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Appendix 1-3: Volpe Center Studies
Appendix 4: White River National Forest Land and Resource Management Plan Direction
List of Acronyms

CDOT    Colorado Department of Transportation
CNHP    Colorado Natural Heritage Program
CSP     Colorado State Patrol
EA      Environmental Assessment
FLREA   Federal Lands Recreation Enhancement Act
LRMP    Land and Resource Management Plan
MA      Management Areas
NEPA    National Environmental Policy Act
NFMA    National Forest Management Act
NNL     National Natural Landmark
NPS     National Park Service
O&G     Outfitter and Guide
Plan    Hanging Lake Management Plan
ROS     Recreation Opportunity Spectrum
SCORP   Statewide Comprehensive Outdoor Recreation Plan
USFS    United States Forest Service
VIS     Visitor Information Services
VOLPE   U.S. Department of Transportation, John A. Volpe National Transportation Systems Center
WRNF    White River National Forest
Executive Summary

This proposed plan will guide visitor use and long-term sustainable management at the Hanging Lake Area with the goal of preserving this special place for future generations to use and enjoy. The plan’s intent is to address the increasing level of visitor use and related resource issues with an adaptable, long-term strategy to effectively protect the natural and historic resources, reduce congestion, and provide for public safety and quality recreation opportunities, all while achieving long-term financial sustainability and maintaining local tourism-related economic benefits.

This planning effort represents a long collaborative effort that has involved numerous stakeholders, interested parties, and government agencies since 2012. Due to Hanging Lake’s complicated interagency land ownership, unique legal authorities, safety issues, alternative transportation needs, and socio-economic drivers, the Forest Service hired the U.S. Department of Transportation’s John A. Volpe National Transportation Systems Center (Volpe Center) in 2013 to assist in the facilitation and development of potential short-term, mid-term and long-term solutions. After four years of implementing short- and mid-term operational solutions, this plan represents the next step in the process: to arrive at a long-term solution that will sustain the Hanging Lake Area’s natural resources and operations into the future. Several collaborative studies conducted by the Volpe Center have provided the Forest Service with the best available science and have served as the foundation for the proposed plan. The Volpe Center’s research and site-specific studies that have been used to create the plan include information regarding Hanging Lake’s physical and social capacity, alternative transportation methods, and operational feasibility studies.

The Volpe Center studies have provided information regarding the number of people per day the site can sustain (capacity) while meeting all of the plan’s objectives. The studies also have helped define feasible management goals, desired future conditions, and adaptive management actions that can be instituted based on conditions in the project area.

Once this plan is brought through the NEPA process and finalized, the Forest Service will make decisions focused on foundational management actions that will inform additional implementation actions in the future.

This plan highlights several key components that are foundational to the proposed management plan and will support feasible and long-term management actions. The first is to allocate and manage in accordance with the area’s defined year-round daily capacity through a fee-based reservation or permit system. The second foundational decision is to utilize a third-party transportation provider (i.e., a mandatory shuttle) in order to allocate and manage to the area’s daily capacity during the “peak” season. Peak Season is defined as May 1 through October 31. During the “Off-Peak” season, November 1 through April 30, the area would be managed to its daily capacity through a fee-based reservation or permit system, and mandatory shuttles would not be required. The third decision is to utilize an adaptive management strategy that utilizes monitoring to ensure that the plan’s objectives are obtained and the intent of the plan continues to be realized given future changes.

While this plan will set management direction for Forest Service-managed lands, management actions by partners are integral to the long-term success of the area and will be formalized through cooperative agreements once this plan is finalized.
Once the plan is finalized, it will describe a suite of tools and methods that the Forest Service will have available to implement the management plan to meet the final management strategy which is defined by goals, objectives, and desired conditions. The Authorized Officer will consider implementation methods based on legal authorities, feasibility, technical logistics and Forest Service physical and financial capabilities. Once the plan is finalized, several approaches could be phased in, alone or in combination, to better manage capacity and a reservation system. These include:

1. Utilize Recreation.gov to issue reservations through the National Recreation Reservation Service. There is an administrative fee for this reservation system.

2. Manage capacity through the Outfitter and Guide (O&G) program using the O&G’s reservation system.

3. Manage capacity through a third party alternative transportation provider’s reservation system.

4. Manage capacity through a reservation system and allow for parking on site.

5. Provide enhanced services and experience to the visitor through a Special Recreation Permit and fee under the Federal Lands Recreation Enhancement Act (FLREA). This would require following national and regional processes and would include a separate public participation process. This tool may be integrated into the above four options.
Chapter 1. Introduction

The White River National Forest (WRNF) is proposing a “Hanging Lake Area Management Plan” (hereafter referred to as ‘the plan’ or plan) for the Hanging Lake Area. Hanging Lake, one of Colorado’s iconic landscapes, has become one of Colorado’s bucket-list hikes and destinations for visitors from all over the world. With approximately 150,000 visitors a year, this “high use” area continues to see increasing natural resource and facility degradation, safety issues, and is impacting visitors’ experiences. The Hanging Lake Project Area consists of the parking area, Interstate 70 on- and off-ramps, a portion of the Colorado Department of Transportation (CDOT) Recreation Path, Hanging Lake Trail #1850, the lake itself, Spouting Rock, and Dead Horse Creek. Hanging Lake is located off of Interstate 70, approximately 10 miles east of Glenwood Springs, in Garfield County, Colorado.

The project area includes mixed land ownership. Figure 1 (page 9) shows the scope of the collaborative management efforts with CDOT and Excel Energy that are needed to make the plan sustainable given the current jurisdictions. While this plan will only set overall management direction for the USDA Forest Service (USFS), management actions by partners will be formalized through cooperative agreements once the plan is finalized.

The desired future condition of the Hanging Lake Area is to protect and preserve the area’s unique and fragile natural resources, improve visitor experiences and sustain the socio-economic benefits related to Hanging Lake. Goals and objectives will set management direction and allow the USFS and affected partners to manage to the desired conditions for the Hanging Lake Area.

The overall goal of this proposed management plan is to create and implement a management system that is implementable, sustainable, and maintains the area’s defined, desired conditions by meeting the following objectives:

I. Protect natural resources
II. Manage congestion
III. Enhance public safety
IV. Improve visitor experience
V. Support local tourism

These objectives frame the area’s desired future conditions. The plan will utilize an adaptive management strategy to ensure the overall intent of the plan is achieved. Chapters 3 and 4 will elaborate on the specific desired conditions and describe the associated adaptive management actions.

This project-level management plan is in conformance with the 2002 White River National Forest, Land and Resource Management Plan, and will not result in a revision. This proposed management plan will be analyzed under an Environmental Assessment in accordance with the National Environmental Policy Act (NEPA) and 36 CFR 218, 219 subparts A and B.
Background

Situated between the resort communities of Vail and Glenwood Springs, and in close proximity to Aspen and other popular tourist destinations, Hanging Lake has become one of Colorado’s iconic places and a bucket-list hike and place to see. Hanging Lake is the result of an active travertine-depositing system that has resulted in the formation of beautiful aqua–blue waterfalls and a natural lake that was formed by a geologic fault, which caused the lake bed to drop away from the valley floor above.

The trail is accessed via the Glenwood Canyon Recreation Path, with most visitors parking at the Colorado Department of Transportation’s (CDOT) Hanging Lake Rest Area off of exit 125 from Interstate 70 (I-70) and walking 0.2 miles to the trailhead. Visitors can also access the trailhead by walking or bicycling from other areas within Glenwood Canyon. The hike to the lake is strenuous, gaining over 1,000 feet in 1.2 miles.

In 1912, the town of Glenwood Springs purchased 760 acres of land (including the lake) for $953. By the mid-1940s the trail became a hot spot for travelers and tourists. Since the trail was built to Hanging Lake and improved by the Civilian Conservation Corp in 1938, it has been a popular tourist destination. With the construction of I-70, increasing numbers of visitors have been able to visit the iconic lake. The lake’s uniqueness, its popularity, and its economic importance was recognized during the planning and construction of the world-famous interstate (I-70) through Glenwood Canyon during the 1980s. During that planning process, the parking lot was designed and constructed to provide access to the lake with capacity for 110 vehicles.
Hanging Lake’s beauty draws visitors year-round, but particularly in the warmer months. In 2012 the USFS installed trail counters which showed annual visitation on the trail at 78,118. By 2016 visitation numbers had almost doubled and steadily increases each year with the number of visitors now close to 150,000 a year (Table 1), making it one of the busiest trails on the White River National Forest. Visitation peaks during the summer season (June-August), with Saturdays averaging 1,000 visitors per day and weekdays averaging 765 visitors a day in 2016 (Table 2). Fall, winter and spring visitation is also steadily increasing as people come later or earlier in the year to avoid the crowds. Trail counter data from 2016 shows an average of 545 visitors per day during the fall (September-November) (Table 3).

Table 1. Average daily traffic (ADT) at Hanging Lake trailhead (Source: TRAFx accessed April 2016)

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days with data</td>
<td>335</td>
<td>364</td>
<td>350</td>
</tr>
<tr>
<td>ADT</td>
<td>273</td>
<td>364</td>
<td>416</td>
</tr>
<tr>
<td>Estimated Annual Traffic</td>
<td>99,632</td>
<td>132,689</td>
<td>147,578</td>
</tr>
</tbody>
</table>

Table 2. Hanging Lake trailhead average daily traffic by season in 2016

<table>
<thead>
<tr>
<th>Day of the Week</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>22</td>
<td>234</td>
<td>732</td>
<td>475</td>
<td>375</td>
</tr>
<tr>
<td>Tuesday</td>
<td>58</td>
<td>154</td>
<td>714</td>
<td>307</td>
<td>312</td>
</tr>
<tr>
<td>Wednesday</td>
<td>29</td>
<td>114</td>
<td>716</td>
<td>353</td>
<td>326</td>
</tr>
<tr>
<td>Thursday</td>
<td>38</td>
<td>159</td>
<td>798</td>
<td>390</td>
<td>356</td>
</tr>
<tr>
<td>Friday</td>
<td>37</td>
<td>227</td>
<td>867</td>
<td>605</td>
<td>438</td>
</tr>
<tr>
<td>Saturday</td>
<td>68</td>
<td>317</td>
<td>1013</td>
<td>923</td>
<td>574</td>
</tr>
<tr>
<td>Sunday</td>
<td>37</td>
<td>326</td>
<td>888</td>
<td>794</td>
<td>520</td>
</tr>
<tr>
<td>Weekly Average</td>
<td>41</td>
<td>219</td>
<td>819</td>
<td>545</td>
<td>416</td>
</tr>
</tbody>
</table>

Table 3. Average daily pedestrian traffic (ADT) at trailhead by season (Source: TRAFx accessed April 2017)

<table>
<thead>
<tr>
<th>Season*</th>
<th>2014 ADT</th>
<th>2015 ADT</th>
<th>2016 ADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>283</td>
<td>523</td>
<td>545</td>
</tr>
<tr>
<td>Winter</td>
<td>23</td>
<td>61</td>
<td>41</td>
</tr>
<tr>
<td>Spring</td>
<td>168</td>
<td>339</td>
<td>219</td>
</tr>
<tr>
<td>Summer</td>
<td>575</td>
<td>780</td>
<td>819</td>
</tr>
<tr>
<td>Annual Average</td>
<td>273</td>
<td>364</td>
<td>416</td>
</tr>
</tbody>
</table>

*Fall = Sept. to Nov.; Winter = Dec. to Feb.; Spring = Mar. to May; Summer = June to Aug.
Other federal and state agencies have identified Hanging Lake’s natural resources as unique, sensitive, and deserving protection. In 2000, Colorado Natural Heritage Program (CNHP, 2001) evaluated and identified Hanging Lake as a potential conservation area, as it supports one of the best examples of a hanging garden plant community and is one of the largest least-altered travertine systems in the Southern Rocky Mountain Province. In two CNHP subsequent reports (CNHP, 2002, 2010) two threats at Hanging Lake were identified: recreation and non-native species. In 2003, CNHP further identified several important natural values that should be protected and rated the elements in terms of biodiversity significance, imperilment, protection, and management urgency. In 2011, the Hanging Lake area was designated as a National Natural Landmark by the Department of Interior (DOI), National Park Service (NPS) due to these values.

As part of this collaborative and comprehensive long-term planning process the Volpe Center completed four studies that have helped to inform the proposed plan. For more detailed information about Volpe Center’s Hanging Lake planning, see Appendix 1-3 or: [https://www.volpe.dot.gov/transportation-planning/public-lands/white-river-national-forest-hanging-lake-recreation-site](https://www.volpe.dot.gov/transportation-planning/public-lands/white-river-national-forest-hanging-lake-recreation-site). In addition to the studies above NPS prepared a vegetation assessment as part of this planning effort (NPS, 2015). These studies, along with other assessments (NPS, 2011) and public and stakeholder input were used in the development of feasible short-, mid- and long-term solutions. For more information see Chapter 2.

The Hanging Lake project area consists of a mix of land ownership patterns and related legal authorities with lands owned by the USFS, CDOT, and Xcel Energy. The CDOT rest area was designated a “safety rest area” as mitigation in the I-70 construction project Environmental Impact Statement (EIS) in the 1980s. As part of the current planning process, discussions and parallel planning processes are underway with CDOT and Federal Highways regarding removing the “safety rest area” designation in order to allow for less complicated management and more consistent access to the site. Each agency with land ownership interests has or is in the process of easements, permits or agreements for the other to occupy their lands.
Figure 3. Land Ownership and Project Area Map
For purposes of this proposed management plan, the “Hanging Lake Area” consists of the trail itself, the lake, the upper waterfall called Spouting Rock, Dead Horse Creek and CDOT’s infrastructure including: the parking lot, I-70 on and off ramps, the recreation path along the Colorado River, refuse containers, several picnic sites, the flush restroom facility in the rest area, as well as a vault toilet at the trailhead (see Figure 3). When the plan mentions the Hanging Lake Area, it is addressing all or portions of this list of infrastructure and features.

Since 1972, Hanging Lake Trail has been managed and maintained by the Eagle-Holy Cross Ranger District’s trails program. The trail crew has consisted of between two to six members who also have maintenance duties and management oversight on six hundred miles of other trails in the District.

**Current Condition and Management Issues**

**Natural Resource and Infrastructure Damage**

Increased visitor use over the last decade has resulted in resource damage and maintenance backlogs on both the trail and around the lake. USFS project reports and trail logs have documented resource and infrastructure deferred maintenance needs for years. Both internal staff and external partners have evaluated and documented resource issues, management concerns and recommendations focused on protecting the areas unique and sensitive values.

Hanging Lake reports done by Colorado Natural Heritage Program (CNHP 2001, 2002, and 2010) as well as the National Park Service (NPS, 2011, 2015) all state the primary threat to the Hanging Lake site was seen as heavy recreational use. The reports identified the following primary natural resource values in need of management actions and protection; sensitive areas and resources such as black swift habitat, rare and endemic plant species, and uncommon plant associations; soil erosion and trail widening (effects on vegetation); exotic plant species; and water quality.
Most of the trail’s more developed infrastructure (boardwalk, railing and rock-fall containment) were constructed in 2009 and 2010 through a grant. Volunteers for Outdoor Colorado, and other partner and volunteer organizations have helped extensively with trail work over the years. With increased use, deferred maintenance is also increasing on trail infrastructure including bridges, steps, railings, and boardwalks. Though well-built, the railing system was not built for the current volume of use and has started to deteriorate as a result.

In addition to the above infrastructure there are seven trail bridges that cross Dead Horse Creek between the trailhead and the lake. All except one of these bridges were built by the Civilian Conservation Corps in the 1930s and require consistent monitoring.

In response to the sudden increase in visitor use and resulting damage and impacts to other agency resources local community outcry began to elevate in 2012, and community members demanded action to protect Hanging Lake. Subsequently, funding through local community grants and donations from the City of Glenwood Springs and Garfield County were obtained to assist the WRNF in funding staffing in the area during the summer. The WRNF continues to cover costs related to trail maintenance. Other funding sources for large capital project grants have come from the State of Colorado Parks and Wildlife and various private organizations. Funding for general maintenance, deferred maintenance, and operations of the trail and parking lot has become increasingly difficult given decreases in USFS and partner financial capacity. The short- and mid-term management actions implemented to date with the funding sources mentioned were implemented as temporary solutions to infrastructure and management needs at Hanging Lake.

**Visitor Demographics**

Visitor use data show that groups visiting Hanging Lake tend to be more diverse and less experienced in the outdoors than typical recreational trail users on the White River National Forest. In general, visitors are less informed about proper trail etiquette and stewardship principles. Posted rules and regulations are often ignored, as well as Leave No Trace ethics such as: plan ahead and be prepared, travel on durable surfaces, dispose of waste properly, leave what you find, minimize campfire impacts, respect wildlife, and be considerate of other visitors.

Over the past several years, visitors engaging in prohibited activities, such as swimming, fishing, tree carving, bringing dogs on the trail, leaving graffiti, and hiking off trail has become more prevalent in the Hanging Lake Area.
Social media posts and pictures have helped to draw more visitors to Hanging Lake as people want to see the beauty of the place. At the same time social media has played a large role in the spread of and response to inappropriate behavior and the need to protect this iconic Colorado setting. Dozens of articles, local and state news reports, radio interviews and websites have included cooperative messages relating to management challenges, what to know before you go, expected visitor behavior, rules and regulations, and explaining the “why” we need to protect it. Colorado residents and non-residents alike have clearly demonstrated the desire to protect this special place.

Colorado’s Statewide Comprehensive Outdoor Recreation Plan (SCORP) describes recreation trends in the state. One of the largest factors relating to high use areas like Hanging Lake is Colorado’s increasing population. The plan shows that between 2000 and 2010 there was a 16.9 percent increase in the state’s population and forecasts the population will grow to almost 7 million by 2030. The plan states that 90 percent of Coloradans participated in some form of outdoor recreation over the past year and 66 percent of all Colorado residents recreating outdoors at least one day a week. Walking, hiking/backpacking, picnicking and fishing were the most popular activities (CPW, SCORP 2014).

The Volpe Center conducted a visitor intercept survey in summer of 2016 and captured valuable information regarding Hanging Lake’s visitor trends (Volpe, Visitor Transportation Survey 2016). Data collected included visitor information related to demographics, visitation planning, frequency, experiences, perceptions, information sources, safety, satisfaction, crowding, economic impact, transportation options, etc.

The study showed the average group size was 3.7. Children comprised 56 percent of visitors, Colorado residents comprised 60 percent of visitors, out-of-state or international visitors comprised 39 percent of visitors. Seventy percent of visitors were first-time visitors. On average, surveyed “visitor groups” spent $836 during their trip within 50 miles of Hanging Lake (included Eagle and Garfield Counties), thereby helping to contribute over $33,000,000 directly into the local economies in 2016. See Appendix 2 for complete study findings.
Access

Currently most visitors travel to the CDOT Hanging Lake parking area via their private vehicle and attempt to park in one of the 110 parking spaces. During the peak months of May through October the lot is full nearly every day by 7:30 am. Depending on funding, the USFS manages the parking lot from June through September focusing on the highest visitation days of Friday through Monday. Due to lack of financial resources, the remainder of the week (Tuesday through Thursday) is not staffed as well as the remaining peak months of April, May and October. On unstaffed days year round, once the lot is full visitors circle the lot looking for the next available parking spot and/or create lines and backups onto I-70. Some visitors choose to park illegally which causes damage to CDOT’s infrastructure e.g. lawns, curbs, irrigation system, etc. In addition, this behavior creates a precedent which leads to more illegal parking. Due to the configuration of Interstate 70, visitors who do not find a parking spot during both staffed and unstaffed days must exit westbound even if they are headed east. Visitors must travel approximately 5 miles out of their way to the Grizzly Creek exit to return eastbound and back to Hanging Lake to try for a parking spot again. On busy days during the peak season it is not unusual for people to loop four and five times trying to get a parking spot. Visitors also rent bicycles in Glenwood Springs and either ride them to the lake from town or are delivered to adjacent rest areas. Approximately 5.7% of arrivals to the trailhead were found to be from bicycle use (see Appendix 3).

USFS, CDOT and Colorado State Patrol (CSP) have worked collaboratively the last several peak seasons on enhanced management actions related to parking including the installation of additional traffic control and parking devices, highway signs and closures mechanisms. Managing parking lot congestion, backups, and intermittent shut downs of the I-70 on-ramp is not financially sustainable and is straining all the affected agency’s limited budgets and personnel. Currently, CDOT manages all of the infrastructure at the parking lot that includes; bathrooms (two), bike path, landscaping, highway and lot signs, all parking lot infrastructure (asphalt, barriers, cones, etc.) and the I-70 on and off ramps.

The USFS has been the lead agency staffing the parking lot since 2013. As USFS and partner funding has varied, staffing ranges from one to six people, four days per week during the months of June through September. USFS employees spend most of the day managing the parking lot, and resource issues at the lake and on the trail have only been minimally addressed. It is common for visitors not to heed the “parking lot full” highway electronic message boards on I-70 and enter into the parking lot, refuse to turn around and come back another time or day. Due to these parking issues many visitors leave frustrated or create social unrest in the lot, confront other visitors and/or USFS and CDOT employees thereby compromising the safety of other visitors and employees.
Safety

With high-use visitation and subsequent crowding and congestion, a range of safety issues have resulted. One major issue is illegal parking in the rest area and on the I-70 on- and off-ramps which restricts safe ingress and egress to the area. Illegal parking and congestion of visitors in the lot and on the trail is resulting in increased emergency services access difficulties (ambulance, fire department, search and rescue, and law enforcement). Crowding and congestion is also contributing to infrastructure damage and failure which can compromise visitor safety in the lot, on the trail and at the lake (see above sections). Congestion is also leading to visitor conflicts.

Over 1 million dollars was spent to replace infrastructure along the trail and at the lake in 2010. With visitation doubling in the last 5 years, infrastructure failures are occurring more frequently due to the volume of use.

Safety issues were the key driver in convening the interagency working group in 2012. Because they specialize in transportation planning, the Volpe Center was commissioned by the USFS in 2013 to assist in the development of short-, mid- and long-term solutions. The Volpe Center assisted the USFS and CDOT in the implementation of short- and mid-term on-site actions that are currently in place, many of which dealt with safety. These include new striping plan, signs, cones, candlesticks, welcome station, swing arm gate, etc.

In sum, the area’s location in a steep and narrow canyon with no flat land to expand parking, the mixed landownership, the safety rest area designation, and the need for ingress and egress back to I-70, all compound the management challenges of this area.
Chapter 2. Current Hanging Lake Management Direction and Other Hanging Lake Studies

Forest Plan Management Direction

Current management strategies for the Hanging Lake Area can be found in the White River National Forest Land and Resource Management Plan, 2002 Revision (Forest Plan). The Forest Plan, through management area prescriptions, provides management direction, desired conditions, standards, and guidelines.

The Hanging Lake Area is within the Colorado River corridor. As part of the White River National Forest, Land and Resource Management Plan process, two segments in Glenwood Canyon on the Colorado River were found to be “eligible” under 5(d)(1) study criteria in the Wild and Scenic Rivers Act. Subsequently the corridor was prescribed Management Area “4.4 Recreation Rivers-Designated and Eligible.” For complete 4.4 Management Area description, see Appendix 1.

While the main purpose of the management prescription and proposed designation is for the protection of its outstanding values, the actual width of a Wild and Scenic River corridor may vary in order to protect those values. The outstanding values identified in this segment were recreational, scenic, and geologic values. Hanging Lake contains all those identified values and is within the Colorado River segment 1.

Figure 4. Hanging Lake, Forest Plan Management Areas
All federal land management agencies use the Recreation Opportunity Spectrum (ROS) classification system to characterize and help provide management direction on a spectrum of recreation opportunities. ROS classes have been adopted for all lands on the WRNF and were mapped in 2002 as part of forest planning effort to coincide with designated Management Area objectives.

ROS serves as a tool to identify and mitigate change. ROS classes define the level of recreation use, impact, development, and management that an area should experience over the life of the Forest Plan. The Hanging Lake project area was mapped in the Summer Recreation Opportunity Spectrum as “Rural” to coincide with Management Area prescription of “4.4 Recreation Rivers- Designated and Eligible.” The “Rural” ROS class is defined as an area characterized by a substantially modified natural environment. The sights and sounds of humans are readily evident, and the interaction between visitors is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities for intensified motorized use and parking areas are available.

**Hanging Lake Studies and Reports**

This section provides more detail on Hanging Lake studies. Volpe Studies can be found online at: https://www.volpe.dot.gov/transportation-planning/public-lands/white-river-national-forest-hanging-lake-recreation-site.

As part of the Hanging Lake Transportation Study project, the Volpe Center conducted numerous studies. One of this plan’s cornerstone studies was a trail and site carrying capacity analysis, titled the “White River National Forest Hanging Lake Capacity Study, 2016.” The Capacity Study was conducted from 2015 to 2016 via on-site visitor surveys, video and photo simulations and trail encounter simulations depicting different trail/lake capacities, trail counter data and traffic counter data in the CDOT rest area (see Appendix 3). To see a video simulation comparing trail volume and capacity scenarios go to: https://www.youtube.com/playlist?list=PLm_7Y91JGJbsuNegaEW1x--yKchErg79P

The capacity study assumes a base operating season as well as a managed timeframe per day. The 2016 capacity analysis presented three distinct management capacity scenarios; Restricted Capacity, Slight Restriction Capacity, and Environmental Sensitive Capacity. In 2017, an Addendum was completed that added an additional capacity scenario called the Resource Conscious scenario (see Appendix 2). The assumptions and methodology used in the capacity scenarios guided the USFS in choosing a daily capacity that is feasible, sustainable and meets management goals and objectives for the Hanging Lake Area year-round. Through an adaptive management approach, the daily capacity may be adjusted up or down if desired conditions are not being met.

In 2016, the Volpe Center conducted a visitor survey on site and produced a summary of results in the White River National Forest Hanging Lake Visitor Transportation Survey – Summary of Results, 2016 document (Volpe, Survey 2016). Data from this survey helped inform proposed management solutions and provided information related to visitor demographics, preferences, satisfaction, demographic, crowding tolerances, willingness to take a shuttle, recreational experience information and trip planning information. See Appendix 4

In 2017 the Volpe Center completed the “White River National Forest Hanging Lake Transportation and Operations Study” (Volpe, Transportation and Operations, 2017). The study examines transportation options for publicly and commercially provided shuttle systems to the Hanging Lake parking lot as well
as the option of allowing private vehicles to park. The transportation study also reviews Hanging Lake area operational needs for the CDOT and USFS infrastructure in order to compare long-term feasibility of potential management options (See Appendix 1.). This plan incorporates that data and will be used in defining final management direction.

Additional studies have been done outside this planning process for Hanging Lake by Colorado Natural Heritage Program (CNHP 2001, 2010). CNHP’s reports defined the significance of the Hanging Lake natural values as well as needed conservation and management responses. Hanging Lake is sited as being a unique example within the Southern Rocky Mountain bio-physiographic province of a lake formed by travertine deposition, and supports one of the best examples of a hanging garden plant community in the province. The site is also one of the larger and least altered travertine systems in the province, where natural geologic and hydrologic processes continue to operate as they have done throughout the history of the lake.

As part of Hanging Lake’s National Natural Landmark (NNL) designation process, the National Park Service studies were completed and culminated in the 2011 designation report (NPS, 2011). For more information regarding Hanging Lake NNL designation go to:
https://www.nps.gov/subjects/nnlandmarks/index.htm
Chapter 3. Goals, Objectives, Desired Conditions, and Proposed Management Overview

The overall goal of this proposed management plan is to create and implement a management system for Hanging Lake Area that is implementable, sustainable, and maintains the area’s defined desired conditions by meeting the objectives below:

I. Protect natural resources  
II. Manage congestion  
III. Enhance public safety  
IV. Improve visitor experience  
V. Support local tourism

The following section describes identified issues, the desired condition, and proposed management actions for each objective.

I. Resource Protection and Restoration of Natural and Historic Features

Issue

The existing level of visitation to the Hanging Lake Area is not sustainable for the site’s natural resources. The area’s defined sensitive and native plant communities, travertine deposition at the lake, and the black swift population cannot continue to thrive under the current level of human use. Reports from CNHP, NPS and USFS state the sensitive nature and need for restoration and protection on and off the trail and cite high-use visitation as the biggest threat to Hanging Lake’s values.

As part of a travertine depositing system, Hanging Lake is sensitive to human-caused or human-influenced changes to its chemistry, structure, or water supply. The hanging garden communities associated with the travertine deposits are also susceptible to damage by trampling or changes in water supply. For these reasons visitors to the site are prohibited from swimming, wading, or fishing in the lake, and are directed to stay on the trail and boardwalk. Efforts in 2015 were made to restrict access to sensitive areas around Spouting Rock with cabling and ropes.

The area is also rich in the history of Glenwood Canyon, the town of Glenwood Springs, and the State of Colorado. There are many historic features along the trail as well as the trail structures themselves.
With annual visitation doubling over the last five years and now reaching 150,000 visitors, the area is experiencing potential irreversible impacts to both natural and historic resources. Off-trail use facilitated by high use and crowding is resulting in vegetation trampling, social trails, drainage problems, wildlife disturbance, and wear and tear on the all infrastructure. Other resource degradation issues related to high-use visitation include graffiti, human waste, litter, entering the lake, etc.

**Desired Future Condition**

The site is managed to a year-round daily capacity that ensures the natural resources (e.g. lake, sensitive plants, swifts, and historic features) and historic features are sustained. Visitation is spread throughout the day, reducing the number of people on the trail and number of passings, and thereby reducing off-trail travel and resource damage. Enhanced monitoring and sustainable management actions are provided to preserve, protect, restore, and interpret the natural resources and historic values. Human use is managed to ensure Hanging Lake’s biodiversity, and the fragile unaltered travertine system process persists for future generations to enjoy. Visitors have easy access to information and are informed prior to arriving on site so they know and understand the need for regulations and responsible Leave No Trace (LNT) ethics.

**Proposed Management Solution**

Institute or utilize a year-round fee-based reservation and/or permit system which would be used to manage and allocate the defined daily capacity for those wanting to hike in the Hanging Lake Area. Manage the site to provide sustainable long-term funding and management for restoration, maintenance, engineering controls, interpretation, and other visitor services. Utilize adaptive management actions as needed identified through monitoring to ensure that natural resources are protected. Consider additional engineering controls and infrastructure as needed to guide visitors’ movement and to protect resources. Collaborate with partners and communities on Hanging Lake information and interpretive messages.

**II. Manage Congestion in the Hanging Lake Area**

**Issue**

Unmanaged parking in the parking lot has led to overcrowding, congestion, illegal parking, and safety concerns. Backups onto the busy narrow elevated decks of I-70 on- and off-ramps occurs regularly and is not safe. Visitors who cannot park, exit the parking lot, drive to Grizzly Creek, and loop back several times trying to obtain a parking space at Hanging Lake. This causes added congestion on the Interstate,
Glenwood Canyon Bike Path, and throughout Glenwood Canyon’s access points and rest areas that are already experiencing crowding and congestion.

Once a visitor can park or get to the Hanging Lake area, the volume of visitors inundate the infrastructure in the rest area and on the trail. With the average of 819 people a day during the summer months on a 1.2 mile trail, resource damage is occurring to the area’s sensitive natural resources and trail infrastructure, as well as affecting visitors’ experiences.

**Desired Future Condition**

The site is managed to a daily capacity that eliminates congestion in the parking area, on the trail, at the lake and at Spouting Rock. Traffic and parking congestion is eliminated by instituting a mandatory shuttle system or parking by permit. Eliminate spikes of high use and reduce the number of people at one time on the trail, at the lake and at the rest area. Monitor congestion and adaptively manage to ensure that visitors have opportunities for safe high-quality recreation experiences.

**Proposed Management Solution**

Institute or utilize a year-round fee-based reservation or permit system which would be used to manage and allocate the defined daily capacity limit for those wanting to hike in the Hanging Lake Area. Visitors would secure a permit that would designate the date and start time of their trip. Institute a shuttle from the local communities to the Hanging Lake Area during peak seasons when congestion issues exist. Monitor congestion-related issues during off-peak season and utilize adaptive management to adjust management actions as needed. Adjust daily capacity up or down based on monitoring to ensure the plan is meeting its desired conditions during both the peak and off-peak seasons.

### III. Enhance Public Safety

**Issue**

High levels of visitation, congestion and unmanaged parking are not sustainable and create safety concerns. Crowding and congestion are leading to illegal parking and backups onto the busy narrow elevated decks of I-70 and on- and off-ramps at Hanging Lake. Illegal parking is resulting in restricted access or blocked access for emergency services. In addition, congestion is having a detrimental impact on the infrastructure throughout the area which is increasing infrastructure failures (e.g., damage to railings, trail features, bridges, decking, etc.) which then become a safety risk. High visitation also creates a high number of passings on the trail, forcing people off the trail and onto rocks, etc.

Unmanaged parking, crowding, and congestion throughout the area often creates rushed, stressed, and frustrated visitors. In many situations visitors’ frustration leads to inappropriate behaviors, visitor conflict and confrontation which facilitates often unsafe conditions for USFS and CDOT employees as well as other visitors.

**Desired Future Condition**

The site is managed to a daily capacity year round that provides for safe access and well-maintained infrastructure throughout the area. The number of people at one time is limited and there is no crowding, illegal parking, and backups onto I-70. Visitors are provided with enhanced visitor services (such as
alternative transportation during the peak season, ranger presence, interpretation and information, and maintained/improved infrastructure) that improve their overall recreation experience.

Visitor conflicts are rare. Emergency vehicles have safe and easy access 24 hours per day, year round.

Proposed Management Solution

Institute a fee-based reservation system seasonally or year round which would be used to manage and allocate the defined daily capacity to reduce crowding, conflict, congestion, inappropriate behaviors, and degradation of infrastructure and natural resources. Increase visitor services to include staff presence in the area to provide enhanced visitor services. Utilize adaptive management actions as identified through monitoring to ensure that safety issues are addressed in a timely manner. Utilize additional engineering controls and infrastructure to guide visitor use and enhance visitor safety. Continue collaboration with key partners on safety issues so that all affected parties can address safety issues that go beyond the Hanging Lake area.

IV. Improve the Visitor Experience

Issues

Trail counters show that visitation during the summer months currently averages 714 to 1,013 hikers a day. During the peak season on managed days (Fri-Mon), once the parking lot fills by approximately 7:30 AM visitors are turned away – some choose to loop I-70 and return several times, others stage in a limited line waiting for a parking spot, and some visitors leave and do not come back. This creates added congestion on the Interstate and at adjacent rest areas in Glenwood Canyon and on the Glenwood Canyon Bike Path. The additional use crowds other CDOT rest areas and the bike path and creates negative interactions and safety concerns between unintended pedestrian use and cyclists. On non-managed days, congestion and illegal parking is prevalent.

Hanging Lake visitors who are turned away are often agitated and frustrated. According to the Volpe visitor survey, many visitors traveled over three hours from Colorado’s Front Range (more than 65 percent) to reach the site and the hike is typically the focus of the day’s activity. The Volpe’s Visitor Survey also shows that 70 percent of visitors are there for the first time have no other activities planned. Over one-third of visitors (36 percent) gathered information about Hanging Lake through word of mouth (family and friends) and 63 percent were aware of parking problems before their visit. The survey also showed that 54 percent of hikers agreed that the numbers of hikers should be limited (Volpe, Visitor Survey, 2016).
Currently, once a hiker makes it to the trail, hikers are likely to experience crowding, with approximately 340+ hikers on the trail at any given time (Appendix 2. Carrying Capacity). According to Volpe Visitor Survey over half of visitors (51-53 percent) feel crowded some of the time on the trail. Some hikers encounter others who disrespect Hanging Lake’s resources, disregard rules and regulations and exhibit illegal behavior which often leads to visitor conflict or detracts from their experience and they attempt to seek out a Ranger to assist.

**Desired Future Condition**

Hanging Lake’s resources are preserved and available for visitors enjoy. The area is managed through partnerships that provide enhanced visitor services that gives visitors opportunities for a high-quality experience. Visitors can make a reservation and know what day and time they can hike and how to access the site. Access is managed to reduce crowding and congestion and is operated in a way that visitor conflict is rare. Crowding is infrequent and rare. The number of people at one time, the number of passings on the trail and total visitor encounters is such that visitors have opportunities for a positive recreation experience. Prior to arriving on site, visitors are prepared via sources that provide information regarding access, rules and regulations, education and interpretation about the Hanging Lake area. Follow-up visitor surveys reveal positive and supportive viewpoints regarding the management system.

**Management Solution – Standardize**

Manage to a daily capacity which will ensure that visitors will have opportunities for a positive experience at the Hanging Lake Area. Institute or utilize a fee-based reservation and/or permit system which would be used to manage and allocate the defined daily capacity limit year round. During the peak season, institute a mandatory shuttle or parking system that is managed to pace the volume of hikers delivered to the site, so each group has separation along the trail, at the lake, and at Spouting Rock. Hikers will be able to hike their own pace. Congestion at the pinch points of the bridges, railing/stair systems, boardwalks, and the rock steps to Spouting Rock will be reduced by instituting the capacity limits. Enhance visitor services on- and off- site with improved interpretation, messaging and on-site staff presence. Utilize the adaptive management strategy to mitigate issues in a timely manner and not unreasonably affect visitors’ access, use, and enjoyment.

**V. Support Local Tourism**

**Issue**

The greater Glenwood Springs area markets Hanging Lake in most commercial brochures or websites for hotels, restaurants, ski resorts, and in community chamber and tourism web pages. Many concierge desks at hotels offer this hike as a must-do activity for their guests. The publicity is not restricted to the Glenwood Springs area; many Colorado tourism partners market Hanging Lake as the hike to do while you are visiting in the State of Colorado. Hanging Lake has also been listed in international publications and other media as a top hike and must-see waterfall.

Colorado’s 2014 Statewide Comprehensive Outdoor Recreation Plan states that Colorado’s economy is heavily dependent upon outdoor recreation (CPW, SCORP 2014). The plan also states that outdoor recreation opportunities within the State contributes more than 34.5 billion in annual economic benefits and creates 313,000 jobs.
The State of Colorado, local communities and governments have recognized the area’s high-use-related impacts and have participated in the planning of long-term solutions described in this plan. Many organizations have also contributed to funding of seasonal rangers during the summer season. Local community organizations as well as residents brought attention to the need for protection as resource damage and visitation sky rocketed over the last five years. The local communities have witnessed the impacts of high-use visitation and are looking to the USFS to manage the site so it is there for future generations to use and enjoy.

The Hanging Lake Area is integral to local tourism providers and the economic benefits it brings to the Glenwood Springs area, the Vail Valley and Roaring Fork Valley communities.

Desired Future Condition

Hanging Lake is managed to ensure it provides sustained economic benefits into the future. The area’s natural and historic features are protected as well as opportunities for a high-quality visitor experiences. Consistent information is provided for visitors regarding access, rules, regulations, interpretative, stewardship, and safety messages.

Proposed Management Solution

Manage to a daily capacity for the Hanging Lake Area. Institute or utilize a fee-based reservation or permit system which would be used to manage and allocate the defined daily capacity limit year round. Work with tourism destination providers to ensure consistent visitor information is available regarding access, rules and regulations, interpretation, safety, etc. Collaboratively monitor visitor experiences at Hanging Lake and the area’s socio-economic contribution to the affected communities. Utilize adaptive management strategy to ensure the intent of the plan is realized.
Chapter 4. Summary of Proposed Management Actions

The USFS is proposing the following management actions that have been determined to meet the defined goals, objectives (Chapter 1) and the desired conditions (Chapter 3) that serve as a foundation for feasible and long-term management actions for the Hanging Lake Area. There are several tools available to the USFS to implement decisions once the plan is finalized. These foundational decisions relating to capacity, access, and season of use, are critical to address future management.

Volpe studies were used to inform decisions and constitute the best available science and information at the time of this planning effort. Assumptions were made by the Volpe Center and the USFS in order to model a baseline for comparison, to inform long-term solutions and to perform a cost analysis to determine the most cost-effective and feasible scenarios that balance the overall goals and objectives in the plan. Assumptions such as estimated costs and season of use may change in the process as the options are analyzed and refined to meet defined goals and objectives.

The following proposed management actions will serve as baseline decisions that are incorporated in all future implementation actions.

**Hanging Lake Daily Capacity**

Allocate and manage the Hanging Lake Area to the daily capacity of 615 visitors year round.

The daily capacity was determined through information provided in Volpe’s 2016 Capacity Analysis, and the 2017 Transportation and Operations Plan and subsequent 2017 Addendum. A “Resource–Conscious” scenario was added in 2017 into the study in order to analyze an alternative between the “Slight Restrictions” and the “Environmentally Sensitive” scenario. The scenarios looked at the capacity of the parking lot, trail and lake and the movement of visitors through all three of those locations. The capacity study was done to assist the USFS in determining the optimal capacity for the site in order to address the issues related to natural resource degradation, congestion, safety, over-crowding, and visitor experience.

The “Resource-Conscious” scenario determined the daily capacity was 615 based on several factors (see Table 4 below). The capacity study examined factors that included the number of hikers on the trail at any given time (which equals the number of passings).

The more visitors pass along the trail, the wider the trail will get and resource damage will occur. Decreasing the number of visitors passing one another provides for visitor safety by keeping the hiker on the trail as well as reduced natural resource degradation, restoration and maintenance needs. By limiting the daily capacity to 615, visitors will have enhanced opportunities for a high-quality experience since there will be a reduction in crowding, fewer people sharing the trail, the lake and Spouting Rock. With the enhanced opportunities for high-quality recreation, it is also assumed that this will help ensure the area’s preservation as well as the related tourism-generated economic impact into the future. This scenario represents an approximate 40 percent reduction from the current highest levels of daily use during peak season. Currently, on these days, the total hikers per day recorded was 1,108, which has shown to be unsustainable (Volpe, 2016, 2017).

During the off-peak season the USFS will continue to monitor on site conditions to ensure that the all of the objectives and desired conditions are met. If through monitoring it is determined that the parking lot
exceeds it capacity and congestion, access, illegal parking, and safety issues arise due to weather and lack of parking due to snow storage, the adaptive management strategy can be utilized which includes adjusting the daily capacity, the mandatory shuttle season could be changed or other needed actions to ensure the plans intended outcome.

Table 4. Carrying Capacity Scenarios, Daily Averages

<table>
<thead>
<tr>
<th>Carrying Capacity Scenario</th>
<th>Operating Hours</th>
<th>Capacity per Hour</th>
<th>Total Hikers per Day</th>
<th>Max Hikers on Trail-Lake</th>
<th>Max Hikers on Trail</th>
<th>Max Hikers at Lake</th>
<th>Max Hikers per 100ft</th>
<th>Max Vehicles in Lot</th>
<th>Average # of Passing’s</th>
<th>Average Distance Between Groups (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Conditions (95th Percentile Week)</td>
<td>24</td>
<td>n/a</td>
<td>1,050</td>
<td>355</td>
<td>293</td>
<td>62</td>
<td>4.31</td>
<td>113(^1)</td>
<td>211 (at peak times)</td>
<td>80 (at peak times)</td>
</tr>
<tr>
<td>Actual Conditions Unmanaged (Mon. to Wed.)</td>
<td>24</td>
<td>n/a</td>
<td>979</td>
<td>371</td>
<td>309</td>
<td>69</td>
<td>4.81</td>
<td>136(^2)</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Actual Conditions Managed (Thurs. to Sun.)</td>
<td>24</td>
<td>n/a</td>
<td>1,108</td>
<td>341</td>
<td>285</td>
<td>58</td>
<td>4.07</td>
<td>113(^3)</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Original Capacity</td>
<td>10</td>
<td>111</td>
<td>1,110</td>
<td>332</td>
<td>278</td>
<td>56</td>
<td>3.85</td>
<td>112</td>
<td>198</td>
<td>110</td>
</tr>
<tr>
<td>Slight Restrictions</td>
<td>10</td>
<td>78</td>
<td>780</td>
<td>234</td>
<td>195</td>
<td>39</td>
<td>2.71</td>
<td>78</td>
<td>134</td>
<td>150</td>
</tr>
<tr>
<td>Resource-Conscious</td>
<td>10</td>
<td>61.5</td>
<td>615</td>
<td>183</td>
<td>153</td>
<td>30</td>
<td>2.14</td>
<td>62</td>
<td>110</td>
<td>185</td>
</tr>
<tr>
<td>Environmentally-Sensitive</td>
<td>10</td>
<td>45</td>
<td>450</td>
<td>134</td>
<td>112</td>
<td>22</td>
<td>1.56</td>
<td>43</td>
<td>87</td>
<td>250</td>
</tr>
</tbody>
</table>

Reservation System

A reservation system will be utilized to ensure that the daily capacity is managed to, thereby meeting the area’s defined desired condition. Visitors will secure a reservation or “permit” year-round which will define a time of entry either for a shuttle or access in their private vehicle to the Hanging Lake Area. All visitors would secure a reservation/permit year round no matter the mode of transportation to the site.

The reservation system may be managed by a commercial provider, partner organization, Recreation.gov or the USFS. A reservation fee most likely will be charged to cover the administrative costs of managing such a system.

The USFS can use a number of options to implement a reservation system. The following describes some of the tools that are available to use to implement the decision after finalization of the plan. The options below can be alone or in combination with other alternatives:

---

1 June 13-19, 2015, CDOT vehicle counter data
2 June 15-17, 2015, CDOT vehicle counter data
3 June 13-14, 18-19, 2015, CDOT vehicle counter data
1. Utilize Recreation.gov to issue reservations through the National Recreation Reservation Service. There is an administrative fee for this reservation system.

2. Manage capacity through the Outfitter and Guide (O&G) program via its permitting process using the O&G’s reservation system.

3. Manage capacity through a third party transportation (shuttle) provider’s reservation system.

4. Manage capacity through a reservation system and allow for parking on site.

5. Provide for enhanced visitor services and operations in the Hanging Lake area and resource restoration, reclamation, maintenance and protection of the sites resources via instituting a Special Recreation Permit under the Federal Lands Recreation Enhancement Act (FLREA) that would generate revenue for sustainable on-site management. This would require following national and regional processes and would include a separate public participation process. This tool may be integrated into the above four options.

Access Management for “Peak” and “Off-Peak” Seasons

A mandatory shuttle system would be used to allocate and manage to the daily capacity of 615 visitors per day. Initially, a shuttle service would be instituted during the high use peak months which is currently from May 1 thru October 31. If through monitoring it is determined that issues persist, the USFS will evaluate the situation and adjust the shuttle service season and or times in order to continue to meet the objectives of this plan using the adaptive management strategy (See Chapter 6).

The Hanging Lake Area would be managed so that visitor access is under a one-stop shopping/reservation scenario. During the peak season the shuttle provider would allocate and manage to the daily capacity through the reservation and shuttle service. The shuttle provider would be required to design the pick-up/delivery schedule from pre-determined locations.

During the off-peak season, (November 1 thru April 30), the area would be managed to its daily capacity through a fee-based reservation system or permit system and mandatory shuttles would not be required. Visitors would be able to drive their private vehicle to the Hanging Lake Area and park. The USFS or other provider would continue to manage the area to a daily capacity through the reservation system. If monitoring indicates that the parking lot exceeds it capacity and congestion, access, illegal parking, and safety issues arise, the adaptive management strategy can be utilized which includes adjusting the daily capacity. The mandatory shuttle season could be changed or other needed actions could be taken to ensure the plan’s intended outcome. More visitor use and operational data is needed during the off-peak season and will be gathered through monitoring.
Chapter 5. Adaptive Management Strategy

Utilizing an adaptive management approach helps managers ensure that desired objectives are achieved and the intent of the plan continues to be realized as future conditions change. This portion of the plan defines the indicators, thresholds, and resulting adaptive management actions that will govern long-term management and potential adjustments needed to ensure desired conditions are being met. An adaptive management strategy allows for the monitoring of physical, social, and managerial resource objectives.

The process is meant to be transparent, informative and dynamic with the ultimate goal of adopting a management system for Hanging Lake Area that is implementable, sustainable, and maintains the area’s defined desired conditions.

Indicators, Thresholds and Management Actions

An adaptive strategy defines how to ensure the plan’s stated desired conditions are monitored and achieved through identified indicators and thresholds. When thresholds are exceeded for a defined indicator, management actions are triggered that will bring the indicator back in line with the management intent. These triggered actions are phased so that typically the least intensive action that can achieve the desired conditions is utilized first.

This plan proposes to implement a defined daily capacity of 615 which can be adjusted if monitoring indicates that desired conditions are being met, improved, or in decline. The plan sets indicators and thresholds and subsequent management tools in order to address issues described in Chapter 3.

Indicators, thresholds and management actions are defined as the following:

**Indicators:** Specific, measurable variables that indicate the status of a specific desired condition. An indicator is a condition statement related to the goals/objectives.

The indicators were selected to be explicit and sensitive, and relate to sustainable long-term objectives and desired conditions. Existing data, feasibility of monitoring and the subsequent management effect are also important considerations.

Indicators focus on the goals and objectives defined earlier in this document (page 20).

**Thresholds:** The minimum acceptable condition for change in an indicator, which serve as triggers for management actions when exceeded.

Thresholds inform at what level an indicator condition is or is not attained. Thresholds are used to assure that actions are in compliance with the plan’s desired conditions. If thresholds are exceeded, a “toolbox” of management actions/tools (identified in Tables 5-8) will offer solutions to bring conditions back to their desired condition.

**Management Actions:** Implemented to preserve or restore desired conditions after monitoring shows that a threshold is exceeded.

Management actions are typically phased and start with the least intensive action that can achieve the desired conditions is utilized first. However, some management actions may require an escalated response depending on the scope and scale of the issue. Monitoring is required to ensure conditions return to meeting indicator thresholds (desired conditions) after management actions are taken. If conditions are not met, a host of other management actions can be implemented.
Adaptive Management Implementation

The Proposed Hanging Lake Area adaptive management strategy is an iterative process of informed decision-making with the purpose of obtaining the desired conditions for physical, social and administrative resources at the Hanging Lake Area. Decisions to implement tailored management actions will be made by the Eagle-Holy Cross District of the White River National Forest and will be based on information obtained from a number of available partners and USFS monitoring data. Management actions will be evaluated for effectiveness and adapted to optimize the achievement of resource objectives. Adaptive management actions can be implemented as described in Tables 5-8 as physical and financial capacity allows.

Adaptive management actions are typically categorized into three different implementation methods: education, engineering, and regulation. Actions may combine all three control methods to address one or more objectives. There is no set order that actions will be implemented; they are based on specific desired conditions for each indicator as measured by their related threshold.

The tables below defines what conditions will be used to describe when a threshold is exceeded. Monitoring data and the results of some adaptive management actions and approaches can also be used as a learning tool to help inform future management decisions not covered in this plan.

Before proceeding with any of the actions described in this plan, the USFS will ensure that actions are needed and will sufficiently address the targeted issue. It is not necessary to use all available actions before moving on to the next action. Current management, which is the baseline for the adaptive management section of this plan, will also be considered when deciding which action(s) are necessary. Rationale for implementing adaptive management actions will be documented in the Annual Operating Plan, but no further analysis will be needed. The actions described in this plan do not preclude any additional actions, not yet identified, to be implemented in addition to, or in replacement of, the actions described here, as long as they are consistent with the White River’s 2002 Forest Plan direction and this plan’s defined desired conditions, goals and objectives.
<table>
<thead>
<tr>
<th>Hanging Lake Area Objectives</th>
<th>Indicator</th>
<th>Threshold*</th>
<th>Adaptive Management Actions “Tool Box”</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resource Protection</strong></td>
<td><strong>Manage to Daily Capacity of 615</strong></td>
<td>Manage the permit system to meet defined Daily Capacity per hour, per day, year round. Capacity is not exceeded more than 10 times per year during off-peak season.</td>
<td>Increase and enhance visitor information including but not limited to: environmental education, interpretation, Leave No Trace Ethics, limited-use permit season, how/where to obtain a permit and general operational information. Collaborate on key messages utilizing community and partner outreach strategies, including internet, multi-media, highway signs, volunteers, employees and trailhead materials. Incorporate Leave No Trace ethics in transportation providers’ marketing and on-site messaging.</td>
</tr>
<tr>
<td><strong>Trail widening</strong></td>
<td><strong>Tread widening and Vegetation trampling</strong> – Does not exceed 50 percent of the area within 10 feet of the edge of trail</td>
<td>Increase frequency of trail counter monitoring.</td>
<td></td>
</tr>
<tr>
<td><strong>Infrastructure deterioration</strong></td>
<td><strong>Social Trails</strong> – No more than two social trails and/or 500 ft. of trail</td>
<td>Reduce crowding within capacity by adjusting shuttle delivery times or require additional pick-up shuttles from provider to spread use across daylight hours.</td>
<td>Increase enforcement during the affected season(s)</td>
</tr>
<tr>
<td><strong>Regulation Infractions</strong></td>
<td><strong>Railings</strong> – No more than two foundation failures per season</td>
<td>Increase/modify engineering controls such as linear barriers, trail hardening, posts, cables, and signs etc. to physically contain hikers to the trail</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Barriers</strong> – No more than two incidents of broken chain, cables or loose foundations per season</td>
<td>Change daily capacity limit if monitoring demonstrates issues related to resource damage, congestion, safety, and visitor experiences continue after 5 years of managing to a daily capacity. Capacity could also be adjusted upwards if trends demonstrate that all objectives are improved and sustainable into the future.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Regulation</strong> – Violations grow to greater than five percent of daily visitation over one peak season</td>
<td>Investigate and implement collaborative efforts with partners for outside funding for deferred trail and infrastructure maintenance, improvements, and replacement.</td>
<td>Implement closures for project work, restoration closures in certain areas, and seasonal site closures during non-shuttled season or portion thereof.</td>
</tr>
</tbody>
</table>

*Monitoring data obtained through reservation and permits and trailhead counter
Table 6. Adaptive Management for Objective 2. “Manage Congestion”

<table>
<thead>
<tr>
<th>Hanging Lake Area Objectives</th>
<th>Indicator</th>
<th>Threshold*</th>
<th>Adaptive Management Actions “Tool Box”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Increase and enhance visitor information including but not limited to: environmental education, interpretation, Leave no Trace Ethics, seasonal information, how/where to obtain a permit and general operational information. Continue to collaborate and utilize community and partner outreach strategies, including internet, multi-media, highway signs, volunteers, employees and trailhead materials.</td>
</tr>
<tr>
<td>Manage Congestion</td>
<td>Peak and Off-Peak Season</td>
<td>Manage the permit system to meet defined Daily Capacity per hour, per day, year round and is not exceeded more than 10 times per year</td>
<td>Reduce crowding within capacity by adjusting shuttle delivery times or require additional pick-up shuttles from provider to spread use across daylight hours.</td>
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<tr>
<td></td>
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<td></td>
<td>Increase enforcement during the affected season(s) to ensure people are arriving at the right time in accordance with reservation system.</td>
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<tr>
<td></td>
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<td></td>
<td>Build additional engineering controls along the trail and at the lake, such as barriers, post and cable, signs, etc.</td>
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<tr>
<td></td>
<td>Off-Peak Season</td>
<td>Number of parking violations and/or vehicles backed up or parked on I-70 on and off ramps – Does not exceed eight days or more per month during one off-peak season</td>
<td>Change daily capacity limit if monitoring demonstrates issues related to resource damage, congestion, safety, and visitor experiences continue after five years of managing to a daily capacity. Capacity could also be adjusted upwards if trends demonstrate that all objectives are improved and sustainable into the future.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>If daily capacity is exceeded during the off-peak season and congestion occurs that results in parking violations, backups onto I-70, parking on- and off-ramps eight days or greater a month, during one off-peak season increase parking lot staffing. If staffing does not resolve issues (exceedance of threshold) increase or change the mandatory shuttle season to manage site to daily capacity (may include weekends vs. weekdays).</td>
</tr>
</tbody>
</table>

*Monitoring data obtained through annual trail and seasonal ranger reports

Table 7. Adaptive Management for Objective 3. “Safety”

<table>
<thead>
<tr>
<th>Hanging Lake Area Objectives</th>
<th>Indicator</th>
<th>Threshold*</th>
<th>Adaptive Management Actions “Tool Box”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>Number of Safety Incidents</td>
<td>Safety Related incidents – Annual 10% increase from previous years – SAR incidents do not exceed a five percent increase over five-year averages</td>
<td>Increase and enhance visitor information and education, enforcement related to access requirements, hiking preparedness, visitor use ethics, etc. Collaborate on key messages utilizing community and partner outreach strategies, including internet, multi-media, highway signs, volunteers, employees and trailhead materials.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Require guide service for all hikers during winter or over the snow months.</td>
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<tr>
<td></td>
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<td></td>
<td>Increase modify engineering controls such as linear barriers, posts, cables, and signs etc. to physically contain hikers to the trail.</td>
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<td></td>
<td></td>
<td>Increase law enforcement presence year-round.</td>
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<tr>
<td></td>
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<td></td>
<td>Close the trail to human entry while snow levels remain high.</td>
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<tr>
<td></td>
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<td></td>
<td>Reduce daily capacity limit from 615 to an appropriate number if increased safety and search and rescue incidents occur beyond the identified thresholds.</td>
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<tr>
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<td></td>
<td>Increase winter education regarding recommended winter safety hiking gear e.g. clothing, footwear with traction devices, poles, and basic survival gear.</td>
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<td></td>
<td>Limit use to daylight hours year round unless guided.</td>
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<td></td>
<td>Don’t plow parking lot or bike path in winter.</td>
</tr>
</tbody>
</table>

*Monitoring data obtained through annual review with USFS and partners (CDOT, CSP, Garfield County Sheriff and Search and Rescue)
## Table 8. Adaptive Management for Objectives 4/5. “Improve Visitor Experience”/“Support Local Tourism”

<table>
<thead>
<tr>
<th>Hanging Lake Area Objectives</th>
<th>Indicator</th>
<th>Threshold*</th>
<th>Adaptive Management Actions “Tool Box”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitor Experience / Support Local Tourism</td>
<td>Decreased visitor satisfaction</td>
<td>Hanging Lake Visitor Surveys do not show downward satisfaction trend by over 20 percent over next two survey cycles (six years). Shuttle wait time – time exceeds 15 min, or is greater than 25 percent/month</td>
<td>Increase and enhance visitor information efforts on and off site regarding permit information, trail information, rules and regulations, “know before you go” preparedness, seasonal information etc. Continue to collaborate and utilize community and partner outreach strategies, including internet, multi-media, highway signs, volunteers, employees and trailhead materials. Change daily capacity limit if issues related to resource damage, congestion, safety, and visitor experiences continues occur after three years of managing to a daily capacity. Capacity could also be adjusted upwards if trends demonstrate that all objectives are improved and sustainable into the future. Adjust shuttle delivery times or required additional pick-up shuttles from provider. Adjust allocation for entry times to offer different recreation experience opportunities (i.e. fewer people during certain times of the day).</td>
</tr>
</tbody>
</table>

*Monitoring data obtained thru OMB visitor survey conducted every three years in combination with partner (Glenwood Chamber of Commerce, Tourism Promotion Board, Outfitter and Guides, Transportation Providers, etc.) visitor survey information.

### Monitoring

The “Hanging Lake Management Plan” and its adaptive management strategy requires long-term monitoring of the area’s desired condition and selected indicators. Monitoring will measure the effectiveness of management actions and track the status of desired conditions over time. Monitoring needs to be practicable and within USFS’s ability to collect information. Outside of the visitor survey, this plan employs existing data collection and monitoring practices that are already in place internally or with partners and/or are built into management decisions in order to address these concerns. Monitoring data will be complied by the Eagle-Holy Cross Ranger District staff and available to the public as requested.

#### Annual Monitoring

Data collection for the first three indicators (resource protection, manage congestion, safety) will be completed every year under existing instruments (see * under each table). Annual monitoring is sensitive to change as well as to indicator conditions and is incorporated into regular programmatic operations of USFS and partnering agencies. Data related to managing to daily capacity will be reviewed every year. USFS and partner staff, patrol logs, surveys, inventories, condition assessments, and routine operational records will continue to provide data related to this plan’s objectives.

#### Long-Term Monitoring

When the plan is finalized it will initiate a three-year schedule to re-survey Hanging Lake visitors regarding visitor satisfaction as funding and partnerships allow. At the three-year review, an in-depth analysis of all monitoring data will be completed to gain a comprehensive understanding of the desired condition status. In order to establish trend data, after the second round of surveys (six years after implementation), data will be analyzed to ensure visitor-experience thresholds have not been exceeded.
Effectiveness of Monitoring
Changes may be made if the monitoring schedule and threshold timelines are not meeting the objectives that were established in this plan. An escalated response can be taken if desired conditions are at risk. A USFS team will review the monitoring data to determine whether management actions are needed and/or if previous implementation of actions have moved the area toward the desired conditions. The team will also review implementation activities and ensure compliance is documented.

Table 9. Monitoring Schedule

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Data Source</th>
<th>Monitoring Schedule</th>
<th>Threshold Non-Compliance Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Capacity</td>
<td>Special Use Permit and trail data</td>
<td>Annual</td>
<td>Shuttle season: Daily capacity is not exceeded more than 10 times a year.</td>
</tr>
<tr>
<td>Resource Degradation</td>
<td>Annual Condition Surveys- staff logs</td>
<td>Annual</td>
<td>Infrastructure does not exceed maintenance capabilities</td>
</tr>
<tr>
<td>Safety</td>
<td>USFS and Partner Patrol logs- Law Enforcement Incidents</td>
<td>Annual</td>
<td>Annual 10% increase from previous years, and/or SAR incidents do not exceed a five percent increase over five-year averages</td>
</tr>
<tr>
<td>Visitor Experience / Tourism</td>
<td>OMB-approved Hanging Lake Visitor Survey</td>
<td>Every three years</td>
<td>Regular visitor surveys done every three years do not show a marked decrease in satisfaction over two survey periods (six years).</td>
</tr>
</tbody>
</table>
Chapter 6. Next Steps

Implementation Actions

After the Hanging Lake Management Plan is finalized, there will be several implementation options that will meet the plan’s final goals, objectives, and desired conditions.

There are four key decisions foundational to the proposed management plan that will support feasible and long-term implementation actions.

1. Manage to the area’s defined capacity (615 people per day) year round through a fee-based reservation or permit system.

2. Seasons are defined as follows. The “peak” season is May 1st thru October 31st. The “off-peak” season, November 1st thru April 30th. Season dates can change depending on monitoring of indicators and thresholds (see Chapter 5).

3. The plan proposes to utilize a third party transportation provider (mandatory shuttle) in order to allocate and manage to the area’s defined daily capacity during the “peak” season. During the “off-peak” season the area would be managed to its daily capacity through a fee-based reservation system or permit system and mandatory shuttles would not be required.

4. The plan will utilize an adaptive management approach, monitoring resource conditions to ensure that the stated desired conditions and related objectives are achieved and the intent of the plan continues to be realized in the face of future changes.

The Authorized Officer will consider implementation methods based on: legal authorities, feasibility, technical and operational logistics, operation and capital needs, long-term sustainability, and USFS physical and financial capabilities. Once the plan is finalized, the following is a brief description of some methods that could be phased in, used alone or in combination:

1. Utilize Recreation.gov to issue reservations through the National Recreation Reservation Service. There is an administrative fee for this reservation system.

2. Manage capacity through the Outfitter and Guide (O&G) program via its permitting process using the O&G’s reservation system.

3. Manage capacity through a third party transportation (shuttle) provider’s reservation system.

4. Manage capacity through a reservation system and allow for parking on site.

5. Provide enhanced services and experience to the visitor via instituting a Special Recreation Permit under the Federal Lands Recreation Enhancement Act (FLREA) that would generate revenue for sustainable on-site management. This would require following national and regional processes and would include a separate public participation process. This tool may be integrated into the above four options.
Due to Hanging Lake’s current resource and management issues and operational challenges affecting USFS, CDOT and other partners, implementation of a management decision will be done as soon as practicable and technically feasible. Once the plan is finalized the goal is to implement the decision in 2018.

Implementation steps for a mandatory shuttle during the peak season will require lead time and separate contracting and/or permitting processes. If the O&G option is selected, in accordance with USFS Manual 2712, a solicitation of interest would be issued followed by a prospectus so competitive interested parties can respond. If selected, implementation of an O&G permit and subsequent services will be dependent on applications received from the prospectus process. Utilization of a third party transportation provider would also require adequate lead time for operations planning, fleet, agreements, contracts, etc.

The implementation of a year-round reservation system outside of a partner or O&G scenario would utilize Recreation.gov. This will require further steps in order to get the reservation system for Hanging Lake operational and ready for the public. A reservation system for Hanging Lake area would be available on-line or by phone through Recreation.gov. Fees for a reservation under Recreation.gov are administrative and do not come back to the USFS for management on site.

The Federal Lands Recreation Enhancement Act (FLREA) allows for the USFS to retain a portion of a fee to protect natural and cultural resources, to mitigate special health and safety concerns, and as a means to allocate capacity or dispersed use. If a fee is charged for a special recreation permit in addition to the reservation fee collected by Recreation.gov, a separate public involvement process would be required as identified under FLREA.

After the plan is finalized the USFS will complete an internal implementation/operations plan that describes actions and timelines. If one implementation method proves to be insufficient, other options as shown above can be used to realize the goals and objectives of the plan.

**Hanging Lake Partners**

This plan represents years of collaborative planning with local, state and other federal stakeholders and interested parties. The planning team formed in 2012 and have been active participants in creating the proposed plan and will play a key role in implementation of the final plan. Stakeholders and interested parties include: Colorado Department of Transportation, Federal Highways, City of Glenwood Springs, Glenwood Springs Chamber of Commerce, Glenwood Springs Tourism and Promotion Board, Garfield County Board of County Commissioners, Glenwood Spring Fire Department, Garfield County Search and Rescue, Excel Energy, Forest Conservancy, Colorado Parks and Wildlife, and Roaring Fork Outdoor Volunteers.

Successful implementation of the final plan will require ongoing interagency collaboration and specific administrative actions related to this project’s operations, enforcement, deferred maintenance, agreements, leases, etc. Administrative actions needed to sustain the long-term management of the site will be based on the Final Decision Notice and Final Management Plan and are displayed below for informational purpose only:

1. Land ownership/occupancy will be resolved between the WRNF and CDOT concerning land ownership issues, and a formal agreement will be instituted through which CDOT grants a lease to the USFS for the parcel of land located at the trailhead. This lease will be issued for a five-year period and be renewed upon expiration.
a. The long-term solution to granting this lease will be to enter into a land exchange between the two agencies so that the trailhead parcel is transferred into USFS ownership.  
b. This will include transferring the vault toilet, and other recreation features to US Government ownership.

2. Enter into a Challenge Cost Share Agreement with CDOT, outlining agency responsibilities in the short-, medium-, and long-term timeframes as related to the implementation of the management plan (Special Recreation Permit, Recreational Enhancement Act fee, and shuttle system).
   a. Interstate 70 signage changes.
   b. Hanging Lake parking area and on and off ramp infrastructure changes.
   c. Facility operations and maintenance.

3. Federal Highway Administration’s removal of Hanging Lake’s designation as a “Safety Rest Area.”

4. Ongoing coordination with interagency partners in marketing and messaging for Hanging Lake.
# List of Preparers

## Hanging Lake Area Proposed Management Plan

**USFS Planning Team**

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaron Mayville</td>
<td>District Ranger, Eagle-Holy Cross Ranger District, WRNF</td>
<td>Management Guidance, Document Review, Decision Maker</td>
</tr>
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<td>Project Lead, Management Plan Writer-Editor</td>
</tr>
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<td>Recreation &amp; Lands Staff Officer, WRNF</td>
<td>Advisor</td>
</tr>
<tr>
<td>Kay Hopkins</td>
<td>Outdoor Recreation Planner, WRNF</td>
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</tr>
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<td>GIS Specialist, WRNF</td>
<td>GIS</td>
</tr>
<tr>
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<td>Deputy District Ranger, Eagle-Holy Cross Ranger District, WRNF</td>
<td>NEPA Coordinator</td>
</tr>
<tr>
<td>Matt Ehrman</td>
<td>Forest Planner, WRNF</td>
<td>Document Editing/Review</td>
</tr>
<tr>
<td>Kate Jerman</td>
<td>Public Affairs, WRNF</td>
<td>Public Outreach and Coordination</td>
</tr>
<tr>
<td>Ben Rasmussen</td>
<td>US Department of Transportation, Volpe Center</td>
<td>Capacity Study, Transportation and Operations Study, Visitor Survey</td>
</tr>
<tr>
<td>Monika Derrien</td>
<td>Sustainable Recreation Program Lead</td>
<td>Document Editing/Review</td>
</tr>
</tbody>
</table>
References


U.S. Census Bureau: [https://www.census.gov/](https://www.census.gov/)


U.S. Department of Transportation, Volpe Center, *White River National Forest Hanging Lake Transportation and Operations Study, 2017*

U.S. Department of Transportation, Volpe Center, *White River National Forest Hanging Lake Transportation and Operations Study 2017 Addendum, 2017*