Approval of Agenda***	
5:45 pm	***Public Comment (Non-Agenda Items)***	
5:50 pm	***Staff Summary***	***14***
	• Field Season Update • Peabody Placer Forest Health Project • Signage Workplan RFP • 2023 Quandary Peak & McCullough Gulch Draft Program Report	
5:55 pm	***Open Space Discussion***	***49***
	• End of Season Naturalist Report • Cucumber Gulch Preserve Updates • 2024 TOB Open Space Grant Review • Council Matters Related to Open Space Topics • Other Matters	
7:15 pm	***Executive Session***	
7:30 pm	***Adjournment***	

I) CALL TO ORDER

Duke Barlow called the September 25th, 2023, regular meeting of BOSAC to order at 5:32 pm. Other members of BOSAC present included Chris Tennal, Krysten Joyce, Nikki LaRochelle, David Rossi, Bobbie Zanca, and Town Council liaison Jeffrey Bergeron. Staff members present included Anne Lowe, Tony Overlock, Scott Reid, Mark Truckey, and Alex Stach. Members of the public included: Greg Ruckman, Marika Page, and others. Jordan Mead from Summit County Open Space was also present. Josh Dayton was present virtually.

II) APPROVAL OF MINUTES

BOSAC REGULAR MEETING – August 28th, 2023
The minutes were approved as presented.

III) PUBLIC COMMENTS

N/A

IV) STAFF SUMMARY

A) FIELD SEASON UPDATE

Ms. Lowe: Field season is well into fall. The crew is doing a lot of maintenance and trying to wrap up projects before the snow falls. You can see the list of projects we have been working on.

B) FRIENDS OF BRECKENRIDGE TRAILS

Ms. Lowe: We did wrap up our Friends of Breckenridge Trails events for the season over the course of the last month. We had a great celebration last Thursday and we appreciate everyone who made it to that event. It's always nice to be able to thank all the folks who came out and volunteered for our program. You can see some of the stats in the packet from this season. We really tried to focus on a mix of different projects this year, from stewardship to trail maintenance to weed removal.

C) 2023 BIFA NUMBERS

Ms. Lowe: This year we started putting up trail counters before the Trail Mix Series at the Breckenridge International Art Festival. We don't necessarily have a ton of baseline data going back multiple years, but we wanted to capture visitor numbers at the three locations this year.

Ms. Zanca: I think it would have been more fun if there were different art installations in the different locations. Just for the variety.

Ms. Joyce: I thought it was great and also a nice surprise while mountain biking to see all the eyes. Definitely a conversation starter. Also, I was curious if BIFA had any feedback

regarding the locations or clean up, I know we've had installations/locations in the past that were difficult for them.

Mr. Overlock: We haven't received any feedback; they haven't reached out to us. We didn't notice much trail degradation or soil compaction that can sometimes be associated with art installations. We will circle back with them and recap over the next month or so.

Ms. Zanca: The way it was presented did help keep people on the trail. I liked that you walked through the middle of it, you weren't tempted to wander off-trail.

Mr. Barlow: Was the trail counter including the Trollstigen Trail?

Ms. Lowe: No, it was at Illinois Creek in a different location than the troll.

D) NATURALIST PROGRAMMING UPDATE

Ms. Lowe: Our naturalists are wrapping up a lot of their interpretive season. They've led more than 85 hikes and had over 565 participants to this date, with multiple different themes and topics. They have a lot of repeat attendees, which was nice to see. They will be working on an end of season report to present at the October BOSAC meeting.

E) PEADBODY PLACE FOREST HEALTH PROJECT

Ms. Lowe: This project is still in the works and if you've been out on the trails in that area I'm sure you've seen it. Jordan from Summit County Open Space & Trails does a great job letting all of the partners know what specifically is happening each week, which helps us get the word out on social media. It's been a seamless approach this season of letting folks know where activity is taking place and what trails are impacted. We are hoping this project will be wrapped up by the end of October.

F) STATE TRAILS GRANT

Ms. Lowe: We have applied for funds from State Trails Grants many times before and have been largely successful. CPW State Trails have refined their program focus and now include multiple categories. Summit County Open Space & Trails has an application in the Planning/Support category focused on entry points into the new National Monument. We would like to submit an application that would fall into the Maintenance category, and it would be focused on in-Town, high-use trailheads. We really need to update and overhaul our kiosks to add accessibility information and trail profiles. We would also plan on replacing the "Bouncy Bridge" on the River Trail, as it's in rough shape and we have lots of new housing along Block 11. We'd love to apply and the deadline is October 3rd. We welcome your feedback and if you're supportive, we would like it if you would allow the Chair to sign a letter of recommendation for us. For this grant, we could ask for up to $250,000, with a match requirement of 25%. We're hoping to do a lot of this work because it is in such high use areas where we are seeing a lot of traffic, and we need better infrastructure to support folks visiting these places.

Ms. Zanca: Do they ask about trail usage numbers in the application?

Ms. Lowe: There is a pre-application form that goes to CPW to have a wildlife perspective examined. We haven't heard back yet if they have any concerns. In these particular in-Town areas, we are hoping they do not have concerns. During the actual application is a good opportunity to provide # of users and types of users.

Ms. Zanca: Do you have counters that give real data or estimates?

Ms. Lowe: It's a mix. We have a series of counters throughout the area that provide us with information.

Ms. Joyce: Obviously this grant deadline is coming up quickly, and I'm generally supportive, but if we are talking about kiosks and signage improvement, I want to make sure that we are thinking about our longer-term goals related to signage. Just so we don't up specific signs and kiosks that won't end up matching our signage plan.

Ms. Lowe: In some cases, this is about getting the infrastructure for a kiosk in place. The design we like to use allows us to change out information on signs attached to the kiosks. As we develop our sign package, we could put the appropriate signs up. We've been talking a lot about putting accessibility information/language on signs and at the right height. That's something we will prepare to do if we go about replacing these kiosks. We'd also like to make the Trollstigen Trail wheelchair accessible as part of this package.

Jeffery Bergeron: In addition to making it wheelchair accessible, it's good that accessibility information on kiosks will let folks know if the trail is accessible for walkers as well.

Ms. Lowe: Good point and this helps us refine our message to not strictly focus on wheelchairs, but all mobility access issues.

Mr. Tennal: Are the funds flagged for the specific items we have on here?

Ms. Lowe: Yes.

Mr. Tennal: Time limit?

Ms. Lowe: Generally, two years.

Mr. Rossi: Did you say there was a match?

Mr. Overlock: Yes, 25%. I think 15% of that can be in-kind with our crew installing the trailheads and doing the trail work as labor. It would then come down to 10-15% cash match.

Mr. Barlow: Is staff comfortable with a two-year deadline?

Ms. Lowe: Yes. These are hard hit areas that need better signage and infrastructure soon.

Mr. Overlock: These are projects that need to happen anyway. This is just a great opportunity to use grant funds for these things.

Ms. Joyce: Is the infrastructure/accessibility part of the grant our goal or the grant's purpose?

Ms. Lowe: It is our goal specifically. The grant's purpose under this category is Maintenance.

Ms. LaRochelle: Will the County apply for this as well?

Ms. Lowe: They're applying for a separate category called Planning & Support. They will be focused on developing a plan and concepts for improvements at trailheads going into the National Monument, with trailheads like Spruce Creek, Quandary, etc.

Ms. Zanca: You can only apply for one category?

Ms. Lowe: Generally, yes.

Ms. Lowe: If everyone is in support, we will draft a letter of recommendation and have Duke sign it on behalf of BOSAC if you are all on board.

Mr. Barlow: Everyone in support?

Unanimous support from all BOSAC members

Additional Comments/Other Matters

Mr. Barlow: I think the Slalom improvements are awesome and it feels more fun, but also feels more downhill oriented than ever. It struck me with the logging road going in that it sure would be nice to have a connection to Little Corporal from Upper Flume. It would help reduce uphill traffic on Slalom.

Mr. Bergeron: I agree. I think sometimes added features offer the misconception that it is a one-way trail. We used to bike up Toxic Forest, but that was decommissioned for Slalom, which was more round-trip friendly. But Slalom with the features made it more of a misnomer that downhill has the right of way. The only other way up there is from Little Corporal. So, we took away two uphill routes and made it one route that feels more downhill.

V) OPEN SPACE DISCUSSION

Cucumber Gulch Preserve Trail

Ms. Lowe: We had a great discussion in July about the trail that goes through the Cucumber Gulch Preserve. Since that time, we've had a "Friends of Cucumber Gulch" group come into formation by a group of neighbors who are invested in the Preserve. They have been working with Tony Boone, who is a trail designer, to come up with an option for a new trail through

the Preserve. If you recall the options we laid out in July, there are 4 proposed options for the Preserve. Option #1 is do nothing, with maybe trying to stabilize the existing trail in places. Option #2, which is our strong staff recommendation, is rerouting Toad Alley to follow the perimeter of the Preserve, which would daylight at Peak 8 thereby protecting the wetlands and habitat currently fragmented by Toad Alley. Option #3 is close to what is being proposed by the Friends of Cucumber Gulch included in BOSAC packet, which is a sustainably built trail that still connects to the Peaks Trailhead, but verges off Toad Alley just below the gondola and swings a little closer to Ski Hill Road. And Option #4, which is removing access altogether.

We wanted to bring this back to you because of this proposal that's been sent to us. I will say, it's a tricky thing with this Preserve, trying to balance all our natural resource protection, biodiversity, and the many species we have there, while also providing some recreational access. We discussed this in depth in 2019 and had talked about a reroute to as a way to be able to preserve core habitat. The thought at the time was that we didn't want to completely close off access to the public, because people tend to appreciate something when they have an opportunity to experience it. Having just received this proposal, staff would like a little bit more time to review and understand it. Also, from a staff perspective, we work very closely with Colorado Parks & Wildlife (CPW) on wildlife impacts when it comes to trail proposals. CPW has been engaged in a lot of Boreal Toad (state endangered species) efforts in the Preserve. We want their feedback on any option that we go with, as they are critical partners/funders. We want them to be happy with whichever route we go. We want to hear your feedback or questions on the proposal and any additional information or resources you all would need to feel comfortable making a recommendation.

Ms. Zanca: Is the proposal we received here the same or different from the original Option #3? Would this new proposal be as disruptive as our proposed Option #3?

Ms. Lowe: I would say it is very similar to what we had previously proposed. It solves a lot of issues we have with the turnpikes on the fen wetlands, which really cutoff a significant amount flow to the fens, but still fragments habitat and doesn't solve the wetlands/water issues below the gondola.

Ms. Zanca: So, an improvement over our original Option #3 concept? Does it use the same geography as well?

Mr. Overlock: It's pretty much the same. It avoid the wetlands above the gondola, uses a sustainable trail design, and pops you out the Peaks Trailhead. It's pretty much the same alignment.

Mr. Bergeron: I'd like to see a better map and potentially have the route flagged before the snow flies.

Mr. Rossi: Agreed.

Mr. Bergeron: One concern is having a portal right across from Peak 8, so this appeals to me in that regard. I'd love to see it flagged and see exactly where it goes.

Ms. LaRochelle: When you went out with Tony Boone, it sounds like he only looked at Option #3. So, you didn't walk the other options with him, or you did?

Mr. Overlock: We walked Option #2 as well and talked about Peak 8 access. I think he felt that we needed every trail option possible and that a sustainable Peak 8 entrance would become an issue to be dealt with eventually.

Ms. Joyce: In addition to or an additional option?

Mr. Overlock: In addition to whatever happens with Toad Alley.

Mr. Rossi: Anne, did you say you felt there was still concerns with site disturbance and fragmentation? Can you give us your opinion on that?

Ms. Lowe: I think from a conservation perspective, there are still concerns from the end of the boardwalk up to the gondola cut. The trail wouldn't be changed in this proposed option from Tony Boone. There are still a lot of water crossings and flow issues not addressed. My main concerns from a staff perspective are habitat fragmentation and the importance of the upland habitat for the boreal toad, a state endangered species, and other wildlife. I'd really appreciate CPW's perspective on any trail realignment or construction to make sure that it's not impacting critical habitat for an endangered species.

Mr. Rossi: When you get their opinion, can we get a sense of mitigation factors like seasonal closures?

Ms. Lowe: Absolutely. We don't do a ton of seasonal closures in Summit County, but we actually had a Regional Wildlife Meeting today on the potential for seasonal closures going forward and getting used to that concept in Summit County.

Mr. Bergeron: When does the gondola close? How long is it closed for?

Ms. Lowe: After Labor Day it only runs on weekends. Starting in October, it only runs for required maintenance and is closed to the public until it opens for the winter ski season in mid-November.

Mr. Bergeron: In the spring?

Ms. Lowe: There is a "dark period" from May 1st to June 15th, which allows the wildlife to do all their calving, fawning, and nesting during that sensitive time. We've done lots of studies with the ski resort to look at impacts from the gondola with their expert and our staff. Everyone was in agreement that we needed to have that dark period in the spring. The ski resort also offered that same closure in the fall, which is a time of animal movement and migration. That's why we have limited run times in September, and it doesn't run in October/early November.

Ms. Zanca: On the topic of Cucumber Gulch, can we revisit the suggestion regarding removing bikes from the Preserve?

Ms. Lowe: I think we can. From a staff perspective, we believe that bikers and hikers are making the same impact in the Preserve.

Ms. Zanca: A couple of large e-bikes came through last time I was in there.

Ms. Lowe: E-bikes are not allowed in there.

Ms. LaRochelle: Why are bikes not allowed in Wilderness Areas? There must be some reason behind that.

Mr. Reid: The Wilderness Act allows horses to go anywhere off trail, but bikes are considered mechanical. There was a big debate when this rule was introduced. It wasn't based on impact, per say. It was a somewhat arbitrary decision based on what is considered "mechanical." Research has shown that bikes and footfalls both create impacts, but those impacts are unique from each other. Generally speaking, bikes stay on the trail and are pretty predictable, whereas hikers are more likely to leave the trail and more unpredictable. Hikers don't move as quickly and tend to stay a little longer. Bikes are often perceived as both too loud (chain noise) and too quiet (smooth bike can scare people coming around a corner). The point in terms of the discussion on dropping bikes in Cucumber Gulch, I don't think it really gets you where you want to go. We haven't really seen definitive science to say that the Preserve would benefit from that. Another thing to consider, at other hiker only trails, we've seen that if you preclude cyclists, it often leads to more hikers knowing that there are no bikes there. What goal are we trying to accomplish at Cucumber Gulch?

Ms. LaRochelle: I think it was considered just as much for user experience reasons. Also, curious about the impact of bikers on wildlife?

Mr. Reid: They analyze footfalls and physical impacts of the tread on the trails themselves, but how do wildlife react to cyclists? Cyclists tend to be more predictable. Wildlife can then understand and be closer to the trail corridor because they predict themselves where that cyclist is going. Hikers, generally speaking, travel at a slower rate and are more likely to travel off trail. They tend to have a larger "shy distance."

Ms. LaRochelle: It seems like we are talking about both the trail options and the potential collaboration with this group and Tony Boone. I think hearing from people on both those topics would be helpful.

Mr. Rossi: Is our goal tonight to kick a recommendation?

Ms. Lowe: I'd like to not rush a recommendation. We just received this proposal, we need to have some discussions with CPW, and we'd like to give you all the time to go see the realignment in the field. I think it makes sense to do all that before trying to rush a decision.

Mr. Barlow: When do you think you'll have concluded discussions with CPW and have a sense of their feelings?

Ms. Lowe: I'd love to get their attention soon, but it can be difficult in the middle of hunting season. I think I could get a response at some point in the next month or so.

Mr. Bergeron: If this BGV thing goes through, we will get some money to use towards the Gulch. I'd like to explore increasing our naturalist presence.

Ms. Lowe: Related to that, is BOSAC interested, even if it's many years down the line, in exploring some means of enforcement?

Ms. Joyce: In the Gulch specifically?

Ms. Lowe: I envision it starting in the Gulch but expanding it elsewhere in the system. It seems to come up more and more often that we don't have an enforcement mechanism. Our naturalists are forward-facing to the public and have a lot of interaction with the public, but it's hard because they don't have any ability to issue citations, other than educate and redirect people. I think we are approaching the point where we need to start looking at enforcement.

Ms. Zanca: We've learned that talking at people didn't have the impact that was needed. A ranger must issue a citation with a fine associated with it; that's the only way to get compliance. I think we are there and need to start that conversation. We have rules there, they aren't enforced, and it is hurting the Gulch.

Ms. Lowe: We have a lot of great models from other Open Space organizations that have rangers in different capacities. We can look for some good examples and bring back additional information. I do totally agree and believe our naturalist program is really successful, but it would be great to be able to expand that and consider that enforcement perspective, too. Another idea that we talked about in July, especially if BVG is going to provide additional funding, it might be worth chatting with an engineer to see if we could do a full perimeter-type trail through the upper part of the Gulch. It would have to be highly engineered, but if we had the funds and felt that people needed that alternative, that could be something we explore.

Mr. Barlow: I think that's the dream goal. To not impact the resource, but give people access to the Peaks Trail without having to be on Ski Hill Road.

Ms. Lowe: This has been really great feedback. I think we'd like to take our time and be thoughtful on this. We will provide additional information, as well as flag the proposed trail realignment so you can get out and take a look at it.

Mr. Tennal: Is there is any point where we will need to bring EcoMetrics, Jessica Doran, or any of the folks involved with the science behind Cucumber Gulch Preserve?

Ms. Lowe: We certainly could. The one person who would be great to bring in would be Brad Johnson, who was a contractor for EcoMetrics. He is the one who did all the wetland and fen

mapping for us and involved in some of the earlier studies, he's very familiar with Cucumber Gulch Preserve.

Mr. Overlock: I will get the coordinates from Tony Boone and based on whatever platform he used to map out the alignment, I will flag the proposed path for BOSAC members to walk.

Ms. LaRochelle: I'm wanting to hear more detail about differences between Tony Boone's alignment and what staff proposed. How much deviation between the two?

Mr. Overlock: Not much deviation. The one we drew on the map and walked in the woods was just a concept of "here is an area where we can avoid some wetlands through trail connections." Tony Boone did more of a walkthrough with a clinometer and measuring grades.

Mr. Reid: Be careful walking the trail alignment, just based on the ordinance which requires visitors to stay on trail at all times. Let's not send out a map and groups of people to just guess the alignment.

Mr. Barlow: Thank you to the members of the public for keeping this conversation going and putting together that proposal.

Leave No Trace Gold Standard Site Certification

Mr. Overlock: The whole concept of Leave No Trace (LNT) is about teaching people to enjoy the outdoors in a sustainable manner. All the principles initially formed were focused on backpacking and backcountry ethics, but it's been redefined to include frontcountry zone, high use area by rephrasing key principles. With these 7 Principles and Behaviors, LNT has become more of a way to communicate in almost a universal language. When someone is traveling from another place, we have this universal language that people can understand and relate to understand cause and effect on the trails. I thought it was very relatable to Breckenridge's Mountain Ideal Certification on Sustainable Tourism, this is a great way to include that piece related to recreation and trails. As we move forward, we will train our staff in these methods and be sure to use this messaging on our websites, signs and kiosks, and social media posts. In a couple years we'd love to apply to be considered as a National recognized Gold Level Standard LNT site and potentially be the first local government entity to become recognized.

Ms. Zanca: What do you have to do to receive that designation?

Mr. Overlock: Using every platform possible to spread the messaging. Working with our partners at Breck Tourism, concierges, etc., and making sure to incorporate LNT messaging in our new sign/kiosk package. Having educational opportunities and training opportunities available for staff and volunteers, as well.

Ms. Zanca: Does LNT have standards for sign messaging?

Mr. Overlock: Not specifically. There are 7 Key Principles that form the basis of Leave No Trace. We have to be sure to include the correct information on those principles.

Ms. Zanca: So, there aren't specific logos and designs related to LNT that are required?

Mr. Overlock: No.

Mr. Tennal: Do you feel there is a deficiency in our existing LNT programming? Where is the biggest gap?

Mr. Overlock: I think we are doing well. The 7 Principles are almost more of a lifestyle change that a lot of folks are already practicing. We are looking good; the biggest challenge is how do we effectively communicate this message to the public.

Mr. Bergeron: I think it's a challenge because we are constantly dealing with such a large influx of people from other places.

Mr. Barlow: One of our biggest challenges related to user experience is trail etiquette. This seems like a great tool to crack the code there.

Mr. Overlock: The seventh principle is to be kind, be courteous.

Ms. LaRochelle: It seems like great content to work into our sign package.

Ms. Joyce: I like the idea of us being a leader in this. It sounds like the Front Range has a few good examples, but being the mountain town that does this particularly well, I think there is a lot of benefit from that.

Mr. Barlow: What tangible steps does it entail? Is there anything else that needs to happen for us to pursue this?

Mr. Overlock: Not really. Alex would get his Level 1 Certificate and we would start training our staff in the spring. I see this process going through the spring and implementing it through the summer and fall of 2024. We'd review in the spring of 2025, implement whatever else we need to do, and possibly apply in the fall of 2025 for Gold Level Standard.

Ms. Zanca: Is there a cost associated with this?

Mr. Overlock: Just the costs of the time and training associated with the LNT certifications. We also must be a member of Leave No Trace, which is a nominal, $150 annual fee.

Mr. Overlock: We will keep everyone updated as we go through this process.

Council Matters Related to Open Space Topics

Mr. Bergeron: First and foremost, the whole BGV thing. I am excited because it seems like it will help fund the Preserve and while not an open space issue, will also keep massive

development out of the Gondola lots. Most of us believe that this development will be better "up the hill." We've also been talking about trying to install more water filling stations around town. The Council is moving forward with eliminating the sale of single-use water bottles, which will go into effect next July. Initially, we considered eliminating all plastic, but I think that will be on hold for a little longer. We also extended the lease for BOEC for another 75 years.

Mr. Reid: BOEC not only wanted to extend their lease, but they also have exclusive use and non-exclusive use of the F&D Placer (near Sawmill Reservoir). There are areas like the ropes course where the public is not allowed (exclusive) and also (non-exclusive) areas like the Sawmill Reservoir and surrounding trail (often used for fishing). They'd like to expand their exclusive areas, which would include near the Sawmill Reservoir. We had to change the layouts so that they would have access to their former ropes courses, but still would maintain public access throughout the Sawmill Trail network. It's pretty much the same around the reservoir, but there will be exclusive areas for BOEC programming, which the public will not be allowed on.

Mr. Bergeron: Their programs are expanding, and this will allow them to continue doing what they're doing. It was a bit of a jigsaw puzzle, but the Council did a good job figuring it out.

Mr. Barlow: Scott Reid, do you know anything about the Upper Blue Sanitation/Iowa Hill thing?

Scott Reid: Upper Blue Sanitation is proposing to add two workforce housing units on their property. Their property is right by the Iowa Hill Trailhead and a new entrance would be created off Town property. Part of the exchange would remove access from the Public Works side (current location of entrance) with the creation of a new entrance from Airport Road to both the trailhead and their new expansion. The trailhead would also be expanded to 20 spots and potentially paved, as part of their exchange. There is a rendering in the Town Council packet that displays this proposed change, but imagining the current layout, it probably holds around 6-8 cars.

Mr. Bergeron: Still in the planning process?

Scott Reid: Yes. Discussion about Council support is tomorrow. After that approval, they would have to go through the whole planning process to finalize things. There are no density requirements.

Mr. Barlow: Any other matters?

Mr. Bergeron: Are we ok with some of the clear-cutting projects being done by the Forest Service around town? Like Tom's Baby area and Middle Flume? It has a perception of overkill in some places.

Ms. Lowe: It's much needed and I think the prescriptions in those areas are well thought out. In some areas where we have lots of spruce and aspen, it's more "spot treatment" and selective cutting, but there are some areas of clear cutting.

Mr. Bergeron: Ok, just wanted to make sure you are aware of it and onboard. I get a lot of feedback from the community about some of those projects.

Ms. Lowe: It's always a surprise when you see those areas and the view is altered. I do think they are making appropriate prescriptions, and it is what is needed in those particular areas.

Mr. Rossi: We had a meeting between Town Managers and a conversation came up about the Recreation Path around the County and how we might share resources or create some sort of joint jurisdiction. There were a lot of anecdotes about e-bikes (accidents and speeding) and maintenance/cost/expansion. There was also discussion about having a consistent user experience with signage standards, including speed recommendations and pointing out blind spots.

Ms. Zanca: Is this not a shared resource already?

Mr. Rossi: There is cooperation between the Town of Breckenridge, Summit County and Town of Frisco. Not as much involving Dillon, Silverthorne, and the new town of Keystone (which will now have input). The bike path is a pretty big resource and there isn't a group/governing body that shares any kind of standards.

Ms. Joyce: Timeline on McCain parcel? Wondering about the renaming timeline and when we would decide what we'd like to do with the parcel.

Ms. Lowe: Logistically, we are still waiting for the parcel to be surveyed and officially designated as Open Space. Our engineers have been reworking some of the other areas and we need to determine where exactly our land lies. We might have to wait until the arterial road is in place. This will affect our total acreage. We initially had around 33 acres and then Council had us purchase an additional 15 acres. A good portion of that additional 15 acres was utilized for the Blue River restoration project to ensure the river had proper sinuosity and the resulting flood plain. We need to see how much space we actually have there to work on.

Mr. Reid: Last Council meeting there was a CIP discussion. Based on that, we can somewhat predict that timeline. The main road being discussed (from Coyne Valley Rd to Breckenridge Building Center) will be constructed in 2024. This is the first step, which is around a 10 million expense. The 2nd step in 2025 would be addressing the Recreation Path piece. With the completion of Alta Verde 2 there is now a need for connectivity. Rec path design would happen next year with the construction beginning in 2025. There was some money put in there for Open Space to install a beginner bike course and other multi-use trails. I believe the idea was to focus on reseeding and regenerating in 2026, with the "soon to be named" parcel not to be reopened to the public until 2027.

Ms. Zanca: Do you recall how much money was identified for this project?

Mr. Reid: It was split between the general fund and Open Space. I can't recall on the Rec. Path, but the trail network and trailhead would be around $300,000.

Ms. Joyce: I must have missed that there was decision made on the beginner bike course/Recreation Path.

Mr. Reid: Council walked the site and observed that Alta Verde was close to completion and felt the need for this. The beginner bike park was identified as a need by the Council at their retreat this past spring. They also would like to see a trailhead out there as well.

VI) EXECUTIVE SESSION

Mr. Barlow moved that BOSAC go into executive session under C.R.S.§ 24-6-402(4)€ for the purpose of determining positions relative to matters that may be subject to negotiations, developing strategies for negations, and/or instructing negotiators concerning a property that the Town may be interested in acquiring for open space purposes. Mr. Rossi seconded the motion. BOSAC went into an executive session at 6:50 PM.

The executive session of BOSAC concluded at 7:36 pm. The participants in the executive session were Duke Barlow, Krysten Joyce, Nikki LaRochelle, David Rossi, Chris Tennal, Bobbie Zanca, and Council liaison Jeffrey Bergeron. Staff present included Anne Lowe, Tony Overlock, Mark Truckey, and Scott Reid. Jordan Mead was present from Summit County Open Space & Trails.

VII) ADJOURNMENT

A motion to adjourn the BOSAC meeting was made by Mr. Bergeron, and Mr. Tennal seconded it. The September 25th, 2023 regular meeting of BOSAC ended at 7:36 pm.

The next regular meeting of BOSAC is scheduled for October 30, 2023.

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Mr. Barlow, Chair

Memorandum

To:	Breckenridge Open Space Advisory Commission
From:	Open Space & Trails Staff
Re:	October 30, 2023 Meeting

Staff Summary

Field Season Update
The field season is winding down with OST Technicians completing the following:

- Trail maintenance on Sidedoor, Barney Ford, and the Chantilly Trail.
- Hazardous tree removal on Fall Classic, Turk's Trail, and Chantilly.

Additionally, Higher Ground Earthworks completed the Golden Horseshoe road repair work on Rich Gulch, Forest Queen, Humbug Hill American Gulch, and Rock Island Road. The contractor has begun work on the Brown's Gulch Trailhead with an expected completion at the beginning of November.

Many of our seasonal staff are finishing up their seasons to start their winter jobs. We will likely have a couple of Technicians stay with us into early or mid-November, as weather permits.

Peabody Placer Forest Health Project
The contractors have finished cutting on the Peabody Placer Forest Health Project and are wrapping up their operations for the season, which include hauling out remaining trees and restoring access roads. Due to the impending weather change at the end of October, the contractors have been given an additional two weeks to complete the tree hauling and restoration. This extension into November will not interfere with the Nordic operations at Gold Run Nordic Center.

Please visit the project site for more information: Peabody Placer Hazardous Fuels Reduction | Summit County, CO - Official Website (summitcountyco.gov).

Signage Workplan RFP
Staff is working on reviewing other sign plans in order to start drafting the RFP for our signage workplan. We anticipate have a draft in the next couple of weeks.

2023 Quandary Peak & McCullough Gulch Program Draft Report
Enclosed please find the draft 2023 Quandary Peak and McCullough Gulch Program Report completed by our partners at Summit County Open Space. New this year was a single contractor, SP+ Corporation, who handled both the parking reservation and shuttle program. For details on numbers of reservations and public comments for both parking and shuttle, refer to the report.

Please note that the draft will be updated as the stakeholders add to, or refine, the list of recommendations. Page 30 of the report details a list of draft recommendations to consider for continued management of the Quandary Peak and McCullough Gulch area.

QUANDARY PEAK & MCCULLOUGH GULCH PROGRAM REPORT

OCTOBER 2023 // PREPARED BY SUMMIT COUNTY

IN PARTNERSHIP WITH THE USDA FOREST SERVICE, TOWNS OF BRECKENRIDGE AND BLUE RIVER, AND COLORADO SPRINGS UTILITIES

CONTENTS

INTRODUCTION

2023 marks the third year of the shuttle and parking reservation system at Quandary Peak and McCullough Gulch.

From June 17 – September 17, visitors wishing to hike Quandary Peak or McCullough Gulch were required to purchase a parking reservation or ride a shuttle from Breckenridge. System operations remained generally the same as last year with a few minor changes in pricing structure, shuttle occupancy, and system timing. The biggest change that occurred in 2023 was a new contractor, SP Plus, managed both the shuttle and parking system. Staff selected SP Plus for a few reasons including the ability for the County to receive 100% of the parking and shuttle revenue, the option for SP Plus to utilize a 19-passenger shuttle during peak use, and a lower overall contract cost to operate the shuttle. Other changes that occurred in 2023 included a new parking pass program, where staff collaborated with Summit County libraries to create a free parking pass for library patrons. In addition, the Town of Breckenridge generously offered to split a portion of the overall subsidy and were integral in the RFP process.

Photo: Looking west toward the McCullough Gulch drainage.

PROGRAM DETAILS

To address public safety issues related to parking congestion, County staff and partner agencies collaborated to implement or continue the following management strategies and improvements in 2023.

- The County and Town of Breckenridge partnered with a new shuttle and parking contractor, SP Plus Corporation.
- SP Plus created a new reservation platform and website, *hikequandary.com*.
- County staff and the Road and Bridge Department continued to maintain parking lot infrastructure, including regularly striping the parking spaces and helipad landing zone as well as grading McCullough Gulch Road.
- The Sheriff's Office continued to issue parking tickets for illegally parked vehicles on County roads.
- Staff and project partners continued collecting data to measure program outcomes utilizing trail and vehicle counters, satisfaction surveys, and shuttle ridership and parking data.
- Staff and project partners improved communications and outreach.
  - Answered daily phone calls and emails
  - Created a media packet for project partners, lodging and tourism companies, and local organizations
  - Updated the Summit County website and created a press release
  - Reached out to 22 organizations and bloggers to update their websites with the new hikequandary.com website and current system information.
- The Quandary Peak, McCullough Gulch, and Blue Lakes Interagency Management Group (Summit County, Summit County Sheriff's Office, USDA Forest Service, Towns of Breckenridge and Blue River, and Colorado Springs Utilities) continued to conduct regular meetings to discuss management.

SHUTTLE PROGRAM

OPERATIONS

- Shuttles ran seven days per week from June 17 to September 17 from 5:00am - 5:00pm.
- Each shuttle had a capacity of 14 to 19 people and/or dogs.
- From June 17-30 and September 6-17, SP Plus operated only two shuttles, and from July 1 to September 5, SP Plus operated three shuttles.
- From 5:00am to 8:00am, all shuttles ran from Breckenridge (South Gondola Parking Garage) to the Quandary Peak Trailhead.
- After 8:00am, one of the shuttles stayed onsite and ran every 20 minutes from the Quandary Peak Trailhead to the McCullough Gulch Trailhead from 8:00am to 4:30pm.
- Pickup and drop off in Breckenridge from the South Gondola Parking Garage. The Town of Breckenridge offered free parking at the lot using a code that visitors received with their reservations.
- The McCullough Gulch shuttle service was included free of charge with the purchase of a parking reservation or shuttle payment. .

RESERVATIONS AND FARES

- Shuttle tickets could be purchased up to two weeks in advance at hikequandary.com.
- Fares were:
  - $7 for visitors
  - Free for residents. Summit County residents could email SP Plus with proof of residency to receive a discount code.
- Shuttles were first-come, first-served, so customers could take a shuttle at any time on the day for which they purchased a ticket.
- Passengers were required to show payment confirmation at boarding.
- Dogs were allowed to ride the shuttle, and tickets were not required for dogs.

Photo: SP Plus shuttle waiting for visitors.

PARKING RESERVATION

OPERATIONS

- SP Plus developed a new website, hikequandary.com, and managed both the parking and shuttle reservation systems from this platform.

- Parking reservations were required from June 17 to September 17. Parking was free and first-come first-served outside of those dates.

- Since parking is prohibited on County roads, McCullough Gulch hikers must park at the Quandary Peak Trailhead at all times.

Photo: Vehicles parked in the Quandary Peak Trailhead parking lot.

RESERVATIONS

- Parking reservations could be made up to two weeks in advance at hikequandary.com.

- Full Day Parking
  - Full day parking: 5:00am-3:00pm
  - $30 for non-peak days (Monday-Thursday, excluding holidays)
  - $55 for peak days (Friday-Sunday, plus holidays)

- Short-term Parking
  - Short-term parking: 4 hours
  - $10 for non-peak days (Monday-Thursday, excluding holidays)
  - $20 for peak days (Friday-Sunday, plus holidays)

- Parking was free after 3:00pm and did not require a reservation.

ENFORCEMENT

- The Sheriff's Office and SP Plus enforced parking at the Quandary Trailhead and along McCullough Gulch Road.

- To discourage overnight parking, parking was not allowed between 12:00am and 4:00am.

- Violations in the Quandary Peak parking lot and along McCullough Gulch Road were a $100 fine.

PROGRAM COMPARISION

Summit County and project partners instituted new changes during 2023 including shuttle fares and season length. Table 1 below provides an overview of the changes implemented over the past three years.

TABLE 1: 2021 - 2023 PROGRAM COMPARISON

	2021	2022	2023
Timeframe	July 30 - October 31	June 1 - September 30	June 17 - September 17
Shuttle			
Contractor	Summit Express	Summit Express	SP Plus
Number of Vans Utilized	Three 13-passenger vans	Three 13-passenger vans	Two or three 13 - 22 passenger vans
Operating Time	5:00 am - 6:30 pm	5:00 am - 5:00 pm	5:00 am - 5:00 pm
Shuttle Ticket Cost	Free	$15 per person, $5 per local resident	$7 per person Free for local residents
Reservation Type	No reservations required	First-come, first-served on reserved day	First-come, first-served on reserved day
Breckenridge Pickup/ Drop Off Location	Airport Road Lot	South Gondola Parking Garage	South Gondola Parking Garage
Parking			
Contractor	Interstate Parking	Interstate Parking	SP Plus
Number of Parking Spaces	67	67	67
Operating Time	4:00 am - 7:30 pm	5:00 am - 3:00 pm	5:00 am - 3:00 pm
Parking Reservation Type and Cost	• Half day morning ($20) • Half day afternoon ($20) • Short-term, 3 hours ($5)	• Full day ($50 - peak days, $25 - non-peak days) • Short- term, 3.5 hours ($20 - peak days, $5 - non-peak days) • Free after 3:00 pm	• Full day ($55 - peak days, $30 - non-peak days) • Short- term, 4 hours ($20 - peak days, $10 - non-peak days) • Free after 3:00 pm

INVESTMENT AND REVENUE

Summit County Government and Town of Breckenridge contracted with SP Plus to provide a parking reservation and shuttle service at a total cost of $277,069 (see Table 2). Per an Intergovernmental Agreement, the County paid SP Plus a fixed sum of $251,069 for the shuttle service, and the Town paid $26,000 for the Flat Management Fee and Sphere Technology. All revenue from the parking reservations, parking citations, and shuttle reservations were remitted to the County. To help with the long-term sustainability of the system, the Town agreed to split the program subsidy by 50% up to $60,000, meaning that the Town contributed a total of $30,000 to support the shuttle and parking system (this includes the $26,000 management fee).

Unlike the previous two years where the parking contractor took 50% of the revenue, 100% of the shuttle and parking revenue was remitted to the County this year. The County received $42,889 in shuttle revenue, $5,521 in parking citation revenue, and $173,496 in parking reservation revenue for a total of $221,906.

Therefore, the entire subsidy for the 2023 operations was $55,163. With the $26,000 management fee and $1,581 contribution from the Town, the remaining $27,581 cost of the shuttle contract was subsidized from the Summit County Open Space and Trails Department's budget. This subsidy is a $134,813 decrease from last year.

TABLE 2: FINANCIAL COMPARISON OF COUNTY COSTS

	2021	2022	2023
Shuttle Contract Cost	$267,600	$294,138	$251,069
Shuttle Revenue to County	$0	$34,411.04	$42,889

	2021	2022	2023
Parking Reservation Management Fee	N/A	$5,000	$26,000*
Revenue to County	$47,424	$97,332	$173,496
Citation Revenue to County	N/A	$2,976	$5,521

	2021	2022	2023
Summit County Subsidy	$220,176	$162,394	$27,581

* Paid by the Town of Breckenridge

PROGRAM DATA

The Quandary Peak Trailhead parking lot has a capacity of 67 spaces—50 spaces for full day reservations, 12 spaces for short-term reservations, and 5 spaces for overflow per day. Occupancy was often exceeded, as SP Plus had the ability to turn the short-term spaces multiple times in one day since their system was based on specific timeslots. For example, if one reservation was from 8:00am – 12:00pm, SP Plus could open a 12:00pm – 4:00pm space. This ability helped increase access to the two trails.

SP Plus utilized three, 14- or 19-passenger vans for the 2023 season. From June 17-30 and September 6-17, SP Plus operated one 14-passenger and one 19-passenger shuttle. During peak season from July 1 to September 5, SP Plus operated three shuttles. Two shuttles were always the 14-passenger vans, and one shuttle was either the 14- or 19-passenger shuttle depending on the day of the week (e.g., the 19-passenger shuttle was often used on busy Saturdays).

Similar to 2022, all three shuttles made continuous loops from Breckenridge to Quandary Peak from 5:00am – 8:00am. After 8:00am, one shuttle was allocated solely to the McCullough Gulch loop while the other shuttle(s) continued to take passengers back and forth from Breckenridge to Quandary Peak.

Photo: View of Quandary Peak from McCullough Gulch Road.

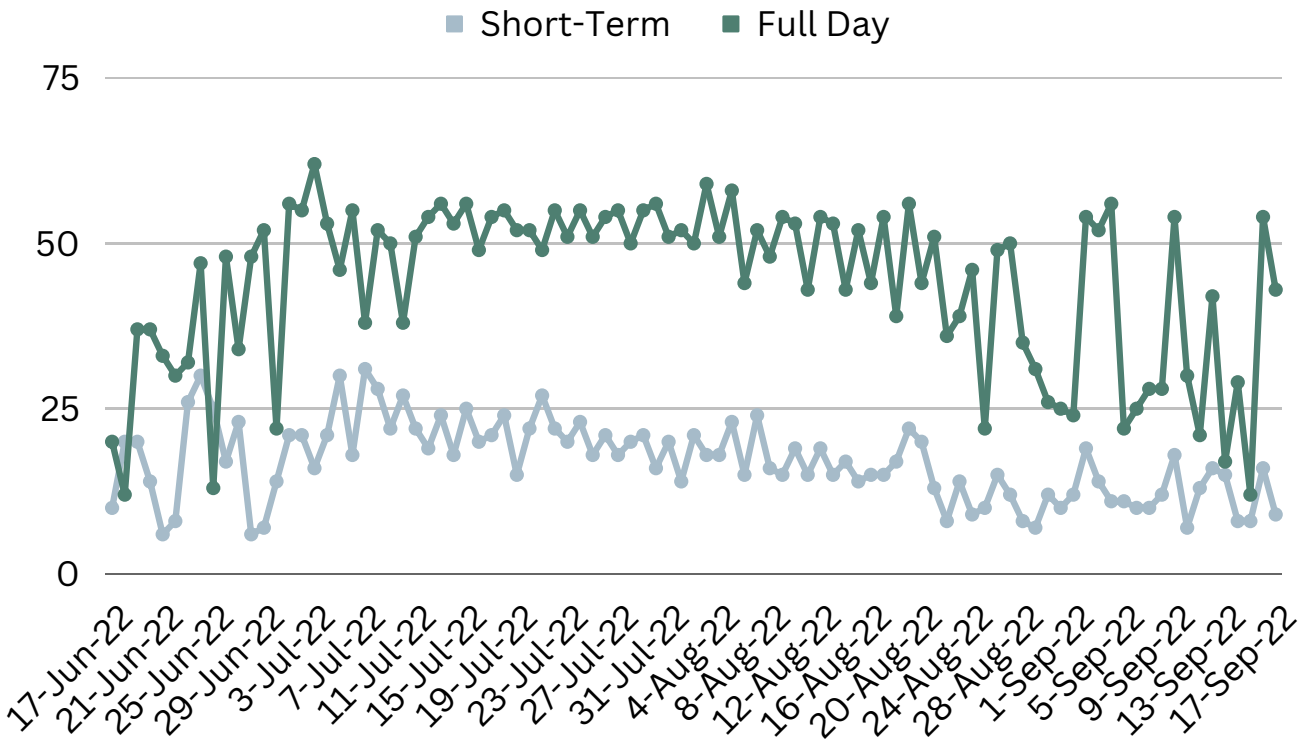
PARKING: SEASON OVERVIEW

From June 17 to September 17, **visitors purchased a total of 5,760 total parking reservations**, an 11.5% increase from 2022 (n=5,164 reservations) and a 71.2% increase from 2021 (n=3,364 reservations). The reason for the increase from last year is most likely a result of SP Plus turning short-term spaces over multiple times a day. In addition, visitors are continuing to hear about the system well in advance of their hike date.

Of the total parking reservations in 2023, visitors reserved **4,088 full day reservations** (126 fewer than 2022) and **1,576 short-term reservations** (626 more than 2022).

Photo: New parking lot signs.

Figure 1: Total Full Day and Short-Term Parking Reservations in 2023



PARKING: MONTH

JUNE

From June 17 - June 30, visitors made a total of 691 parking reservations, a slight 4.3% decrease from June 2022. Of these total reservations, 465 were full day and 226 were short-term.

JULY

July was the most popular month. Visitors made 1,619 full day reservations and 671 short-term reservations for a total of 2,290 parking reservations. This is a 28.1% increase from 2022.

AUG.

August was the second busiest month, as visitors made a total of 1,883 reservations—1,413 full day and 470 short-term reservations. This is a 12.8% increase from 2022.

SEPT.

From September 1 to September 17, visitors made 591 full day and 209 short-term reservations for a total of 800 parking reservations — a 9.2% decrease from 2022.

Figure 2: Total Number of Parking Reservations Per Month

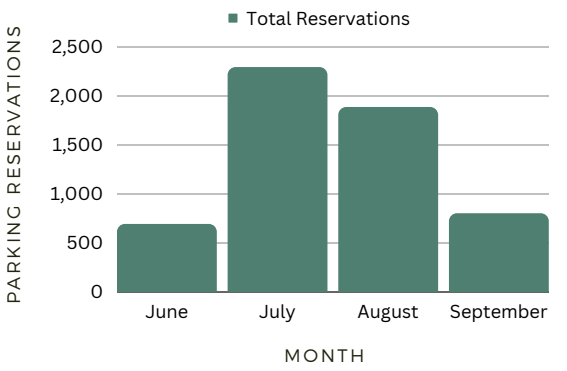
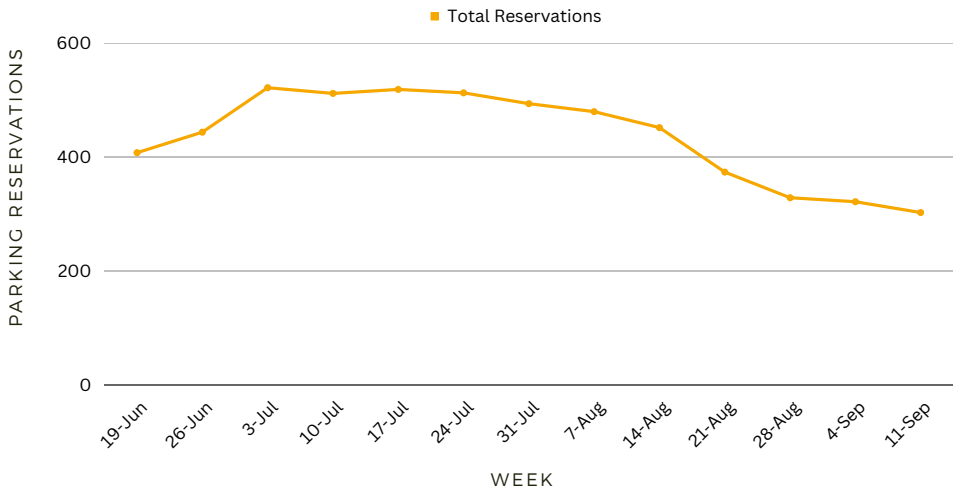


Figure 3: Total Number of Parking Reservations Per Week

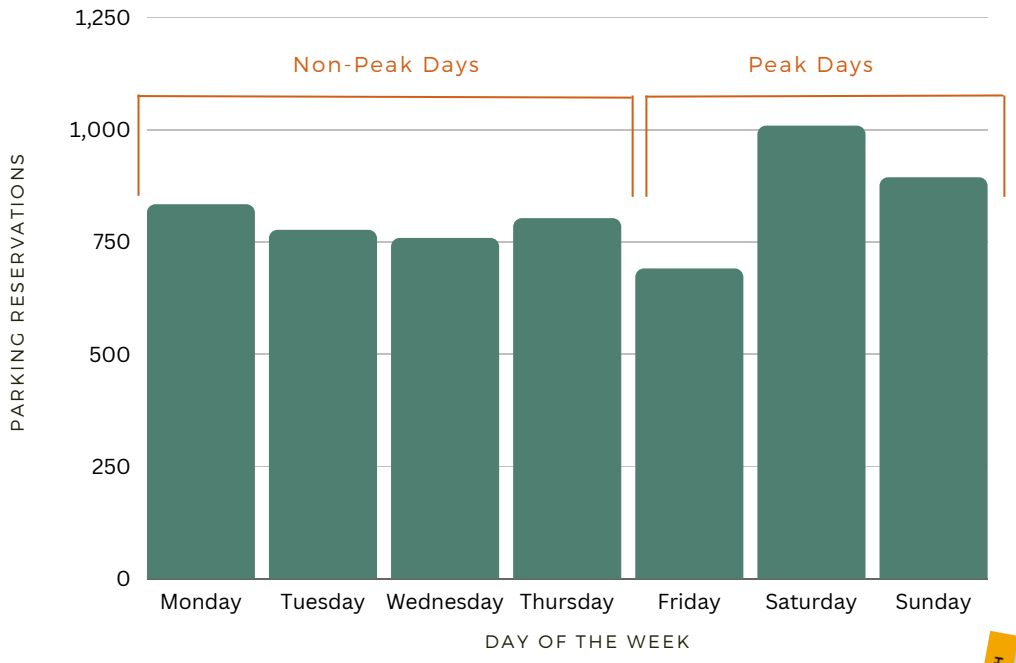


PARKING: DAY OF THE WEEK

Saturdays (n=1,008) and Sundays (n=893) were the two most popular days to make a parking reservation in 2023 (Figure 4). Although Friday was also considered a peak day, it was the least popular day to make a reservation (n=690 reservations). Friday was also the least popular day to make a parking reservation in 2022.

Reservations on non-peak days were evenly distributed throughout the week, with a difference of only 75 reservations between Monday (n=833), the most popular non-peak day, and Wednesday (n=758), the least popular non-peak day.

Figure 4: Total Number of Parking Reservations Made by Day



LIBRARY PASS

To reduce the financial barrier of the parking reservations, staff worked with the Summit County libraries to create a new parking pass program. Anyone with a Summit County library card had the ability to check out a Quandary Peak Trailhead parking pass. Each library branch (Frisco, Breckenridge, and Silverthorne) had one pass available and library patrons could use the pass for one day during their week-long check out period. In the beginning, the libraries issued a code that patrons could enter on hikequandary.com to receive a free reservation. However, the electronic process proved to be too complicated, and therefore, the parking passes became a physical tag that someone could hang on their front view mirror.

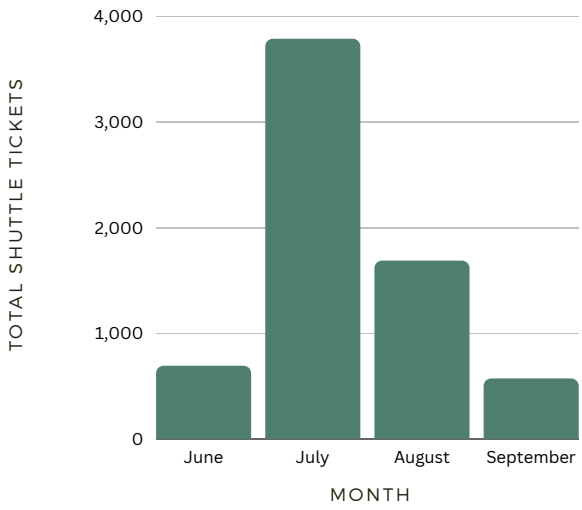
From June 17-September 17, **library patrons checked out the parking passes 32 times**. The pass at the Breckenridge branch was checked out the most (17 times), followed by Frisco (10 times), then Silverthorne (5 times).

SHUTTLE: SEASON OVERVIEW

SHUTTLE TICKETS

From June 17 to September 17, **visitors purchased 6,738 shuttle tickets**, **a 149.6% increase from 2022** (n=2,699 tickets). It is likely that the increase in ticket sales is due to the lower $7 price of a shuttle ticket versus the $15 price in 2022. In addition, all shuttle tickets were free for Summit County residents. Residents simply had to email SP Plus with proof of residency (e.g., driver's license, utility bill, mortgage payment) and SP Plus would send a discount code to be applied at check out. This program was a success, as **499 Summit County local passes** were 'purchased' in 2023, as opposed to only 54 local tickets purchased in 2022. This **824% increase** may be attributable to the free cost of a ticket as opposed to $5 in 2022, as well as the ease of receiving a discount code versus creating an entire resident profile on a third-party website, which was required last year.

Figure 5: Total Shuttle Tickets Purchased Based on Month



SHUTTLE RIDERSHIP

Total ridership on all four routes was 28,828 passengers and 693 dogs, **a 187.2% increase** from 2022 (n=10,195 passengers). Of these total passengers, 6,736 people rode the shuttle from Breckenridge to the Quandary Peak Trailhead, and 6,490 took the shuttle back to Breckenridge from the Quandary Peak Trailhead. Of the visitors utilizing the shuttle system to travel to and from McCullough Gulch, 8,104 people rode the shuttle from the Quandary Peak Trailhead to the McCullough Gulch Trailhead, and 7,498 passengers rode the shuttle back from the McCullough Gulch Trailhead to the Quandary Peak Trailhead. It is inferred that ridership was higher to and from McCullough Gulch than Quandary Peak because both parking reservation and shuttle ticket holders could ride the shuttle to McCullough Gulch from the Quandary Peak Trailhead, and this service is free for everyone.

Figure 6: Total Shuttle Ridership Based on Route

SHUTTLE SYSTEM DATA

SHUTTLE RIDERSHIP BASED ON MONTH

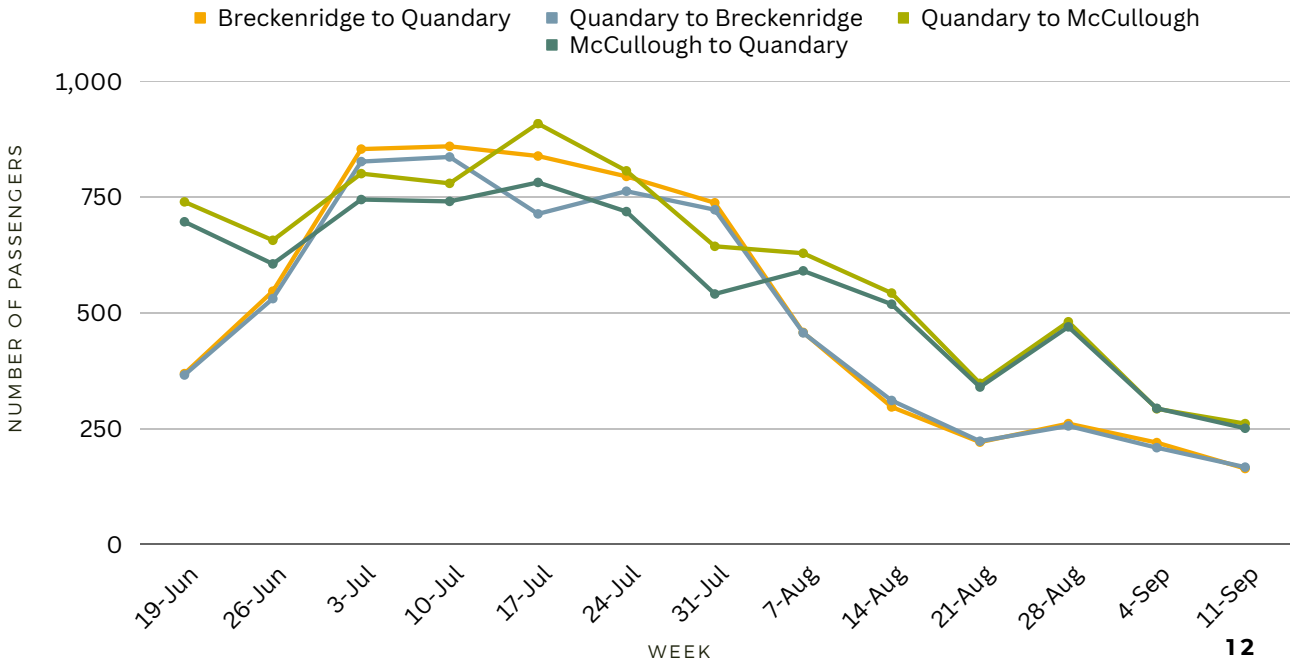
July was the most popular month to utilize the shuttle system, as visitors purchased a total of **3,787 tickets** and total ridership on all four routes was **14,096 passengers**. This total equates to an average of 3,524 total riders or 114 riders per day. Peak ridership occurred Saturday July 22 on the Breckenridge to Quandary route when 286 passengers rode the shuttle in one day.

August was the second most popular month to utilize the shuttle system, although ridership was about half of July ridership. In August, visitors purchased **1,687 shuttle tickets**, and total ridership on all four routes was **7,907 passengers**. This total equates to an average of 1,977 total riders or 64 daily riders.

In June, visitors purchased **692 tickets**, and total ridership on all four routes was **4,036 passengers**. There was a substantial difference in ridership between the Breckenridge/Quandary route (average of 669 total riders per route) and the Quandary/McCullough Gulch route (average of 1,349 total riders per route). In June, there were approximately 51 to 103 daily riders based on the route.

The shuttle system was the least utilized in September, as only **572 tickets** were purchased, and total ridership on all four routes was **2,789 passengers**. Shuttle reservations varied drastically in September, with a range of 6 to 93 tickets being purchased per day. Daily ridership was about 41 riders.

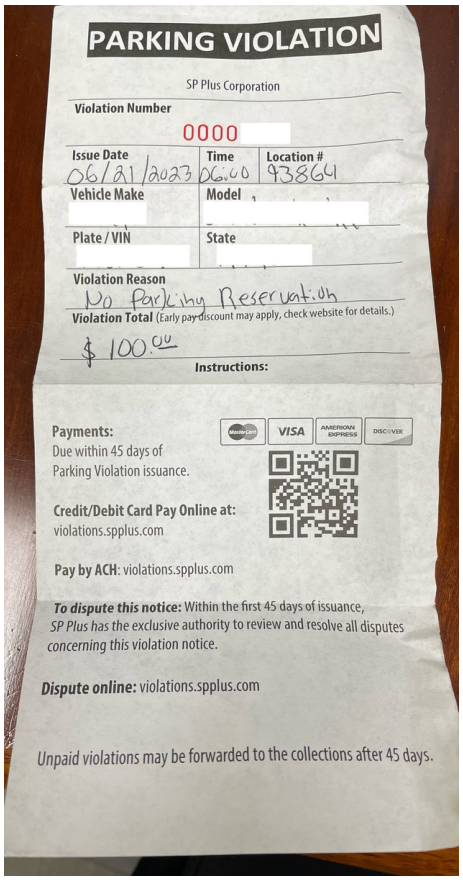
Figure 7: Total Shuttle Ridership Based on Route and Week



VIOLATION DATA

In the Quandary Peak Trailhead parking lot, SP Plus issued a total of **223 parking violations** from June 17 to September 17. Due to no cell phone service, SP Plus did have difficulty in enforcing visitors who overstayed their allotted time. Therefore, roughly all the tickets issued in the Quandary Peak Trailhead parking lot were visitors who parked without a reservation. Last year, 276 violations were issued during the four month-long system, and 333 parking violations were issued during the three month program in 2021. **This means that violations dropped 19% from last year and 33% from 2021.** It can be inferred that outreach efforts, signage, and word-of-mouth has helped spread the word about how to appropriately access Quandary Peak and McCullough Gulch. In addition, the SP Plus parking attendant was able to provide visitors with information about the system to prevent them from receiving a ticket.

The Sheriff's Office issued X citations from June 17 to September 17 along McCullough Gulch Road.


PARKING VIOLATION

SP Plus Corporation

Violation Number

0000

Issue Date: 06/21/2023 | Time: 06:00 | Location #: 93864

Vehicle Make | Model

Plate / VIN | State

Violation Reason: No Parking Reservation

Violation Total (Early pay discount may apply, check website for details.)

$ 100.00

Instructions:

Payments: Due within 45 days of Parking Violation issuance.

Credit/Debit Card Pay Online at: violations.spplus.com

Pay by ACH: violations.spplus.com

To dispute this notice: Within the first 45 days of issuance, SP Plus has the exclusive authority to review and resolve all disputes concerning this violation notice.

Dispute online: violations.spplus.com

Unpaid violations may be forwarded to the collections after 45 days.

Photo: A ticket received for parking without a reservation.

PUBLIC FEEDBACK

SATISFACTION SURVEY

To gauge satisfaction of the parking reservation and shuttle system, Summit County staff distributed a satisfaction questionnaire, asking about their experience reserving a parking spot or shuttle ticket, the cost of a reservation, ease of riding the shuttle, and ability to find information online about the program. This survey mimicked the satisfaction survey distributed in 2021 and 2022 in order to compare feedback received over the past three years.

In 2023, staff installed five survey kiosks with paper surveys in the Quandary Peak Trailhead—one at the shuttle stop, two next to the trailhead sign, and two next to the restrooms. From June 17 to September 17, **visitors completed 109 surveys.**

Photo: Satisfaction survey kiosks stationed at the Quandary Peak Trailhead.

SURVEY RESULTS

Overall satisfaction of the system

1=terrible; 10=excellent

Visitors were more satisfied with the shuttle system than they were with the parking reservation system. **Visitors gave the shuttle system an overall satisfaction ranking of 7.4 and a 3.1 rating for the parking reservation system.** The reason for the low satisfaction of the parking system is likely attributed to the high cost of a reservation and the inability to pay onsite. Visitors enjoyed the shuttle system because it was convenient and had friendly drivers, but said the wait times were too long and a time schedule is needed.

Would you recommend the system to other visitors?

60% of visitors stated they would not recommend the parking reservation system to others because it is "too expensive," "confusing," and "a rip off to locals." Of the visitors that would recommend the parking system, most stated it was "because they had to [use it]." On the other hand, **85% of visitors stated they would recommend the shuttle system** because it was "efficient," "easy to use," and "reduces emissions." This follows the same sentiment as the previous two years with more people recommending the shuttle system than the parking system.

Ease of making a reservation/ using the system

1=very difficult; 10=very easy

Visitors felt reserving a shuttle ticket (rating = 8.3) and riding the shuttle system (rating = 8.6) was very easy. One visitor stated "shuttles are usually a pain and require a lot of waiting, but this was so easy!" On the other hand, **visitors thought reserving a parking spot was only slightly easy (rating = 5.8), although 82% stated that they did not have any trouble parking**. Most comments related to needing more signage at the trailhead, having trouble using the website to book a reservation, and being confused about the reservation parameters (e.g., "will I be ticketed after 3:00pm if the full day reservation ends at 3:00pm but I park until 5:00pm?").

Acceptability of cost

1=expensive; 10=inexpensive

Visitors thought the cost of the shuttle ticket was relatively inexpensive and **gave the shuttle cost a rating of 7.5. Visitors felt the cost of a parking reservation was very expensive with a rating of 3.1,** and a majority of the open ended comments were related specifically to the high cost. These ratings were very similar to previous years, as visitors gave the shuttle system a 7.6 rating in 2021 and 8.1 in 2022. The 3.1 rating was exactly the same as 2022 for parking, but lower than 2021 rating of 4.4.

PARKING RESULTS

When and which trail did you visit?

Of the visitors that completed a survey, **60% visited on a peak day and 40% came on a non-peak day**. Most people that reserved a parking space stated they hiked **Quandary Peak Trail (70%)** as opposed to only **28% going to McCullough Gulch Trail** or **2% visiting Blue Lakes.** This is similar to 2022, as over 76% of parking reservation holders hiked Quandary Peak.

Parking reservation type

Of the survey respondents utilizing the parking system, **59% reserved a full day reservation and 26% reserved a short-term reservation**. There were a few visitors that stated they parked after 3:00pm (**6%**) or said that they were not aware of the system and could not park because they did not have a reservation (**9%**).

In 2023, it took most visitors an average of **6.1 hours to hike Quandary Peak and 4.7 hours to hike McCullough Gulch**.

How frequently do you visit?

A majority of survey respondents stated that this was their first time visiting Quandary Peak or McCullough Gulch (51%), or that they rarely visit these trails (37%). This level of frequency is similar to 2022, as 64% of visitors also stated it was their first time. **Only 12% of visitors** stated they visit Quandary Peak or McCullough Gulch **two times or more per year**.

Overall experience and crowding sentiment

Visitors had an **excellent experience on their hike** despite what they thought of the parking system. On a scale of one (terrible) to ten (excellent), survey respondents had an **overall experience rating of 8.2**.

In addition, when asked if the trails felt crowded, **visitors stated that the trails were not very crowded with a rating of 3.9 out of 10** (1=not crowded, 10=very crowded). Compared to 2022, visitors felt slightly more crowded this year than last year (rating=3.4).

PARKING COMMENTS

THE FOLLOWING REPRESENTS VERBATIM, OPEN-ENDED COMMENTS RECEIVED FROM THE PARKING SURVEY.

Cost

- I have been wanting to do this hike for a long time, but the permits are too expensive for me to justify it.
- RIP OFF TO LOCALS!
- Far too expensive!!
- It is DISCRIMINATORY again poorer people and minorities.
- I understand the reason to do it, but it is a roadblock in me wanting to redo this hike again.
- Fine is too close to parking cost.
- Parking was too expensive. $15 is more appropriate... won't be back due to parking expense.
- What happened to free first-come first served? There should not be a fee for hiking.
- $55 to park is INSANITY!
- We worry it's not accessible to people with less money.
- Paying for nature is absurd.
- Too expensive for my taste
- Biggest rip off to locals EVER!!!
- Just seems wrong to charge $$$. I know you are trying to control traffic on the trail but still this is unacceptable.
- Allow carpooling or $20 parking.
- Cut it out! It is stupid to charge people to enjoy nature.
- If my girlfriend had told me parking was $50, then I would not come.
- It should be about $20 cheaper.
- National parks should be free. Please do not charge for parking. Stop capitalizing the outdoors!
- Where are the fees collected going? $55 for the hundreds that hike - where is this money going?
- $50 bucks is highway robbery.
- $30 to park during the week is bull*#$t! Should be $10 during the week which lot was ~1/3 full. I respect the need to limit the number of cars, but this is too much.

Compliments

- Convenient for an early start.
- It was easy to use.
- Thankful for the after 3pm option for locals!
- Certainly lots of people, but I didn't feel crowded at all - except a bit at the summit.
- Thank you a lovely experience.
- Very convenient, good way to have a spot available.

Infrastructure and site characteristics

- Dirt lot, no trash cans, and toilets are not clean.
- Did not do hike because I couldn't park. Need a parking pass machine. No cell reception to get pass.
- No service at trailhead and didn't know you needed [a reservation].
- Parking lot and site need work!
- If paying to park, a trash can would be nice at the bottom.
- Need a trail camera in lot.
- I would like a few more trail signs or ribbons around trees to mark the way.
- Site needs serious work.
- Saw a lot of people leave clothes and belongings by the sign on the trail.
- For $50, there should be some toilet paper in the port-o-johns!!

System Operations

- It was initially confusing how to reserve an all-day pass. Just having a radio button option would be helpful. E.G., ( ) Partial day ( ) Full day
- The parking system was impossible to use on the website! It was so frustrating especially without service. It was very confusing!!
- The online site should have a box to check for all day parking.
- The reservation system is UNACCEPTABLE. First come first serve is obviously the way. Many spots were open and I still had to pay the expensive fee.
- How were we supposed to know about this system? We just got into town last night.
- There are unused spaces and we are prohibited from using them. Ridiculous! So disappointed that there is a new barrier to using my national forest.
- Keeps me away from the national [forest] that I pay for with my tax dollars.
- Parking reservation system is an unnecessary obstruction for people trying to enjoy tax-funded national parks. VERY dissatisfied. Please do better.
- We were not informed and could not park and couldn't enjoy the national forests. It should be first come first serve to enjoy the trails and NO COST!
- Sign says advanced notification/reservation and some people turned away as they did not even try to go online and reserve.
- The website and sign in the overflow parking lot says "must have a reservation to park before 3pm." So it sounds like we can park in the lot w/o a reservation, but what about at the McCullough Gulch TH? Can people park there w/o a reservation after 3pm? Since this wasn't clear online or on your sign, we did not hike unfortunately. What a disappointment.
- I would disallow dogs. They damage the trail and are a danger to other hikers (tripping hazard). Very supportive of the reservation system-better for the trail and neighborhood
- Unaware I needed to pay to park. Would have reconsidered visiting if I knew. Trail and lot in good condition. BUSY trail. Needed enforcement of dogs on leash. Lots of small children and dogs that clogged the trail.
- Wish $$$ was used for enforcement of or education of trail etiquette.
- Have an hourly option. Maybe w/ a minimum 4 hours.
- You need a button for full day. Not easy to navigate.
- It is confusing. I don't like to load parking app on my phone.

Photo: Vehicles parked in the Quandary Peak Trailhead parking lot.

SHUTTLE RESULTS

When and which trail did you visit?

Of the visitors that completed a shuttle survey, **57% visited on a peak day and 43% came on a non-peak day.** Most people that rode the shuttle stated they hiked Quandary Peak Trail (**59%**) as opposed to **41%** of visitors going to McCullough Gulch Trail. Shuttle riders who took the survey in 2022 were about equally as likely to hike McCullough Gulch as Quandary Peak.

How frequently do you visit?

Similar to parking survey respondents, **91% of shuttle riders stated that this was either their first time visiting** Quandary Peak or McCullough Gulch (69%) **or that they rarely visit** these trails (22%). Only 9% of visitors stated they sometimes visit Quandary Peak or McCullough Gulch more than two times per year. This frequency is similar to 2022, as 84% of visitors last year stated it was their first time visiting or they visit fewer than one time per year.

Overall experience and crowding sentiment

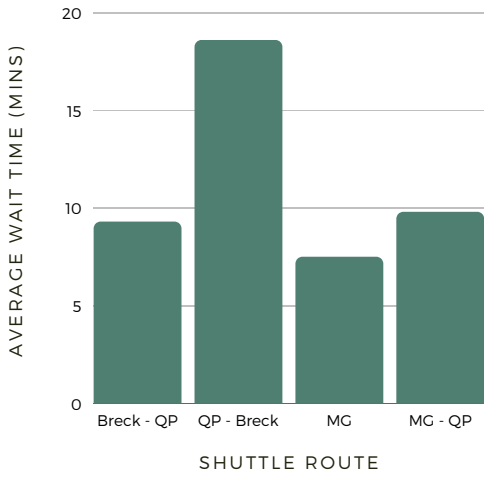
Shuttle riders stated they had an excellent experience on their hike, with an **overall experience rating of 9.4** out of 10.

In addition, when asked if the trails felt crowded, **visitors stated that the trails were moderately crowded with a rating of 5.1** out of 10 (1=not crowded, 10=very crowded). Compared to 2022, visitors felt more crowded this year than last year (2022 rating=3.7).

Average wait time

Of the visitors utilizing the shuttle system, the **average wait time on all four routes was 11 minutes**, with a range between 7.6 to 19 minutes. Visitors stated that the Quandary to Breckenridge route had the longest wait time of 19 minutes, with 18% stating that they waited 35 minutes or more for a shuttle. The visitors that waited more than 35 minutes visited Quandary Peak or McCullough Gulch when only two shuttles were running before July 1 or after September 7. All other routes were under 10 minute wait times.

FIGURE 8: AVERAGE SHUTTLE WAIT TIME



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SHUTTLE COMMENTS

THE FOLLOWING REPRESENTS VERBATIM, OPEN-ENDED COMMENTS RECEIVED FROM THE SURVEY.

Shuttle system timing

- They need later shuttle times! It ends too early. There needs to be a time schedule too.
- Shuttle needs to stay on schedule and not abandon people at the trailhead/parking lot.
- All advertising said the shuttle vans ran every 30 minutes, but we waited 45+ minutes both ways. This really disrupted our planning for the day!
- Long wait after the hike for the bus.
- Waiting much longer for shuttle bus than I have in the past. Should not have buses just waiting 25+ minutes before they leave for Quandary.
- There needs to be later shuttle times! It is advertised until 5pm but last pick up [at McCullough Gulch] is at 4pm! We had to walk 2.5 miles back to our car.

Compliments

- Convenient!
- Shuttle drivers were super friendly and accommodating.
- Great way to cut down traffic/parking headaches!
- Shuttles are usually a pain and require a lot of waiting but this was so easy
- Beautiful trail.
- Efficient, cheap, and frequent.
- Friendly, easy, don't know why people complain.
- Susan was so friendly and helpful after our hike. Also, our first driver took us straight there.
- Both of our drivers were great! Thank you for a great easy convenient and pleasant service!
- The drivers are pleasant and friendly.

Communication

- We didn't know about the shuttle program. We arrived today from Buena Vista and are super annoyed that we could not hike today. Sign posting is extremely poor.
- There is no information at the parking lot leading you to the place where you can take a shuttle.
- The shuttle driver told us that the last shuttle picked up at McCullough at 4:30 which is not true.
- Information at the lot and information from the drivers would be helpful.
- We couldn't locate the Breck shuttle at first.

System logistics

- Price isn't accessible. Exit should not be timed- [it] added a lot of stress when hike took longer than anticipated. We couldn't stop enjoying things!
- If it's not an hourly rate why do I need to select an end time? It should be an hourly option.
- I wish I couldn't purchases multiple tickets - I have do make three separate transactions. *(Issue resolved mid-season.)*
- The negative part of buying shuttle passes is that you have to do it for each person. *(Issue resolved mid-season.)*

Infrastructure and site characteristics

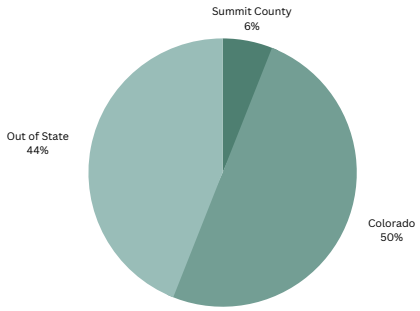
- The site needs serious work.
- The site is terrible.
- Some benches at pick up locations would be nice.
- Unacceptable - especially in poor weather with no shelter or sun reprieve.
- Need telephone/cell service.

DEMOGRAPHICS

To understand who is using the shuttle and parking reservation system, visitors were asked certain demographic questions. These results are a combination of both parking and shuttle survey respondents, as demographics did not differ between the two groups.

Zip code of primary residence

Only **6% of survey respondents stated that they were Summit County residents**. Otherwise, 50% of visitors lived in Colorado but were not Summit County residents, and **44% were from another state or Canada**. This composition of visitors is almost the same as last year, as 95% of survey respondents were not Summit County residents.



Age

The average age of survey respondents was **39 years** old. The age range of visitors who took the survey was 21 to 63 years old.

Gender

There was almost an **equal split between female (52%) and male (44%)** respondents. Roughly 4% preferred not to answer this question.

Ethnicity

7% of visitors were of Hispanic, Latinx, or Spanish origin, 82% were not, and 11% preferred not to answer.

Race

A majority of visitors stated they were white (79%). Other races included Asian (4%), American Indian or Alaska native (1%), another race not listed (5%), and Native Hawaiian or pacific islander (1%). 10% preferred not to answer.

Household Composition

Most respondents stated they were **"single, no children"** (26%) or a **"couple, with children at home"** (23%).

Household Income

There was no pattern in household income. 22% of visitors stated they made $200,000 or more, but 18% stated they made $50,000 or less.

PUBLIC COMMENTS

To gauge what information visitors needed, **Summit County staff compiled comments and questions received by the public via email and phone communications** over the course of the 2023 summer season. They are categorized by theme, and this data set is separate from the satisfaction survey.

During the course of the 2023 season, the Open Space and Trail Department received a total of 53 emails—47 question-related emails and 6 emails with comments about the program. This total does not include the **numerous daily phone calls (on average around three to five calls per day) to the Open Space and Trails general phone line**.

COMMENTS

Comment emails received by Open Space and Trails staff concerned either access to McCullough Gulch after the shuttle system ended or visitors trying to resolve a parking ticket and being frustrated with the process. See below for an example of the comments.

McCullough Gulch Access

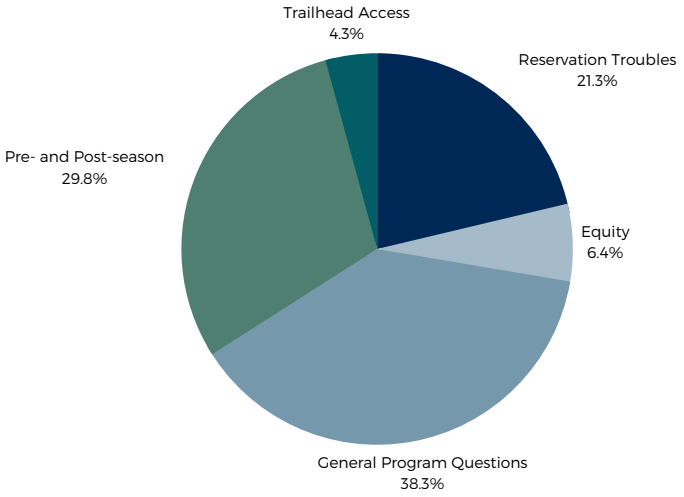
- "As you know, there's no parking allowed along McCullough Gulch Rd and no shuttle from the base parking lot to the trailhead after 9/17. It's unfortunate that this wonderful, popular hike is now 4 miles longer just because there's no parking along the side of the road. I'd like to see the regulations relaxed to allow parking along one side of the road after September 17 when the shuttle stops running."
- "After the bus system shuts down (and the summer Breck crowds are over) it is a great time for locals to hike McCullough. Making people park in the Quandary lot---which is much more likely to have parking problems---does add a long stretch of uninteresting road and does make it harder for some of us slower hikers to get higher into the gulch."

Parking Violations

- "I'm sharing this out of frustration. The website to resolve my ticket did not recognize the violation # or vehicle. After multiple attempts to contact direct, I finally reached a rude customer service rep and she put me on hold and disconnected the call. I'm still trying to resolve, so sending this feedback as I suspect lots of other people have had the same problem."
- "I understand the need for Parking Reservation to control the amount of hikers/cars, however it's frustrating that even though I went the correct process I was still given a parking violation."

QUESTIONS

Staff received 47 emails with questions pertaining to trailhead access, accessibility, general shuttle and parking operations, pre- and post-program questions, and how to fix reservation errors. Below is a sample of questions received from visitors.



PRE- OR POST-PROGRAM

"Will a reservation be required to park at Quandary on June 1st 2023?"

“I am planning to 14er hike for Quandary peak on October 8th. Do I need to do reservation for parking?”

“Does the lack of reservations mean parking is free after 9/17? Or are parking rates the same, but paid in-person without reservation?”

RESERVATION TROUBLES

"I am attempting to purchase a parking spot for Quandary Peak and I have used multiple browsers that don’t work. Can you help me?”

EQUITY

"I was wondering if there is a military discount/promo code for parking to hike Quandary?”

"Is there disabled parking at the Quandary Peak trailhead?”

GENERAL INFORMATION

"Is it possible to park before 4am at the parking lot?"

"How frequent are bear sightings on this trail around this time?"

"I’m thinking that might be our plan to Uber to Quandary trailhead! Have you heard of anyone doing that?"

"Is the Lower McCullough Gulch trailhead also part of the hikequandary parking reservation system? Or is it still free parking as it was in years past?"

TRAILHEAD ACCESS

“With the parking rules around McCullough Gulch, I’m wondering if I can still park at the pull-offs along 851?”

“Would you have any advice on how to best reach the Pacific Peak and North McCullough Gulch area?”

VISITATION DATA

Understanding levels and patterns of visitation at Quandary Peak and McCullough Gulch allowed partner agencies to evaluate how the third year of the program influenced recreational access and demand. **Staff continued monitoring various trail and vehicle counters** that were installed in the same location as 2021 and 2022. These counter locations included Lower McCullough Gulch Trail, Upper Blue Lakes Trail, McCullough Gulch Road, and Blue Lakes Road. In addition, the Colorado Fourteeners Initiative provided TRAFx data from the East Ridge trail counter on Quandary Peak to represent use on the peak's main route, and the Forest Service provided data from a TRAFx trail counter located at the start of the McCullough Gulch Trail.

NOTE: *Staff divided all detections, or the time-stamped records recorded on the counter, by two to account for out-and-back travel. Therefore, visitation in this report is represented as "visits" (so half the time-stamped records), or the distinct number of times that visitors hiked Quandary Peak or McCullough Gulch, or "trips," the number of out-and-back travel by vehicles.*

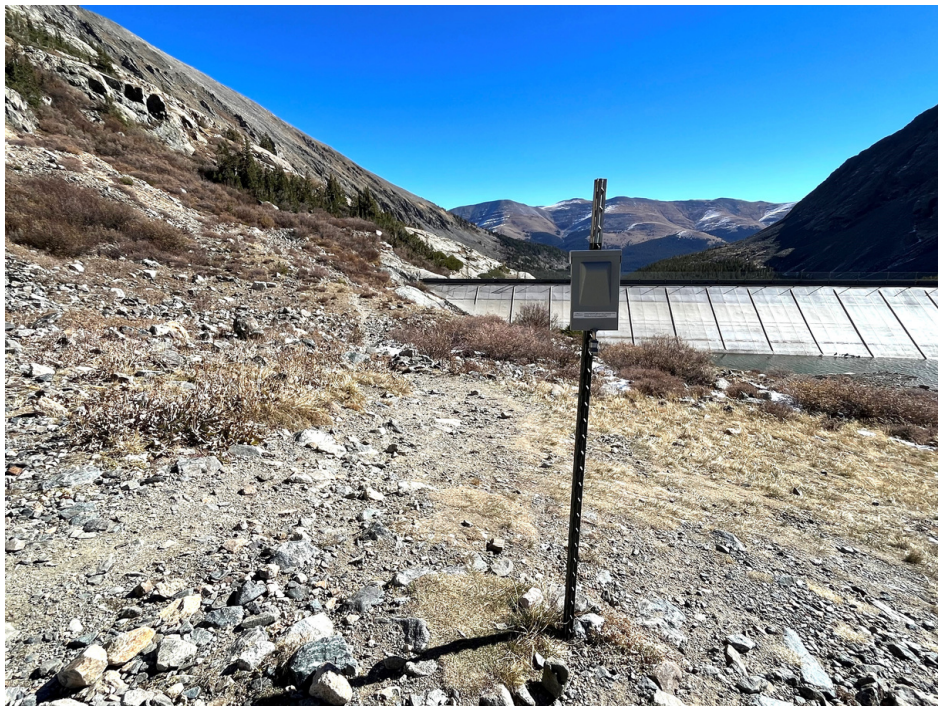


Photo: Trail counter on the Upper Blue Lakes Trail.

QUANDARY PEAK

From June 17 to September 17, 2023, **Quandary Peak had an estimated 22,243 visits, a 23.5% increase from 2022** (n=18,010 visits) and 17.1% decrease from 2021 (n=26,810 visits, Figure 10). July received the highest visitation with 9,680 visits and an average of 312 hikers per day. August was the second busiest month, with 7,065 visits and an average of 228 hikers per day. September received 3,220 visits and an average of 189 hikers per day, and June was the least busiest month, with only 2,278 visits and an average of 175 hikers per day.

Saturdays (n=5,490 visits) were the busiest days and visitation was almost double that of a weekday. Although Wednesdays were the least popular day to visit Quandary Peak with 2,365 total visits, **there was little variance between Monday to Friday visitation** with a range of 2,365 to 2,823 visits. Peak visitation at Quandary Peak occurred on Saturday August 5, where the trail counter detected 586 visits in one day. The quietest day at Quandary Peak was Wednesday September 13 (n=49 visits).

FIGURE 9: VISITATION BASED ON DAY

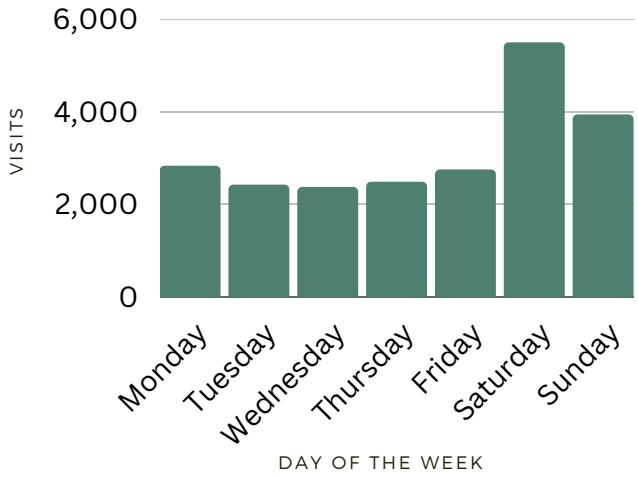
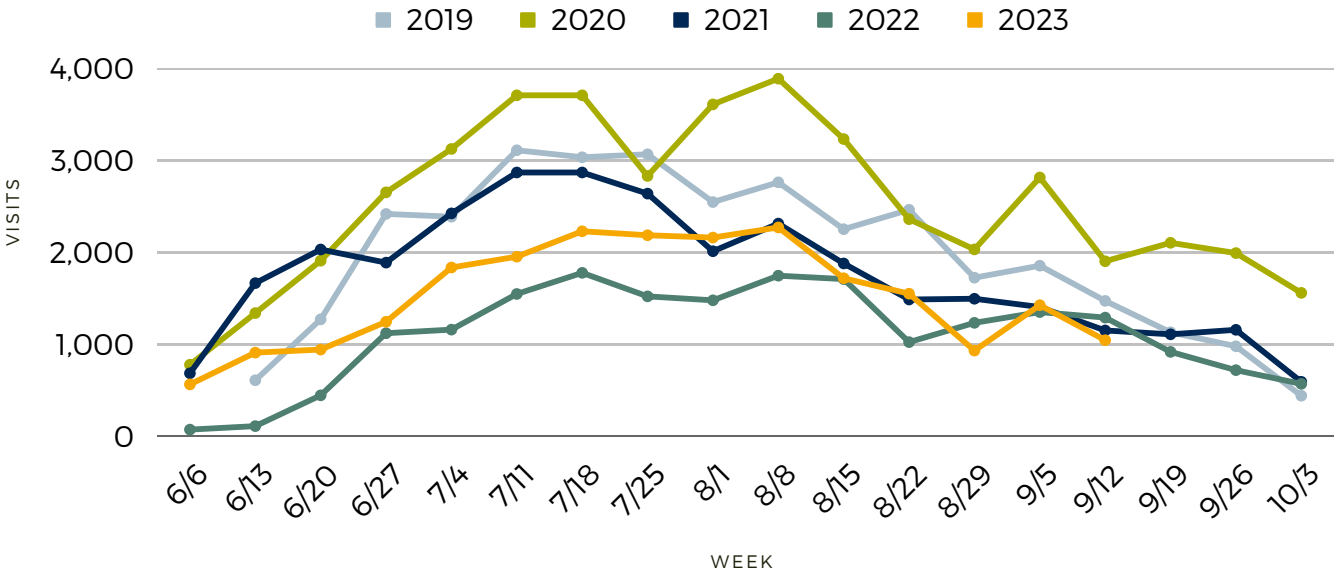


FIGURE 10: VISITATION AT QUANADRY PEAK 2019-2023



MCCULLOUGH GULCH

From June 17 - September 17, **McCullough Gulch had an estimated 11,797 visits. Total visitation in 2023 increased 90% from 2022**, but decreased 17.5% from 2021 and 46.5% from 2020 (Figure 12).

July was the busiest month with 5,345 visits, followed by August with roughly 3,431 visits. June was the third busiest month with 1,652 visits, and September was the least busiest month with 1,370 visits.

Saturdays, with an average of 318 visits per day, **were the busiest day of the week** to hike McCullough Gulch. Apart from Saturdays, the other days of the week had similar visitation with an average ranging between 212 visits (Tuesdays) and 285 visits (Sundays).

FIGURE 11: VISITATION BASED ON DAY

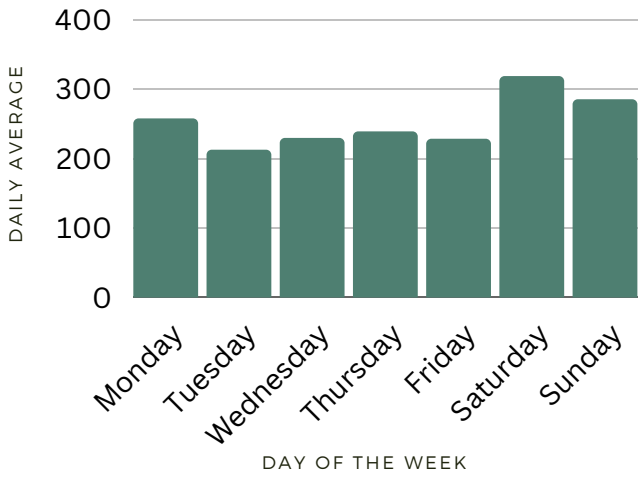
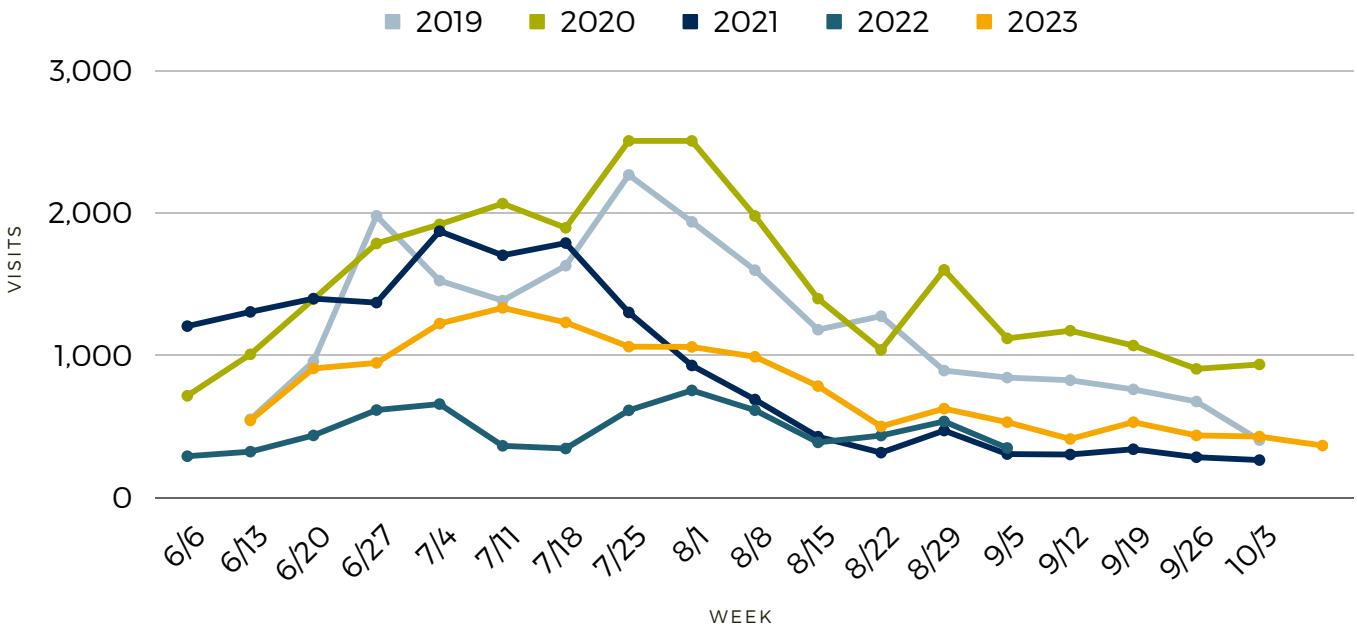


FIGURE 12: VISITATION AT MCCULLOUGH GULCH 2019 - 2023



ADDITIONAL VISITATION

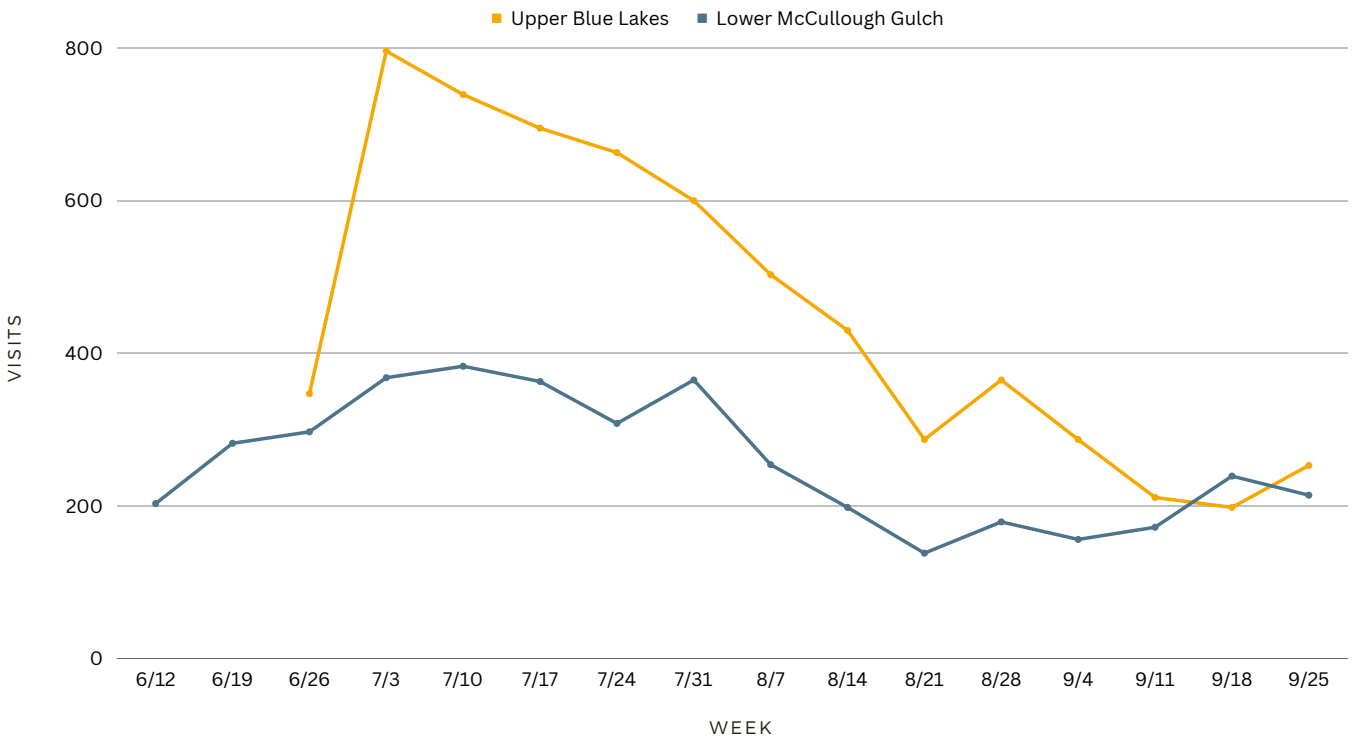
To determine if visitation increased on adjacent trails, staff continued to monitor the Lower McCullough Gulch and Upper Blue Lakes trail counters.

Visitation at Upper Blue Lakes and Lower McCullough Gulch continues to be substantially lower than visitation at Quandary Peak and McCullough Gulch. From June 17 to September 17, the **Upper Blue Lakes Trail received 5,925 visits (a 12.7% decrease from 2022) and Lower McCullough Gulch Trail received 3,590 visits (a 10.8% decrease from 2022).**

July was the most popular month to visit the Upper Blue Lakes Trail (n=3,249 visits), followed by August (n=1,861 visits), and then September (n=1,158 visits). Due to a counter error, visitation was not collected at the end of June.

At Lower McCullough Gulch, visitation during June (n=893 visits), August (n=999 visits), and September (n=851 visits) was fairly consistent. July was the most popular month, with visitation almost doubling from the other three months (n=1,579 visits).

FIGURE 13: WEEKLY VISITATION AT UPPER BLUE LAKES AND LOWER MCCULLOUGH GULCH TRAILS IN 2023



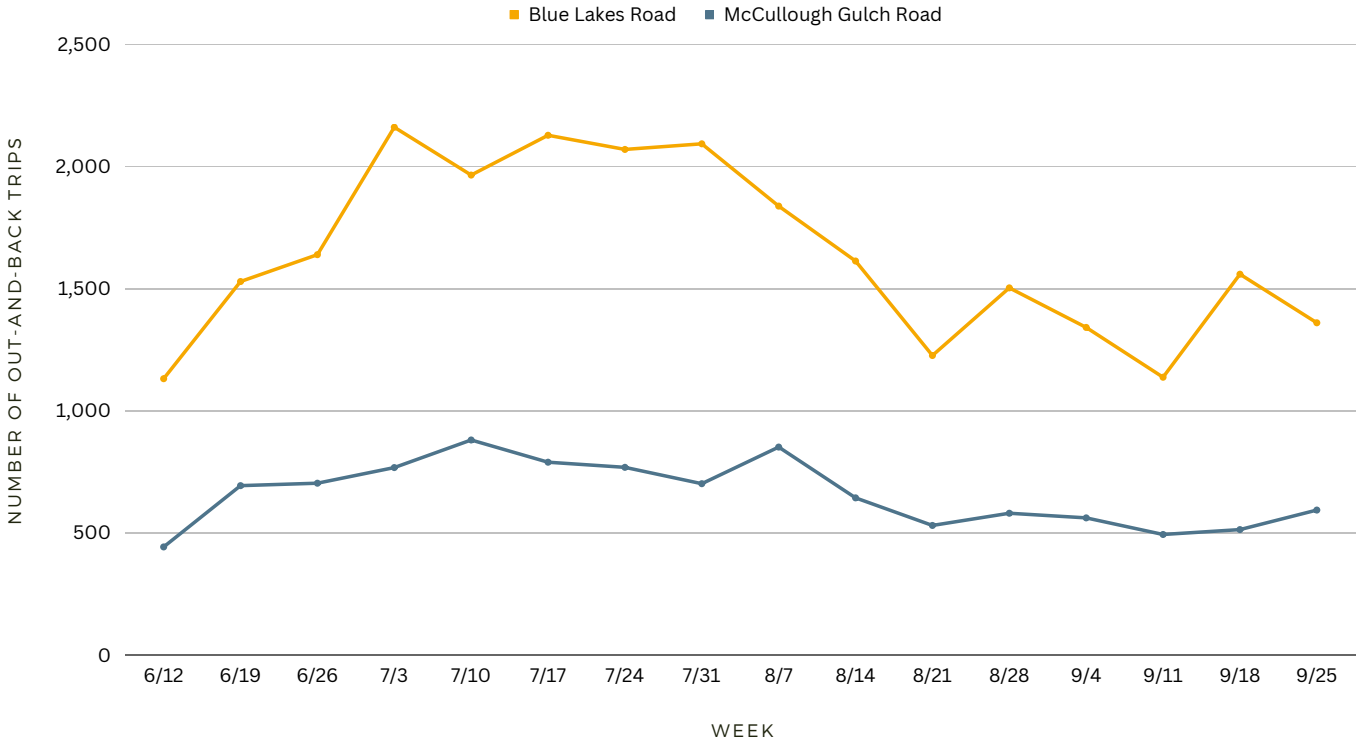
VEHICLE DATA

Staff installed two vehicle counters on McCullough Gulch Road and Blue Lakes Road to collect data regarding the number of vehicles still traveling on McCullough Gulch Road despite the parking regulations near the trailhead, and to gauge use on the adjacent Blue Lakes Road to determine if traffic there increased as a result of the system. Counters were installed in the same locations as 2021 and 2022 for staff to be able to compare vehicle use since the start of the pilot program in 2021.

Similar to 2021 and 2022, **visitation on McCullough Gulch Road in 2023 was lower than Blue Lakes Road**. From June 15 to September 17, the McCullough Gulch Road counter detected **9,288 out-and-back trips**, **a 17.5% decrease from 2022**. Visitation was fairly consistent in all four months. Although July received the highest average daily use of 114 trips per day, June and August both had an average of 93 trips per day and September received an average of 83 trips per day.

From June 15 to September 17, the Blue Lakes Road counter detected **22,921 out-and-back trips, a 10.9% increase from 2022**. July had the highest average daily use with 300 trips per day, followed by August (228 trips), then September (203 trips), and then June (195 trips).

FIGURE 14: WEEKLY VISITATION ON MCCULLOUGH GULCH ROAD



CONCLUSION

The parking reservation and shuttle system continues to successfully improve public safety, decrease congestion on surrounding roads, and allow emergency vehicle access. The interagency management group—which consists of Summit County Open Space and Trails and Road and Bridge departments, Summit County Sheriff's Office, Forest Service, Towns of Breckenridge and Blue River, and Colorado Springs Utilities—continued to meet regularly to discuss and manage the area.

The following recommendations, which were made in collaboration with the interagency group, continue to look for ways to improve the parking reservation and shuttle system, address equity and inclusion concerns, and provide adequate access to the area. In addition to the parking and shuttle system, greater challenges in the area include parking congestion at nearby trailheads, the new National Monument designation, displacement of use, lack of adequate infrastructure, financial sustainability, and staff capacity.

The following recommendations are not organized by priority and are independent of cost. Further discussions must occur between partners to prioritize the following strategies based on funding availability and the goals and priorities of each partner agency.

Photo: Crowding occurring at Lower Blue Lakes.

RECOMMENDATIONS

Shuttle System

- Continue to assess all aspects of shuttle operations (i.e., frequency, accessibility) that help increase shuttle use and enhance financial sustainability.
- Consider utilizing larger vans (19- and 25-passenger vans) during peak times to reduce passenger wait times.
- Consider decreasing weekday number of vans, and afternoon service from Breckenridge to Quandary due to low demand and as a cost saving measure.
- Consider running the McCullough Gulch shuttle from 8:00am - 4:00pm only, and not having this shuttle part of the Breckenridge to Quandary Peak loop in the early morning.
- Continue opertaing the shuttle from 5:00am - 5:00pm (the primary demand hours).
- Continue road maintenance (e.g., grading) on McCullough Gulch Road to reduce shuttle travel time.
- Improve the information provided in visitors' confirmation emails to reduce confusion around parking in the South Gondola lot and using the free parking code.
- If possible, open the restrooms up earlier at the shuttle pick up in Breckenridge for the 5:00am visitors.
- Consider constructing a shade structure and benches to protect visitors from the sun and inclement weather when waiting for a shuttle.
- Continue utilizing the Breckenridge parking garage as the shuttle pickup location in Breckenridge and work with the Town of Breckenridge to offer free garage parking with the purchase of a shuttle ticket.
- Continue to offer the free Summit County resident tickets.
- To limit confusion, add additional signage directing visitors to the shuttle pick-up and drop off locations.

Parking Reservation System

- Consider reducing the cost of a parking reservation to improve satisfaction ratings and equitable access to Quandary Peak and McCullough Gulch.
- Continue offering full day and short-term reservations, as well as free parking after 3:00pm.
- Request feedback regarding why visitors are cancelling their reservations.
- Continue to utilize strategies to maximize space availability in the parking lot.
- Strategize ways to limit the number of visitors still driving to the McCullough Gulch trailhead to find parking, such as increasing and improving signage.
- Resume the library parking pass program in 2024 and consider offering more than one pass per library.
- Seek alternative options that do not require cell phone coverage for visitors that arrive and are unaware of the parking reservation requirement.
- Assess the possible expansion of the Quandary Peak Trailhead parking lot. With the acquisition of the adjacent property, any possible expansion of the trailhead should also contemplate impacts to shuttle ridership.

Infrastructure

- Continue to maintain parking lot infrastructure and seek alternative methods to delineate parking spots (e.g., fire hoses or rocks) to decrease the staff time required to maintain the painted lines.
- Particularly in the context of National Monument planning, staff and partners should address the overall condition, infrastructure, and services in the area. Several comments stated the site was in terrible shape.
- Install better or more signage at the South Gondola Parking Garage to direct visitors to the shuttle pick up location.

Reservation Platform

- Continue to have one company oversee the reservation system and central website to make either a parking or shuttle reservation.
- Continue to improve the accessibility and ease of using the reservation platform.
- Allow multiple shuttle tickets to be purchased under one reservation.
- Improve the readability and flow of the website to encourage visitors to read the information about the system.
- Provide detailed information about how to access each trail if making a parking reservation or riding the shuttle.

Other Recommendations

- Improve access to McCullough Gulch when the shuttle service ends. Explore management and parking options for McCullough Gulch Road and Trailhead.
- Continue to partner with the Sheriff's Office to provide enforcement.
- Parking congestion is occurring at Blue Lakes and Spruce Creek, so staff and partners must consider strategies that take a holistic approach rather than focusing only on Quandary Peak and McCullough Gulch.

Photo: Vehicles parked illegally at McCullough Gulch after the shuttle system ended.

ACKNOWLEDGEMENTS

Summit County: Allison Morton, Katherine King, Jordan Mead, Jessica Forsyth, Brad Kremske, Sheriff Jaime FitzSimons, Lieutenant Kevin Igo, Commander Scott Wagner, Undersheriff Peter Haynes, Robert Jacobs, Sarah Hulsey

USDA Forest Service: Adam Bianchi, Cindy Ebbert, Sam Massman, Daniel Morris, Tyler Kirpatrick

Town of Breckenridge: Anne Lowe, Matt Hulsey, Shannon Haynes

Town of Blue River: Michelle Eddy, John DeBee

Colorado Springs Utilities: Lisa Walters, Jackie Chambers

SP Plus: Kie Ehlers, Karl Foster, Annette Olvera, Garrett Litsinger

Memorandum	
To:	Breckenridge Open Space Advisory Commission
From:	Open Space & Trails Staff
Re:	October 30, 2023 Meeting

Open Space & Trails Discussion

Naturalist End of Season Report
The 2023 Naturalist season is wrapping up at the end of October. The Naturalists, Ella Garner and Lauren Sawyer, will join the BOSAC meeting for a presentation of the season's highlights. The end of season report is enclosed.

Staff requests BOSAC watch the presentation and be prepared answer the following questions:

1. ***Does BOSAC have any questions or concerns regarding the naturalist report?***
2. ***Does BOSAC have any ideas or feedback for the naturalists?***

Cucumber Gulch Preserve Updates
At the last BOSAC meeting, BOSAC members requested hearing from experts related to trail alignments and the ongoing wetland and habitat protection in Cucumber Gulch Preserve (Preserve). CPW is hoping to send someone to the BOSAC meeting, but they have been too busy to meet with staff during the hunting season.

ERO Resources
Bill Mangle of ERO Resources volunteered to staff that he was approached by Tony Boone about the proposed trail alignment through Cucumber Gulch Preserve. He said he told Tony Boone that he doesn't recommend a trail through the Preserve to Peak 7, as it bisects habitat and does not align with the OST Master Plan. He said a perimeter trail would be most beneficial to Preserve health. Bill offered to send a memo, which is included in the packet and includes many references to our OST Master Plan. As BOSAC members will recall, Bill was hired by DTJ Designs as a subcontractor on our OST Master Plan.

Johnson Environmental Consulting
Brad Johnson, a subcontractor of EcoMetrics who completed all the fen and wetland mapping studies in the Preserve, offered to send an email with his thoughts on recreation and Preserve management. Please see the enclosed email.

OST Master Plan
Our OST Master Plan includes many references to habitat protection and Cucumber Gulch Preserve. Please refer to the Conservation Overlay component of the management zones on page 22. Cucumber Gulch Preserve is located in the Conservation Overlay, which recommends limited infrastructure, low trail type and density, and limited trail elements. Additionally, our trail planning and design guidelines on page 24 recommend considering habitat impacts early, avoiding wetland and riparian habitat, avoiding sensitive wildlife habitat, and minimizing new habitat fragmentation. There is also a recommendation on considering opportunities for conservation with new trails. Please also refer to the conservation section on trail development guidelines on page 27.

Additionally, one our Stewardship Strategic Initiatives in the OST Master Plan is Habitat Protection as a critical part of our program. Finally, Cucumber Gulch Preserve is identified as a Strategic Initiative, which recommends management of trail users and visitors to reduce human impacts on page 45.

Gondola Studies

Our contractors throughout the years have analyzed a lot of wildlife data in relation to the gondola operations. Included in the BOSAC packet are charts of animal captures from our cameras showing spikes in animal activity during the spring closure and again during the fall closure in the Preserve. Also included is a study by EcoMetrics regarding the gondola operations in the Preserve, and while the report focuses on the gondola and wildlife interactions, the report provides great information on wildlife, habitat, and the dark period.

Staff requests that BOSAC review the enclosed information and be prepared for further discussion. No vote is needed at this time.

1. ***Does BOSAC have any feedback for staff related to the additional materials?***
2. ***Does BOSAC need more information or review of this topic?***

2024 TOB Open Space Grant Review

Enclosed in the packet are two open space-related grant requests and supporting documentation for BOSAC's consideration. These two applications were included in the Town's grant program and have been referred to BOSAC for discussion and recommendation. As BOSAC recalls, the Town has an active grant program and Town Council's grant committee chooses which submitted grants are reviewed by BOSAC and will potentially be funded via the Open Space program. Any BOSAC recommendations will be considered by the Town Council grants committee.

The Colorado Fourteener's Initiative and Friends of Dillon Ranger District were both funded in last year's grant cycle.

The two grant applications include:

- The Friends of Dillon Ranger District ($15,000) seeks funding for urgent trail maintenance, wildlife habitat improvement, and forest stewardship projects throughout the Breckenridge and Blue River area.
- The Colorado Fourteener's Initiative ($10,000) seeks funding for trail maintenance, engaging volunteers in trail stewardship, educating hikers, and collecting hiking use data on Quandary Peak.

Staff requests BOSAC review the two grant applications and answer the following questions:

1. ***Does BOSAC have any questions regarding these two grant applications?***
2. ***What recommendations does BOSAC have for the Town Council grants committee regarding these applications?***

Council Matters Related to Open Space Topics

Jeffrey Bergeron, in his role as Council liaison to BOSAC, will provide updates on open space-related topics that Council has recently discussed.

Other Matters

This standing agenda item is intended to provide commissioners an opportunity to raise questions for a brief discussion and response, or to suggest items for upcoming agendas.

2023 Naturalist Field Report

1. Introduction

The Town of Breckenridge Open Space and Trails (OST) Program employs two Naturalists whose primary responsibility is to support the management and health of Cucumber Gulch Wildlife Preserve (Preserve). Starting in July, the Naturalists begin leading educational, guided hikes focused on the Preserve's rare and sensitive ecosystems. Naturalists assist staff and contractors in the Preserve by participating in natural resource field surveys and data collection efforts, in addition to processing and analyzing data and reports. The OST Naturalists also interact with visitors throughout the season and record direct and indirect observations. Lastly, the team of naturalists assisted with several other OST program objectives, including Friends of Breckenridge Trails (FOBT) stewardship-focused volunteer events and high-use restoration efforts. The following report presents data collected throughout the 2023 Naturalist season on wildlife, visitor use management, and environmental outreach.

2. Cucumber Gulch Preserve

Cucumber Gulch Preserve is the crown jewel in the Town of Breckenridge's Open Space and Trails program. The Preserve is a rare fen wetland complex located near the base of the Breckenridge Ski Resort (Figure 1). A high management priority, the OST program manages the Preserve for its exceptional biodiversity, unique wetlands, and wildlife species richness.

Figure 1: Cucumber Gulch Preserve Entrances.

The Preserve is closed to the public annually from May 1st through July 5th to protect wildlife during the sensitive season of fawning, calving, and nesting. To further protect this critical season, the gondola does not run from May 1st -June 15th through an agreement with the Town The Preserve opens annually on July 6th and closes on October 31st.

During the annual spring closure, Naturalists provide trail ambassadorship at major trail portals to the Preserve and rove trails. If a visitor is encountered, Naturalists provide information about the closure and recommendations for alternative open trail destinations. Additionally, letters and information pamphlets were sent to all neighboring homeowners in proximity to the Preserve about the closure and visitor regulations.

In 2023, field surveys began in May, initially focused on data collection for both North American beaver (*Castor canadensis*) and boreal toads (*Anaxyrus boreas boreas*). Beaver surveys were conducted biweekly, May through September, at dawn and dusk at three locations inside the Preserve. Boreal toad surveys occurred monthly from May through August. For information on field surveys, please refer to Section 5, Cucumber Gulch Preserve – Wildlife Studies. Additionally, Naturalists took ownership of data collection from Traffx trail counters and game camera images inside the Preserve. This information provides insight into both wildlife composition and visitor use trends year-round to help inform management decisions.

3. Environmental Education

Guided Hikes

During the early season and closure of Cucumber Gulch Preserve from June 6th to July 5th, interpretive hikes were offered once daily at either Illinois Creek or Iowa Hill, to provide an alternative to hiking in the Preserve. A total of 100 people attended a wildflower hike at Illinois Creek Trail, and a total of 40 people attended a natural history hike at Iowa Hill Trail. Daily patrol of Cucumber Gulch Preserve was also performed during the closure to intercept any potential trail users and provide education about the closure. Suggestions of other hiking locations around the area were given to trail users.

Guided hikes at Cucumber Gulch Preserve were offered from July 6th to September 4th. A total of 304 participants attended a guided hike at Cucumber Gulch Preserve (Figure 2). Cucumber Gulch Preserve guided hikes were offered twice daily at 10:00 am and 2:00 pm, Tuesday through Saturday, to accommodate the 8-person group size limit in the Preserve. After Labor Day, when the gondola stopped running, out-and-back hikes were offered twice weekly, with a noted decrease in attendance. While guided hike efforts were focused on twice-daily Preserve experiences, they still offered at least one guided hike per week at either Iowa Hill or Illinois Creek, as an alternative hike for larger groups to attend. Only 7 hikers may sign up for a Cucumber Gulch Preserve guided hike due to group size limits, however hikes at other locations may accommodate up to 15 hikers, giving an opportunity for larger groups. In July, 39 people attended the once-weekly guided hike offered at Illinois Creek, and in August, 65 people attended the once-weekly guided foraging hike at Iowa Hill Trail.

Hikes at all three locations were offered after Labor Day through September on a rotating basis with little to no attendance. Naturalists focused their efforts on interpretive stations and data collection/processing at this time.

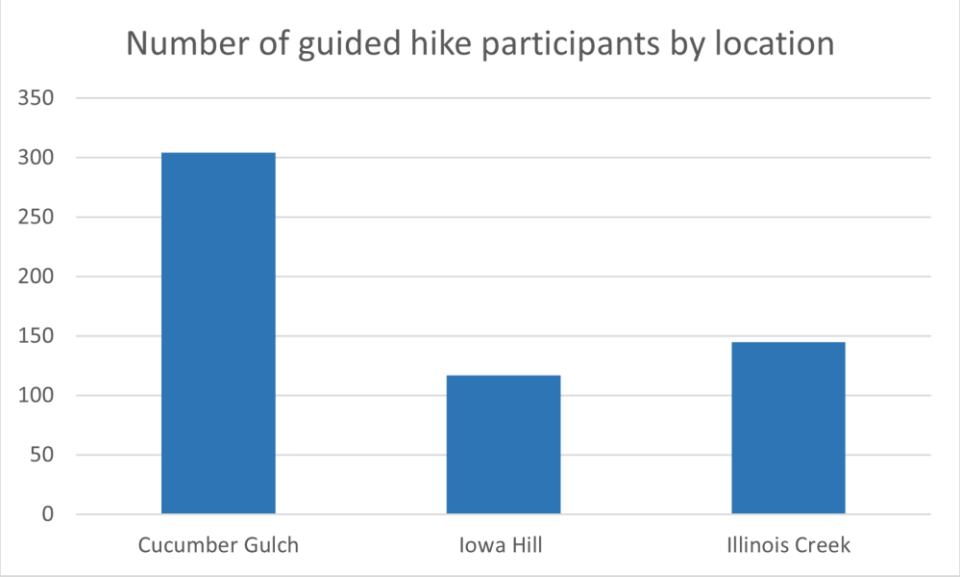


Figure 2: # of guided hike participants 2023.

Hike participants are asked to take a voluntary short survey on their experience at the conclusion of each tour. Surveys are designed to gather qualitative demographic information about hike participants to determine the success and reach of the OST programs. Survey data indicated Naturalist-led hikes received

a 5/5 excellent rating from 96% of participants, with only one participant rating the hike 4/5. This season, most participants were Summit County residents (45%), or Colorado residents (32%), while only (23%) of participants were out of state visitors. This contrasts with last season, where (54%) of guided hike participants were out of state visitors, and only (17%) were Summit County residents (Figure 3). For most groups attending a hike together, one person may submit the survey for the group versus everyone submitting a separate survey. These survey results may not represent the full measurement of participant's hiking experiences.

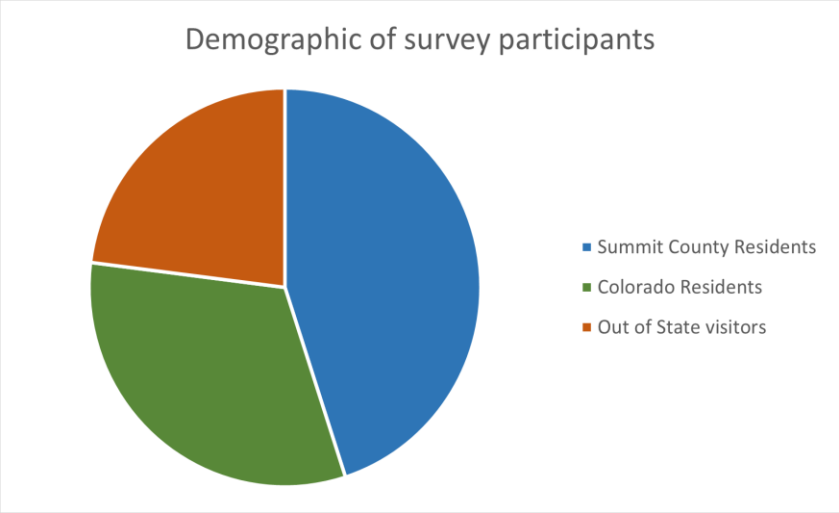


Figure 3: Location demographic from survey participants.

Interpretive Stations

Naturalist Interpretive Stations were held at Illinois Creek Trailhead, a popular trailhead where the Isaac Heartstone Troll is located. In June, Naturalists hosted five weekly interpretive stations that a total of 397 people attended. This season in July and August, Naturalists focused on leading hikes twice daily, rather than continuing tables. In September, Naturalist resumed weekly tables that a total of 874 people attended.

Trail Ambassadorship

Throughout the season, Naturalists provide trail ambassadorship in Cucumber Gulch Preserve and along other Town trails. By monitoring trails and establishing a presence, the Naturalists create educational opportunities, promote trail etiquette, and encourage Leave No Trace principles. Other ambassadorship locations included high-use areas such as Illinois Creek, Sawmill Reservoir, the B&B Trailhead, and Shock Hill.

5.Wildlife Studies & Data Collection

Wildlife Surveys

Throughout the 2023 season, Naturalists assisted in North American beaver (*Castor canadensis*) surveys under the guidance of EcoMetrics staff. Surveys occurred bi-weekly at dawn and dusk inside the Preserve. Beginning May 18th and ending October 5th, Naturalists assist in collecting qualitative data on beaver activity.

From June to August, the team of Naturalists, as well as the Denver Zoo Boreal Toad Conservation Team, assisted EcoMetrics and staff in boreal toad (*Anaxyrus boreas boreas*) surveys throughout the Preserve. According to Colorado Parks and Wildlife (CPW), boreal toads were once common in the mountains of Colorado. Still, populations are declining in response to the spread of the pathogenic chytrid fungus (*Batrachochytrium dendrobatidis)*. Surveys were performed by walking the banks of each pond in the slow-moving and ponded shallow water for egg masses, tadpoles, or toads. No toads were observed throughout the 2023 field season. Naturalists logged 12 boreal toad survey hours.

Wildlife Camera Data Analysis

Naturalists collect, maintain, and analyze game and trail camera footage within Cucumber Gulch Preserve. There are a total of nine cameras within the Preserve (Figure 4). Camera data provides essential wildlife composition information at cameras throughout the Preserve. Game cameras turn on and record captures when movement is sensed. A camera capture is a single photo or the first photo in a series of photos. Additionally, the trail camera, located in Upper Cucumber Gulch Preserve along Toad Alley, records both wildlife and visitor use activity.

Use Figure 4 to compare to Figure 5 & 6 in relation to camera location. Figure 5 represents 2 weeks before Preserve opening. Figure 6 represents 2 weeks after Preserve opening.

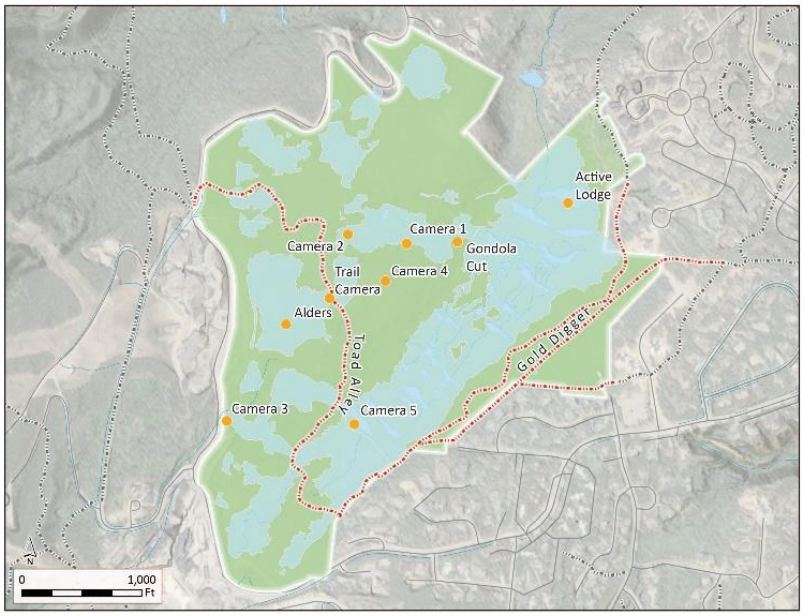
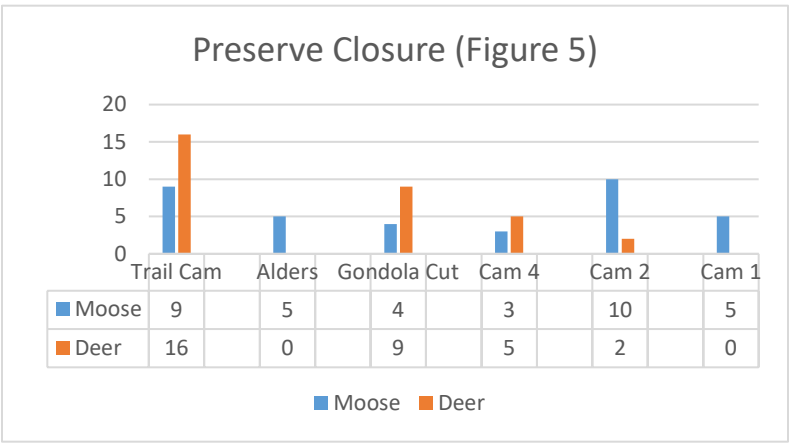
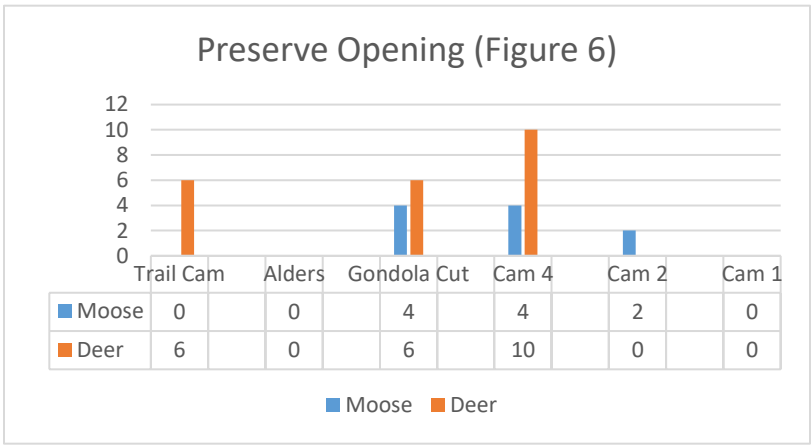


Figure 4: Wildlife camera locations within Cucumber Gulch Preserve.





Camera captures by location and species (Figures 5 & 6) indicate several distinct trends. Figures 5 & 6 highlight the number of ungulates in the Preserve in different locations during two different time periods. By comparing Figure 5 & 6, the data suggest that before the opening of Cucumber Gulch Preserve (July 6th) there are more moose and deer present. The cameras depicted on the graphs are closest to the trail, potentially suggesting that as the Preserve opens, less animals can be found near the trails. Another

observation can be made from the utilizations of the graph suggesting impact of human recreation causes less ungulates to be present.

Throughout the season, the Preserve's game cameras recorded 477 individuals, including 12 species. Of wildlife captured on camera, the top six species, mule deer, moose, red fox, aquatic birds, raccoon, and muskrat. For species per camera capture, please see Figure 7.

Camera captures data by species (Figures 7 and 8) also indicate several trends. Moose, the most frequently captured species, were viewed at Cam 2, Gondola Cut, Alders and the Trail Cam. Moose were captured laying down on Cam 2 and Alders, suggesting they are resting areas. On Gondola Cut and Trail Cam, moose were most often captured moving through areas, which suggest these areas are corridors for travel. Mule deer were the second most captured species that were viewed the most on Cam 4 and Trail Cam. These captures from Cam 4 and Trail Cam of mule deer also suggest they are passageways for travel, especially with young. Red fox, the third most frequent species by camera capture were seen the most at Cam 3 and Trail Cam. In several captures of red fox was found to have prey or to be hunting, suggesting these are popular areas to catch a meal. Finally, birds are the fourth most frequent category and were captured the most on Cam 3. In shots captured, most birds were mainly in search of food and sometimes found in flocks.

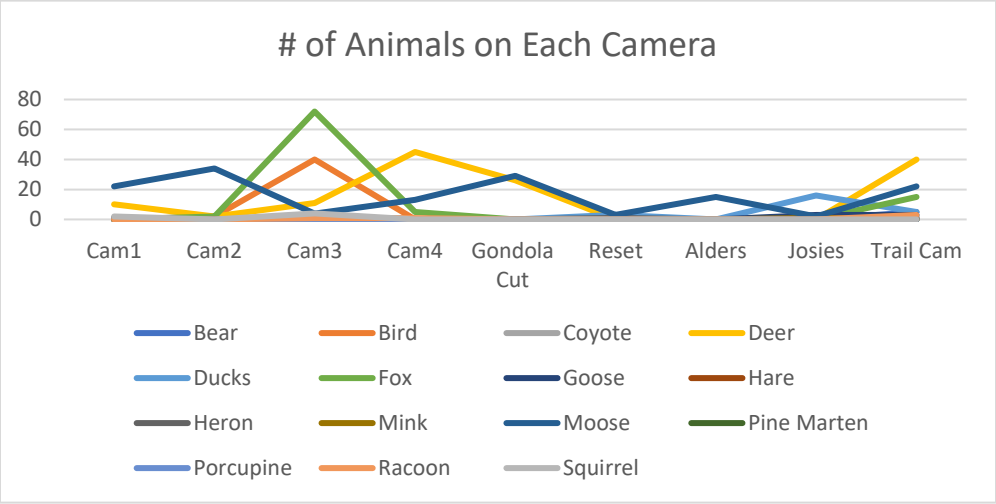


Figure 7: Number and species type captured at each wildlife camera.

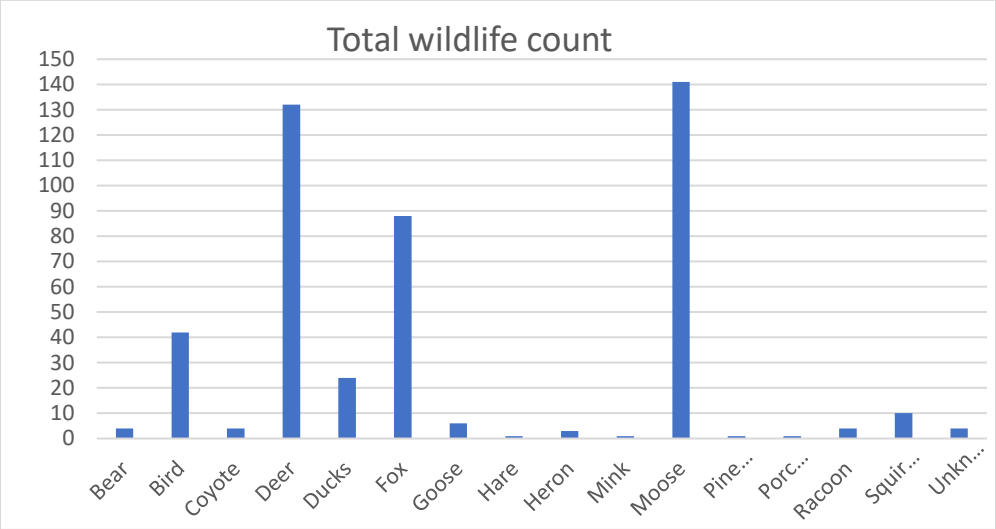


Figure 8: Total wildlife observations observed by species.

6. Visitor Use Data

Visitor Use - Annual Closure

Data gathered from the Traffx trail counters and the "Trail Camera" provides an insight into the amount of human traffic occurring in Cucumber Gulch Preserve. The Traffx trail counter strictly provides quantitative data as how many visitors are accessing the Preserve, while the trail camera provides more insight as to what activities trail users are doing, what direction they are hiking, and if they have a dog/dogs with them.

During the annual closure (May 1st to July 5th), Naturalists counted 64 individual trail users on the trail camera. The Traffx trail counter recorded 229 counts from June 1st to July 5th, over half (109) of which during the first 5 days of July, right before the Preserve opened. This difference between the trail counter and camera is due to the fact that Toad Alley trail is an out-and-back trail, so the Traffx counter is recording many individuals twice. The trail camera is about a half a mile further down the trail from the trail counter near the Peaks Trailhead entrance, therefore some trail users may not hike all the way down to the trail camera, particularly during May and June when there may be snow on the ground.

Out of the 64 individuals recorded on the trail camera during the closure, more than half (53%) accessed the Preserve from the Peaks Trailhead on Ski Hill Road, and (47%) of trail users accessed the preserve from either the Shock Hill/ Nordic Center or White Wolf areas (Figure 9). The trail camera also recorded that (84%) of trail users are hiking, and only (16%) are mountain biking during the spring closure (Figure 10). The trail camera only recorded two dogs in the Preserve during the closure.

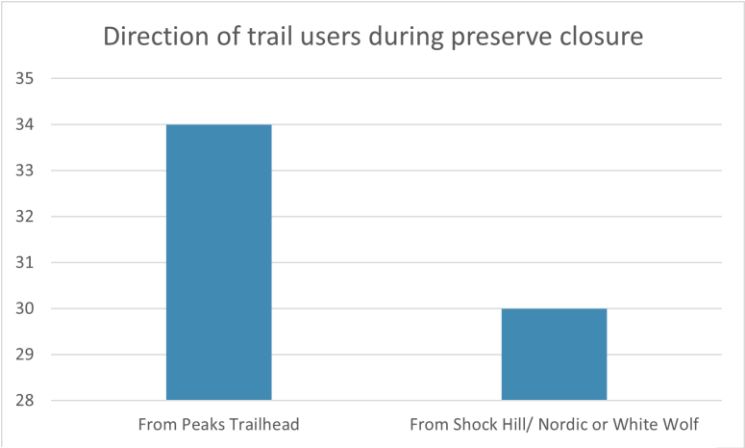


Figure 9: Direction of trail users within the Preserve.

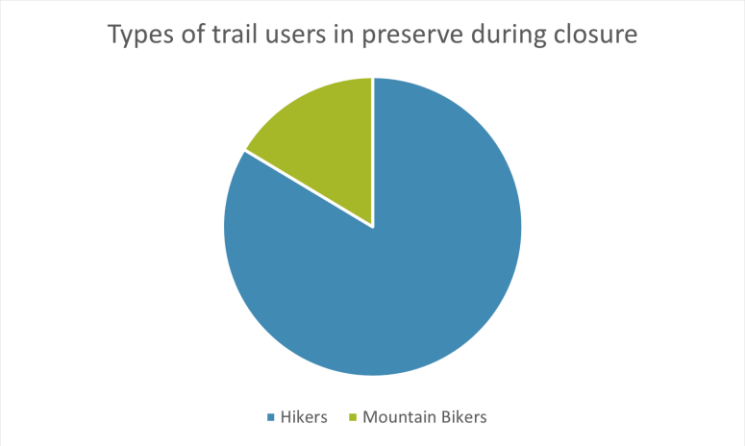


Figure 10: Ratio of hikers to bikers.

Visitor Use - Open to the Public

Cucumber Gulch Preserve opens to the public each year on July 6th. According to the Traffx trail counter, once the Preserve opened in July 2023, Toad Alley trail users increased by over 9,000%. The trail counter recorded 11,225 counts for the month of July, and only 109 of those counts were during the closure. It's important to note that some of counts are likely individuals walking out-and-back, however once the gondola is running in July, many users ride the gondola up and hike the trail back down, one-way through the Preserve. After July, Toad Alley trail users steadily decrease by 20-30% (Figure 11). This drastic increase in trail activity is triggered by the opening of the Preserve and removal of closed signs, fences, and gates, as well as increased tourism in general around Breckenridge. The drastic increase, and subsequent decrease in trail users is also primarily hikers, as the number of mountain bikers stays consistent on Toad Alley (Figure 12). This season there were only 21 recorded dogs on trail cam all season, 19 of which were while the Preserve was open to the public (Figure 13).

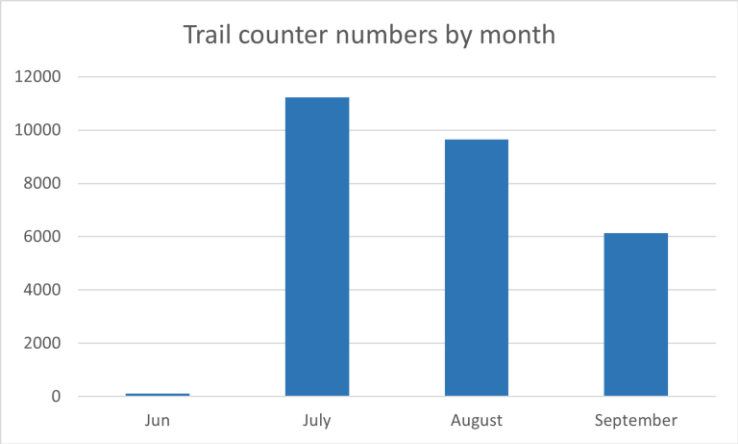


Figure 11: TRAFx observations by month.

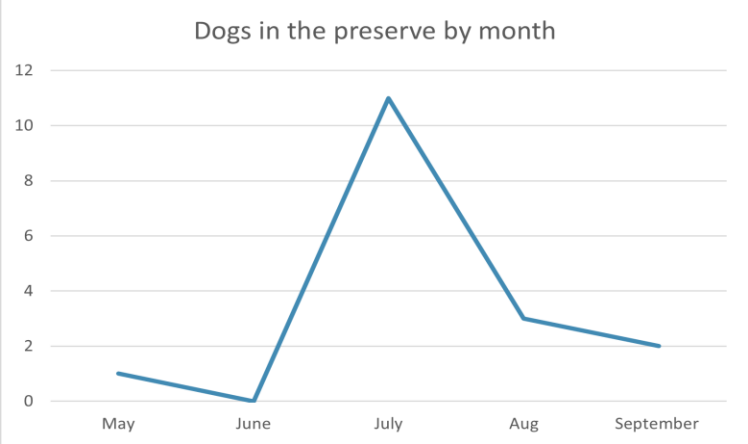


Figure 12: Number of dog observations in the Preserve in 2023.

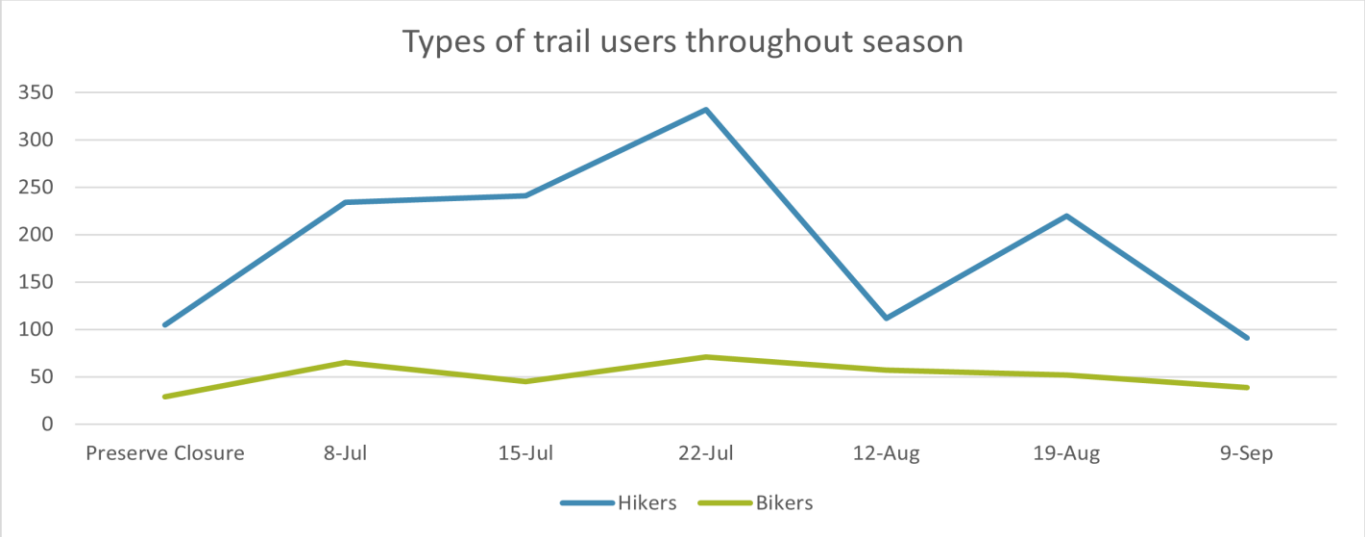


Figure 13: Trail user type while Preserve is open.

7. Friends of Breck Trails Stewardship Events

Noxious Weed-pull Events

OST staff hosted a number of volunteer stewardship events with Friends of Breckenridge Trails (FOBT) group in 2023, including weed-pulls and trail restoration efforts. The weed-pull events targeted false chamomile (*Tripleurospermum inodorum*) in sensitive areas with large amounts of false chamomile. Naturalists assisted with the Summit County Community Weed-Pull Event on July 8, 2023, spreading out on several of Breckenridge's trails, including Cucumber Gulch Preserve and Blue River Trail. At this event alone, volunteers and OST staff pulled over 400 pounds of weeds from the Town's trails. Naturalists also lead two other volunteer weed pulls for FOBT, on July 27th at Cucumber Gulch Preserve and Schock Hill Trail, and on August 10th at the Blue River Trail. The two FOBT lead weed-pulls had a total of 15 volunteers, who logged approximately 30 cumulative hours.

Restoration Events

Trail restoration events focused on cleaning up trash, scarifying and reseeding social trails, building protective fencing, pulling noxious weeds, and planting willow cuttings along river corridors. Naturalists assisted FOBT with a total of three restoration events at the B&B Trail, the Blue River Trail and at the Illinois Creek Trail. On May 20, 2023, Naturalists assisted FOBT with "Duty-Free Clean-up Day", focusing on removing trash and dog poop from busy trails. Volunteers spread out on the Blue River Trail, B&B Trail, Sallie Barber and along the Main Street Riverwalk. On June 17, 2023, Naturalists assisted FOBT with their continual environmental restoration project along Illinois Creek Trail. Together, the OST staff and volunteers closed and scarified social trails, constructed new buck and rail fencing to protect hillside and creek revegetation, and planted willow stakes along the river corridor. Naturalists also hosted an interpretive station at the trailhead to educate visitors on the benefits of visitor use management and how these processes protect vegetation in high-use areas. On July 22, 2023, Naturalists assisted FOBT with a restoration event at the Blue River Trail. The focus of this event was to build protective buck and rail fencing along the river corridor, pick up trash and pull noxious weeds.

Throughout the season, Naturalists assisted in willow harvesting and planting as part of management plan goals at two high-use areas, the Blue River corridor and Illinois Creek. Willows (*Salix spp.*) are hearty and can be propagated for increased vegetation. In the spring, before leaf-out, willows are cut into stakes and grown to develop new roots and stems for planting along Illinois Creek and the Blue River.

ERO Resources Corporation

Denver 1626 Cole Boulevard, Suite 100, Lakewood, CO 80401-3306
Durango 835 East Second Avenue, Suite 400, Durango, CO 81301
Hotchkiss 161 South 2nd Street, PO Box 932, Hotchkiss, CO 81419
Idaho 7154 West State Street, Suite 398, Boise, ID 83714

October 24, 2023

TO: Anne Lowe, Open Space and Trails Manager, Town of Breckenridge

FROM: Bill Mangle, Natural Resource Planner

RE: Cucumber Gulch Preserve resource values and master plan designations

ERO Resources was heavily involved in the assessment and recommendations that are documented in the Town of Breckenridge Open Space and Trails Master Plan. As part of this planning process, we evaluated sensitive natural resources in and around the Town of Breckenridge, including those within the Cucumber Gulch Preserve.

As documented in the master plan, Cucumber Gulch is a unique and significant ecological resource. The ecological attributes of the area include, but are not limited to:

- Fen and mire wetlands (EcoMetrics)
- Montane willow carr and alpine willow scrub wetlands (CNHP)
- Priority habitat for moose (CPW)
- Potential habitat for Canada lynx (CPW)
- Boreal toad habitat (CNHP)

Other ecological and land use designations include:

- Highest priority habitat; Crucial Habitat Assessment Tool (CPW)
- Potential Conservation Area; B3: High Biodiversity Significance (CNHP)
- Cucumber Gulch Overlay Protection District (Town of Breckenridge)
- Aquatic Resource of National Importance (US EPA)

Additional site analysis conducted by ECO Metrics (2021) further documented these significant resources. Their findings include the following:

- Wetland health has been supported by beaver activity, but the general trend is a gradual decline due to increasing stress.
- Habitat connectivity and buffer capacity are declining rapidly as the areas surrounding Cucumber Gulch Preserve are becoming developed or deforested.
- Water distribution is responding positively to treatments made in 2019.
- Water quality is good throughout Cucumber Gulch Preserve with no significant issues documented over 20 years of intensive monitoring.
- Beaver, the keystone species of Cucumber Gulch Preserve wetlands, appear to be increasing in both population numbers and extent of activity, but number remain very low compared to the 1990s.
- Long-term bird monitoring shows a decline in species diversity over 20 years, along with a shift that favors more common generalist species over specialists.

- Human use in the Preserve has increased dramatically and continues to increase in a steady upward trend.

Their report recommends several management actions, including the development of a strategy to decrease the number of people, access points, and paths within the Preserve.

Based on the above information and our analysis supporting the master plan process, we continue to support the following master plan recommendations that pertain to Cucumber Gulch Preserve:

- **Habitat Protection** - Emphasize the protection of wetland and riparian habitats. These habitats are uncommon on the landscape but make a significant contribution to wildlife habitat and water quality in the region.
- **Habitat Fragmentation** – Large blocks of undisturbed habitat are critical for the survival of many wildlife species in and around Breckenridge, along with movement corridors between those blocks. Avoid new trail routes that fragment large blocks of sensitive or undisturbed habitat. Where new trails or connections are desired, consider routes along the periphery of habitat blocks, following existing roads or disturbance corridors where possible.
- **Trail Planning and Design** – Minimize new impacts to streams, wetlands, and riparian habitat. Where possible, locate trails on upland ridges greater than 100 meters from wetlands and riparian habitat.
- **Stream Restoration and Enhancement** – Identify opportunities to remove, reroute, and obliterate existing roads and trails in wetlands and sensitive habitats. This includes recent road removal at Lincoln Park and may include proposed trail modifications within Cucumber Gulch.

The Master Plan defines management zones for the open space and trail system. The Cucumber Gulch Preserve is designated to be within a ***Conservation Overlay Zone***, where habitat conservation and resource protection are the priority for management.

Anne Lowe

From: bjohnson-jec@comcast.net
Sent: Wednesday, October 25, 2023 9:21 PM
To: Anne Lowe
Subject: RE: CGP

External Message - Please confirm you know the sender!
Hello,

I am sorry I can't be present in person, but I appreciate the opportunity to comment by proxy.

I was first introduced to Cucumber Gulch in the late 1990s. It was at this time that the ecological significance of the gulch's habitats became known, and its wetlands were formally designated as Aquatic Resources of National Importance by the US EPA. In 2011, I was part of the team who assessed the condition of the gulch's wetlands and recognized the degradation that was insidiously penetrating the interior of the preserve. What really alarmed us at that time was that the core habitat of the preserve was being affected. The core habitat is the inner sanctum for wildlife – and even for plants – and that which affects the core habitats, affects the entire preserve.

Why is that? In answering, I would like to take a step back and speak of general principles; principles which can be used to inform the management decisions made by the Town.

Ecological stress emanates from development and human presence. In the case of a preserve such as CGP, it is easiest to imagine stress from adjacent development pushing in from the outside and encroaching into the preserve. That zone of marginal stress is called the buffer. It is a largely sacrificial band of habitat that serves to attenuate stress and shield the inner habitats from its impacts including poor water quality, excessive sediment, noise, domestic animals, invasive species, pathogens, such as chytrid fungi, human/wildlife interactions and other agents. The greater the development on the outside of a preserve, the deeper the stress permeates and the wider the buffer habitat becomes.

But stress doesn't just emanate from outside of a preserve. When developments – including trails – intrude into core habitats they bring with them a portfolio of ecological stressors specific to the nature of the development. Suddenly, the core is no longer the core. In the case of a linear feature such as a trail, stress can be envisioned as radiating outwards from it in both directions, creating a belt of sacrificial buffer habitat through the middle of the preserve. In such a case, notice that the configuration of the preserve's habitats have been subtly but profoundly changed. Now there are two fragments of core habitat, with stressors assailing them from all directions, and moreover the unfragmented habitat may or may not be that which is needed wildlife. As use of a feature such as a trail increases, so does the stress it imposes on the preserve's habitats. Core habitats become squeezed into ever narrowing patches.

The ecological importance of CGP has been unambiguously documented, and even federally designated. The gulch is home to rare fens, old growth forests, and serves as key wildlife habitat in the wilderness-urban interface. There is no question that removing trails or keeping new ones from the interior regions of the CGP would benefit wildlife and the habitats that support it.

I believe the question before the Town is – in its rawest sense – whether the gulch is to be managed foremost as a habitat preserve or a recreational resource. I do not believe it is my position to advocate or oppose any management action in the Preserve, but rather to provide objective information so that the Town can make a fully informed decision moving forward. I appreciate the opportunity to do so.

_____

Brad Johnson, PhD, PWS
Johnson Environmental Consulting, LLC
Carbondale, CO
970.658.7782

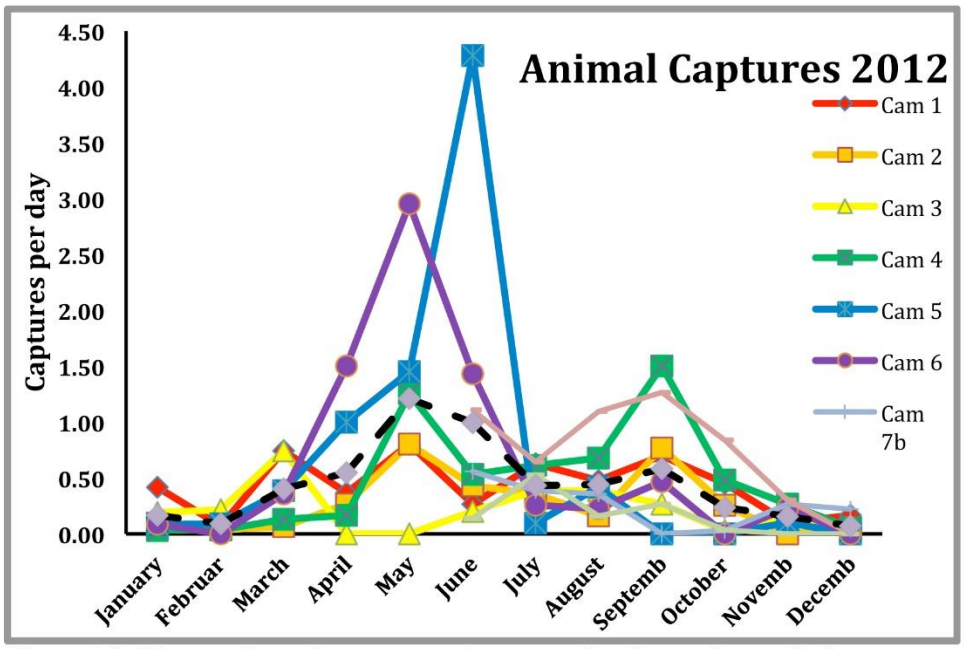
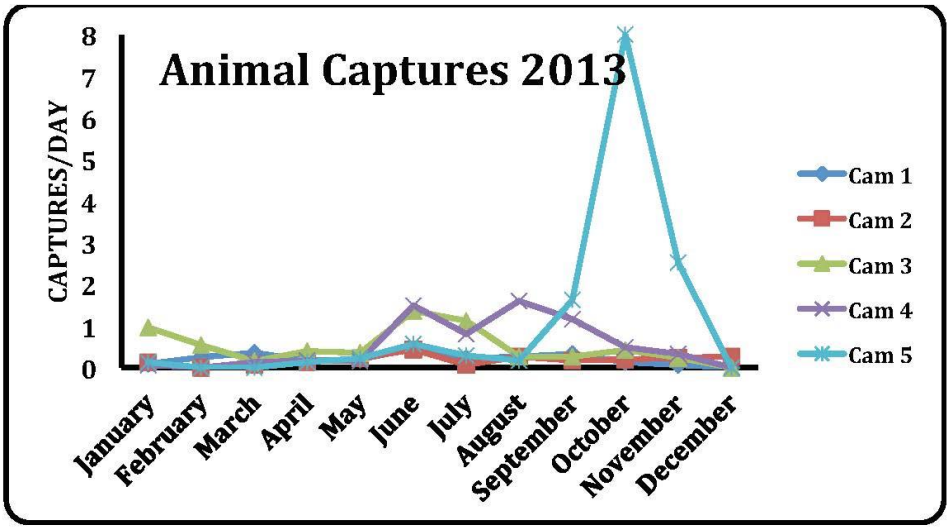


Figure 4.2 The number of camera captures per day for each month the camera was out (total monthly captures divided by operational days per month). The legend at the right is camera number. A camera capture is defined as a single photo or the first photo in a series of photos. Of note; camera 4 May and September spikes were deer, Camera 5 June spike were crows and camera 6 May spike were geese and ducks. This graph does not include humans and dogs.



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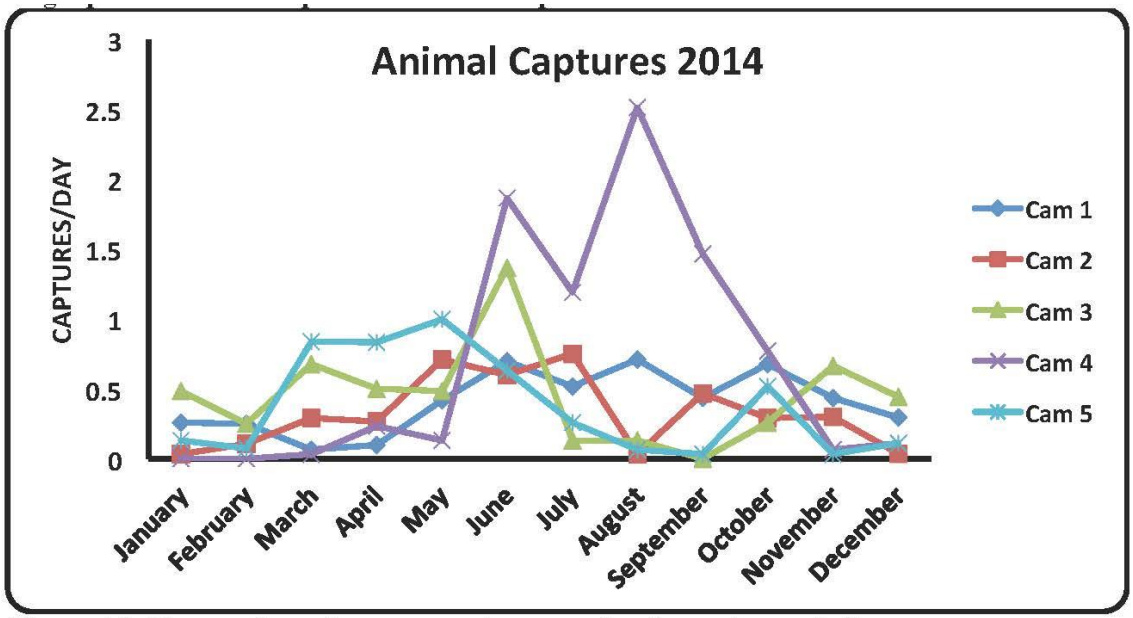

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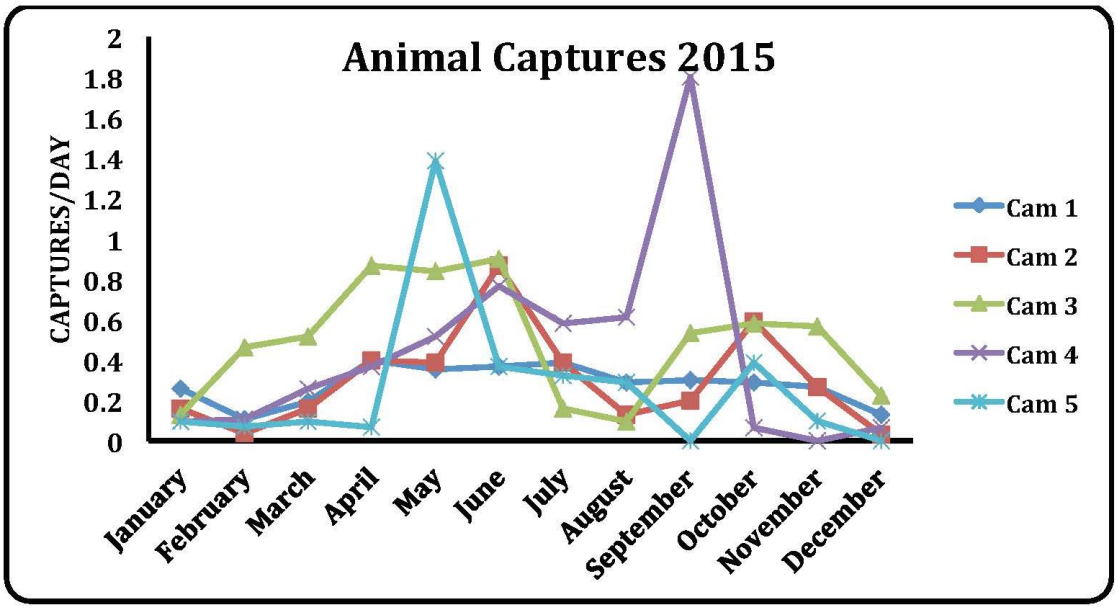


Figure shows the number of camera captures per day for each month the camera was operational (total monthly captures divided by operational days per month). The legend at the right is camera number. A camera capture is defined as a single photo or the first photo in a series of photos. Camera 4 is in the gondola cut and clearly shows the September spike in activity.

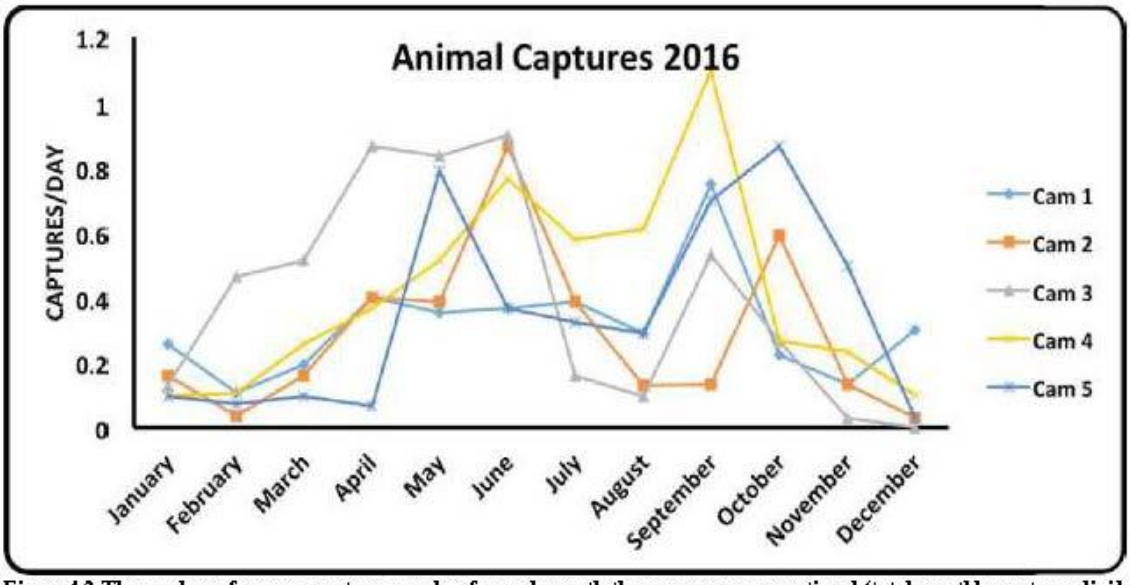


Figure 4.2 The number of camera captures per day for each month the camera was operational (total monthly captures divided by operational days per month). The legend at the right is camera number. A camera capture is defined as a single photo or the first photo in a series of photos. Of note; camera four September spike was due to deer and the camera five October spike was due to raccoons. This graph does not include humans and dogs.

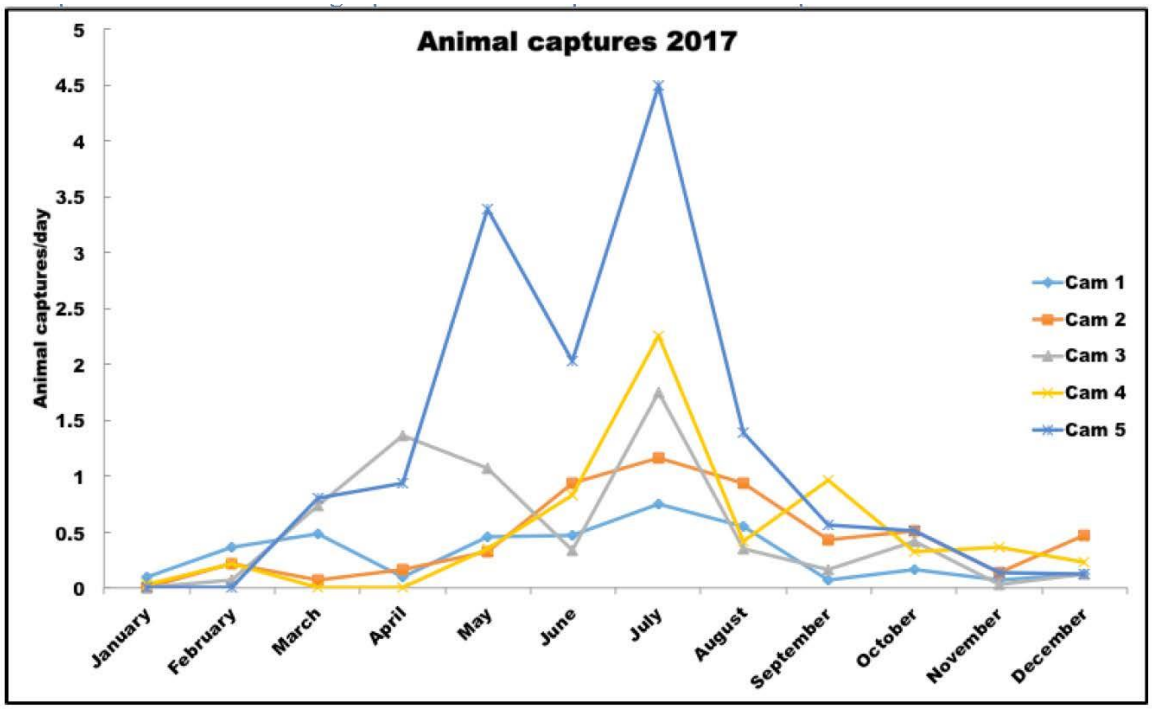
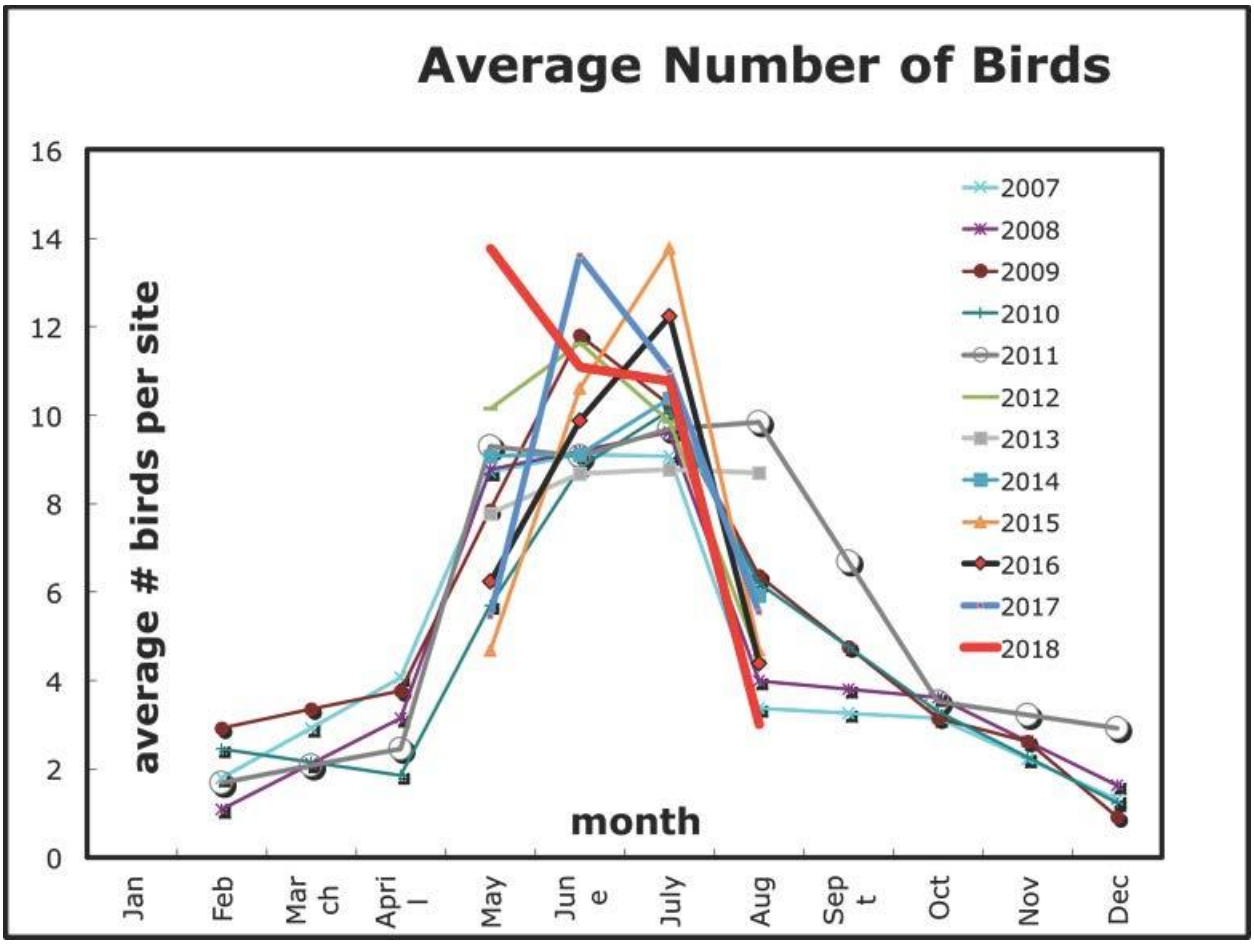


Figure 4.2 The number of camera captures per day by month. A camera capture is defined as a single photo or the first photo in a series of photos.

Average Number of Birds Per Month

2007-2018



Impacts to Cucumber Gulch Preserve by the BreckConnect Gondola

A report to the Town of Breckenridge and Breckenridge Ski Resort Joint Working Group

By EcoMetrics, LLC

January 3, 2020

Background and purpose

In its unique geological and ecological setting, and with its diversity of forested, meadow, shrubland, and wetland habitats, Cucumber Gulch Preserve is a biodiversity hotspot. This went largely unnoticed until the 1990s when it was highlighted in a Colorado State University biodiversity study that recognized it as *an extraordinary natural resource worthy of the greatest conservation efforts* (Town of Breckenridge 2012). Cucumber Gulch Preserve is ranked at the highest level of urgency for protection and management by the Colorado Natural Heritage Program, and it is recognized as an Aquatic Resource of National Importance, earning it the highest level of protection by the US Environmental Protection Agency. Protecting Cucumber Gulch was a main impetus behind the creation of the Breckenridge Open Space program, and in 2000 it was formally designated a wildlife preserve via Town ordinance that established the Cucumber Gulch Overlay Protection District and a Preventative Management Area that, for the purpose of preservation, severely restricted the types of development and activities that are allowed.

Although natural resource protection is the primary reason for the Town of Breckenridge's investment in Cucumber Gulch, public recreation access has a long history, and continued recreational access is a secondary priority for the Preserve. The Breckenridge Nordic Center hosts thousands of people on skis and snowshoes in winter. In summer, a network of trails serves thousands more who come to hike, bike, view wildlife, and enjoy nature. Massive efforts go into managing recreation, trail use, and visitor behavior in and around the Preserve to limit human disturbance, yet human pressure continues to increase with the growing summer population, more convenient access, and a rising demand for outdoor recreation. In the 2012 Cucumber Gulch Preserve Management Plan (Town of Breckenridge 2012), the challenge of managing the Preserve is described as *balancing public access with natural resource protection goals*.

Preserving habitat quality and biodiversity in Cucumber Gulch is indeed a serious challenge. The impact of recreational users is just one of many ecological stressors. The land surrounding Cucumber Gulch Preserve is being developed rapidly, isolating it from neighboring habitat while increasing disturbance, diminishing buffer capacity, and impeding the migration and dispersal of plants and animals. Constant maintenance and frequent restoration treatments have been necessary to prevent degradation of the Preserve's core wetland habitat which is highly susceptible to incision and drying caused by artificially high stream energy, sedimentation, and beaver population crashes. Weed control and the spread of invasive species are persistent issues that require constant vigilance and a regular annual maintenance budget. Despite these escalating efforts, biological indicators and long-term monitoring suggest that biodiversity is declining. Construction and operation of a gondola through the Preserve is one of many cumulative stressors that challenge land managers on a mission to preserve ecological health.

In 2002, two years after designating Cucumber Gulch a Wildlife Preserve, The Town issued a variance to the Overlay Protection District that lifted the protective covenants to allow construction of the BreckConnect gondola, which now bisects the protected area. An alternate alignment that followed Ski Hill Road around the Preserve was rejected because construction costs were higher. The gondola was built as a joint venture between the Town and the Breckenridge Ski Resort in 2006, and the Ski Resort

began running it for winter operations that year. Summer operation began on a trial basis in 2010 and has continued ever since. The length of the summer operating season has increased over the past 9 years, and the current proposal is to expand use even more in 2020 through 2029. The issue currently at stake is whether or how summer gondola operations can be mitigated to reduce or offset the negative effects to habitat and biodiversity in Cucumber Gulch Preserve.

The Town and the Ski Resort both have interests in running the gondola and in preserving Cucumber Gulch. When the gondola began running in 2006, the initial agreement was for winter use only, but the Town and the Ski Resort agreed *to explore opportunities to expand the operation of the gondola for longer hours during the winter season and to add additional times of operation outside the winter season* (2006 agreement). The spirit of this agreement was to give the parties a chance to work together to decide how to balance gondola operations with the preservation goals.

For the past 10 years, permission to operate the gondola in summer has been granted to the Ski Resort by the Town in a series of temporary conditional agreements. The agreements in 2010 through 2012 were described as trials to study the impacts of extended summer operations on Cucumber Gulch Preserve. The Town and Ski Resort are now seeking a longer-term agreement, and a joint working group was formed to advise Breckenridge Town Council on a course of action and management plan based on what was learned in the 2010-2012 studies and 10 years of experience operating the gondola in summer.

The group's immediate concern is to decide *whether a dark period* (an extended period when the gondola does not run) *is necessary to prevent or mitigate any seasonal wildlife impacts to Cucumber Gulch Preserve*. The first step in this analysis, and the primary purpose of this report, is to establish the nature and degree of gondola impacts to help inform this decision. The study question we were asked to consider is: *Does the BreckConnect gondola significantly impact habitat quality and biodiversity in Cucumber Gulch Preserve?*

The short answer is yes. A wildlife preserve with a gondola running through it is less pristine than one without a gondola running through it. It is impossible to imagine that the wildlife of Cucumber Gulch are unaffected by the gondola line clear-cut or ambivalent to the visual impacts and noise from the overhead traffic of gondola cars. The question immediately turns to a matter of degree. It's not *if* there are impacts, but *how much* and *what kind*? Whether the impact is considered *significant* depends on what standard of preservation the Town and Ski Resort agree to uphold in Cucumber Gulch Preserve. *How much* and *what kinds* of impacts is the Town willing to accept as tradeoff for operating a gondola through the Preserve?

This study is an in-depth evaluation of gondola operations in the broader context of the ecological health of Cucumber Gulch Preserve, where it is one of many cumulative environmental stressors. By understanding how the gondola impacts wildlife, habitat, and biodiversity, and by knowing when and where the effects are greatest, the Town may be better equipped to reduce negative impacts by avoiding operation during critical times and/or to mitigate negative impacts by relieving other types of ecological stress.

This analysis relies on information we obtained in a review of scientific literature and reports provided by the Town and the Ski Resort. We also included opinions solicited from wildlife biologists Tom Davies (Colorado Parks and Wildlife), Kelly Colfer (Western Bionomics), and Sean Knox (Rocky Mountain Ecology) who were invited by the joint working group on a field trip to Cucumber Gulch Preserve this summer to share their expertise[1]. Additional field studies were performed by EcoMetrics.

Findings

Gondola operation schedule (past and proposed)

The gondola was constructed in 2006 and was operated solely in winter from 2006 through 2009. From 2010 to 2019, summer operations were allowed in addition to winter via agreements between the Town and the Ski Resort (see the gondola operations timeline). The schedule of open days allowed in May through September is shown in figure 1. When it is closed to the public, the gondola may still be run periodically for maintenance. For example, according to the 2019 maintenance log, it was operated on 25 of the 46 days during the closed "dark" period from April 29 and June 13.

Figure 1 also shows the schedule that the Ski Resort is currently proposing for the next 10 years of summer gondola operations (2020-2029). According to the proposed schedule, the gondola would be open all of April and May through Memorial Day. It would then close for a period of 10-17 days and reopen on the Friday before the second weekend in June through Labor Day. After Labor Day, it would be open on Friday through Sunday of the first two weekends in September. On the days it is not scheduled to be open, the gondola could be operated for maintenance only.

The 2010-2019 agreements also specify allowable hours of summer operation, including ½ hour of use before and after public open hours for employees. The Ski Resort's proposed schedule for 2020-2029 asks for open hours from 9:00 AM to 6:00 PM in July, early August, and on Labor Day weekend, and from 9:30 AM to 5:30 PM in June, late August, and after Labor Day. Operation ½ hour before and after open times is also presumed. (See the gondola operations timeline and figure 2.)

[1] Citations in this report that show the expert's name are opinions solicited by the joint working group during the field trip.

Gondola summer operations timeline

2002: A variance to the Cucumber Gulch Overlay Protection District was granted to allow construction of the gondola in Cucumber Gulch Preserve.

2006-2009: An initial agreement between the Town and the Ski Area allowed for winter operation of the gondola, specifying that it shall operate daily when Peak 8 ski lifts are open for winter recreation business. At that time, the Town and Ski Area agreed to explore opportunities to expand the operation of the gondola for longer hours during the winter season and to add additional times of operation outside the winter season.

2010: The Town approved operation of the gondola for 68 days during summer 2010 from July 1 through Labor Day (September 6, 2010) from 8:30 AM to 5:45 PM each day. The agreement specified that operation during any other hours as not allowed, except as required for necessary maintenance. One condition of this agreement was that the Town would do an evaluation of this summer's gondola operation on Cucumber Gulch, including, but not limited to, the wildlife in the gulch and that the Ski Area would provide information and help pay for it. (See Carello 2010b, 2012b)

2011: The Town approved a request by the Ski Area to begin gondola operations earlier, in mid-June, on the condition that the Ski Area participate in a study on the effects of the gondola on birds in June. The Ski Area did not participate in the study and instead accepted the previous 2010 conditions which allowed 67 days of operation from July 1 to Labor Day (September 5, 2011).

2012: The Town approved operation of the gondola for 86 days from June 16 to Labor Day (September 3, 2019) plus September 7-9 and 14-16. The allowed times of operation in 2012 were 9:15 AM to 5:30 PM each day. Operation on any other day or at any other time was expressly not allowed. This agreement specified another study on the effects of gondola operation on birds that the Town would use to evaluate future operations. This approval was stated as a trial for 2012 and not an agreement to operate in summer after 2012.

2013-2015: The Town approved operation of the gondola daily from June 14 through September 2, 2013; June 13 through September 1, 2014; and June 12 through September 7, 2015 with additional weekends in September for a total of 87 days in 2013, 87 days in 2014, and 90 days in 2015. Specified hours of operation were 9:15 AM to 6:00 PM.

2016-2018: The Town approved operation of the gondola daily in 2016, 2017, and 2018 starting on the Friday prior to the second weekend in June through Labor Day and on Fridays, Saturdays and Sundays through the last weekend in September for a total of 97 days in 2016, 97 days in 2017, and 100 days in 2018. Specified hours of operation were 9:00 AM to 6:00 PM each day during June and after Labor Day, and 8:30 AM to 7:00 PM from July 1 through Labor Day.

2019: The Town approved operation of the gondola beginning as early as June 14, but only after a "dark period" during which the gondola is closed to public and operated for maintenance only. Operation was allowed through Labor Day plus on Fridays, Saturdays, and Sundays through the last weekend in September for a maximum of 93 days. Specified hours of operation were 9:00 AM to 6:00 PM each day during June and after Labor Day, and 8:30 AM to 7:00 PM from July 1 through Labor Day.

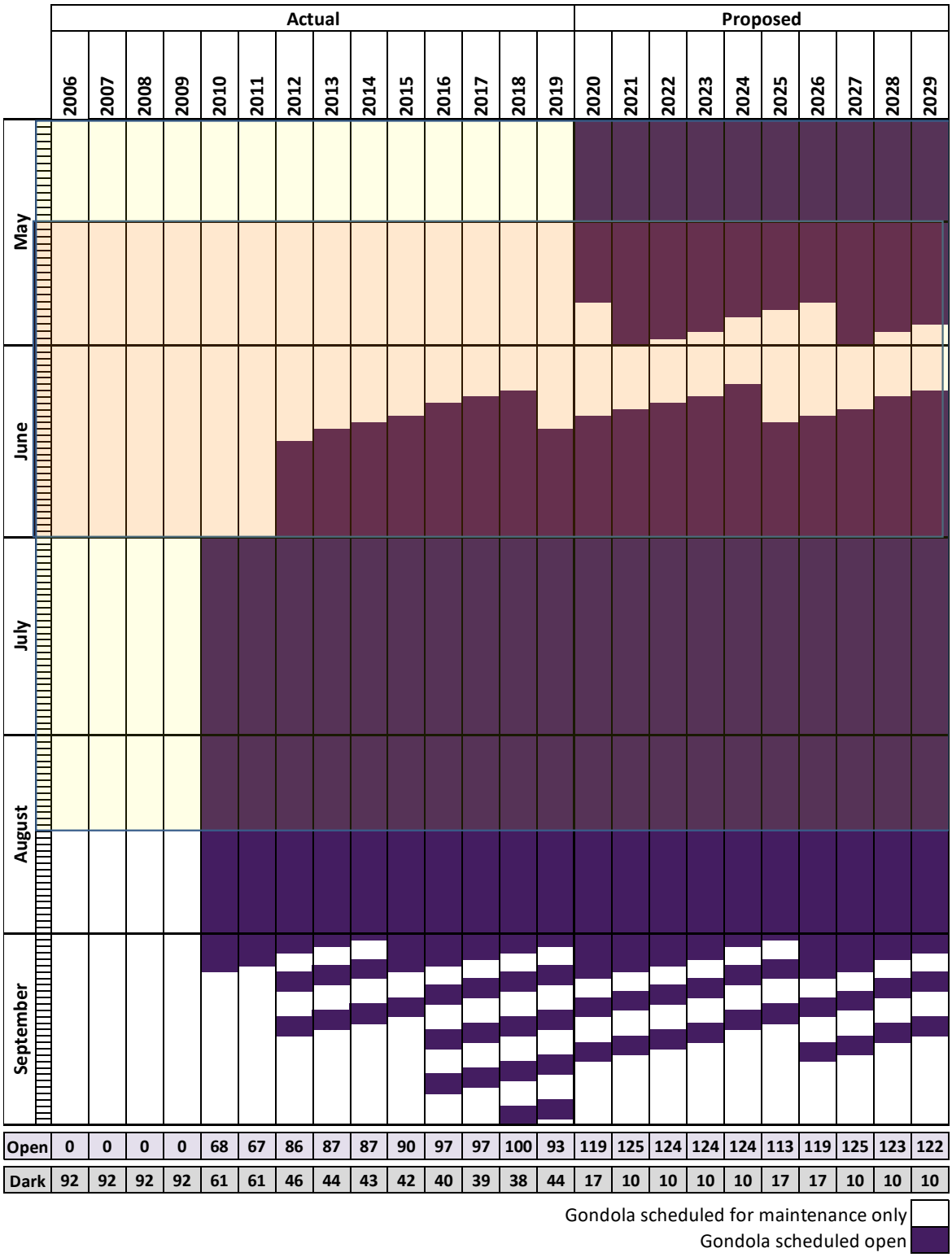


Figure 1: Actual (2006-2019) and proposed (2020-2029) schedule of gondola operations for May through September. Yellow highlight shows critical time for birds. Orange highlight shows CPW recommended critical time for elk, deer, and moose. The chart at the bottom shows the number of days open (purple) and length of dark period (number of consecutive closed days May through August) by year.

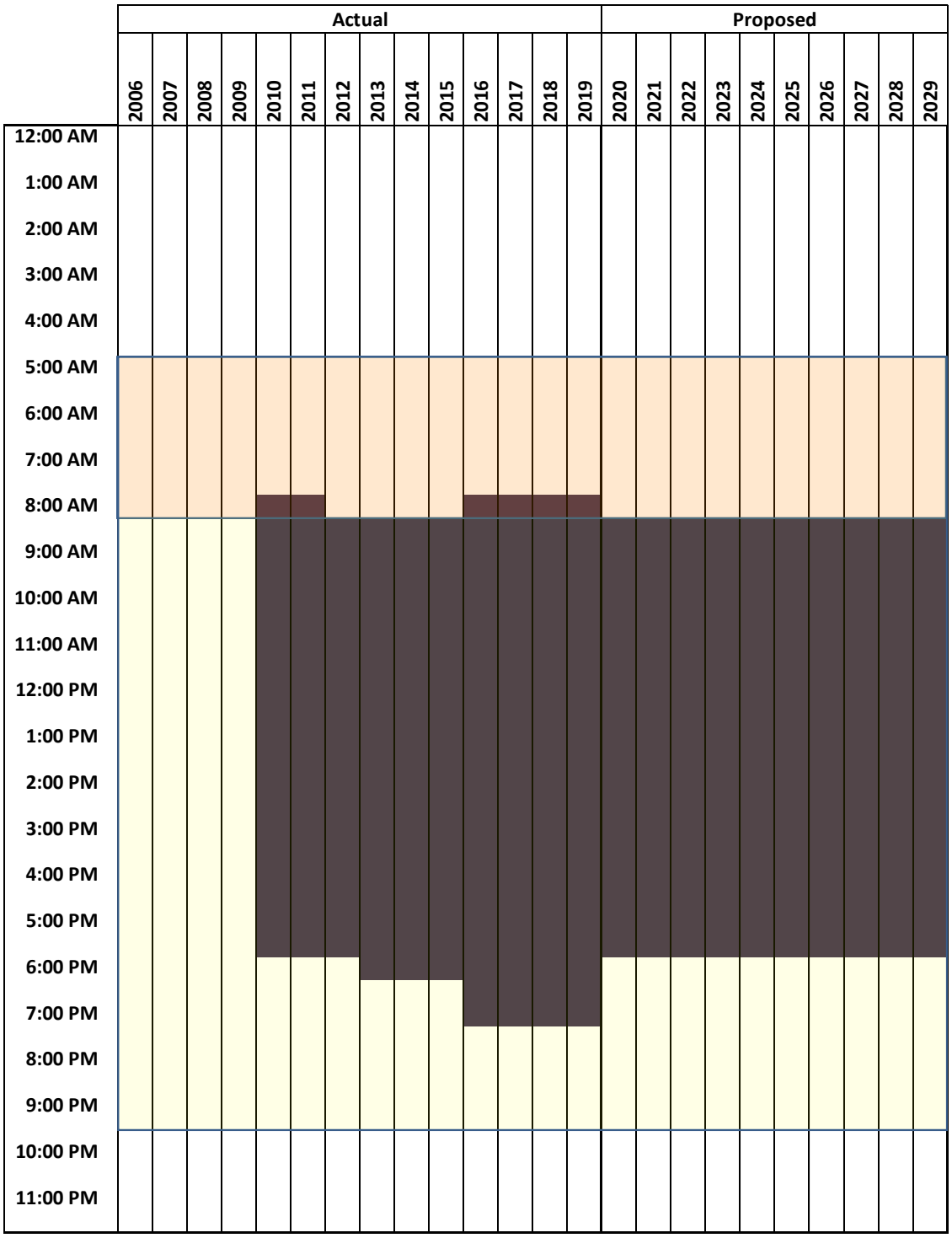


Figure 2: Scheduled hours of summer gondola operation including ½ hour for employee use before and after normal open hours. In years 2013-2019 open hours were reduced during June and after Labor Day. Hours for 2020-2029 reflect the current proposal by the Ski Resort. The proposed opening time is ½ hour later and closing time ½ hour earlier than shown in June and after Labor Day. The daytime period of dawn to dusk is highlighted in yellow. The period of greatest wildlife vulnerability in dawn is highlighted in orange.

Temporary impacts (gondola construction disturbance)

Gondola construction was a temporary impact that brought a high level of disturbance to Cucumber Gulch Preserve during the spring and summer of 2006. Even though measures were taken to limit disturbance while construction was taking place, construction activities certainly caused stress to wildlife and diminished habitat suitability for some species while they were going on. For most wildlife species, human disturbance appears to be perceived as a form of predation risk, and antipredator behavior is a cost to other beneficial behaviors like foraging, rest, and mating (Frid and Dill 2002). It is likely that some groups of animals were displaced or suffered declines in number or fitness as a result of construction disturbance that season (Carello and Hoffa 2006, 2007, 2008). These temporary impacts occurred more than 13 years ago, and any lasting impairment is probably negligible compared to the permanent physical impacts and disturbance caused by ongoing gondola operation and maintenance.

Permanent physical impacts (clear-cut and gondola infrastructure)

Installation of the gondola required some permanent physical and hydrological modifications that have lasting effects on health and habitat quality even when the gondola is not operating. Overall, the gondola construction was completed with an impressively small amount of lasting disturbance for most of its length, given the enormity of this piece of infrastructure. There are six towers in the Preserve, all constructed with little permanent disturbance outside their small footprint and located in areas that appear to have minimal impact on wetland hydrology or vegetation. The rest of the lift infrastructure is suspended above ground.

The forest clearing that was made to accommodate the lift line below Peak 7 is about 1200 feet long by 40 feet wide, which is an area of approximately 1.1 acre inside the Preserve. A similar clearing about 400 feet long on Shock Hill was also made just outside the Preserve. The physical cover and shading normally provided by a forest tree canopy over these areas is now absent, leaving the clear-cut area susceptible to increased temperature, drying, and a shift in the vegetation community with respect to shade tolerant versus intolerant species, weeds, and invasive species (Beardsley and Johnson 2011, Carello and Hoffa 2008). These impacts were at their greatest right after the lift line was cleared, and even though the canopy is kept clear, herbaceous vegetation and shrubs are growing back. Weed cover has also decreased in the gondola clearing since 2008 as replanted areas grew back. Keeping the lift-line clear requires constant maintenance and tree-cutting, however, which is another form of ongoing physical disturbance.

The simplified vegetation structure in clear-cuts offers less cover for wildlife than the surrounding forest, making the habitat less suitable for some species during some seasons and times of day. For tree-nesting birds and small mammals, forest clearing directly reduces the number of available sites. About 2% of the forest area in Cucumber Gulch Preserve was cleared for the gondola line. The effect of nest site reduction on population size may therefore be significant in populations that are at or near carrying capacity. The effect is greater when it is understood as a cumulative impact on top of all the other recent forest clearing in and around Cucumber Gulch Preserve (Carello and Hoffa 2006, 2007, 2008). Lack of forest cover can also mean increased risk of predation for some species and decreased foraging efficiency for others. For example, the tree removal for the gondola clearing in 2006 created thousands

of feet of forest edge which may be partially responsible for a dramatic increase in brown-headed cowbirds at that time. Brown-headed cowbirds are nest parasites that exploit the host birds that are forced to nest on the edge of forests (Carello and Hoffa 2008). Other birds and mammals also selectively use or avoid artificial clearings and forest edge habitat at times.

If surrounding forested areas are large enough, mobile species can habituate to clearings by simply avoiding them during seasons or times of day when forest cover is important. But when these areas are selectively avoided by wildlife, they function as barriers to migration and movement, leading to fragmentation. Allen et al. (2017) showed that moose become more sensitive to disturbance in fragmented habitat and tend to avoid patches with human pressure. Barrier and fragmentation effects are greatly exacerbated when the clearings are long and linear, like the gondola clearing. Bartzke et.al. (2014) studied the response of ungulates to power lines (which may be similar to the gondola line while the gondola is not moving), concluding that they are a weak barrier for moose most of the time. In these studies, the barrier effects of linear features altered moose movements, although effects were minor compared to topography and forest cover cues that they naturally use to guide their movement (Bartzke et al. 2015).

Goldrup (2003) suggests that elk are more selective in habitat type and more sensitive to habitat fragmentation than moose. Impacts to elk may be moot, however, since elk no longer inhabit Cucumber Gulch[2] (Tom Davies). Mule Deer may be more sensitive to habitat fragmentation and barrier effects than elk or moose. Habitat degradation and barrier effects of the clear cut may be more significant for other species such as small mammals, amphibians, and birds that are more vulnerable to avian predators where forest cover has been removed.

Some forest ungulates preferentially select forest clearings and edges for some activities, especially if the clearings have good forage and cover (Bartzke 2014). For moose and deer, the negative barrier and fragmentation effects of the clear-cut could be partially offset during times when these animals preferentially browse in clearings and along forest edges. The potential benefits of the clear-cut on these forest ungulates would only count, however, if the gondola itself does not deter them from using the clearings. The structure of the gondola itself, with its towers, cables, and cars suspended over the Preserve, is another permanent physical impact that affects wildlife behavior, habitat suitability, fragmentation, and ultimately the number and distribution of species in Cucumber Gulch Preserve. These impacts are investigated in more detail later.

Wildlife disturbance

Analogs

The impact to wildlife by gondolas has not been studied directly except for here in Cucumber Gulch Preserve, but we can infer gondola impacts using common sense and studies of analogous types of disturbance. A power line is like a gondola in that the disturbance is linear with cleared vegetation along portions of its length, but a powerline does not have large cars, movement, or noise from mechanical

[2] An elk sighting reported by Dr. Christy Carello (2008) near the Peaks Trailhead at the base of Peak 7 is the only reported sighting in the vicinity of Cucumber Gulch since she began monitoring in 2003.

operation and people. When the gondola is operating, either for public transport or for maintenance, it is more like a busy road with constant traffic, at least in terms of sight and sound. When it is not operating and car movement is limited to wind, it is perhaps like a road with slow traffic or a trail. Scientific literature on the negative impacts of roads is plentiful.

An important distinction between a gondola and a road is that aerial gondola cars do not pose a real physical threat to wildlife the way ground vehicles do. Animals don't get run over by gondolas, and this is something that the more sentient wildlife may be able to learn and habituate to. Another distinction is that the ground surface below the gondola is more natural than a road. The gondola line—a clearing with natural ground vegetation and aerial cars—may be less of a physical barrier to wildlife than a road—an artificial surface with ground vehicles. The gondola is more of a deterrent maintained by instinctual fear and hard-wired predator-avoidance behavior than an actual physical barrier, but the effects are similar. The difference is a matter of degree.

The gondola also differs from a road or trail in that the main disturbance comes from above ground rather than on the ground. Suspended above ground, a line of moving gondola cars is visible for a greater distance than cars on a road, especially in forested areas. Wildlife sensitivity, negative behavioral responses, and displacement have been documented for low-flying aerial vehicles including drones, providing some insight into aerial disturbance. Larger and louder aerial vehicles elicit a greater flight response, and predictable flight patterns are a greater disturbance than random ones (Mulero-Pazmany et al. 2017). Birds are the most likely group of wildlife to be negatively influenced by aerial disturbance. The negative impact of zip-lines is also well-documented, providing another analog to the gondola (Tom Davies). Tom noted that one of the intensifying factors in zip-line disturbance was human noise such as talking, laughing, and yelling. These sounds are also associated with the gondola.

Gondola visibility

Moving cars on the segment of the gondola line that crosses Cucumber Gulch are clearly visible from 64 acres in the 119-acre Preserve (figure 3). In the areas from which it is not visible, it is obscured by terrain or dense forest. When the gondola is operating, the progression of cars in both directions—often with occasional starts and stops—is an obvious artificial visual disturbance. The moving cars are probably the most prominent visual cue, but unnatural reflections, erratic glare spots, and moving shadows are also stimuli that catch the attention of wildlife and people. The visual impact on wildlife is less when the gondola is still because wildlife response behavior is often associated with or aggravated by movement. But the gondola is rarely still. Even when it is not running, the cars and cables often sway in the wind, and the glare spots and shadows they cast move too.

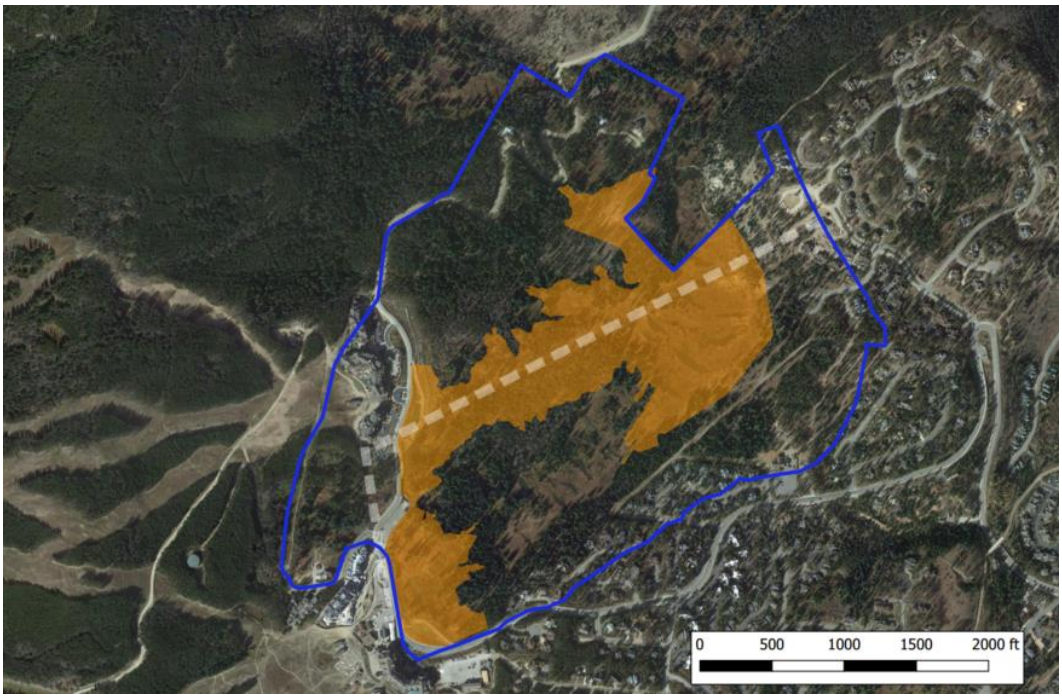


Figure 3: 64-acre area (orange) within Cucumber Gulch Preserve (blue) from which the gondola line (dashed line) is clearly visible. This area was mapped in a field survey conducted in June 2019 when the gondola was not running. The area affected by glare and reflections is probably greater than what is shown. The area upon which gondola shadows fall is smaller.

Gondola noise

For such an enormous machine, the gondola is surprisingly quiet. The mechanical noise is a low intensity hum that is noticeable above the natural summertime background sounds of wind, water, and songbirds in Cucumber Gulch Preserve. The bumping and rattling of cars where they roll over sheaves at each tower is also noticeable whenever the gondola is moving, and these sounds are also just marginally louder than natural ambient background noise. As a source of noise pollution, the mechanical sounds of the running gondola create a constant low-level artificial background noise. Even when it is not running, there are some unnatural noises caused by wind blowing through the cables and cars. A greater source of noise pollution associated with the gondola comes from its passengers. Voices and the sounds of stomping as people move around the metal floors in cars overhead are by far its noisiest aspects. Unlike the consistent hum and rattle of the machine, passenger noises are acute and sudden. When the gondola has a lot of passengers, these loud interruptions are frequent.

We measured noise levels along the gondola line when it was running on July 15, 2019 and when it was not running on June 13, 2019 (figure 4). In each trial, we made 5 1-minute recordings from each of 10 stations along the gondola line. Maximum sound intensity (average maximum for the 5 recordings at each station) ranged from 56 to 95 decibels. Some of the loud noises associated with these peaks were natural sounds, like wind gusts, but most of the loud noises came from construction and traffic in areas adjacent to the Preserve. In some cases, it was noise from the gondola (passenger voices and stomping). At only 2 of the 10 stations were the peak noises louder when the gondola was open (in July) versus when it was closed (in June). The loud noises coming from gondola operation are usually not

significantly louder than the noise disturbance coming from adjacent construction and traffic. The gondola increases the frequency of disturbing noise in the Preserve, but not necessarily the intensity.

Gondola noise is also perceptible during quiet times in between the interrupting sounds of construction, traffic, and people. Minimum sound intensity (average minimum for the 5 recordings at each station) ranged from 40 to 59 decibels. At all stations, the minimum decibel level was greater when the gondola was open (in July) than when it was closed (in June). When the gondola is running, quiet times are not as quiet. There is a constant artificial hum and rattle that keeps the decibel level from dropping below a certain level. The intensity of background gondola noise depends on the height of the closest towers.

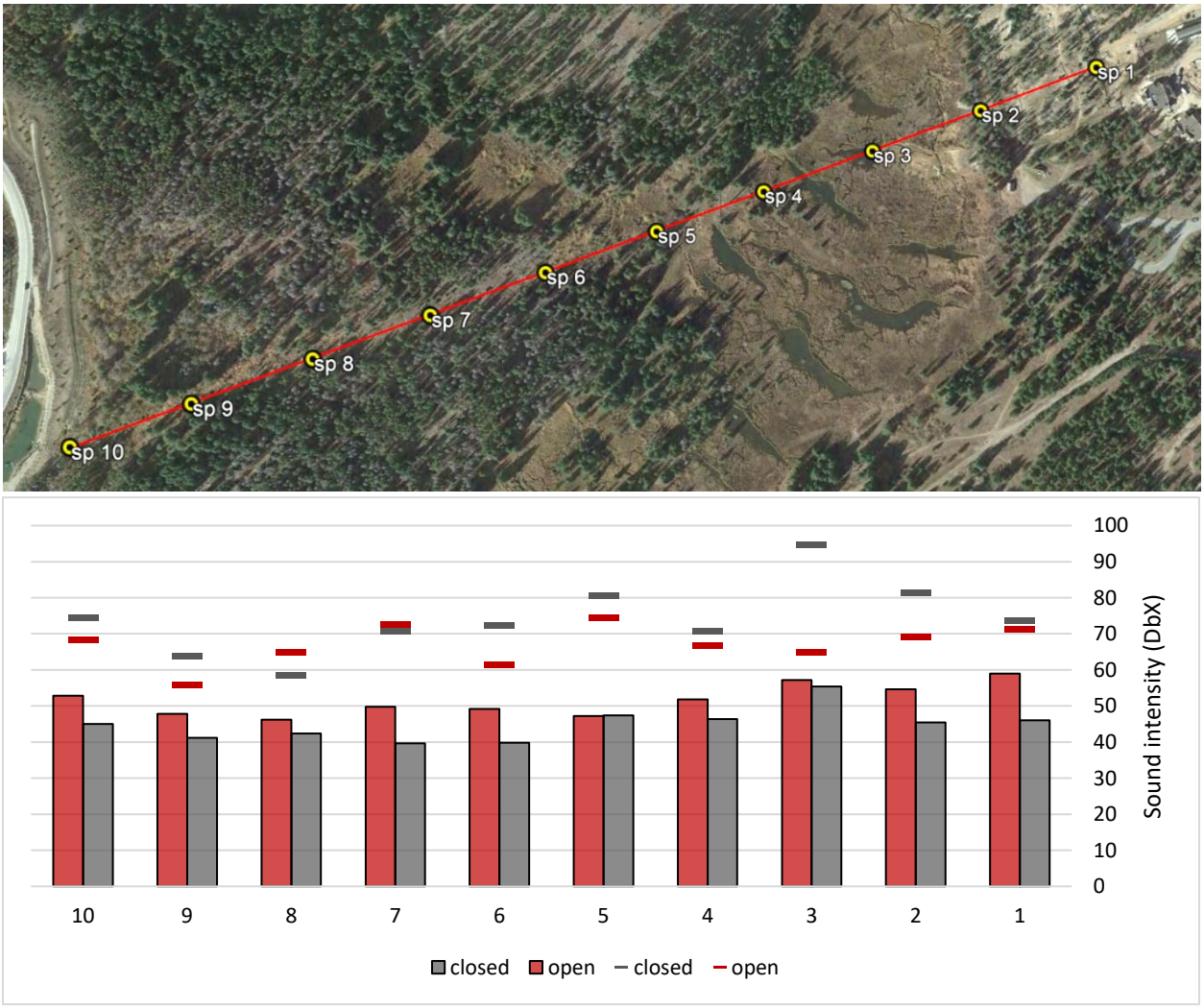


Figure 4: Average sound intensity was measured for 1 minute each from 5 points at each of 10 stations (sp 1 – sp 10) along the gondola line (under the centerline and at 25 and 50 meters each side) when the gondola was closed on June 13, 2019 (gray) and open on July 15, 2019 (red). Average minimum decibel level (bars) and average maximum decibel levels (dashes) for each station are shown.

More people

Another significant impact of the gondola is increased visitation to Cucumber Gulch Preserve. The Preserve is a very attractive location for visitors who want to get outdoors easily from town or the Peak 7 and 8 base area lodges, and the gondola makes access much more convenient. The potential for the gondola to increase human traffic in the Preserve was high on the list of concerns when it was initially proposed and as pressure to expand summer operations has been increasing. Each of the gondola summer operations agreements between the Town and Ski Resort includes provisions for mitigating the additional crowding with directives for trail closures, construction of alternate trails, signs, special rules for bikes and pets, and staff to educate visitors and enforce rules. Despite the concern, and despite massive efforts to manage visitation, the number of people in Cucumber Gulch Preserve has risen 500% since gondola summer operations began. The Gulch now sees an average of 300 trail user per day in July, compared to about 60 in 2011 (Carello and Turco 2018).

Wildlife responses

The greatest lasting impact of the gondola on Cucumber Gulch Preserve is disturbance to wildlife. Even domesticated animals and those that have become habituated to human development respond to artificial visual and auditory cues. Wildlife are more sensitive to artificial disturbance, exhibiting behavioral responses that negatively affect fitness. Acute stimuli—sudden, short-duration, random events or encounters—usually trigger short-term changes in behavior such as flight or hiding that are similar to predator-avoidance behaviors (Frid and Dill 2002). In some cases, disturbance causes animals to stop what they are doing to be more alert. In other cases, it causes them to flee or avoid the area altogether. Longer-lasting disturbance events, or frequent short events that interrupt normal behavior essential to survival (such as foraging, mating, or caring for young) can result in decreased fitness and population-level responses (Bartzke et al. 2015, 2016, Blumestien et al. 2016, Brown et al. 2012, and Neumann et al. 2010, 2011, USFS 2019).

When disturbance events become more frequent, or when they are chronic (continuous, long-lasting, predictable events or encounters), wildlife tend to respond by avoiding the area where the disturbance occurs. Level of disturbance is a prime factor in determining habitat quality because habitat with higher intensity or more frequent disturbance is actively selected against or avoided altogether (Neumann 2009). Habitat avoidance results in locally depressed population numbers for affected species, and in small isolated habitats like Cucumber Gulch Preserve, it may ultimately lead to displacement of the species. This is especially true for highly mobile or migratory species.

The gondola is a linear feature that crosses Cucumber Gulch perpendicularly, bisecting the important wildlife migration corridors that were initially slated for protection as part of the Preserve (figure 5). It may therefore function as a migration barrier that, depending on the degree of disturbance and avoidance behavior, inhibits the movement of animals that need to cross it to complete their migration routes. When a barrier of this sort runs through a piece of habitat, it restricts movement between the parts, partially or fully isolating them from one another in a phenomenon known as habitat fragmentation. As the parts become increasingly smaller and more isolated, the habitat becomes less and less capable of supporting species and biodiversity. Habitat fragmentation is a leading cause of declining biodiversity at the local, regional, and global scales (Fahrig 2003).

In a related case, the US Forest Service (2019) responded to public comments about a proposed new ski lift on Peak 7 of the Ski Resort, judging that the removal of 2.9 acres of spruce-fir forest and construction of the lift would have minimal impacts to habitat connectivity. Rationale for the judgment was not given, but it may be that—unlike the gondola—the Peak 7 lift is planned to operate only in winter, it does not cross an identified wildlife migration corridor, and it passes over high-traffic areas that were previously clear-cut and developed as ski slopes. The gondola, on the other hand, operates in all seasons, it crosses identified migration wildlife corridors, and it passes over a wildlife preserve and biodiversity hotspot.

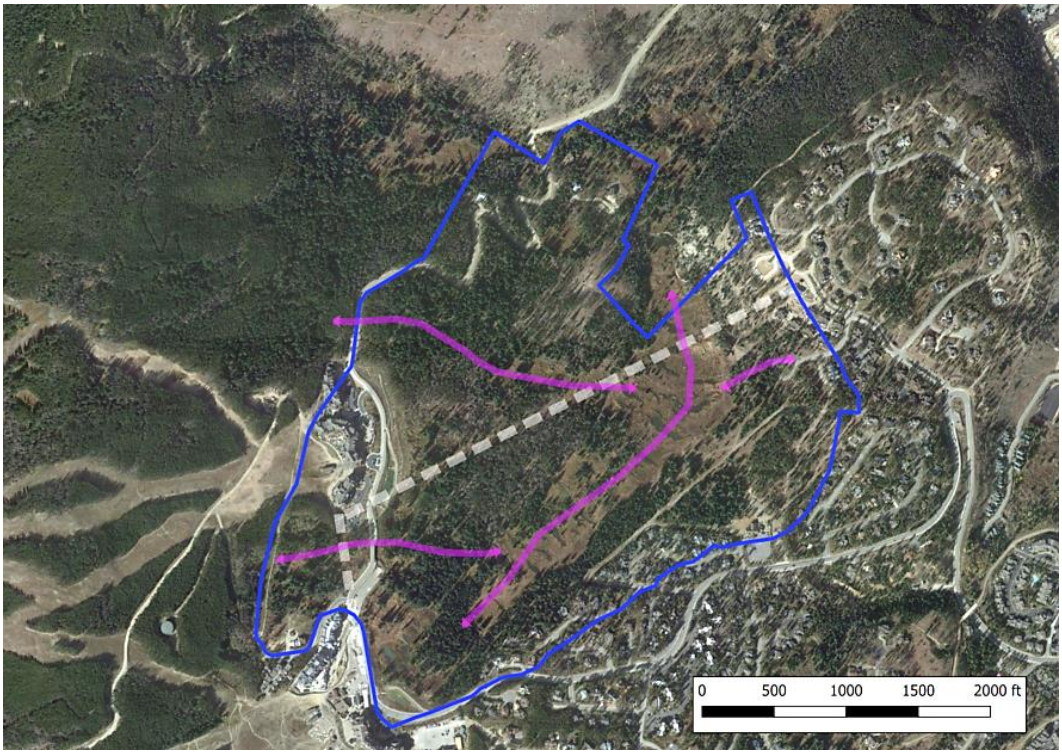


Figure 5: The importance of Cucumber Gulch Preserve as a migration corridor was highlighted as a key resource in initial evaluations that led to the formation of the Preserve and Overlay Protection District (blue boundary). Animals following the migration corridors drawn by SAIC (2001) (shown in purple) must now cross the gondola (white) in addition to the developed areas along the perimeter of the Preserve.

In some species, the impacts of disturbance may be lessened due to desensitization or habituation. Desensitization is a behavioral phenomenon in which an animal tends to stop noticing a disturbance that is constant or regular. Habituation occurs when the chronic disturbance continues to be noticed, but the animal's behavioral response changes. Both can be thought of as animals "getting used to" the disturbance. Tolerance is often measured as the distance from the source of disturbance at which an animal initiates a behavioral response, like flight. Flight initiation distances are related to species size. Large species may simultaneously be more likely to be disturbed by humans and more likely to habituate to reduce energetic costs (Blumstein et al. 2016a). Fitness costs to habituation and individual difference in risk tolerance are not well understood. Most species tend to show some level of habituation to chronic (predictable) disturbance, but there is a high degree of variation in species' ability to habituate

and tolerate human stress (Blumstein et al. 2016b). Like a road, the gondola is a chronic, regular, and relatively predictable disturbance, so animals may be more likely to become desensitized or habituated to it than to unpredictable disturbance events.

Habituation can be a double-edged sword for wildlife and for managers aiming to keep them wild. It is an effective survival mechanism at the local scale, but it involves a loss of wildness and potentially decreased fitness in populations at the regional scale. In extreme examples, such as the elk herd in Estes Park, animals abandon some of their normal survival strategies and natural migration patterns to become almost domesticated. Habituated mule deer in Buena Vista, Salida, and many other Colorado towns are another example of wildlife that have become less wild.

Beaver

Beaver are the keystone species of Cucumber Gulch Preserve. They are the "ecosystem engineers" that create and maintain the wetland and aquatic habitat diversity upon which most of the other species in the Preserve depend. Displacement of beaver is the mechanism by which the gondola could potentially impair Cucumber Gulch wetlands and the species they support. That is, if gondola operations displace beavers, the health and function of wetlands would suffer as a result. The joint working group asked us to evaluate beavers specifically because they are such a critical component to the health of Cucumber Gulch Preserve.

Beavers are skittish. They are acutely sensitive to close-up human disturbance and spook easily, retreating to deep water, cover, or their lodge at sign of danger. They employ a characteristic tail-slap and vocal calls to warn the rest of the colony of danger, and that triggers nearby beavers to also seek cover. Beavers spend most of their time in the water where they are perhaps less sensitive than terrestrial animals to a distant overhead disturbance (the gondola towers spanning the core wetland are 64-71 feet tall). Kelly Colfer, Sean Knox, and Tom Davies were each of the opinion that beavers are probably not very sensitive to the visual and noise disturbance associated with gondola operation.

Beavers are adept at dealing with disturbance where they encounter it. They tend not to shy away from human development, and their territories often overlap with ours. They are masters of habituation, with a lot of flexibility to adjust their behavior to avoid disturbance rather than moving to get away from it. Some studies suggest that the nocturnal activity we commonly associate with beaver is partly a behavioral response to living with human disturbance. In remote places, beavers are sometimes active throughout the day. Nevertheless, in areas with disturbance and high risk of predation, the nocturnal habit is a key to survival, making the hours from dusk to dawn the times of greatest vulnerability.

The beaver's ability to habituate is critical to its survival among predators because beavers are very territorial. They invest a lot of energy in establishing and maintaining their home habitat with dams and lodges. So, rather than abandoning home when they are threatened, they tend to stay put and adjust their behavior to stay safe. Once a colony has established its territory, it is not likely to be displaced unless the disturbance or perception of risk is extreme. Chronic disturbance may, however, deter dispersing beavers looking to establish new home territory from selecting sites nearby. If operating the gondola causes enough disturbance to deter beaver colonization, it will have a greater probability of

displacing beavers in late summer and fall than at other times of the year because that is when dispersing individuals are selecting their territories (Woodward 1964).

Fall is also a critical time for beavers in established colonies. At this time of year, they need to be busy fortifying dams and lodges and foraging to supply winter food caches in preparation for a long winter under the ice. Excessive disturbance that distracts them from performing these activities could potentially increase the risk of winter mortality. Beavers are least vulnerable to disturbance during winter, when they spend most of their time in the lodge or under ice-covered ponds. Spring and early summer are also not likely to be critical times.

Beaver activity has unfortunately declined significantly over the past 20 years in the Preserve (figure 6). In 2017, the number of active lodges dropped to 1 from a high of 7-8 in 1999-2001 (Carello and Turco 2018). In 2018 and 2019 there were 2 active lodges. The downward trend does not correlate with the operation of the gondola, however, and is more likely due to other causes. The steep decline occurred in the early 2000s, before the gondola was present, and is likely tied to disease or other factors. A series of tularemia outbreaks over the past 20 years has wreaked havoc on beaver populations region-wide, and Colorado Parks and Wildlife biologist Tom Davies reported that the most recent outbreak in 2014-15 reduced local beaver numbers by as much as 95%.

The one active lodge in 2017 (which remained active through 2018 and 2019) is near the gondola line. Out of all the equally suitable unoccupied beaver habitat in Cucumber Gulch Preserve at that time, this colony chose to establish its territory at this location, suggesting that they are not seriously threatened by the gondola.

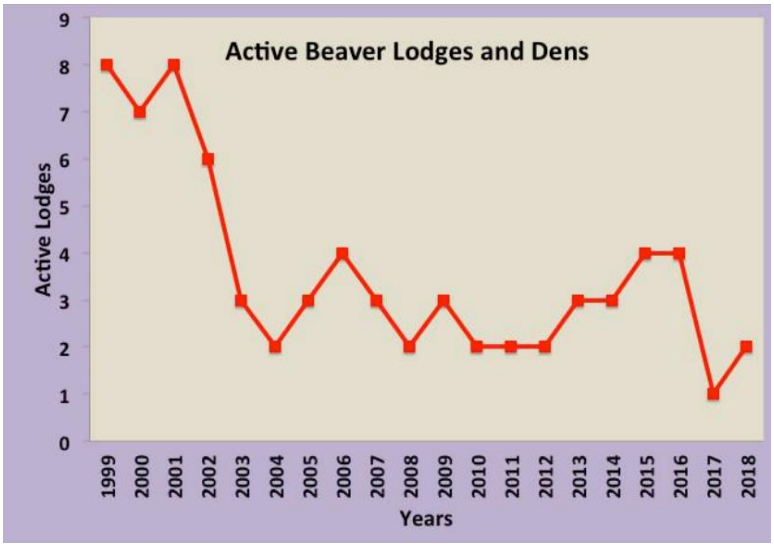


Figure 6: The trend in the number of active beaver lodges and dens in Cucumber Gulch Preserve indicates a drastic decline in the number of beaver colonies over the past 20 years. This figure is from Carello 2018.

We also tracked the total area of beaver ponds in Cucumber Gulch Preserve from aerial images going back to 1999 (Doran *et al.* 2018). When we split out the area in a 100-meter swath under the gondola line and compared that with the rest of the gulch as a percentage of riparian valley-bottom area, pond

density underneath the gondola is consistently greater than or equal to the density in Cucumber Gulch as a whole (figure 7). The latest crash in beaver pond area was in 2011 when most of the unmaintained beaver dams breached during thunderstorm flash floods. Recovery since that crash has been faster underneath the gondola than in the rest of Cucumber Gulch which, despite restoration efforts, has remained low because beavers have failed to reoccupy those areas. The increase in pond area under the gondola since 2015 is due to the activity of one persistent colony at that location. These results do not rule out a negative impact on beaver by the gondola, but they do suggest it is not a major disturbance.

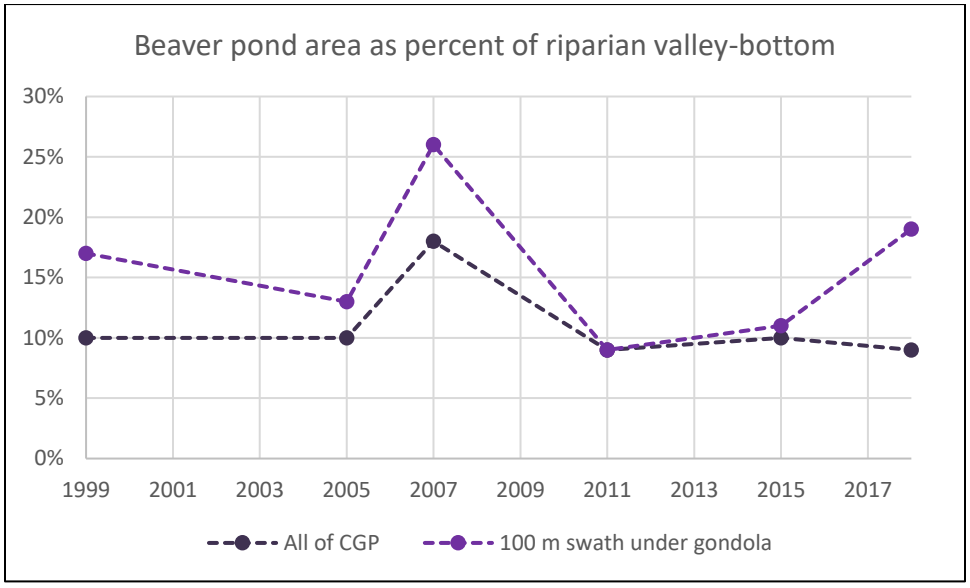


Figure 7: Beaver pond area as a percent of riparian valley-bottom for all of Cucumber Gulch Preserve (black) and for the 100-m wide swath underneath the gondola (purple). In 2017, the only actively inhabited beaver lodge in the Preserve was underneath the gondola line.

Moose, deer, and elk

Large mammals are the most noticeable wildlife in Cucumber Gulch Preserve. Moose, deer, and elk are what most people think of when it comes to wildlife in the Preserve, and the joint working group has been particularly interested in learning about the impacts of the gondola on these resident ungulates.

Historical records dating back to the 1850s indicate that moose wandered into northern Colorado from Wyoming but were transient and never established a stable breeding population until after they were introduced (or reintroduced) in the 1970s through the 2000s (Colorado Parks and Wildlife 2013). By 2012, the reintroduction program had established a breeding population of about 2300 moose in Colorado. The moose population in Colorado continues to grow, even while it is declining in neighboring states (Colorado Parks and Wildlife 2013) Moose were a rarity in the 1990s when the initial studies of Cucumber Gulch were going on, but they are now common. They are year-round residents of Summit County and now inhabit the Preserve during spring, summer, winter, and fall.

Mule deer use Summit County as summer range, migrating seasonally back and forth between here and the Arkansas Valley where they spend winter (Tom Davies). The timing of their arrival in Cucumber

Gulch Preserve varies with weather and snow conditions but is usually between the middle of May and early June. Tom Davies said in some years they arrive as early as April. Mule deer frequency in the Preserve has been declining over the past decade (Carello and Turco 2018, 2017, 2016), and numbers have been declining in Summit County over that time period as well (Tom Davies). The putative cause of the local declining mule deer population is habitat degradation (Tom Davies, CPW 2014).

Elk, which used to be common in Summit County and were frequent visitors to Cucumber Gulch, also migrate seasonally and use Summit County as summer range. There was an Ophir Mountain herd that summered near Breckenridge and another one that wintered in South Park. Elk are now rare in this area and have only been observed in the vicinity of the Preserve one time since monitoring began in 2003 (Carello 2008, Carello and Turco 2018). The Ophir Mt. herd dropped from 300 to 50 individuals over 6 years (Tom Davies).

Because of its variety of wetland and forested habitat, good structural and vegetation diversity, and plentiful access to water and food, Cucumber Gulch Preserve is prime habitat for ungulate calving, fawning, and rearing of young (Tom Davies, Kelly Colfer, Shean Knox). Tom Davies explained that mule deer and elk calving habitat is like that of moose. Deer need cover where they can hide their fawns, but they like to be in nearby open areas with a wide view during birthing. Elk calving requirements are similar, but elk prefer steeper terrain than deer. Both species usually avoid direct south aspects and tend to calve on slopes with east through north through west aspects. Kelly Colfer and Sean Knox agreed with this assessment.

Ungulates are more sensitive to disturbance during calving season than at other times of the year, and elk are especially so. Tom Davies said elk are 100% intolerant to disturbance when calving. He explained that the reason for Colorado Parks and Wildlife's original recommendations regarding gondola operations—to keep it closed from May 15 to June 30—were made to prevent disturbance to ungulates in calving and fawning season. At that time, the greatest concern was displacement of elk, but Colorado Parks and Wildlife still recognizes May 15 to June 30 as a critical time to avoid disturbing mule deer and moose while they are birthing, fawning, and calving. Tom Davies is more concerned about mule deer than moose, and he explained that the impact of operating the gondola during that period would be considered significant by his agency. The impact of running the gondola prior to May 15 would be considered less significant.

The Cucumber Gulch wildlife camera monitoring data set has records of moose calves in the Preserve from May 26 through October 6. Mule deer fawns were recorded June 4 through September 26. The presence of calves in late May and fawns in early June is consistent with mid-May birth dates. This timing coincides with birth dates reported in mountain areas of Montana (Peek 1962) that have climate similar to Breckenridge. Tom Davies and Kelly Colfer suggested that fawning and calving seasons may begin earlier than May 15 in years with a mild spring and/or less snow.

Cucumber Gulch Preserve camera data confirms that deer and moose are active at all hours, but activity peaks in the hours of dawn and dusk. Gondola disturbance may therefore be the most disruptive during these times. Daytime operations are probably more disruptive than nighttime operations because the

animals may be able to bed down away from gondola disturbance where they do not have to be constantly vigilant.

Big game animals have been the focus of a great deal of scientific research, and there are abundant studies documenting the negative effects of human disturbance on moose, deer, and elk. Most studies liken human-caused disturbance stimuli to predation risk (Allen et.al. 2017), and studies support the hypothesis that antipredator behavior is a significant cost. The time and energy animals spend in vigilance, flight, or travelling to avoid predators (or artificial stimuli they interpret as predator risk) is a cost (Frid and Dill 2002). Predator avoidance behavior is an instinctive trait that can be triggered by threatening stimuli like loud noises and approaching objects. Brown et al. (2012) suggest that anthropogenic noise levels alone do not elicit a strong response by ungulates—they are more sensitive to visual cues or a combination of sight and sound. Large mammals are also sensitive to aerial disturbance. Flight response and avoidance behavior to small unmanned aerial vehicles taking off or landing were triggered at mean distances of 300 +/- 190 meters (620 to 1620 feet) (Bennitt et al. 2019). Stoen et al. (2010) documented a strong response of moose to helicopters, finding that their rate of movement increased 100-fold for up to 2 hours after an approach.

In 2010 Emily Latta, then a student at Metro State College, did an experiment to test the effect of gondola operations on moose habitat selection in Cucumber Gulch Preserve (Latta *et al.* 2010). By using a paired set of cameras with one aimed at the opening of the gondola cut and one at the forest edge (figure 8), and by comparing the number of photo captures during gondola open hours versus closed hours, she found that moose avoid the clearing when the gondola is running but not when the gondola is not running (Table 1). That is, moose approaching from the forest were much less likely to pass into the clearing under the gondola when it was running versus when it was not. This suggests that moose are sensitive to the moving gondola, that it affects their movement and habitat selection, and that it functions as a barrier to moose movement when it is running.

We repeated this analysis using data from the same camera locations for 2012-2019 and found a similar pattern (Table 1). Moose avoidance of the clearing was statistically significant while the gondola was open and running (P=.000006). On days when the gondola was closed, moose were still more likely to avoid the clearing during its normal operating hours versus hours when it would normally be closed, but the correlation is much weaker (P=.09). These results are the opposite of what would be expected if moose had desensitized to the gondola, but they may indicate habituation. After several years of summer gondola operation, moose still strongly avoided the gondola clearing while it was running. They also weakly avoided the clearing at times of day when it would be running if it was open. This may mean that moose habituated to the disturbance (the running gondola) by sometimes avoiding the clearing in daytime altogether. The results of this study corroborate Emily Latta's (2010) experiment and are consistent with the hypotheses that moose are sensitive to gondola operations, that they adjust behavior in response to it, and that it functions as a barrier when it is running.

Deer tend to use open areas in the forest more than moose, and this pattern was evident in the same 2012-2019 paired camera data set (Table1). Results of this analysis showed that deer are highly responsive to gondola operation. On days when the gondola was scheduled to be open, deer used the

clearing when the gondola was not running but strongly avoided it when the gondola was running (P=.0000007). On days when the gondola was closed, they did not discriminate between open and closed hours (P=.755). Even more than moose, mule deer are sensitive to gondola operations and they adjust behavior to avoid it. When it is operating, the gondola disrupts deer movement and limits available habitat.

Figure 8: Photos of moose from the forest/edge camera (left) and the gondola clearing camera (right) (from Latta *et al.* 2010).

Table 1: Statistical results for paired camera study testing for habitat discrimination related to the gondola by moose and deer.

	date	closed			open		
Moose (Latta 2010)	hours	on	off	sum	on	off	sum
	forest/edge	14	7	21	17	5	22
	clearing	11	11	22	1	6	7
	sum	25	18	43	18	11	29
	χ2 test	p =	0.3		p =	0.006	
Moose (2012-2019)	date	closed			open		
	hours	on	off	sum	on	off	sum
	forest/edge	36	32	68	49	35	84
	clearing	12	22	34	5	26	31
	sum	48	54	102	54	61	115
	χ2 test	p =	0.1		p =	0.0005	
Deer (2012-2019)	date	closed			open		
	hours	on	off	sum	on	off	sum
	forest/edge	7	15	22	18	20	38
	clearing	21	53	74	20	158	178
	sum	28	68	96	38	178	216
	χ2 test	p =	0.8		p =	0.0000001	

Ungulates are particularly sensitive to people. Neumann (2009) documented moose behavioral predator-risk behavior when people were near, and further studies showed similar responses to snowmobiles, backcountry skiers, hikers, and hunters, with hunters triggering the strongest response. (Neumann 2010, 2011). The behavioral responses in these studies were acute, and researchers concluded that occasional encounters with people would not have a significant effect on animal energy budget or population-level impacts. Chronic human activity can trigger habitat displacement, however (Lykkja 2009). Moose cows apparently perceive anthropogenic disturbance events as a risk, influencing their choice of calving sites and ultimately their fidelity (Tremblay 2007). Habitat with chronic human disturbance is perceived as a higher risk, and moose cows tend to avoid these areas when selecting calving sites even when those sites had been successful in the past. Mule deer have also been found to abandon areas for alternate habitat due to disturbance and increased human activity (Pelletier 2006).

In a literature review of the effects of recreation on moose, Harris *et al.* (2013) determined that unpredictable encounters (off-trail or off-road use) have a greater impact than predictable encounters. Freddy *et al.* (1986) found that mule deer were disturbed more by persons afoot than by snowmobiles. Responses by deer to people were longer in duration, involved running more frequently, and were greater in estimated energy expenditure. Kelly Colfer cited a study of moose in Alaksa that showed them to have a greater flight response to skiers compared to snowmobiles, perhaps because they could hear a snowmobile approaching from great distance, whereas the skier was more of a surprise. He reiterated that moose response can be unpredictable. Sometimes they respond aggressively and other times they are more inclined to flee. Tom Davies agreed that moose are unpredictable in this way, especially during calving season.

Kelly Colfer has a lot of experience with trail impacts to deer and elk. In his experience, elk tend to flee from a mountain bike at 1500 feet. For deer the estimate is 600 feet. He explained that elk may be less able to habituate to encounters with people (hikers, bikers, skiers, *etc.*) than with artificial objects like vehicles. In a large-scale study of elk encounters with on-foot people in Colorado, Phillips and Aldredge (2000) demonstrated the potential magnitude of impact to elk populations from high levels of recreational activity during calving season if people are dispersed across calving areas. Large numbers of recreationists, traveling randomly and covering long distances, could produce levels of disturbance similar to their treatments which resulted in declining calf/cow proportions and reduced reproductive success. Gondola impacts related to increasing human visitation in Cucumber Gulch Preserve is an important additional stress to moose, deer, and elk, on top of the visual and sound disturbance of the gondola itself.

To summarize the potential impacts of the gondola on ungulates, both moose and deer are sensitive to the gondola and they have been demonstrated to avoid it while it is being operated. It is therefore a deterrent to movement and migration of both species, especially when it is running, as well as a factor in habitat fragmentation and decreased habitat quality. Given the small size of the Cucumber Gulch Preserve, any further fragmentation may have increasingly greater impact. The Preserve is prime calving and fawning habitat, and moose, deer and elk are most vulnerable during this time. A critical time to avoid disturbance, as recommended by Colorado Parks and Wildlife biologists and corroborated by years of camera data in Cucumber Gulch, is May 15 to June 30. Moose calves and deer fawns are

common in the Preserve, but elk are no longer seen. Ungulates are sensitive to disturbance by recreationists on foot, bikes, or vehicles, with deer and elk being more sensitive than moose. Increasing disturbance—directly from the gondola and indirectly from the increased frequency of human interactions with people brought to the Preserve by the gondola—could lead to habitat displacement especially as a cumulative impact on top of all the other sources of disturbance now acting on the Preserve. Moose, deer, and elk habituate to predictable disturbance better than to unpredictable encounters, so the effects of increasing human use will be greater if there are more trails or more dispersed use.

Birds

In terms of species richness and number of animals, birds make up more of Cucumber Gulch Preserve's biodiversity than any other group of wildlife. A bird list from Carello and Turco (2019) has 72 species that have been observed in Cucumber Gulch Preserve since records were kept in 2003 (table 2). Of these species, about 1/3 are potential year-round residents and the others are migratory species that occupy the area seasonally. Most of the migratory birds that use the Preserve nest and breed here in summer.

The abundance of birds (number of individuals) and richness (number of species) both increase in spring as migrants arrive, peak in June and July during prime nesting season, and begin dropping off in August as migrants leave (figure 9).

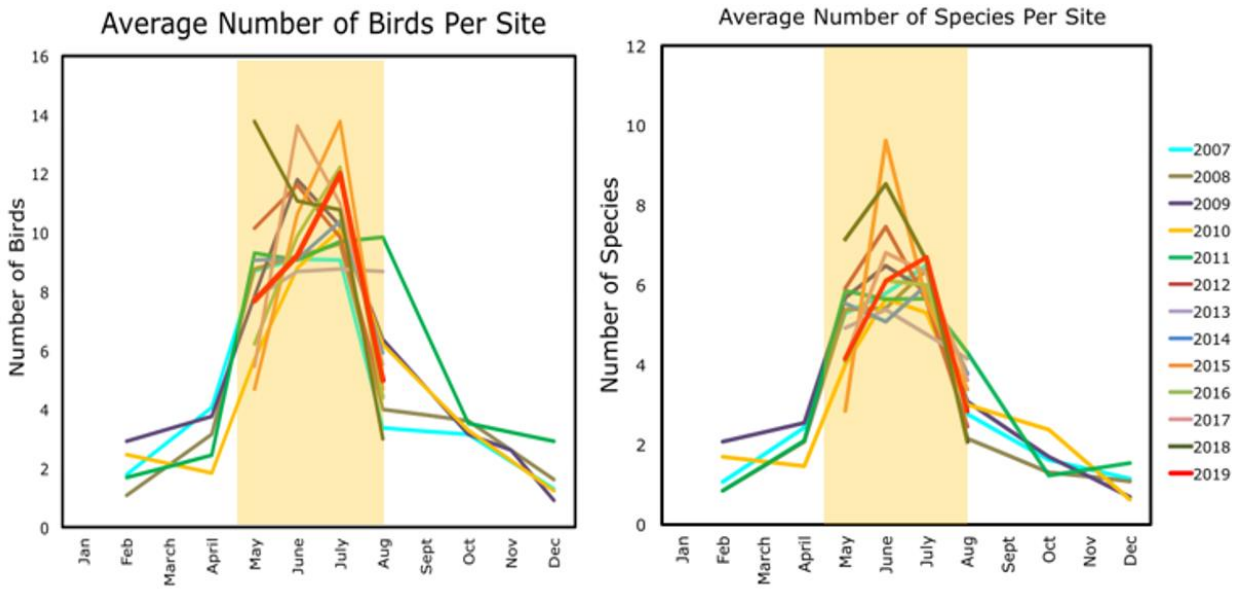


Figure 9: Plots showing the observed relative abundance of birds and bird species in Cucumber Gulch Preserve over the calendar year for 2007-2019 (from Carello 2019). The critical time of bird vulnerability from May 1 through August 15 is highlighted.

Common Name	migration status	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
American Crow	resident	■	■	■	■	■	■	■	■	■	■
American Dipper	altitudinal migrant		■	■		■	■	■	■	■	■
American Robin	altitudinal migrant	■	■	■	■	■	■	■	■	■	■
American Three-toed Woodpecker	resident	■	■	■	■			■	■	■	■
Bald Eagle	accidental		■	■							
Band-tailed Pidgeon	short-distance migrant										
Barn Swallow	neotropical migrant										
Black-capped Chickadee	altitudinal migrant										
Belted Kingfisher	altitudinal migrant	■		■			■				
Blue-winged teal	short-distance migrant										
Brewer's Blackbird	altitudinal migrant	■									
Broad-tailed Hummingbird	neotropical migrant	■	■	■	■	■	■	■	■	■	■
Brown Creeper	resident	■	■	■	■	■	■	■	■	■	
Brown-headed Cowbird	short-distance migrant	■	■	■	■	■	■	■	■	■	■
Canada Goose	altitudinal migrant	■	■	■	■	■	■	■	■	■	■
Cassin's Finch	resident	■	■	■	■	■	■	■	■		
Chipping Sparrow	short-distance migrant	■	■	■	■	■			■		
Cliff Swallow	migrant		■	■			■		■	■	■
Common Raven	resident	■	■	■	■	■	■	■	■	■	■
Common Snipe	short-distance migrant										
Cooper's Hawk	short-distance migrant	■	■	■	■	■	■	■	■	■	■
Cordilleran Flycatcher	neotropical migrant	■	■	■	■	■	■	■	■	■	■
Dark-eyed Junco	resident	■	■	■	■	■	■	■	■	■	■
Downy Woodpecker	resident	■	■	■	■	■	■	■	■	■	
Dusky Flycatcher	neotropical migrant										
Dusky Grouse	resident										
Eurasian Collared Dove	resident							■	■		
Fox Sparrow	short-distance migrant		■		■					■	
Gadwall	migrant										■
Golden-crowned Kinglet	migrant					■	■	■	■		■
Gray Jay	resident	■	■	■	■		■		■		■
Great Blue Heron	altitudinal migrant	■	■		■	■	■		■	■	■
Great-horned Owl	resident										
Green-winged Teal	short-distance migrant	■	■	■	■			■	■	■	■
Hairy Woodpecker	resident	■	■	■	■		■		■	■	■
Hermit Thrush	short-distance migrant	■	■	■	■		■	■	■	■	■
House Wren	accidental									■	■
Killdeer	altitudinal migrant										
Lincoln's Sparrow	short-distance migrant	■	■	■	■	■	■	■	■	■	■
Long-eared Owl	short-distance migrant										
Mallard	altitudinal migrant	■	■	■		■	■	■	■	■	■
Mountain Bluebird	altitudinal migrant			■					■		
Mountain Chickadee	resident	■	■	■	■	■	■	■	■	■	■
Mourning Dove	altitudinal migrant	■	■	■	■		■		■		
Northern Flicker	resident	■	■	■	■		■	■	■	■	■
Northern Shrike	migrant										
Olive-sided Flycatcher	neotropical migrant		■					■		■	
Osprey	neotropical migrant				■	■				■	
Pine Grossbeak	resident	■	■	■	■				■	■	
Pine Siskin	resident	■	■	■	■	■	■	■	■	■	■
Pygmy Nuthatch	resident									■	■
Red-breasted Nuthatch	resident	■	■	■	■	■	■	■	■	■	■
Red Crossbill	irregular			■	■					■	
Red-naped Sapsucker	short-distance migrant	■				■					
Red-tailed Hawk	resident	■	■	■	■			■	■		
Red-winged Blackbird	altitudinal migrant		■	■	■		■				■
Ruby-crowned Kinglet	altitudinal migrant	■	■	■	■	■	■	■	■	■	■
Rufous Hummingbird	migrant		■						■		
Solitary Sandpiper	accidental										
Song Sparrow	altitudinal migrant							■	■	■	■
Spotted Sandpiper	neotropical migrant	■	■	■	■	■	■	■	■		
Stellar's Jay	resident	■	■	■	■	■	■	■	■	■	■
Townsend's Solitaire	resident										
Tree Swallow	short-distance migrant										■
Violet-green Swallow	short-distance migrant	■	■	■	■	■	■	■	■	■	■
Warbling Vireo	neotropical migrant									■	■
Western Wood Pewee	neotropical migrant										
White-breated Nuthatch	resident	■	■	■	■	■	■	■	■	■	■
White-crowned Sparrow	altitudinal migrant	■	■	■	■	■	■	■	■	■	■
Wilson's Snipe	migrant	■	■	■	■	■	■	■	■	■	■
Wilson's Warbler	neotropical migrant	■	■	■	■	■	■	■	■	■	■
Yellow-rumped Warbler	neotropical migrant	■	■	■	■	■	■	■	■	■	■

Table 2: Bird list for Cucumber Gulch Preserve (from Carello and Turco 2019) showing migration status and whether the species was observed in regular monitoring surveys each year 2010-2019. Shaded cells indicate positive observation.

Both the number of birds and the number of bird species are typically 6-10 times greater from May through the middle of August compared to other times of the year in Cucumber Gulch Preserve. Birds are also most vulnerable at these times of year because that is when they are nesting, breeding, and rearing young. For these reasons, resident bird expert Dr. Christy Carello identified May through August as the critical time for bird vulnerability to disturbance in Cucumber Gulch (Carello and Hoffa 2009). To prevent the displacement of bird species, Carello (2011) recommended minimizing any activities that could disrupt bird breeding behavior during this critical period. Operating the gondola through bird breeding habitat is likely one of those disruptive activities.

Kelly Colfer explained how the timing of a disturbance like the gondola relative to the nesting period affects bird response. In his experience, if the disturbance begins during or before the nesting period, birds will tend to leave for better habitat (*i.e.* they will be displaced). But if the disturbance begins after they have made their nests, they will remain with the nests (and be forced to deal with the disturbance on a daily basis). Either response—habitat displacement or habitat impairment due to disturbance—negatively impacts the species affected.

When asked for their opinions about summer gondola operations and birds, neither Kelly Colfer, Tom Davies, nor Sean Knox disagreed that it was a potential impact. Other than Kelly Colfer's comment about nesting fidelity, no other expert opinions were offered. Sean said the response of birds to the gondola would depend on the species because some species may react strongly and others not.

According to the scientific literature, birds are particularly sensitive to disturbance and act as indicators of overall habitat quality (Carello 2019, Mac Nally 1997). Birds are vulnerable to development, human disturbance, and noise pollution, and responses to these impacts are well-documented at the individual, population, community, and landscape levels. Physiology (*e.g.* Bisson et al. 2011), behavior (*e.g.* Bayne *et al.* 2008), habitat displacement (e.g. Butler et al. 2013), community assemblage (*e.g.* Price and Lill 2007) and decreasing diversity (*e.g.* Shannon et al. 2016) responses have all been documented as negative impacts caused by human disturbance. The scientific literature is replete with studies that demonstrate harmful effects of visual disturbance, noise pollution, development, habitat fragmentation, and human encounters with birds (Ortega 2012, Price 2008, Kaseloo 2005, Marzluff 1997).

More specifically, when evaluating the impacts of resorts and recreation development on songbirds, Marzluff (1997) concluded that the most important responses to these developments are habitat loss and fragmentation, supplementing nest predators, habitat structure simplification, snag removal, and increased intrusion into surrounding forests by people. Birds near resorts often have disrupted breeding (Lehtonen 1973, Vermeer 1973, Robertson and Flood 1980). Avian diversity decreases and density increases as common generalist species come to dominate disturbed areas at the expense of rarer, more specialized species (Robertson and Flood 1980), a situation that is also being documented in Cucumber Gulch reserve (Carello and Turco 2019).

Bird disturbance from recreation depends on the bird and the type of recreation (Knight and Cole 1995a), but some generalities are clear. The predictability, frequency, magnitude, timing, and location of recreation are important to songbirds. Birds may habituate to predictable disturbances such as

walking, driving, or camping in consistent locations (Marzluff 1997). As was the case for ungulates, the impacts of hikers and bikers may be less if people stick to one or a few designated trails and leave other areas alone (Snyder and Snyder 1974). The potential influence of disturbance increases with its frequency and intensity. Increased visitor use in a Netherlands park was correlated with reductions in songbird density (van der Zande and Vos 1984), suggesting that increased recreational use would similarly impair songbird populations in Cucumber Gulch Preserve (Carello and Turco 2019).

Because they are so vulnerable to human disturbance, and because they make up the largest portion of animal biodiversity in Cucumber Gulch Preserve, the Town has been intensively monitoring bird diversity using a tightly controlled long-term sampling protocol for the past 20 years. Unfortunately, the trends are not optimistic, as bird diversity in the Preserve has been declining on this watch (Carello and Turco 2019). When the gondola was first proposed, the Town's initial concerns were about the impact to bird diversity, and the initial studies were focused on birds (Carello 2010b, 2012b).

The number of bird species counted in regular surveys varied from 32 to 44 over the past 10 years with no statistically identifiable trend (the slope is not statistically different from 0) (figure 10). The distribution of birds within and between species has been shifting significantly, however. Some species are increasing in abundance while others are declining, and overall the number of species is decreasing relative to the number of individuals observed (Carello and Turco 2018, 2019).

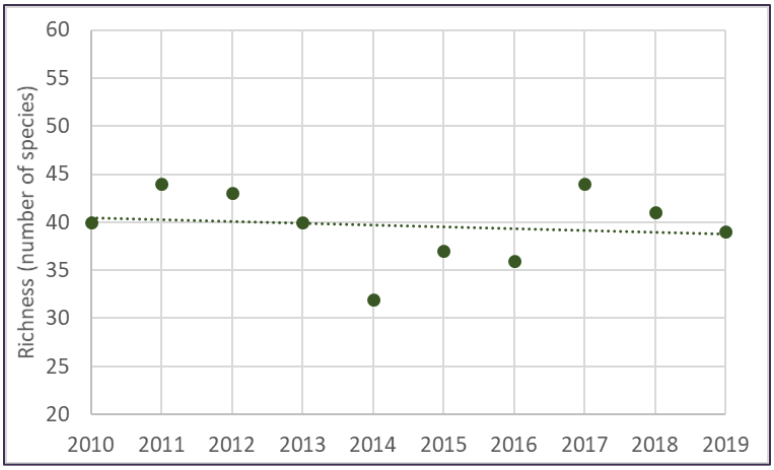


Figure 10: Bird species richness calculated form annual bird surveys performed by Carello and Turco (2010-2019). The slight negative trend is not statistically different from zero.

Of particular concern is the growing population of cowbirds—a generalist nest parasite—and concomitant decline in birds like the warbling vireo and hermit thrush—host species that are highly vulnerable to cowbird parasitism (Carello and Turco 2016). Cowbirds, like most nest parasites and nest predators, often thrive in disturbed habitats, so the trend of increasing cowbird abundance is indicative of increasing disturbance and decreasing habitat quality in Cucumber Gulch Preserve. It also illustrates one mechanism by which gondola disturbance may cause the displacement of native songbirds. According to Marzluff (1997) and Martin (1993a, b), nest predation is probably the most important

limiting factor on songbirds, even outweighing winter mortality for migratory species (Bohninggaese et al. 1993).

Over 16 years of intensive bird monitoring, Cucumber Gulch Preserve has seen an influx of crows, ravens, cowbirds, and other generalist birds that tend to increase with human disturbance and altered landscapes (Carello and Turco 2016). Meanwhile, the number of specialist birds has been declining. The shift in the avian community towards generalist anthropophiles, invasive species, and nest parasites and against rarer native specialists is a strong indicator of declining habitat quality. It is also a direct measure of decreasing biodiversity.

Avian biodiversity represented by the Simpson's diversity index—a summary statistic that accounts for the number of species and relative abundance of individuals among species—has been declining in Cucumber Gulch Preserve over the past 16 years (Carello and Turco 2019). Average diversity index over the most recent 7 years is significantly less than for the previous 7 years (figure 11).

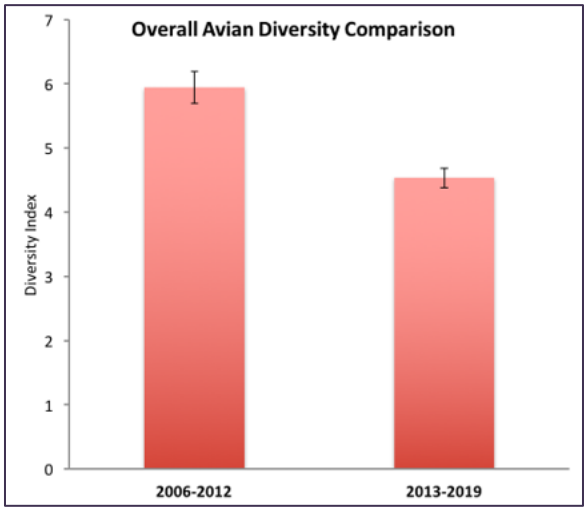


Figure 11: Simpson's Diversity Index for avian species recorded in repeated annual surveys of Cucumber Gulch Preserve. Figure from Carello and Turco (2019).

The timing of avian biodiversity decline is corelated with increasing summer use of the gondola, but the gondola is only one of several stressors that could be impacting birds in Cucumber Gulch Preserve over this time frame (Carello and Turco 2019, 2018, 2017). Other factors include rapid development of the buffer area, forest clearing, construction disturbance, increased traffic, noise from new resort attractions like the Fun Park, and increased recreational use in the Preserve.

Special studies were performed in 2010 and 2011 when the gondola first started summer operation to determine whether a direct response of the bird community would be detected. In 2010, a before-after-control-impact experiment detected a statistically significant decrease in bird abundance near the gondola after it began operation versus before operation. A similar decline was not observed in control sites away from the gondola to demonstrate that the gondola was the cause of disturbance (Carello 2010b). A similar displacement of birds was observed when the experiment was repeated in 2011 (Carello 2012b).

The gondola studies also tracked the response of several pre-selected indicator species and documented a statistically significant decline in the number of Wilson's warblers which were displaced from areas near the gondola after operation began. The 2010 study did not detect a displacement response in Cordilleran flycatchers, broad-tailed hummingbirds, or Lincoln's sparrows. One complicating factor in this study is that the gondola was operated during the week prior to the study, so birds may have prematurely relocated (Carello 2010). When the experiment was repeated in 2011, both Wilson's warblers and Cordilleran flycatchers were displaced when the gondola began operating (Carello 2012).

Another negative impact was documented in the behavior of violet-green swallows. In 2010, these birds were observed trying to nest in the cavities at the bottom of gondola cars while the cars were still. When the gondola cars later moved, the birds abandoned those nests (or could not find them) and presumably left the area (Carello 2010). Nesting behavior by violet-green swallows in the gondola cars was confirmed by Carello (2012) in the 2011 follow-up study, which also documented the response of these birds after their gondola-car nest sites were lost. In a response, Rick Thompson, a wildlife biologist working for the Ski Resort, recommended modifications to the gondola cars as a prophylactic measure to prevent nesting and subsequent loss of brood, and Carello (2012) strongly agreed with this recommendation. No modifications have yet been made and this issue is apparently unresolved.

Most birds in Cucumber Gulch Preserve are more active during the day than at night, so gondola disturbance during the day would likely be more disruptive than at night. The exception is owls, which are more active at night. Bird activity peaks in the morning, in the hours of dawn, so operations at that time likely have the most impact.

Other wildlife

Other wildlife species in Cucumber Gulch Preserve could also be impacted by the gondola. The presence of fox and coyote appears to be increasing over the past 16 years based on the frequency of observations and camera captures. These generalist scavenger species habituate well to human development and often move in on disturbed habitat, sometimes displacing specialist species. Boreal toads, an endangered species, are present in the Preserve but are rarely observed. The most recent sighting in 2019 was near Josie's cabin not far from the gondola line. Neither Tom Davies, Kelly Colfer, nor Sean Knox thought the gondola would have much direct impact on boreal toads. River otters, a Colorado species of concern, have been observed in the Preserve the past few years. Potential impacts of gondola disturbance on this species were not investigated.

Discussion

Does the BreckConnect gondola impact habitat quality and biodiversity in Cucumber Gulch Preserve?

The short answer was yes. After a review of the science, the long answer is still yes. Construction of the gondola was completed with great care in 2006, but the work still involved disturbance that summer. The lift-line clear-cuts, maintenance, and emplacement of infrastructure are permanent physical impacts, and when the gondola is operated it brings visual and noise disturbance as well as more people

to the Preserve. These impacts have undeniable consequences for the wildlife that the Preserve was set aside to protect. Nothing in the body of scientific evidence gives reason to reject these hypotheses, but the science does help explain the nature of the impacts. It provides a basis for predicting the outcome of these impacts in terms of the Cucumber Gulch Preservation goals as well as opportunities to mitigate them.

Are the gondola impacts to Cucumber Gulch Preserve significant?

In February 2002, when the Town was initially contemplating the idea of putting a gondola through the brand-new Cucumber Gulch Preserve, the Summit Daily News published an article by Jane Stebbins titled *Scientists disagree about gondola impacts along Cucumber Gulch*. The article begins: *Nick Roe, a biologist with IRIS Environmental Systems, says a gondola through Cucumber Gulch will not result in "substantial degradation" to the wetlands or the animals that live there. Robert Henke of Scientific Applications International Corp. says it will.*

The two scientists, one hired by the Ski Resort and the other by the Town, based their opinions on the same body of scientific evidence. The reason they disagreed was not so much a matter of science, but rather a difference in what they (or their clients) considered to be significant. To the one, the amount of degradation is not *substantial*. To the other it is. That the gondola has an impact is scientific fact. Whether or not one considers it significant depends on what standard of preservation is used as a benchmark.

Later in the article, then-time commissioner Dave Pringle is quoted *We all have a warm fuzzy feeling about Cucumber Gulch, but it's circled by roads, it's girdled by development, it's crisscrossed by trails. It's hard for me to say a gondola is going to be the one thing that will throw it over the edge and ruin the gulch*. Fortunately, that is not how it works. The Cucumber Gulch ecosystem is not headed towards some threshold where it will suddenly collapse into a state of ruin. Rather, as human disturbance impacts accumulate, habitat quality will continue to decline and the risk of weakening or displacing species will continue to increase. Even as ecological stressors mount there will still be some habitat and there will still be some wildlife. There will just be less of each. And what is left will be less natural, more artificial, and less biodiverse.

In the article, Roe's argument that the gondola would not impose *substantial degradation* began with the point that the gondola is just one more impact on top of *a history of changes including forest fires, mining, logging, hunting, year-round recreation, and sediment pond failures*. His standard of success was defined using an example of a gondola in Banff *under which moose, deer, coyote, cougar and elk migrate and forage.*

Henke's argument that the gondola would impose *substantial degradation* began with the same observation that the gondola is one more impact on top of many stressors at play in Cucumber Gulch Preserve. He noted that *currently, homes line the gulch, and people cross-country ski, mountain bike, hike and walk their dogs through the area.* The standard of success in Henke's position was much stricter: *If you want to eliminate the impacts, the gondola needs to be out of the gulch.*

Whereas, the standard in Henke's argument considers any new impact that affects habitat quality and biodiversity as significant and substantial. The standard Roe used in his argument, on the other hand, does not count gondola impacts as significant and substantial as long as some of the wildlife are still able to migrate and forage. The issue cannot be resolved under a double standard.

Neither standard is objectively right or objectively wrong out of the box. It ultimately comes down to values. What impacts count as significant and, looking forward, how those impacts can be mitigated, depends what natural values the Town agrees to preserve in Cucumber Gulch. The important thing, from a planning point of view, is to agree. The important thing, from a management point of view, is to be clear about the goals. From there, decisions about what impacts are significant and how they should be mitigated become clear.

The purpose of outlaying the science in this report is to provide some guidance to the joint working group on the type and degree of impact the gondola has on the Preserve. This information can be used in recommending how to mitigate the impacts so that the Town and Ski Resort can come to a long-term agreement that meets preservation goals. If the joint working group is going to be effective in this endeavor, the first and most important step will be to agree on common vision for Cucumber Gulch Preserve. Before any joint resolutions about mitigation can be made, the two disparate standards must be resolved into a single vision that Town Council ultimately agrees to uphold.

If the standard for Cucumber Gulch Preservation is now something less than it was originally, then that should be acknowledged, and the mitigation requirements for the gondola can be lessened. If the Town still wishes to enforce a high standard of preservation in Cucumber Gulch, then permission to operate the gondola through the Preserve in summer and during critical wildlife periods for the next 10 years demands a high level of mitigation.

Mitigating gondola impacts

Avoiding the impacts

The opportunity to avoid impacts to Cucumber Gulch Preserve was lost in 2002 when the Town lifted restrictions of the Cucumber Gulch Overlay Protection District and agreed to construct a gondola through the Preserve. It is now a question of mitigating them.

Reducing impacts

Construction impacts were apparently reduced as much as possible, and since they already occurred there is no more opportunity to reduce them. Opportunities for reducing the permanent physical impacts related to the clear-cuts and infrastructure in the Preserve are also off the table because the gondola would have to be removed and the clear-cuts reforested for that to happen. But there is still opportunity to reduce the operational impacts by limiting when and how often the gondola is run.

The gondola is a greater disturbance to wildlife when it is running versus when it is not. So, in general, the more the gondola is run the greater impact there is on Cucumber Gulch Preserve habitat quality, migration, breeding, fitness, species displacement, and biodiversity. Leaving the gondola still has some impact, operating it for maintenance has greater impact, and running it for transportation has the most

impact. Exercising restraint in how often the gondola is operated (for maintenance or while open for business) is one strategy for reducing impacts.

Wildlife are more vulnerable in some seasons more than others and in some hours of the day more than others. It is important to consider when the gondola is operated, in addition to how often, while planning for reduced impact (figure 12). Running the gondola in winter has some impact. Operation in spring, summer, and fall is more impactful because this is when the most wildlife is present and active in the Preserve. The most impact occurs during the critical time of May 1 through August 15 for birds and May 15 through June 30 for moose, deer, and elk.

When the gondola first began operation in 2006-2009, only winter operations were allowed. There was some disturbance to wildlife in Cumber Gulch Preserve but only during the least-sensitive period from November to April. Impacts have been increasing as gondola operation expanded into the more sensitive summer periods and the most sensitive critical periods in 2010 through 2019.

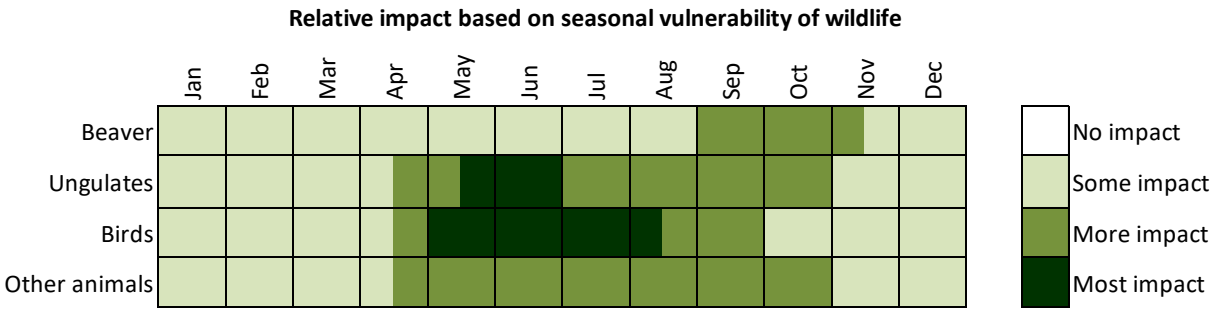


Figure 12: Relative intensity of impacts from gondola operations based on seasonal vulnerability of wildlife.

Scaling back summer use—and especially scaling back use during the critical periods in May, June, July, and August—could be an effective strategy for reducing the operational impacts to the Preserve. Limiting the hours of operation, and especially avoiding operation during the hours of dawn, is another potential way to reduce impacts.

The concept of a "dark period" was introduced in the 2019 agreement as a period of 45 contiguous days during which the gondola would not be allowed to operate. The question immediately facing the joint working group, and one we agreed to address in this report, is: *Is a dark period necessary to prevent or mitigate wildlife impacts within Cucumber Gulch Preserve*? The answer is that a dark period cannot prevent wildlife impacts in the Preserve, but it may be an effective strategy for reducing those impacts by limiting the amount of disturbance that is caused by operating the gondola during the times when wildlife is most vulnerable. Whether or not it is *necessary* goes back to the question of what preservation standard the Town agrees to maintain in Cucumber Gulch Preserve

If a dark period is enforced, it would be most effective during the May 15 to June 30 period because that would minimize disturbance for most of the ungulate critical period and part of the bird critical period. There is nothing particularly special about the 45-day length. If the dark period is shorter it will be less effective at reducing impact, and if it is longer it will be more effective. 47 days is the minimum length necessary to cover the entire ungulate critical time, and 107 days is the minimum length needed to

cover the whole bird critical time. The effectiveness of a dark period closure would also depend on how much operation is allowed for maintenance while it is closed. The more the gondola is operated for maintenance during the dark period, the less effective it will be.

One problem with the strategy of reducing impacts by limiting use or enforcing a dark period is that there is immense pressure to operate the gondola in summer. Presumably both the Ski Resort and the Town benefit from using the gondola as a tourism amenity and to facilitate transportation between downtown and the resort complexes at Peak 7 and Peak 8. The gondola was built so it could be used, and there are a lot of ulterior benefits to using it. Pressure to run the gondola is already great, and it will continue to increase as the resort industry and Town population continue their pace of rapid growth. Unsurprisingly, the proposed schedule currently offered by the Ski Resort would increase summer use of the gondola, not decrease it (figure 13).

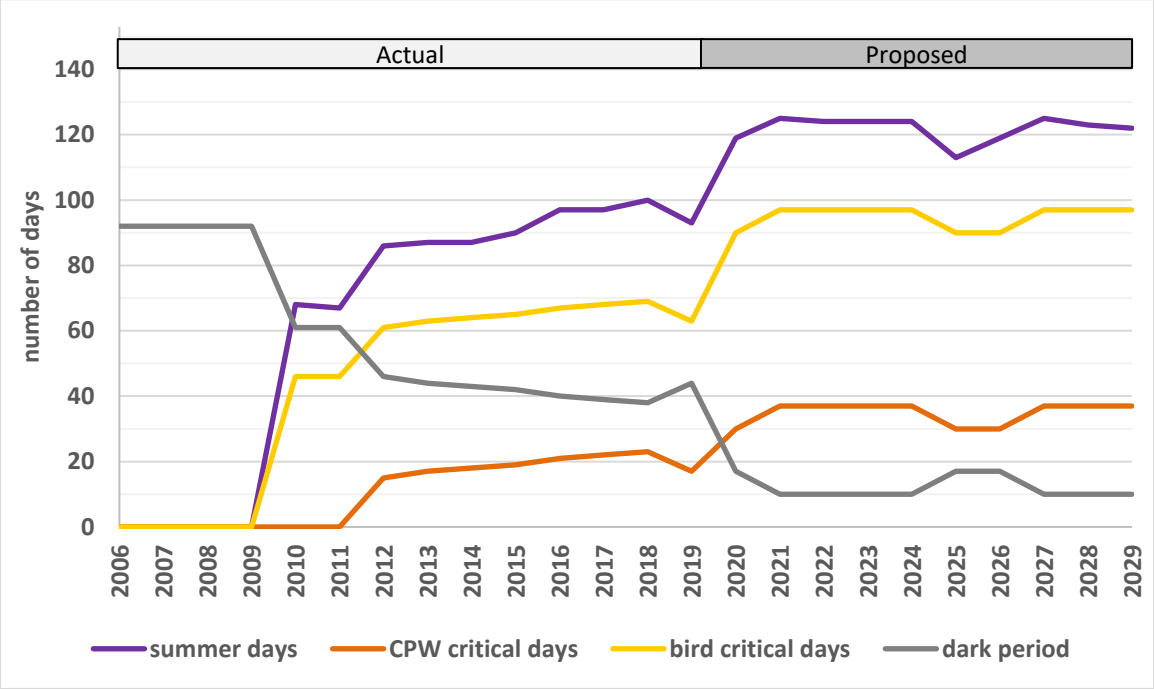


Figure 13: Plot of actual (2006-2019) and proposed (2020-2029) days scheduled for open gondola operation. The purple line shows the total number of days open in summer (May-June). Orange shows the number of days open in the 47-day CPW recommended critical period for elk, deer, and moose (May 15-June 30). Yellow shows the number of days open in the 107-day critical period for birds (May 1-August 15). Gray shows the length of the dark period (number of consecutive days closed in May-August).

The Ski Resort's current proposal would increase the average number of days the gondola is open in summer to 122 (range 199-125) days. It would only be closed an average of 31 (range 28-40) days from May through September, and the need to run it for maintenance on those limited closed days would likely be great. The current proposal would increase use during the 47-day ungulate critical period to an average 35 (range 30-37) days, and use in the 107-day bird critical period would increase to an average 95 (range 90-97) days. The dark period would be reduced to an average 12 (range 10-17) days.

There is no critical threshold of disturbance that will prevent gondola impacts to Cucumber Gulch. As the number of operational days increases, so does the impact to wildlife in the Preserve. Since the gondola exists and operates in the winter there will always be a net negative effect. Any summer use can only increase the amount of impact. Limiting the number of days and hours the gondola is allowed to run in summer can only lessen the amount of accumulating disturbance. The only feasible way to mitigate increasing summer use, therefore, would be to compensate for it in other ways. The more the gondola runs, and the more it overlaps with critical times for wildlife, the more compensation will be required to balance it.

Compensatory mitigation

Compensatory mitigation is a strategy whereby the negative effects of one action—in this case the gondola—are offset by positive effects from some other action like restoration. One benefit of this approach is that it has the potential, at least theoretically, to result in a net neutral or net positive overall effect on the health of Cucumber Gulch Preserve. One problem is that requires active—and potentially expensive—restoration efforts and monitoring to prove that it is working. Compensatory mitigation actions would require additional costs that were probably not accounted for in the original gondola budget, so they must be added in retrospectively.

There are many stressors other than the gondola which could potentially be ameliorated to offset the gondola impacts on Cucumber Gulch Preserve through compensatory mitigation. One challenge, over and above cost, is finding an appropriate restoration treatment that can positively and confidently compensate for the level of impact caused by the gondola. It can be difficult to quantify the negative effects of gondola disturbance in a way that clearly balances with the positive gains made by restoring some other aspect of Cucumber Gulch health. The equation is simplest when the negative impacts are compensated by relieving similar kinds of impacts caused by another source. This is called in-kind mitigation.

In-kind compensatory mitigation

The greatest impact of the gondola on Cucumber Gulch Preserve is disturbance to wildlife, so an effective in-kind compensatory mitigation strategy would involve relieving other sources of anthropogenic wildlife disturbance that are of equal or greater magnitude. One other major source of anthropogenic wildlife disturbance is the number of people visiting and recreating in the Preserve. But given the extreme measures that are already being taken by both the Town and the Ski Resort just to maintain recreation use at status quo, it is doubtful whether any more effort could relieve enough visitor disturbance to compensate for the gondola. Fully closing the Preserve to any human visitation might come close, but this would be a controversial action that contradicts one of the two management goals for Cucumber Gulch Preserve, which is to maintain some level of recreation access. The Town does not wish to fully restrict access to the Preserve from the Townspeople who value it.

The other major source of wildlife disturbance comes from the resorts, residences, roads, and other development surrounding the Preserve, and there is even less practical opportunity for reducing disturbance from these sources. Regrettably, an in-kind compensatory mitigation strategy based on reducing current levels of anthropogenic wildlife disturbance does not appear to be a viable strategy.

Out-of-kind compensatory mitigation

In the out-of-kind mitigation strategy, gondola impacts would be compensated by restoring health and condition to Cucumber Gulch Preserve by relieving other types of ecological stress. This type of mitigation is even more challenging than in-kind because there is no concrete or quantitative way to balance positive gains against the negative impacts. Weighing the negative impacts of wildlife disturbance by the gondola, in this case, against the positive impacts of, say, wetland or forest restoration is theoretically plausible, but it is technically abstract. It is like dealing with two different currencies. It takes extra effort and expertise to justify that the gains actually compensate for the losses in a meaningful way. Nevertheless, if actions can be taken to accomplish the preservation goals in Cucumber Gulch, and if those actions are beneficial enough to offset all or some of the setbacks caused by the gondola, then out-of-kind compensatory mitigation does offer a possible solution.

In a field trip to Cucumber Gulch Preserve with the joint working group this summer, representatives from the Ski Resort proposed cutting trees to create more clearings in the forested portion of the Preserve and planting them with aspen as a potential mitigation strategy to compensate for some of the gondola impacts. A rationale for how this treatment would offset disturbance by the gondola has not been laid out, but if it can be demonstrated to remediate some important ecological stressor, if it restores damaged habitat and makes Cucumber Gulch Preserve healthier, then it may be a viable strategy. One concern with this treatment is that it may be contraindicated by the recommendations for bird conservation which warns against more forest clearing and the creation of more of the artificial forest-edge habitat that exploited by birds that predate or parasitize nests (Carello and Turco 2016, 2018). It is also unusual that the proposed mitigation action, clearing areas of the forest, is similar to the impact.

The causes of wetland impairment in Cucumber Gulch Preserve are well-documented (Beardsley and Johnson 2011), and annual wetland monitoring studies confirm the challenge of maintaining healthy wetland habitat in this altered landscape (*e.g.* Doran *et al.* 2018). Restoration actions that relieve these ecological stressors to improve natural wetland habitat in the Preserve may be a good avenue for out-of-kind compensatory mitigation. The primary goal in the 2012 Cucumber Gulch Management Plan states: *Preserve the critical habitat and functional wetlands of the Preserve as the primary management goal. (The high degree of biodiversity present in the Preserve is dependent on the integrity of the wetlands complex. Plant and wildlife biodiversity is the primary conservation value of the Preserve)* (Town of Breckenridge 2012). The need and opportunity for wetland restoration and ongoing effort to manage ecological stressors to maintain the health of Cucumber Gulch Preserve are known. The challenge would be how to balance the positive benefits of present and future wetlands restoration or management actions against the negative impacts of the gondola to assure adequate compensation is made.

Off-site compensatory mitigation

If no feasible mitigation strategy can be identified within Cucumber Gulch Preserve, a final option would be to mitigate the impacts by restoring and protecting an alternate site with similar characteristics. Off-site out-of-kind compensatory mitigation would be the most extreme and least tangible way to offset gondola impacts, but it stands as a last resort if the ecological stress in Cucumber Gulch becomes too

great to meet objectives. If the group determines that the preservation management goals can no longer be met in Cucumber Gulch, this strategy could potentially be employed by directing mitigation efforts towards the creation of a new Preserve in another location where objectives could be achieved feasibly. However, Cucumber Gulch was made a Preserve to protect unique natural values that are not found anywhere else. There is no other Cucumber Gulch. Working together to protect this place as much as possible, in spite of all the disturbance and ecological stress, is a better way.

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Application Title	Applicant First Name	Applicant Last Name	Applicant Email Address	Final Report Provided?	2024 AMOUNT OF REQUEST:	BRIEF DESCRIPTION OF REQUEST – 20 words or less:	Describe the project/program(s) to be funded (250 words or less):	Total number served by the program request (Please provide the number of unique
Colorado Fourteeners Initiative	Brian	Sargeant	brian@14ers.org	Yes	$10,000	CFI staff and volunteers will perform trail maintenance, update trailhead kiosks, and collect hiking use/trail conditions data on Quandary Peak.	CFI's Adopt-a-Peak crew will work one eight-day hitch performing trail maintenance on Quandary Peak's East Ridge route. The crew will complete staff-only reconstruction work on more technical rock structures and host at least three single-day volunteer trail stewardship projects involving a minimum of 50 volunteer days. The goal is to continue high priority delineation work high on the ridge that will help keep hikers on the trail corridor and reduce trampling of fragile alpine vegetation. The work will consist of disguising socially created braids with rocks and transplanted vegetation. CFI plans to build multiple rock structures to help retain soil and support areas of eroding tundra. This grant will fund staff time planning the volunteer projects, directly recruiting, and communicating with volunteers, as well as boots-on-the-ground staff time working with partner organizations, local businesses, youth camps, and individuals. CFI will place a TRAFx infrared trail counter on Quandary Peak to monitor the number of hikers climbing this peak daily. CFI will also collect detailed GPS-based trail conditions inventory to assess how trail conditions have changed in recent years. This data allows CFI and the Forest Service to track use and see how hiking use effects on-the-ground conditions, determine the need for continued trail maintenance and restoration work, and estimate the economic impact that 14er hikers provide to local trailhead economies. CFI also hopes to reconfigure/update the trailhead kiosk which is currently located in a poor location and is failing to educate hikers about important LNT ethics and responsible recreation practices.	22000
Friends of the Dillon Ranger District	Doozie	Martin	doozie@fdrd.org	No	$15,000	Continued work on Breckenridge-based trails, enhanced youth engagement and rehabilitation projects due to increased usage.	Spruce Creek/Wheeler Mohawk Lake Trail System – This trail continues to see among the highest usage in the County. With so much pressure on the trail tread, degradation is occurring in numerous sections. We will continue to scout with the USFS for drainage and structure improvements in order to mitigate further erosion. Other improvements may include increase signage and closure of social trails to prevent future resource damage. Horseshoe Gulch – We are excited to pick up where we left off on general trail maintenance in this expansive area. We are working with USFS specialists to identify the placement of a new stream crossing and will continue to monitor drainage issues—particularly on the first mile of the trail. Turnpikes (elevated tread structures) have been installed in years past with drainage dips to protect them. Friends of Breckenridge Trails – Each year, we touch base with Tony for potential partnerships on collaborative work days. Adopt a Trailhead Program- Trailheads are adopted by volunteers who pick up trash and report any infrastructure issues at trailheads. A total of 16 trailheads in the Breckenridge area are a part of this program and we will continue to seek volunteers to have every National Forest trailhead "adopted". Educational Programming- FDRD provides free youth education programming for Town of Breckenridge camps both during the summer and winter breaks. Summer programming may include education on wildlife, stream health and macroinvertebrates, forest health and stewardship, etc. The winter programming entails exploring snow science and safety while on snowshoes.	With all of the trails being impacted by this work, the number of individuals that can benefit from our programming could reach as high as 5,000.

Colorado Fourteeners Initiative
A Partnership for Preservation

August 15, 2023

Peyton Rogers, Executive Administration Assistant
Town of Breckenridge
150 Ski Hill Road
PO Box 168
Breckenridge CO 80424

Dear Ms. Rogers:

Thank you for the $10,000 grant from the Town of Breckenridge to support Colorado Fourteeners Initiative's work on Quandary Peak during 2023. While our brief work season is still under way—extending, we hope, through the first weekend in October—here is an update regarding how the Town's funds were spent this year.

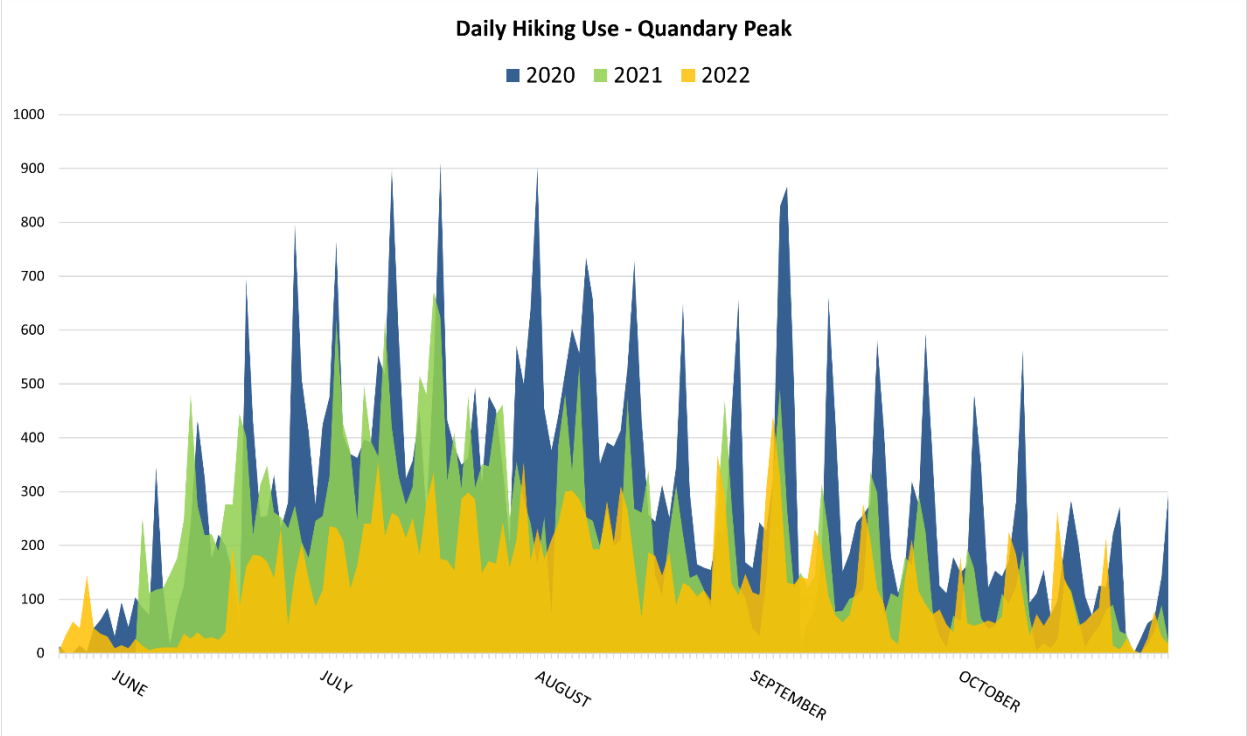
Adopt-a-Peak: CFI's short summer field season is always affected by late spring snowpack. An above average snowpack means our high elevation worksites may still be covered in snow in mid-July. Too little snow and wildfires might become a hazard for crews working across the state. This year, many of Colorado's river basins experienced above average snow water equivalent. In June 2023, the South Platte River Basin, where Tenmile and Mosquito Range 14ers are located, was at 198% of the average snowpack for that month. That same snow lingered at high elevations through early-July. CFI's Adopt-a-Peak crew had planned to start their season with an eight-day hitch on Mount Democrat near Alma. Unfortunately, the snowpack in the Mosquito Range in mid-June was too deep to perform trail work so the crew shifted their efforts to work on Quandary Peak. Quandary's East slope tends to melt earlier than some neighboring 14ers and the trail starts at a lower elevation – meaning warmer temps and drier trails.

This extra eight-day hitch meant more work was performed on the peak than originally planned for 2023. So far this summer, CFI's Adopt-a-Peak crews have worked four eight-day hitches on the mountain – contributing more than 100 staff days of work. Each hitch, the Adopt crews worked the first four days by themselves, performing more technical rock work and preparing for the upcoming volunteer projects. On the last four days of each hitch, the crews were joined by various volunteer groups.

In total, CFI's Adopt team has hosted 13 single-day volunteer trail maintenance projects this summer (exceeding our goal of four volunteer projects). These 13 projects have contributed more than 186 volunteer days of stewardship on Quandary Peak. Three additional volunteer projects are scheduled to occur on the peak later this summer/fall. CFI will not have the final metrics for mileage maintained, square footage of structures built, and check steps installed until the work journals are reviewed and totaled in October.

Hiker Education: So far, two volunteer Peak Steward days have been spent on Quandary Peak with a total of 328 hikers contacted about using Leave No Trace practices to minimize their recreational impact on the fragile alpine tundra landscape. An additional four Peak Steward days are on the calendar for August and September.

Sustainable Trails Hiker Counts: For the tenth consecutive season CFI placed an infrared trail counter on Quandary Peak's East Ridge to study hiking use. A counter was installed on the East Ridge route on June 14th. CFI staff removed snow from the trail which rerouted hikers onto the summer route and past the trail counter. Data has not yet been downloaded this season. The chart below compares Quandary Peak's daily hiking use from 2020-2022.



In June, Colorado Fourteeners Initiative released the latest edition of our report which estimates that the number of people climbing a 14,000-foot peak in Colorado last year fell by 8 percent to 279,000 hiker use days. Last year saw the second-fewest number of 14er hikers over the eight years CFI has produced estimates (2015 = 260,000). Continued access and parking restrictions at the highest-use peaks near the Front Range contributed to a 33 percent drop in 14er hiking over two years. Hiking use

on Quandary Peak ranked second in the state at an estimated 20,000 to 25,000 hiker days (best guess = 22,000). Best-guess Quandary hiker days declined 13,000 from the 2021 season (-37%) and a whopping 27,000 hiker days (-55%) compared to the 2020 pandemic season. Last year was the first full season in which Quandary hikers had to either pay for a reserved trailhead parking spot, ride a paid town shuttle bus, or find alternate means of reaching the trailhead.

This level of recreational use suggests a statewide economic impact of more than $75.7 million, based on past 14er-related expenditure studies performed by Colorado State University economists John Loomis and Catherine Keske. Their 2009 study found that climbers of Quandary Peak near Breckenridge spent an average of $271.17 per day for gasoline, food, lodging, equipment, and other retail purchases. Quandary Peak has always been considered one of the most trafficked peaks in the state.

Our findings in this report reveal that 22,000 people visited Quandary Peak last year. From this report we can estimate that hikers recreating on this peak generated more than $5.9 million for nearby trailhead communities like the Town of Breckenridge (down for nearly $12 million in 2020). The report highlights the need to protect these natural resources which provide a positive economic impact to local communities.

I hope this report provides a sense of the work that CFI has accomplished this summer with support from the Town of Breckenridge. Please do not hesitate to contact me should you have any questions or concerns.

Regards,

Brian J. Sargeant
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303.278.7650
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