STAFF REPORT

Agenda Item: 6

Report To: Open Space Advisory Committee **Meeting Date:** April 18, 2022

Staff Contact: Gregg Berggren, Trails Coordinator, gberggren@carson.org
Lyndsey Boyer, Open Space Manager, lboyer@carson.org

Agenda Title: For Discussion Only: Review and discussion of the Prison Hill Recreation Area: A Targeted Geomorphic Review.

Staff Summary: This item will review the 'Prison Hill Recreation Area: A Targeted Geomorphic Review' final report. This report includes review and analysis of the ephemeral channels and open ride areas at the Prison Hill OHV Area to assess their durability in the context of motorized recreational use.

Agenda Action: Other/Presentation **Time Requested:** 30 minutes

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Proposed Motion
N/A

Board's Strategic Goal
Quality of Life

Previous Action
N/A

Background/Issues & Analysis
In the summer of 2021, staff engaged with consultants to complete a review of the Prison Hill OHV Area to assess the durability of the ephemeral channels that are being used as rock crawler routes, as well as three open ride areas. The final results have been summarized in a report to help support staff in future planning and decision making for the Prison Hill OHV Area. Conclusions from the report indicate that the geomorphology of the area supports OHV use with very limited resource impact; both the crawler routes and open ride areas are generally bedrock controlled and therefore will not be compromised by OHV use. Additionally, the report concluded that the ephemeral channels do not host special or unusual areas for vegetation or wildlife – these areas are not considered riparian areas.

The study also indicated that while the majority of the project area is stable, staff should utilize best management practices such as erosion control measures to help slow the natural water and erosion. Since 2021, staff have worked with contractors to install numerous erosion control features throughout the project area, including installation of rock check dams, lead of ditches, as well as decommissioning steep, erosive routes to reduce erosion and sedimentation throughout the site. Staff will utilize the results and recommendations from the report to continue implementing erosion control measures and improving route sustainability throughout the site.

ATTACHMENTS:
Exhibit A: Prison Hill Recreation Area: A Targeted Geomorphic Review

Applicable Statute, Code, Policy, Rule or Regulation
N/A

Financial Information
Is there a fiscal impact? ☐ Yes ☒ No

If yes, account name/number:

Is it currently budgeted? ☐ Yes ☐ No

Explanation of Fiscal Impact:

Alternatives
N/A

Board Action Taken:
Motion: _____ 1) _____ Aye/Nay
2) _____ _____
_____
_____
_____
_____

_____
(Vote Recorded By)

EXHIBIT A

March 14, 2022

Prison Hill Recreation Area:
A Targeted Geomorphic Review

Prepared for:

Carson City Parks Recreation & Open Space
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Prepared by:

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Table of Contents

List of Figures

List of Photos

Attachments

File Doc: 2022-03-14 Rpt Prison Hill Geomorph 21-238.5 CCPros lz-jm L3-24.docx

Introduction and Report Purpose

The Prison Hill Recreation Area is located near the southeast edge of Carson City, Nevada approximately seven miles from the downtown area. The Prison Hill Recreation Area includes a 1,540-acre Non-Motorized Area to the north and a 950-acre Motorized Area to the south. The Prison Hill Recreation Area is described in Carson City's 2016 *Management Plan for Carson City Open Space and Parks in the Carson River Area* as well as several site assessments and monitoring reports (see References section for details).

This report provides the description, methods, and conclusions of a geomorphic analysis of the open ride areas and crawler routes within the Prison Hill Motorized Area. Approximately 50 acres of the entire 950-acre Motorized Area is described and is referred to as the Study Area throughout this report. The focus of the analysis is geomorphic stability and sustainability including environmentally sensitive resources within the Study Area. The intent of this report is to support and assist in developing management practices and strategies moving forward.

Background

Motorized recreation has taken place on Prison Hill for many decades. The 1977 Bureau of Land Management (BLM) *Recreation Management and Site Plan for the Prison Hill Recreation Lands* states that the primary recreational activity on Prison Hill was formal and informal off-road vehicle use. In 1983, the BLM designated approximately 950 acres on the southern end of Prison Hill for motorized activity and closed the northern portion of Prison Hill to motorized vehicles. At that time, motorized travel in the designated area on the southern end was unrestricted.

The Prison Hill Recreation Area was conveyed from the BLM to Carson City under the Omnibus Public Lands Act of 2009 and the land is subject to the tenets of the subsequent Programmatic Agreement signed in 2012, as well as the Conservation Easement signed in 2010. Carson City partnered with the National Off-Highway Conservation Council (NOHVCC) in 2017 to help develop a management strategy for motorized uses. In 2018, NOHVCC secured grant funding from the Nevada Off-Highway Vehicle (OHV) Program to complete the Prison Hill Recreation Area Site Assessment for the motorized area and the *Prison Hill Recreation Area OHV Management Plan*. The OHV Management Plan was created through a collaborative public process with input and guidance from the Open Space Advisory Committee and from stakeholders which included various user groups, interested residents, and nearby homeowners. This OHV Management Plan is currently being implemented.

Currently OHV travel is restricted to the existing trails including the crawler routes and three designated open riding areas. The crawler routes and open riding areas are signed within the OHV area. A digital copy of the Prison Hill OHV Trail System map is available online (as a PDF) and as a Georeferenced Avenza Map at https://ohv.nv.gov/trails/prison-hill-ohv-area.

Methods

Methods used to conduct the analyses include field reviews and background research. Lynn Zonge, Fluvial Geomorphologist with Resource Concepts, Inc., walked, mapped, and photographed the Study Area and adjacent areas multiple times during October 2021. Information on soils, geology, precipitation, and OHV uses were reviewed. See the References section for a list of these reports.

Area Description

General Characteristics

The Prison Hill Motorized Area encompasses 950 acres of large colorful rock formations with complex topography, ranging from steep boulder terrain to meandering sandy washes and open desert. The elevation ranges from 5,000' above sea level at the lowest point to 5,724' at the highest point.

The Motorized Area generally faces the south. It is bordered to the north, northeast, and northwest by the Prison Hill Non-Motorized Area, to the south and southeast by residential parcels and to the southwest by the Northern Nevada Correctional Center and Golden Eagle Lane. The Carson River borders a small section on the Southeast portion of the area where there is no permitted motorized use.

The average annual precipitation for Carson City is about 11 inches. The majority of the precipitation falls in the winter months. The largest rainfall events typically occur during winter storms, although summer thunderstorms occasionally deliver significant water in a short amount of time (WRCC, 2022).

During three days in October 2021, an unusually large rain event deposited about 3.8 inches within 36 hours at the author's home near the Carson City Airport. This equates to a one in 25-year event (NOAA Atlas 14, Point Precipitation Frequency Estimate table).

The geology of the Motorized Area is mapped granite (80 to 110 million years old) and pediment deposits (130 thousand years old). The granite is similar in composition to that found in the Sierra Nevada Range. The pediment deposits are similar to alluvial-fan deposits except that they are present as veneers on broad natural erosion surfaces cut into bedrock and older alluvial deposits (Stewart, 1999).

Crawler Routes and Open Ride Areas

The specific areas analyzed for this report include five crawler routes and three open ride areas listed below. These areas are illustrated by Figure 1 and described in Attachment A.

Crawler Routes with length:

- Rubber Side Up: 1,360 feet
- Mailbox Canyon: 835 feet
- Gunslinger: 1,460 feet
- Double Waterfall: 830 feet
- Death Walls: 2,460 feet

Open Ride Areas with area:

- Ghost: 0.9 acres
- Headlight: 5.8 acres
- Off-the-Trailer: 23 acres

The granite bedrock that is exposed throughout the Motorized Area dominates the Crawler Routes and the Open Ride areas. The soils are mapped as Glenbrook gravelly loamy coarse sand and Glenbrook-Rock outcrop complex. These soils are described as somewhat excessively drained with very low runoff potential. Due to the sandy composition, steep slopes, and thin soil depth over bedrock, these soils are highly susceptible to site degradation (NRCS, 2021).

Figure 1. Aerial photo illustrating the locations of the crawler routes and open ride areas.

Analysis

Geomorphic Processes

As mentioned previously, the topography of the Study Area is complex. Overall, the slopes are steeper toward the top of Prison Hill to the north and more gentle moving to the south along the series of coalescing alluvial fans (see map in Attachment A). Within the Study Area, the slopes range from 23% at Rubber Side Up to 8% at the lower portions of Death Walls and Off the Trailer. However, over short stretches slopes may be vertical or flat due to the shape of the granite outcrops.

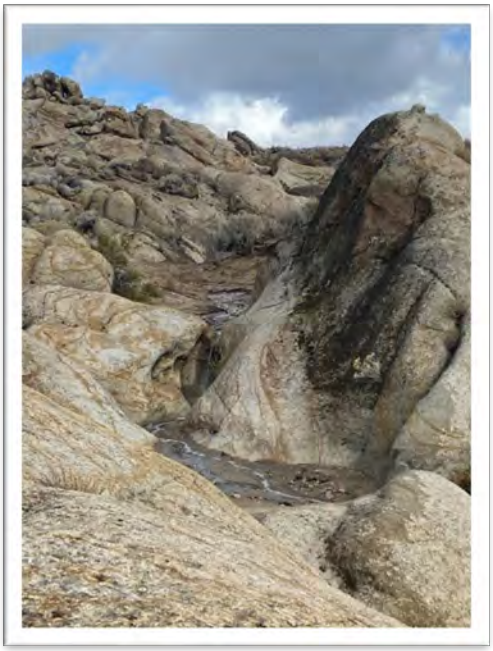


Photo 1. An example of waterfalls and sediment pockets in Death Walls.

The abundant granite outcrops create local breaks in the slopes and also provide base level controls. The bedrock is not appreciably erodible by flowing water or vehicular traffic and therefore is a barrier to downward erosion and thus creates a base level (the lower elevational limit for an erosional process). The bedrock also creates local pools and pockets where water velocity is slowed down, and sediment is deposited. The granite rock forms intermingled waterfalls and sediment pockets for a complex system which includes sediment transport and deposition.

In general, sediment transport within the drainages appears greater and more frequent than the drainage side-slope erosion or erosion from overland flow. This is intuitive because the greater concentration of flowing water (i.e., within the drainages) is also the greatest concentration of energy. This sediment transport process is evident by wide areas of lighter colored course sediment in the bottom of the drainages which terminate the toes of the reddish more fine-grained side slope sediment. This indicates that the primary sediment transport is via the drainages.

Photo 2. An example of vegetation and bedrock within Double Waterfall.

Vegetation

The vegetation is typical of well-drained granitic soils in the Carson City area. Sagebrush and bitterbrush dominate with occasional ephedra and rabbitbrush. There are few perennial grasses such as Indian ricegrass and desert needle grass. Non-native annuals such as cheatgrass, filaree, and tansy mustard also occur.

The vegetation composition is consistent throughout the Study Area. The vegetation composition within the drainages is the same as the vegetation on the adjacent alluvial fans. This indicates that the

soils and water availability is also consistent. There are no springs, shallow groundwater, or special aquatic sites present.

Biotic crust exists throughout the Study area where it has not been recently disturbed. Where it is present, the vegetation and biotic crust hold the sediment in place.

Photo 3. An example of soil color contrast below Death Walls.

Study Area Management

During the time of the field analyses, the Study Area was undergoing refinement in land management. Roads were being blocked and decommissioned. Informational signage was being installed. Erosion control was being implemented. The OHV Trail System Interim Map was being revised. Examples of management measures are provided in Attachment B.

Crawler Routes

The Crawler Routes are within drainages that are bedrock controlled. These drainages will not change noticeably through time due to the hard bedrock that is resistant to erosion. These routes carried water and sediment when local runoff occurred during the October 2021 event.

The entrance points, exit points and escape routes that are within deeper soil are the most vulnerable to erosion. As the name implies, escape routes are routes out of the drainages, generally at points where the bedrock obstacles are the most difficult to get over. These routes are typically short and in most instances do not show evidence of more erosion than other areas. Generally, the areas that show the most erosion are the access roads where there is a continuous steep slope with no water diversions or energy breaks.

The City is currently adding filters to ensure that only the more capable vehicles can access the more difficult Crawler Routes. This will minimize the use of the escape routes or creation of new escape routes. In addition, redundant escape routes are being decommissioned which will help to keep the soil disturbances to a minimum.

Photos and maps of each Crawler Route are provided in Attachment A.

Open Ride Areas

The Open Ride Areas are situated around bedrock outcrops. In these areas, vehicles utilize the existing roads through the vegetated areas and can travel at will across the bedrock. Signage directs riders to stay on existing roads, and the edges of the Open Ride Areas are marked with signs.

There was no evidence of erosion within the Ghost and Headlight Open Ride Areas. The Off-The-Trailer is the largest Open Ride Area. Near the parking area, erosion from concentrated flows was evident. The area of erosion is unusual in that the soils are deeper than that found elsewhere in the Study Area. This area may benefit from additional erosion control measures.

Photos and maps of the Open Ride Areas are provided in Attachment A.

Conclusions

The Crawler Routes and Open Ride areas are mostly bedrock controlled and therefore will not be compromised for OHV use. In addition, these areas do not host special or unusual areas for vegetation or wildlife.

Vegetation provides soil stability, especially on slopes. The sandy soils are highly susceptible to erosion and are held in place with the vegetation. The management practice to minimize new disturbance to vegetated areas is important.

While the majority of the Study Area is relatively stable, management practices to help slow water and erosion will help to keep localized areas with deeper soil intact, such as the lower area of the Off the Trailer Open Ride Area. Annual monitoring and adaptive management are important to implement in this complex geomorphic area.

The recent and on-going improvements such as decommissioning routes and signage implemented by Carson City will support the sustainability of Crawler Routes and Open Ride Areas. This area is a long-standing and unique resource for the OHV community and Carson City. The geomorphology of the area supports OHV use with very limited resource impact. Straight forward erosion and sediment control activities together with good signage, monitoring, and management can be employed to keep this area in good condition as an important recreation area.

References

Carson City Parks, Recreation and Open Space, 2016. Management Plan for Carson City Open Space and Parks in the Carson River Area.

Carson City Parks Recreation and Open Space, 2021. Carson City Open Space – Conservation Easement Monitoring, Prison Hill OHV Area – Monitoring Report.

NOAA, 2021. NOAA Atlas 14, Vol 1 Vers 5 Point Precipitation Frequency Estimates. Accessed on October 27, 2021 at https://hdsc.nws.noaa.gov

NOHVCC, 2018a. Prison Hill Recreation Area Site Assessment. Prepared for Carson City.

NOHVCC, 2018b. OHV area management plan. Prepared for Carson City.

NDOW, 2019. Prison Hill golden eagle habitat evaluation. Letter prepared by Mark S. Enders dated April 5, 2019.

NRCS, 2021. Custom Soil Resource Report for Carson City Area, Nevada. Web Soil Survey Accessed 9-12-2021 at https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Stewart, J.H., 1999. Geologic Map of the Carson City 30x60 Minute Quadrangle, Nevada. Nevada Bureau of Mines and Geology Map 118.

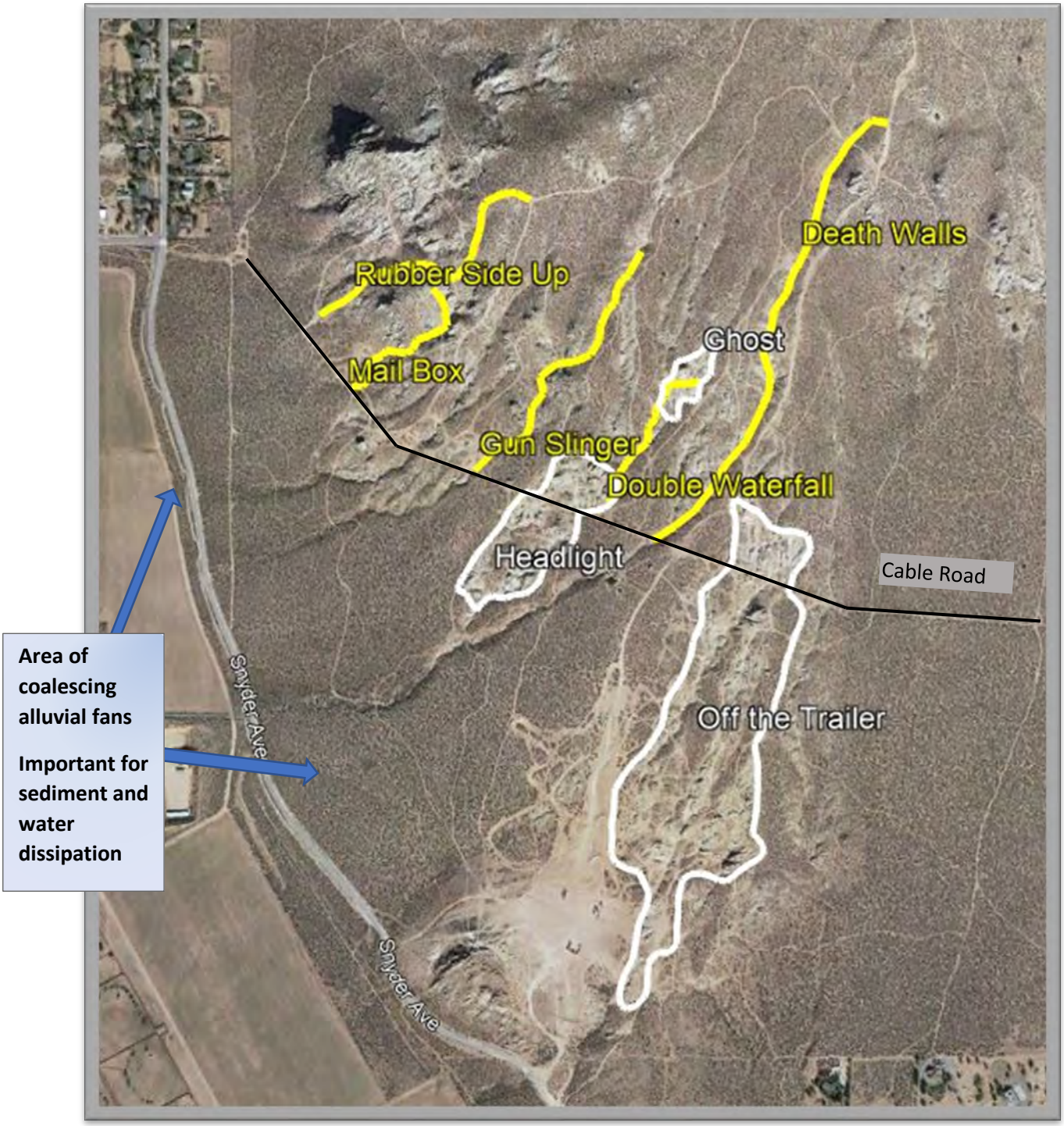
WRCC, 2022. Western Regional Climate Center web page https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?nv1485 accessed on 01-11-2022.

Attachment A

Crawler Route and Open Ride Area Descriptions

Attachment A. Crawler Route and Open Ride Area Descriptions

Descriptions of the Crawler Routes and Open Ride Areas are described in this Attachment. The Crawler Routes are described in order from the west to the east. The Open Ride areas are described from smallest to the largest.



Attachment A. Crawler Route and Open Ride Area Descriptions

Crawler Route: Rubber Side Up

Description Summary

- Approximately 1,360 feet long
- Mostly located on a ridge with some relatively short rock crawl areas
- Mostly moderate slopes
- Relatively small watershed
- No apparent sediment transport or erosion beyond the lower access area on Cable Road

Attachment A. Crawler Route and Open Ride Area Descriptions

Crawler Route: Mailbox

Description Summary

- Approximately 835 feet long
- Within a drainage with numerous access routes into and out of the drainage
- Many bedrock sediment traps
- Relatively small watershed
- No apparent sediment transport or erosion beyond the lower access area on Cable Road

Attachment A. Crawler Route and Open Ride Area Descriptions

Crawler Route: Gunslinger

Description Summary

- Approximately 1,460 feet long
- Located within a relatively large drainage (approximately 10 acres from the top to Cable Road)
- Numerous access routes into drainage
- Many bedrock sediment traps
- Water and sediment continue in the drainage past Cable Road and mostly dissipate across the alluvial fan
- Water and sediment reached Golden Eagle Lane during the October 2021 event

Attachment A. Crawler Route and Open Ride Area Descriptions

Crawler Route: Double Waterfall

Description Summary

- Approximately 830 feet long
- Many bedrock sediment traps
- Located within a moderate sized watershed (between 5 and 10 acres above Cable Road)
- Crosses through the Ghost and Headlight Open Ride areas
- Water and sediment continue in the drainage past Cable Road and through the Headlight Open Ride Area and join with the Death Walls drainage down gradient and south of the Headlight Open Ride Area
- Water and sediment reached Golden Eagle Lane during the October 2021 event

Attachment A. Crawler Route and Open Ride Area Descriptions

Crawler Route: Death Walls

Description Summary

- Approximately 2,460 feet long
- Escape Routes are steep
- Located within a relatively large watershed (approximately 60 acres)
- Water and sediment continue in the drainage past Cable Road and through the Headlight Open Ride Area and join with the Double Waterfall drainage down gradient and south of the Headlight Open Ride Area
- Water and sediment spread out and dissipate across the alluvial fan above Golden Eagle Lane
- Water and sediment reached Golden Eagle Lane during the October 2021 event

Attachment A. Crawler Route and Open Ride Area Descriptions

Open Ride Area: Ghost

Description Summary

- Approximately 0.9 acres
- Mostly consists of bedrock
- Hosts the top of the Double Waterfall Crawler Route
- Mostly moderate slopes
- Relatively small watershed
- No apparent sediment transport or erosion

Attachment A. Crawler Route and Open Ride Area Descriptions

Open Ride Area: Headlight

Description Summary

- Approximately 5.8 acres
- The upper half is mostly granite while the lower half hosts several vegetated areas comprising about 2 acres)
- Hosts the bottom of the Double Waterfall Crawler Route

Attachment A. Crawler Route and Open Ride Area Descriptions

Open Ride Area: Off The Trailer

Description Summary

- Approximately 23 acres
- Located within a relatively large watershed (approximately 40 acres)
- Mostly bedrock with some large (about 4 acres total) vegetated areas
- Near the parking area, erosion from concentrated flows was evident
- Multiple small drainages coalesce at the bottom of this Open Ride Area into one confined drainage
- This drainage carried water and sediment to Golden Eagle Lane during the October 2021 event

Attachment B

Examples of Management Measures

Attachment B. Examples of Management Measures

Example of rock used to slow down erosion.

Signage near Headlight Open Ride Area.

Attachment B. Examples of Management Measures

Signage near Headlight Open Ride Area.

Road Closure near Death Walls.