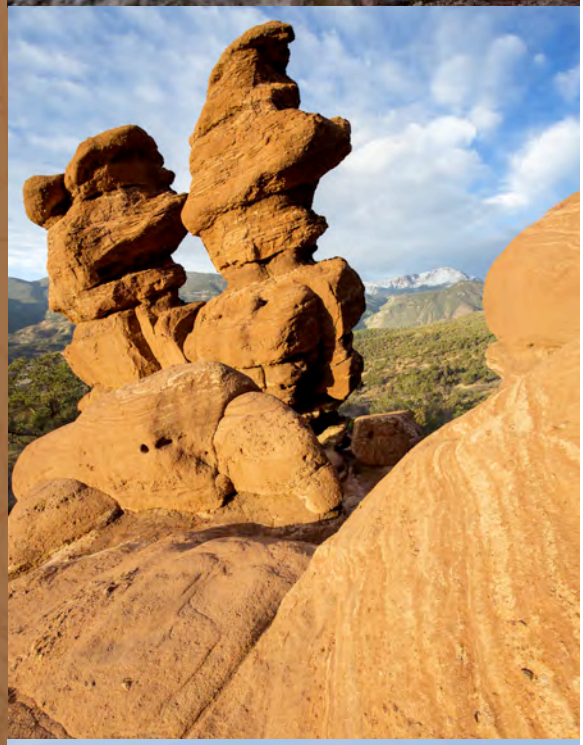
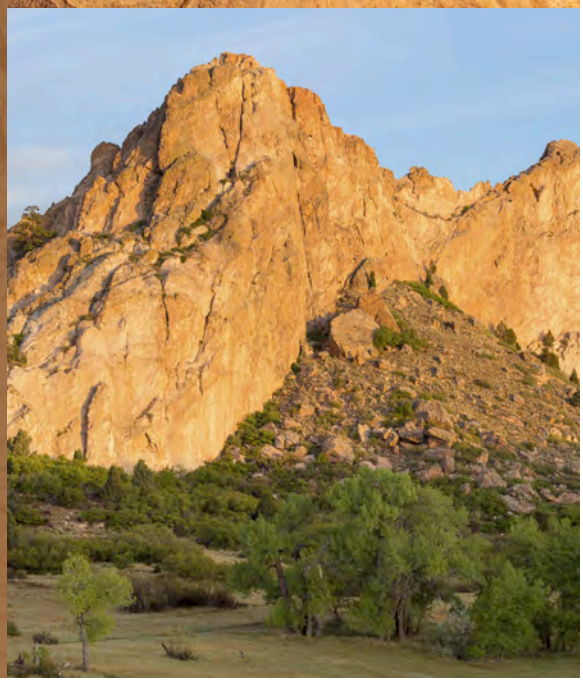
Garden of the Gods Trail Assessment





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GARDEN OF THE GODS TRAIL ASSESSMENT

DECEMBER 2018

PREPARED FOR:

CITY OF COLORADO SPRINGS
PARKS, RECREATION AND CULTURAL SERVICES

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EXECUTIVE SUMMARY

The Garden of the Gods Park is the #1 City Park in America, and ranked among the top tourist attractions in the world. Sandstone spires, vistas of the Pikes Peak massif, and rolling trails all contribute to the remarkable landscape.

In recent years, the Garden of the Gods has experienced historic visitation which has impacted the sustainability of the Park's fragile natural resources. In 2017 alone, the Park recorded nearly 6 million visitors with 2018 projected to be another record-breaking year.

In August 2000, the Rocky Mountain Field Institute (RMFI) completed the first formal trail assessment for the Garden of the Gods Park. In addition to inventorying and documenting the condition of the Park's designated trail system and social trail network, the assessment called for the creation of a volunteer stewardship program to engage the community in the care of the Park's trails and surrounding natural resources.

Since 2002, RMFI been leading the volunteer stewardship program and working with partners to complete a wide variety of trail and restoration projects in the Garden of the Gods Park. Each year, work objectives are determined and prioritized in close coordination with staff from the City of Colorado Springs Parks, Recreation and Cultural Services Department and Garden of the Gods Park Rangers. While a tremendous amount of highly impactful and beneficial work has been accomplished in the Park to date, the need for an updated trail assessment became more critical in light of the significant changes in use and visitation being experienced at the Garden of the Gods in recent years.

Consequently, in 2018, RMFI was tasked with completing a follow-up trail assessment for the Garden of the Gods Park with the primary goal to assess the condition of the Park's designated natural surface trails to more effectively determine work objectives and priorities for the coming 5-10 years.

RMFI mapped 12.10 miles of primary, designated natural surface trails; 1.41 miles of connector trails; and 9.72 miles of social trails (compared to 39.22 miles of social trails mapped in the 2000 trail assessment). In addition, RMFI recorded 210 issues (occurrences of natural resource damage) and 966 features including 786 that currently exist and 180 new features requiring installation (for both primary and connector trails combined). Approximately 33% of existing features require routine annual maintenance, while 44% of

require no action at this time. Of the natural resource issues observed in the Park, 3% were classified as severe, 7% were classified as major, 73% were classified as moderate, and 17% were classified as routine. The average score for the 23 primary trails assessed was 7.12 (C- grade) while the average condition score for the connector trails was 8.03 (B-). The highest concentration of social trails was observed near Balanced Rock.

In the coming 5-10 years, RMFI recommends using the results of the trail assessment as a resource to help determine future work priorities and objectives in the Garden of the Gods Park. With regard to features, RMFI recommends installing all 180 new features called for in the assessment. This will increase long-term sustainability of primary and connector trails by improving drainage off the trail and hardening the trail surface. RMFI also recommends replacing and/or repairing all of the 44 features designated as failed, near failed, or in need of repair in the assessment. Finally, RMFI recommends completing routine annual maintenance on all 311 features requiring this type of action (i.e., drains, culverts). By prioritizing annual maintenance, the life of the feature will be extended and long-term function of the feature will be enhanced. With regard to natural resource issues, RMFI recommends addressing all 175 instances of degradation classified as severe, major, or moderate, and completing routine maintenance on all 35 instances of degradation requiring this type of action.

Condition scores of all trails should be utilized to help determine priorities as well. Trails with an F (failing) condition score need to be given closer and more immediate attention as compared to trails with scores of A's or B's. This is particularly critical if user safety could be compromised or the natural resource might degrade beyond the point of repair. Given the significance of the Park and the unique challenges it currently faces (and will likely continue to face if use and visitation trends continue), RMFI recommends employing a Garden of the Gods Stewardship Coordinator to manage and implement annual work objectives in partnership with the City of Colorado Springs Parks, Recreation and Cultural Services Department. This position also would oversee a dedicated work crew comprised of 5-6 highly skilled individuals tasked with implementing recommendations set forth in this 2018 trail assessment. In addition, RMFI recommends utilizing the GIS data converted into the more user-friendly Google Earth format as an adaptive management tool so that annual progress toward addressing the many issues and actions detailed in the assessment can be effectively tracked. Finally, RMFI recommends repeating this trail assessment and data collection protocol no later than 2028 so that progress and success can be evaluated and future objectives for trail management and protection can be determined.

RMFI would like to extend a very special thank you to the many partners who made this project possible including the City of Colorado Springs Parks, Recreation and Cultural Services Department, the Garden of the Gods Foundation, the Friends of Garden of the Gods, and the Colorado Fourteener's Initiative. Funding for this project was provided by the Garden of the Gods Foundation and the Friends of Garden of the Gods. Without this critical funding, this project would not have been possible.

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INTRODUCTION

The Garden of the Gods Park is a 1,300-acre public park located in Colorado Springs, Colorado. The Park is owned by the City of Colorado Springs and managed by the Parks, Recreation and Cultural Services Department with support from the Garden of the Gods Foundation. The Park was designated as a National Natural Landmark in 1971 and is characterized by vertical red rock geologic formations in the shape of fins and hogbacks. The Park is comprised primarily of Connerton soils, which are the most heavily erodible soils in El Paso County.

The Garden of the Gods Park is often rated as the top public attraction in the United States, and recent visitation trends reflect this designation. In 2017 alone, the Park attracted nearly 6 million visitors, far surpassing the previous estimate of 2 million visitors per year; 2018 is on track to be another record-breaking year. In spring 2018, the Park implemented its first shuttle system to help mitigate traffic congestion during the busy summer months. The Park accommodates a variety of users including hikers, cyclists, and equestrians.

With visitation concentrated in such a small area, there is unusually high use of off-trail areas in the Park. An extensive network of visitor-created social trails has developed as users seek to escape the crowds or find a unique vantage point. Consequently, damage to the Park's biophysical resources has been extensive.

The Rocky Mountain Field Institute (RMFI) is a nonprofit environmental stewardship organization based in Colorado Springs, Colorado. Founded in 1982, RMFI actively engages thousands of community volunteers each year in the completion of hands-on trail and restoration projects that help to conserve and protect public natural landscapes, improve wildlife habitat, and provide for sustainable outdoor recreation opportunities.

Since 2002, RMFI has been working in partnership with the City of Colorado Springs, Garden of the Gods Foundation, Friends of Garden of the Gods (FOGG), and other key partners to complete a variety of trail and restoration projects in the Garden of the Gods Park. Since that time, RMFI has led nearly 700 workdays and has actively engaged nearly 16,000 community volunteers who have contributed over 75,000 hours of volunteer labor in the Park.

Each year, RMFI completes between 50-65 individual workdays in the Park utilizing its own paid field staff who either operate as a dedicated work crew or oversee groups of

volunteers. Each seasons' work priorities are determined through site visits and coordination efforts with Park staff. Projects include a variety of trail and restoration initiatives such as social trail closure and restoration; construction of drainage, erosion control, and stabilization features; construction of rock/timber steps; invasive species removal; and other key tasks. Ongoing maintenance of the Parks' trails and natural resources has been critical to keep up with the increased use and visitation as well as historic precipitation and flooding events that also have impacted the Park in recent years.

In August 2017, RMFI was asked to complete a trail assessment for the Garden of the Gods Park to better understand current conditions of the trails and surrounding landscape so that stewardship priorities could be more effectively determined for the subsequent 5-10 years (the last trail assessment for the Garden was completed by RMFI in August 2000). In October 2017, RMFI met with the City of Colorado Springs Parks, Recreation and Cultural Services staff to discuss project objectives, approach, timeline, and available resources. Soon after, RMFI contracted with Tom Cronin, Sustainable Trails Coordinator with the Colorado Fourteeners Initiative (CFI), to lead data collection efforts for the assessment. RMFI then compiled the data and prepared representative maps and imagery to visually display the data and findings.

The trail inventory and subsequent assessment were focused solely within the Garden of the Gods Park; Rock Ledge Ranch was not included in the project area. Only named and designated natural surface trails were mapped and included in the assessment; paved trails in the Park were not included. In addition, all existing social trails (i.e., user created paths that are not constructed or maintained and not recognized as official trails by those groups responsible for trail stewardship within the Park) and connector trails (i.e., generally short paths constructed and maintained to link primary system trails with trailheads, parking lots, and other official trails) were mapped and included in the assessment. This report presents findings from the 2018 trail assessment including a condition assessment and scoring of all primary, designated trails as well as detailed information on all existing trail features and trail issues within the Park.

DATA COLLECTION PROTOCOL

Data collection for the trail assessment was completed in March 2018 using a Trimble Geo 7x series handheld data logger with Terra Sync software (version 5.86). All data were

collected using a Universal Transverse Mercator (UTM) projection (Northern Hemisphere, Zone 13N) and the World Geodetic System 1984 (WGS84) geographic coordinate system. Data layers provided should not require additional processing to be used in ESRI software. A new data dictionary specific to the trail system in Garden of the Gods was created prior to the data collection process.

The data collection process involved walking all natural surface primary (designated) and connector trails to record the trail line, data on all existing features (i.e., timber/rock steps, drains, retaining walls, bridges, turnpikes, fences, etc.), data on all new features (i.e., new features needing to be installed/constructed), and data on all existing trail issues (i.e., erosion, trail widening, braiding, etc.). Recorded data included the location, dimensions, number, condition, action, and photograph of all trail features and issues. The condition of all trail features and issues was recorded as a numerical value ranging from 1 to 5 (1=failed; 5=no action); these numerical values were later used in the trail scoring process. The action associated with all trail features and issues also was recorded as a numerical value ranging from 1 to 8 (1=install new; 8=no action) with these values also later used in the trail scoring process. All social trails were inventoried and mapped, but no condition or action scoring was completed.

Features vs. Issues

Trail features include the trail elements that are constructed/installed (i.e., timber/rock steps, drains, retaining walls, bridges, turnpikes, fences, etc.). Trail feature conditions include:

- Failed (1)
- Near Failed (2)
- Repair (3)
- Maintain (4)
- No Action (5)
- N/A (for new features; 6)

Trail feature actions include:

- Install New (1)
- Alter Function (2)
- Expansion (3)
- Decommission (4)
- Replace In-Kind (5)
- Repair/Rehab (6)
- Routine Maintenance (7)
- No-Action (8)

For new trail features only, the number and/or dimension of the new feature needed (i.e., number of new steps, square feet of retaining wall) was recorded as a numeric value ranging from 1 to 5. This was done not only to account for the quantity of new feature(s) needed, but also the difficulty level associated with the construction/installation of the new feature (1=more steps/square footage required; 5=fewer steps/square footage required). These numbers represent the overall "difficulty value" of installing new features and were later used in the trail scoring process.

Trail issues include the broader resource damage occurring in a given trail segment (i.e., erosion, trail widening, braiding, etc.). Trail issue conditions were rated using the following scale:

- Severe (1)
- Major (2)
- Moderate (3)
- Routine Maintenance (4)
- No-Action (5)

For all trail issues, a numeric value ranging from 1 to 5 was assigned to represent the severity of erosion present in cubic feet (1 being the most cubic feet; 5 being the least). These numbers represent the overall "difficulty value" of repairing severely eroded areas and were later used in the trail scoring process.

Trail issue actions include:

- Install New (1)
- Alter Function (2)
- Expansion (3)
- Decommission (4)
- Replace In-Kind (5)
- Repair/Rehab (6)
- Routine Maintenance (7)
- No-Action (8)

All trail issues have both a start and end point recorded in order to observe change over time as well as assist crews in addressing issues (for example, the start and end of trail braiding observed on a primary trail was recorded). Occasionally, select trail features also have a start and end point in cases where the same feature with uniform characteristics exist for an extended length beyond the sightline (i.e., timber steps or timber check steps), though most commonly, trail features have only a single location point.

Primary vs. Social vs. Connector Trails

- Primary Trails: Constructed and maintained trails recognized by the City of Colorado Springs, RMFI, and other organizations affiliated with the Garden of the Gods Park.
- Social Trails: User created paths (not constructed or maintained) that are not recognized as official trails by those groups responsible for trail stewardship within the Garden of the Gods Park.
- Connector Trails: Generally short paths that are constructed and maintained, and link the primary system trails with trailheads, parking lots, and other official trails.

Data Processing and Scoring

Field data were first uploaded from the Trimble Geo 7x unit and differentially corrected, processed, and exported using Trimble GPS Pathfinder Office software (version 5.85). The data were then uploaded into ArcMap (version 10.6) for the mapping and scoring process. All data relevant to the scoring process were then extracted from the attribute tables within ArcMap, and exported and reformatted for Microsoft Excel.

Analysis files for each trail were then created in Excel to allow the data to be analyzed through a series of equations and algorithms developed by the Colorado Fourteeners Initiative (CFI). Each analysis file in Excel consists of three worksheets including existing trail features, new trail features, and trail issues. The numerical values recorded in the field for each trail feature/issue condition as well as values recorded for each trail feature/issue action were imported into the analysis spreadsheet. In addition to the condition and action values, difficulty values also were imported into the spreadsheet. The set of values were multiplied to create individual feature scores, which were then totaled and weighted accordingly (existing trail features = 20%, new trail features = 40%, trail issues = 40%). An overall trail score was then generated by averaging individual scores from the three worksheets in each analysis file for each primary trail in the Park.

Scoring Scale

The following scoring scale was used to determine associated letter grades for all primary trails included in the assessment (Table 1).

Overall Trail Score Description

- A (Good): A constructed trail that is likely maintained regularly (e.g. cleaning drains, corridor clearing, etc.). Most existing features are functioning properly and require little to no action. Trail requires few to zero new features be installed and has few to zero resource damage issues. See Figure 1.
- B (Fair): A constructed trail possibly requiring routine maintenance as well as some small scale reconstruction projects. A small number of new features may need to be installed and/or some existing features may need minor repair. Some small-scale resource damage issues may bepresent. See Figure 2.

- C (Moderate): Potentially characterized by annual degradation if no action were to occur. Some existing structures need attention and others need to be installed throughout. Areas of erosion and/or braiding are present. See Figure 3.
- D (Poor): Significant portions of the trail may be eroded. Many existing structures are in poor condition and many new structures may be required to improve trail condition. See Figure 4.
- F (Very Poor): Trail has extensive resource damage occurring. Many existing structures have failed or are near failing. Trail may run fall line. Re-route(s) may be suggested. See Figure 5.

RESULTS

Primary Trails

A total of 23 primary trails were mapped for the purposes of the trail assessment project (Table 2). Collectively, these trails measured 12.10 miles in length (63,870 linear feet). Figure 6 details the percentage each individual trail represents of the entire system.

Primary Trails – Features

A total of 861 features were recorded across all primary trails included in the assessment, including 703 that currently exist and 158 new features needing to be installed. Table 3 details number and condition of features on each of the 23 primary trails in the Park (i.e., install new, failed, near failed, repair, maintain, no action). Approximately 33% of all existing features require routine annual maintenance (drains, culverts) and 44% of all existing features require no action at this time. Figures 7 displays all trail features and their condition across the Park; Figure 8 displays only the new features requiring installation; Figure 9 displays all features requiring no action at this time; Figure 10 displays the number of all existing features by trail.

Primary Trails – Issues

A total of 202 issues (occurrences of resource damage) were recorded throughout the trail system. There was 48,414 cubic feet of erosion (23,618 ft^3 on the Palmer Trail alone), 318 feet of trail braiding, and 2,477 cubic feet of trail widening observed on 13 of the 23 primary trails included in the assessment. Table 4 details issues observed on each of the 13 primary trails. Figure 11 graphically displays cubic feet of erosion recorded during the trail assessment.

Each occurrence of resource damage observed in the Park also was classified by its condition: severe, major, moderate, routine maintenance, and no action required. Of the natural resource issues observed in the Park, 3% were classified as severe, 7% were classified as major, 73% were classified as moderate, and 17% were classified as routine. Table 5 presents the number of each issue condition observed for each primary trail. Figure

12 details all issues of natural resource degradation recorded in the Park along with condition; Figure 13 identifies all features and issues requiring regular, routine maintenance (mostly annual) at this time.

Primary Trails – Scoring

The average condition score for all primary trails was 7.12 (C-). In total, there were 3 trails with a score of A, 5 trails with a score of B, 3 trails with a score of C, 6 trails with a score of D, and 6 trails with a score of F. A summary of primary trails, trail scores, and associated letter grades is shown in Table 6. Figure 14 visually display trail scores for the 23 primary trails included in the assessment project.

As previously mentioned, the Garden of the Gods accommodates a variety of trail users including hikers, mountain bikers, and equestrians. Table 7 details trail condition scores by trail use type for the primary trails included in the assessment. Hiker only trails scored the highest with an average score of 8.90 (B+). Trails allowing both hikers and equestrians scored the lowest with an average score of 6.59 (D-), while trails allowing cycling, hiking, and equestrian use scored in the middle with an average of 7.54 (C). Figure 15 visually depicts trail condition scores for primary trails allowing hiking and equestrian use; Figure 16 visually depicts trail condition scores for primary trails allowing mountain biking, hiking, and equestrian use.

Connector Trails

A total of 30 connector trails were mapped as part of the trail assessment project. Collectively, the connector trails measured a total 1.41 miles (7,450 linear feet). Figure 17 details the location of all connector trails mapped in the Park. Table 8 details the lengths for all connector trails in the Park. Please note that as detailed below, only 17 of the 30 connector trails were named, and had features and issues recorded as well as trail scores assessed.

Connector Trails – Features and Issues

Given the relatively short distance and nature of each of the connector trails, features were only documented and recorded on 17 of the 30 connector trails in the Park. A total of 105 features were recorded on these 17 connector trails including 83 that currently exist and 22 new features needing to be installed. Table 9 details the number of features recorded on each of the 17 connector trails in the Park and the condition associated with each (i.e., install new, failed, near failed, repair, maintain, no action). Approximately 37% of all existing features require routine annual maintenance (drains, culverts) and approximately 60% of all existing features require no action at this time.

Each occurrence of resource damage observed in the Park also was classified by its condition: severe, major, moderate, routine maintenance, and no action required. Only 8 instances of natural resource degradation were recorded on the 17 connector trails. All 8

were classified as moderate issues involving erosion. Table 10 details the quantity of each issue condition observed during the trail assessment; Figure 18 details the feature and issue conditions that were recorded on the 17 connector trails in the Park.

Connector Trails – Scoring

Of the 30 connector trails mapped during the assessment, 17 were run through the analysis process to be scored. These 17 were chosen because they had the most features/issues present on which to base any type of score, or they were less than 100 feet in length and did not qualify for the assessment. The average condition score for the 17 connector trails was 8.03 (B-). In total, there were 3 trails with a score of A, 10 trails with a score of B, 0 trails with a score of C, 1 trail with a score of D, and 3 trails with a score of F. A summary of connector trails, trail scores, and associated letter grades is shown in Table 9. Figure 19 visually displays trail scores for the 17 connector trails included in the assessment.

Social Trails

A total of 241 social trails were mapped as a part of the trail assessment project. Collectively, the social trails measured a total of 9.72 miles (51,322 linear feet). As a comparison, 39.22 miles of social trails were mapped during the 2000 trail inventory and assessment. Although social trails were not assessed in terms of their condition for the 2018 assessment, a note of importance is that social trails are among the greatest contributors to vegetation loss and soil erosion in the Park. In some cases, social trails are single paths; in other cases, these social trails resemble a series of “spider webs” of interconnecting trails. As seen in Figure 20, this pattern is especially apparent around Balanced Rock (southwest portion of the Park).

RECOMMENDATIONS AND DISCUSSION

Implementation Overview

RMFI recommends using the results of the trail assessment to help determine and prioritize future work objectives in Garden of the Gods Park. In previous years, RMFI worked closely with staff from the City of Colorado Springs Parks, Recreation and Cultural Services Department as well as Garden of the Gods Park Rangers to develop work objectives on an annual basis. While effective, this 2018 trail assessment now provides a more useful tool from which to more effectively determine and prioritize work locations and objectives, as well as an effective baseline from which to measure and track progress on an annual basis, and over time. While RMFI expects to continue to address maintenance hotspots as they arise, such as when a significant storm event causes erosion or an unsafe path, this trail assessment should be utilized to develop work plans and priorities on both a seasonal and annual basis.

Of particular importance, is the need to utilize an integrated approach in the implementation of future trail and restoration projects in Garden of the Gods. The primary reason for this is that few, if any, of the disturbances and natural resource issues are the result of single factors working in isolation. Rather, disturbance, damage, and other natural resource issues are the result of multiple interacting factors and influences (i.e., biophysical, social, behavioral), and strategies to address and correct them must incorporate an integrated approach that recognizes the many interacting factors at play. As an example, social trail closure and restoration projects must also be coupled with appropriate and effective signage and education so that users understand the reasons for the closure and are directed to a more sustainable route.

Utilizing the data and findings from this trail assessment report as a guide, stewardship priorities should be determined through the following project criteria, which are adapted from a set of criteria detailed in RMFI's 2000 trail assessment report:

- Is the project a necessary prerequisite or requirement for the success of other trail/restoration projects;
- Does the project preserve and restore critical physical, biological, and cultural resources;
- Does the project demonstrate value in how active management (both behavioral and biophysical) can help restore and protect the Park's valuable natural resources;
- Does the project provide an opportunity to test and refine effective trail/restoration strategies/techniques, both from a biophysical and behavioral standpoint;
- Does the project demonstrate value in halting or reversing degradation that will be significantly more expensive to address in the future;
- Does the project demonstrate a park-wide benefit.

As stated above, all stewardship projects implemented in the Park must take into account physical, biological, and cultural resources. It is important to note that Garden of the Gods is home to unique populations of the honey ant, first described in a publication dating back to 1882. In the summer of 2018, the City of Colorado Springs Parks, Recreation, and Cultural Services staff initiated a honey ant study to better understand trends in their habitat and population as well as impacts from the millions of visitors who frequent the Park each year. In addition, Garden of the Gods Park boasts a rich cultural history, and many American Indian Nations have a strong connection to the Park including the Apache, Cheyenne, Comanche, Kiowa, Lakota, Pawnee, Shoshone, and Ute people. It is of paramount importance that any future stewardship projects implemented in the Park consider the potential impacts to honey ant colonies, sensitive cultural sites, and other areas of significance. Consequently, RMFI will remain in close consultation and communication with Park staff, the City of Colorado Springs archaeologist, and the Director of the Colorado Springs Pioneers Museum.

There was a tremendous amount of data collected and analyzed during the assessment project. To inform implementation, RMFI recommends beginning first with the data recorded and analyzed for features and issues. The reason for this is the condition and action data collected for all features and issues were recorded with such detail and specificity that it literally provides a step-by-step guide on the type and location of action needed. As a secondary guide to implementation, RMFI recommends using the trail condition score ratings (rated on a scale from A+ to F-). This method will provide a better overview of the holistic needs and conditions of each trail in the Park rather than the detailed overview provided by individual feature and issue data. However, both methods have their merits and both should be used in an integrated way to inform future implementation plans and project objectives.

Based on analysis of the trail assessment data, its near 40-year history as an environmental stewardship organization, and its two decade history completing a wide variety of trail and restoration projects in the Garden of the Gods Park, RMFI proposes the following recommendations and strategies for addressing needs in the Park.

Implementation - Primary and Connector Trails

Primary trails are the most common way visitors get around the Park. The trails also have the largest impact on the landscape and require the most time and attention because of increased use. Therefore, RMFI expects to spend the majority of time addressing features and issues on primary trails.

The assessment recorded 30 connector trails in Garden of the Gods. The longest of these trails is 683 feet (0.13-miles) long, and the average length is 248 feet (Table 8). Connector trails are nearly impossible to eradicate due to their obvious nature. As noted previously, connector trails in the Park are typically short (less than 100 feet) and provide shortcuts at junctions. When a visitor knows a trail connection is coming, they immediately begin looking for a shortcut to connect with the next trail. Despite the excessive impact that most often occurs at these junctions, connector trails make sense from a user perspective. Therefore, RMFI recommends that connector trails should be adopted into the formal trail system and be managed as primary trails.

Features

RMFI recommends installing all 180 new features detailed in the assessment for both primary and connector trails. New features needed include a combination of water bars, timber steps, drains, log checks, retaining walls, and other key features (the exact feature needed is identified in the GIS dataset discussed later in this document). This will help improve long-term sustainability of primary and connector trails by improving drainage off the trail and hardening the trail surface. RMFI also recommends replacing and/or repairing all features designated as failed, near failed, or in need of repair in the assessment for both primary and connector trails; 44 in total. This action will help enhance the overall safety and

experience of the user as well as help the feature perform as intended. Finally, routine annual maintenance should be completed on all primary and connector trail features requiring this type of action (i.e., drains, culverts); 311 in total. By prioritizing annual maintenance, the life of the feature will be extended and its long-term function maintained.

Issues

RMFI recommends first addressing the severe issues, all of which were erosional issues recorded along the Palmer Trail (3 in total ad encompassing a combined length of 259 linear feet, an average width of 165 inches, and average depth of 33 inches). None of the connector trails had severe issues. These should take priority because they have the potential to impact user safety and cause continued degradation of the surrounding natural resources. In November 2018, RMFI began a variety of projects along the Palmer Trail including constructing rock riser steps and drains, hardening portions of the trail, and maintaining existing features along the trail including drains, water bars, and rock riser steps, all of which will help address the severe issues recorded on the trail during the assessment (as well as the major, moderate, and routine maintenance issues).

There were only 14 major erosional issues recorded, and all were on the Cabin Canyon, Palmer, and Strausenback Trails. As with the severe issues described above, the action involved with addressing major issues generally involves the repair and rehab of the area through a variety of erosion control, stabilization, and drainage enhancement techniques. The same actions hold true for trails exhibiting moderate erosional issues, which represented the majority of the issues (73%) recorded during the assessment. Given the extensive nature of the moderate issues in the Park, RMFI expects to devote a significant amount of time early in the implementation phase addressing these issues. During the 2018 field season, RMFI began extensive projects on the Strausenback Trail, Palmer Trail, Ute Connector Trail to begin addressing some of these erosional and natural resource degradation issues.

Condition Scores

Condition scores of all of the trails should be utilized to help determine priorities as well. However, unlike data collected for features and issues, which detail the exact location, problem, and action needed in a specific place, the overall trail condition score ratings provide a broad overview of needs and priorities across the entire trail length.

In general, RMFI recommends that trails with an F (failing) condition score (for both primary and connector trails) be given closer and more immediate attention as compared to trails with scores of A or B, especially if the safety of the user could be compromised. Specific recommendations for all trails based on rating are detailed below.

Grade A Trails
The following trails received a score of A in the assessment.

1. **Hamp Trail**: The Hamp Trail received the highest score of the assessment, a perfect "10". The trail is in excellent condition, due mostly to its abbreviated length (0.13 miles). The trail also is close to the maintenance shop, and receives less use than most other trails. While open to equestrians, the relatively flat gradient and lack of features make it an easily maintainable trail.

   Recommendation: Monitor for future needs.

   Priority: Low

2. **Ridge Trail Loop**: The Ridge Loop Trail, a hiking only trail, received a score of 9.52. The assessment recommends maintaining 13 features and installing 1 new feature.

   Recommendation: Monitor for future needs.

   Priority: Low

3. **Gateway Trail**: The Gateway Trail received a score of 9.10. The trail roughly parallels Gateway Road, from the main entrance off 30th Street. The trail receives significant use due to its proximity to the Garden of the Gods Visitor & Nature Center and Rock Ledge Ranch. The assessment recommends maintaining 3 features; however, as of the writing of this report the Parks Department had nearly completed an entire reconstruction of this trail.

   Recommendation: Monitor for future needs.

   Priority: Low

Grade B Trails
The following trails received a score of B in the assessment, scoring between an 8.00 and 8.99.

1. **Cottonwood Trail:** The Cottonwood Trail received a score of 8.50. This trail is located on the east side of the Park, and runs east-west connecting the Ute and Chambers Trails.

   Recommendation: Monitor for future needs.

   Priority: Low

2. **Upper Loop Trail**: The Upper Loop Trail received a score of 8.28. This trail is the only natural-surface trail in the central Garden that is open to hikers (climbing access trails are restricted to only those users with a climbing permit and necessary gear). For this reason, it is likely the most-used natural surface trail in the Park. RMFI spent multiple seasons improving the Upper Loop Trail, installing hundreds of timber riser steps. Prior to this work, the trail likely would have scored among the lowest in the Park. However, thanks to the hard work of many, the trail is in excellent condition and withstands the use. There are 2 sections on the eastern most part of the trail, near Easter Rock, that require maintenance.

   Recommendation: Monitor for future needs.

   Priority: Low

3. **Scotsman Trail**: The Scotsman Trail received a score of 8.06. This trail is very popular as it is located near one of the few picnic areas in the Park. The trail is 1.06 miles in length, one of just 4 trails that are more than 1 mile long, and is extremely popular with equestrians. The Scotsman is eroding, however there were no measurable natural resource issues observed. There are 44 features that are functioning, 15 features that require maintenance, and 32 new features that need to be installed.

   Recommendation: The Scotsman Trail scored high in the assessment; however it is not exempt from requiring attention. Of the 32 new features that need to be constructed, the majority are timber steps and drainage features.

   Priority: High

4. **Valley Reservoir Trail**: The Valley Reservoir Trail received a score of 8.00. The trail is located on the east side of the Park, and is popular with mountain bikers and hikers. The trail is comparatively narrow, relatively flat, and short (0.17-miles) as it serves as a connector between two longer trails – the Ute and Chambers Trails. The Valley Reservoir Trail requires just 5 new features.

   Recommendation: The Valley Reservoir Trail has been the site of trail improvement projects over the last few seasons. This short section of trail can be improved through the installation of 2 series of timber steps, 2 backwalls, and 1 drain.

   Priority: Medium

5. **Chambers Trail**: The Chambers Trail received a score of 8.00. This trail runs north-south along the east side of the Park and is popular with mountain bikers. The trail follows a contour along the base of a ridge. The majority of the 0.41-mile trail is in

excellent condition; however, the southern portion that connects with the Ute Trail is experiencing some incision. Only 2 new features are required on the Chambers Trail.

Recommendation: Maintain the 2 failing drains on the Chambers Trail.

Priority: Low

Grade C Trails

The following trails received a score of C in the assessment, scoring between 7.00 and 7.99.

1. **Arnold Trail**: The Arnold Trail received a score of 7.87. The 0.18-mile long trail is named after the road where the trail begins in the most southern area of the Park. The Arnold Trail is most popular with hikers who access the trail via the neighborhood. There are 6 features that need to be constructed, 2 features that need repair/replacing, 4 features that need maintenance, and 2 features that require no action. There ere no measurable natural resource issues observed on this trail.

   Recommendation: The Arnold Trail would benefit from construction and maintenance of drainage structures; however, the trail is not a high priority at this time. Monitor for future needs.

   Priority: Low

2. **Balanced Rock Trail**: The Balanced Rock Trail received a score of 7.83. This trail is among the most popular in the Park due to its proximity to its namesake rock formation. The 0.54-mile trail is located in the southwest portion of the Park. There are 5 existing features that require no action, 6 features that require maintenance, and 1 new feature needs to be built. A proliferation of social trails originates around the parking area, explaining the 36 ft^3 of erosion braiding that was documented.

   Recommendation: The Balanced Rock Trail needs to be better delineated with fencing and signage. Once the designated trail corridor is established, surrounding social trails can be restored.

   Priority: Medium

3. **Rock Ledge Ranch Overlook Trail**: The Rock Ledge Ranch Overlook Trail received a score of 7.59. This east-side trail is used by mountain bikers, hikers, and equestrians as an opportunity to gain vistas of the central and aast Garden. The trail is the shortest in the Park at just 0.10 miles. Three new features need to be installed and 2 features require maintenance.

Recommendation: The Rock Ledge Ranch Overlook Trail is a very short loop that is fairly stable. Fencing that was installed in recent seasons has helped to confine impacts to a small area. The recommendation is to monitor for future needs.

Priority: Low

Grade D Trails

The following trails received a score of D in the assessment, scoring between 6.00 and 6.99.

1. **Dakota Trail**: The Dakota Trail received a score of 6.93. This trail is located on the north end of the Park and is 0.43-miles long. It connects the Bretag and Foothills Trails and provides Park access via the Foothills Trail from the north. Nine new features need to be installed and 1 feature has failed. Overall, the Dakota Trail is in fair condition, but it received a low score due to areas of incision (540 ft^3) and erosional braiding (9 ft^3).

   Recommendation: The score of the Dakota Trail can be greatly improved through the construction of a series of in-trail stabilization structures (timber check steps) and the closure of braided trails. Braiding is occurring due to a channelized trail tread that makes for poor conditions and an undesirable walking surface, especially when wet.

   Priority: Medium

2. **Ute Trail Connection**: The Ute Trail Connection received a score of 6.89. The Ute Connector is very popular with mountain bikers and equestrians and poses perhaps the biggest potential for user conflict in the Park. Areas of this 0.24-mile trail are fall line and severely incised, which are perfect conditions for gaining speed on a bike. Work crews have addressed some areas of erosion on this trail already, including the 3 failed features.

   Recommendation: Still remaining on the Ute Trail Connection is the need to install 6 new features to stabilize the trail tread and drain water. The area that needs to be addressed on this trail is about 500-feet in length; the remaining 800-feet of trail is in fair condition. We recommend addressing this trail in the near future.

   Priority: High

3. **Buckskin Charlie Trail**: The Buckskin Charlie Trail received a score of 6.29. This trail is located in the southern portion of the Park. At 1.10-miles long, it is the second-longest soft-surface trail. The trail takes off from the Scotsman Trail and loops down to connect with the Arnold Trail. This trail is frequented most often by residents in the adjoining neighborhood and those visitors who park at the Ridge Road Overlook Parking Area.

Recommendation: Given the length of trail, it is not surprising that the Buckskin Charlie Trail scored relatively poorly. Over the 1.10-miles, we documented the need to install 17 new features, maintain 42 existing features, and repair 2 features. There are 24 features that require no action at this time. Installing these features will help to address the 3,265 ft^3 of erosion that was documented on the trail.

Priority: Medium

4. **Niobrara Trail**: The Niobrara Trail received a score of 6.16. Located on the east-side of the Park, this trail is most popular with mountain bikers and equestrians, extending 0.93 miles. There has been a significant amount of work accomplished on the Niobrara Trail in recent years; however, this trail experienced significant erosion during extreme rain events in recent years.

   Recommendation: Due to the existing conditions and the use by bikers and equestrians, the Niobrara Trail requires constant maintenance. There re 17 new features recommended for construction, primarily in-trail stabilization and drainage features. There re 7 instances of features that require maintenance, and 9 features that are operating as intended.

   Priority: Medium

5. **Strausenback Trail**: The Strausenback Trail received a score of 6.14. This trail is one of the most popular trails among equestrians due to its proximity to the horse trail parking lot. There has been a significant amount of stabilization work accomplished on the Strausenback Trail in previous years and it remains a focus of stewardship efforts in the 2018 and 2019 field seasons. Along the 0.47-miles of this trail, 5 new features are recommended for installation and 21 features for maintenance.

   Recommendation: The 5 new features are already included in RMFI work plans for the 2018 and 2019 field seasons. However, routine maintenance will be necessary after the construction of those features. Mainly, the trail requires an annual or semi-annual re-grading through the addition of trail-fill material.

   Priority: High

6. **Ute Trail**: The Ute Trail received a score of 6.11. This trail is 1.09 miles long and located on the multi-use east-side of the Park. The trail starts at the south Garden Parking Lot, which is the second largest parking area. The Ute Trail parallels Juniper Way Loop before terminating at Gateway Road.

Recommendation: The Ute Trail has been the site of many trail improvement projects in recent years. A series of timber stabilization features were installed on the fall-line section of trail that was experiencing significant incision and soil loss. Still, 15 new features are recommended for installation on the Ute Trail. The majority of these features are check-steps, or a continuation of the structures that have been installed in recent seasons. There also are opportunities to install drains to help minimize the amount of water channelization and soil displacement. There are 22 existing features on the Ute Trail that require maintenance, and 12 features that are functioning properly.

Priority: Medium

Grade F Trails

The following trails received a score of F in the assessment. All of the following trails scored less than a 6.00.

1. **Cabin Canyon Trail**: The Cabin Canyon Trail received a score of 5.91. This trail is a loop, starting at the Spring Canyon Parking Lot and gaining elevation to a prominent ridge before descending down toward Garden Drive and connecting back with the Parking Lot. In all, the trail is 0.64 miles in length.

   Recommendation: The Cabin Canyon Trail received a failing grade due to the relatively high number of features that require maintenance (23) in addition to required new features (8) and those that are near failed (4). Of the recommended 8 new features, 6 are a series of either timber or rock check steps that will provide stability to the rapidly eroding trail tread. The 2 new features are drains. The near-failed features are drains that are no longer operable due either to back-filled soil or missing stones that allow water to remain on trail.

   The recommendation for the Cabin Canyon Trail is to address the near failing features and install new features in the short-term. The various maintenance projects are a medium priority.

   Priority: High

2. **Old Colorado City Trail**: The Old Colorado City Trail received a score of 5.66. This trail runs north-south, starting at the junction with the Buckskin Charlie Trail and terminating at Temple Drive. The trail is 0.62 miles in length and is most popular with hikers, many of whom likely enter the Park from the adjoining neighborhood. The trail also is accessible via the Ridge Road Parking Lot. The trail scored poorly due to a high amount of trail braiding (50 ft^3) and erosion (2,400 ft^3). There are 6 new features required, 1 feature that has failed, 22 features that require maintenance, and 23 features that require no action.

Recommendation: The Old Colorado City Trail could be vastly improved by addressing the areas of trail braiding and installing erosion control structures. Of the 6 new features, 4 are series of timber check steps and the remaining 2 are drains. Most of the required maintenance is to drainage features that are inoperable. This is often an easy fix, either by cleaning the sediment that accumulated behind the drain or reinforcing the structure with rocks or timbers.

Priority: High

3. **Bretag Trail**: The Bretag Trail received a score of 5.55. This trail starts just north of the Main Parking Lot and terminates at the junction of Gateway Trail and Gateway Road. For most of its 0.47-mile length, the trail is in good condition. However, the trail lacks undulations with the contour in some areas resulting in channelized water flow and erosion. The trail has experienced 229 ft^3 of erosion in these areas. Four new features need to be installed, 4 features need repair, 11 need maintenance, and 6 require no action.

   Recommendation: This trail can be improved quickly through routine maintenance and repair of failing drainage structures. In order to minimize future erosion, 2 check logs, 2 series of check steps, 1 turnpike, and 1 drain need to be constructed. The turnpike is required about 50 feet from the trailhead where the trail crosses over an ephemeral drainage.

   Priority: High

4. **Palmer Trail**: The Palmer Trail received a score of 5.53. This trail was the only trail where severe issues were recorded. At a length of 1.72 miles, the Palmer is the longest trail in the park and one of the most popular due to the trailhead proximity to the Main Parking Lot. This trail is open to equestrians, but is most frequented by hikers. Some sections of the Palmer Trail are in fair condition; however, this trail is experiencing significant soil loss due either to a lack of features or failing features. We observed a staggering 77 moderate natural resource issues on the Palmer Trail, along with 8 major, 3 severe, and 10 routine issues.

   Recommendation: The Palmer Trail is a high priority for stewardship crews due to the significant number of issues. This trail also had a significant number of features that require attention. In all, there are 16 new features, 12 failed, 6 near failed, 4 in need of repair, 50 in need of maintenance, and 71 that require no action at this time.

   Priority: High

5. **Columbia Trail**: The Columbia Trail received a score of 5.00. This trail, at only 0.10 miles long, received one of the worst scores due to the high number of features that need attention. The Columbia Trail is located in the south-central portion of the park, and is accessible via Columbia Road.

   Recommendation: Given the relative short length of this trail, its score can be improved through the installation of 2 new features, including a 200-foot length of timber check steps and maintenance of 2 drain features.

   Priority: High

6. **Siamese Twins Trail**: The Siamese Twins Trail received a score of 4.87. This trail has long been a maintenance issue for Parks staff due to the high-intensity use from equestrians and visitors who are drawn to the sandstone slabs. Much progress has been made in recent years through trail delineation, stabilization, and wayfinding. However, this 0.58 mile long trail needs additional attention in order to improve long-term sustainability. For a stretch of ~50 yards, the trail follows an old drainage that has since been disconnected from the trail corridor; however, this section of trail sees channelized water flow and significant erosion.

   Recommendation: A primary reason for the low score on the Siamese Twins Trail is the amount of natural resource erosion observed – 2,320 ft^3 over the length of trail. There were 4 moderate natural resource issues observed on the trail, areas of trail incision where soil displacement is occurring rapidly. Trail stabilization features such as timber riser steps have been constructed on this trail in recent seasons, and RMFI recommends continuing with this approach as it has proved successful. Maintenance needs will remain high due to the location of the trail, heavy use, and use of timber in construction.

   Priority: High

Implementation - Social Trails

Social trails form in a variety of ways. Some social trails in the Park make sense from a user's perspective, others make logical connections with primary trails, and others represent redundant and improperly designed trails that can lead to extensive natural resource degradation. Rather than adopting a management approach of "close all social trails", RMFI recommends evaluating each social trail based on usage and condition to determine whether it makes sense to adopt the trail into the designated trail system. As stated in RMFI's 2000 trail assessment report, the following questions should be asked before making the decision to close a visitor-created social trail:

1. Does the trail provide access to a viewpoint from a designated trail or parking area?
2. Does the trail provide efficient and logical access to a designated trail from the road system or parking area?
3. Does the trail provide a more logical or efficient route than a designated trail?
4. Does the trail offer Park visitors some opportunity a designated trail does not? If so, what?
5. Is demand for the trail so high that any effort to close and revegetate is likely to fail?

If the answer to one or more of these questions is "Yes," the option of designating this trail as a system trail should be given careful consideration, rather than trying to close it with uncertain success.

In areas represented in Figure 20, particularly the vast network of social trails around Balanced Rock, RMFI recommends implementing a 5-step approach to closing and restoring all rogue, redundant, and improperly designed social trails to help mitigate impacts to habitat and the surrounding natural resources. The 5-step process is detailed below:

1. Decompact the trailbed: It is crucial to decompact the trailbed at least 4-6 inches when closing a rogue trail. Overuse can compact soil, which will make natural establishment of vegetation extremely slow. Freshly decompacted soil will increase the success of reseeding efforts and enhance vegetation regrowth.

2. Bring area back to grade: This step will prevent water from continuing to downcut along the rogue trail while also helping to minimize sedimentation. Additionally, if the rogue trail is not brought back up to grade it will continue to be perceived as a trail and will attract use. Filling the old trailbed with a native soil is crucial for fully restoring the impacted area.

3. Revegetation: Once erosion is addressed, revegetation treatments should be applied to achieve long-term slope stabilization and develop a self-sustaining, native plant community. Spreading native seed and installing erosion matting or covering with mulch is crucial to fully restoring the eroded area. Revegetation can be supplemented with transplants from the surrounding area to increase the ‘natural’ look of the restored site.

4. Minimize the visibility of all rogue trails: As long as use continues on restored areas, erosion control and re-vegetation attempts will be unsuccessful. Physical structures, such as barriers and debris (fencing, large boulders, vegetation, timber slash, etc.) can help disguise closed trails. Visual barriers in conjunction with educational signage can substantially increase the success rate of any restoration project. Education is often an overlooked portion of restoration, but most people will not walk off-trail if they realize the damage they may be causing.

5. Monitor and assess site: Monitoring the site is an effective method to determine if restoration goals were achieved. This may be as simple as taking 'before' and 'after' photos to assess effectiveness of restoration treatments. For certain projects, more quantitative measures may be required.

RMFI also recommends that signs be used in combination with barriers (i.e., fencing, large boulders) and revegetation to actively close social trails. Sign messages differ in their effectiveness, and reach different audiences. Sign messages can:

- Politely appeal for a suggested behavior (e.g. "Please Stay on the Trail")
- Firmly order a behavior (e.g. "Walk Only on Designated Trails!")
- Appeal to a deeper motive with a reason (e.g. "Preserve Park Vegetation for Future Generations by Staying on the Trail")
- Threaten enforcement action (e.g. "Stay on Trail -- Violators Will Be Fined!")
- Threaten by warning of danger (e.g. "Danger -- Falling Rock. Stay on the Trail").

Other Implementation Strategies

GIS Data/Google Earth Tools

The collection and presentation of spatial data specific to the needs and issues in the Garden of the Gods represents an incredible resource and tool that the City of Colorado Springs Parks, Recreation and Cultural Services Department and RMFI can use to make decisions regarding priority work locations and objectives for many years to come. Upon completion of the GIS data collection and geoprocessing, RMFI converted all shapefiles and associated data files into the Keyhole Markup Language (kml) format suitable for use in Google Earth. Google Earth is a free tool available to anyone with a cellular phone, laptop, desktop computer, or other related device that allows the user to visually explore the world with the click of a mouse or swipe of the finger. Recognizing that not everyone has access to the ArcGIS software, RMFI wanted the data to be used and displayed in a format accessible to all.

RMFI recommends using the Google Earth layers and dataset as a shared tool and resource to not only help inform seasonal and annual project objectives and priorities, but to digitally and spatially track progress toward the completion of specific actions identified through the trail assessment. Currently, every single waypoint, layer, line, polygon, etc., mapped during the assessment is displayed via Google Earth in an interactive format that allows the user to click on a point representing a feature class or issue class in addition to the action associated with each. Once a point is clicked, a data table appears that tells the user what the feature or issue is (i.e., erosion, timber step, drain, etc.); length (feet), width (inches), and depth (inches, if applicable) of the respective feature/issue; quantity of the feature/issue; material (for features only, i.e., timber, rock); condition of the feature/issue

(i.e., failed, near failed, needs repair, etc.); action associated with that specific feature/issue (i.e., decommission, install new, repair, etc.); and a picture of the exact feature/issue in question.

Upon completion of the associated action for each feature and issue, RMFI recommends updating the Google Earth data point and categorizing it into a new "Completed" layer so that RMFI staff and Parks staff have a spatial and visual record of work completed to date. This method will require great attention to detail and coordination among all partners, but can and must be done to ensure the data are used in a beneficial and meaningful way.

Way Finding and Educational Signage

Way finding signs in the Garden of the Gods are an invaluable resource protection tool. Visitors rely on signs to located their intended destination. In 2018, the City of Colorado Springs Parks, Recreation Cultural Services Department implemented a new sign package for Garden of the Gods. The consistent signage and messaging has made a tremendous difference in ease of navigation and safety for users as well as provided for more aesthetically appealing visuals. However, there are likely more improvements to be made to both directional signage and educational/interpretive signage, pending the availability of funding.

RMFI recommends implementing the following improvements to the Park's trail signs and maps to both assist Park visitors and protect natural resources:

- Signs should indicate directions to major trailheads and parking areas.
- Signs should have a "You Are Here" locator.
- Major trail junctions should be clearly signed.
- Trail signs should be oriented with the surrounding landscape.
- Trail signs should indicate distances between major landmarks or trail junctions.
- Incorporate additional opportunities for educational/interpretive signage including trail etiquette, Leave No Trace principles, honey ants, vegetation, erosion, cultural resources, stewardship programs/partners, etc.

Effectiveness Monitoring

RMFI is one of the only organizations in the state that has research and effectiveness monitoring as part of its mission. Because RMFI has a strong local and regional presence, it has the ability to make repeat visits to a project location to determine the effectiveness of treatments and techniques implemented at the project site over time. RMFI recommends continuing monitoring efforts to both assess effectiveness of structures and treatments, but also to track progress toward completing specific actions detailed in this trail assessment report.

Citizen Science Program

In 2017, RMFI piloted a new citizen science monitoring program to offer an additional avenue to engage community volunteers. RMFI hired an independent contractor to oversee the design, implementation, and reporting of the program. Citizen science is the involvement of the public in community-driven scientific research, and provides a sustainable system for monitoring land stewardship and restoration activities by engaging adult volunteers and college students in the measurement of ecological parameters at RMFI project sites over time. During the 2017 field season, RMFI citizen scientists were recruited and trained, and collected data on 2 trails in Garden of the Gods Park - the Niobrara Trail and a closed social trail located in the south reservoir valley. Citizen scientists collected data related to trail depth and width, trail slope and aspect, vegetative cover and richness, and pre/post photographs to answer the following questions:

- How does the trail change over time?
- How do slope and aspect relate to trail tread depth and width?
- Do structures slow the rate of change on a trail?
- Is the effectiveness of the structure correlated with slope and aspect?
- Do trail improvements redirect traffic onto the designated trail, thereby reducing vegetation impacts on social trails?

To train the citizen scientists, 11 instructional videos were created, and pre- and post-tests were administered to evaluate knowledge gained after completion of the training modules. This methodology ensured quality control among the scientists collecting data in the field, and helped in reporting the impacts of the training program on fostering community awareness about the ecology and natural history of Garden of the Gods Park, and educated the community about current threats to the Park. In 2017, 10 citizen scientists were trained and completed 9 monitoring days in the field.

The program was continued and expanded in 2018 with the addition of new monitoring locations and a new human dimension monitoring component designed to evaluate compliance when confronted with a closed trail and other closed trail indications (i.e., fencing, signage). The 2018 program was coordinated by the same independent contractor RMFI worked with in 2017. With nearly 2 years of data collected and the majority of kinks and challenges worked out with the data collection protocol and process, RMFI recommends continuing this program into the future.

RMFI's Garden of the Gods Community Stewardship Program

Few land management agencies have the financial resources to meet the improvement and maintenance needs of the areas they manage without the help and involvement of volunteers. Consequently, RMFI recommends continuing its Garden of the Gods Community Stewardship Program, now in its 18th year. Since inception, RMFI has led nearly 700 workdays and has actively engaged nearly 16,000 community volunteers who have contributed over 75,000 hours of volunteer labor in the Park valued at close to $2 million.

The program is primarily implemented with community volunteers and volunteer groups that are overseen by 2-3 paid RMFI field staff. This oversight helps to ensure volunteers are properly trained in the appropriate trail and restoration techniques being implemented and also helps ensure high quality work is performed on the ground. Workdays generally occur between the months of March and November, with the majority of community volunteer workdays happening on Saturday and Sunday. Custom volunteer group workdays (i.e., for local businesses and organizations) also are scheduled during the week. RMFI leads approximately 50-65 community stewardship workdays in Garden of the Gods each year as part of this program. The program has multiple objectives including the completion of highly impactful trail and restoration projects that help to protect the valuable natural resources of Garden of the Gods, but also helps instill and foster an ethic of environmental responsibility and stewardship in the community. The program is based on the premise that if we actively engage our citizenry in the care and maintenance of their public lands, they will learn to better use and respect them, and will pass this belief onto others.

Dedicated Garden of the Gods Stewardship Crew

RMFI recommends piloting the concept of a dedicated Garden of the Gods Stewardship Crew comprised of 5-6 highly trained and experienced staff to take the lead on coordinating and implementing project priorities and objectives beginning in 2019. This crew would be overseen by a new position, a Garden of the Gods Stewardship Coordinator, who would also serve as a member of the dedicated Stewardship Crew, and would be instrumental in working with project partners to determine seasonal and annual project priorities and needs. The Crew would have the ability to work independently, be divided into smaller teams to address different projects in other areas of the Park, and oversee and work with community volunteers and volunteer groups. The Crew would also work with local friends groups and advocacy organizations to further leverage the workforce and impact. RMFI has employed this Stewardship Crew model with great success since 2016 to implement stewardship projects in parks and open spaces acquired through the City's Trails, Open Space, and Parks tax (TOPS).

Timeline

Implementing the set of recommendations detailed in the preceeding pages to restore the Garden of the Gods to a healthy, natural, and sustainable condition will take time; a commitment from the Colorado Springs Parks, Recreation, and Cultural Services Department, and other key partners (i.e., Garden of the Gods Foundation, Friends of Garden of the Gods, Garden of the Gods Trading Post); as well as a long-term commitment of financial resources.

The actions identified in this trail assessment report can likely be implemented in the next 5-10 years provided the funding, capacity, and support exist. However, vegetation regrowth, changes in human behavior resulting from educational initiatives, and large-scale improvements to ecological condition will take decades. Furthermore, like many public

parks, open spaces, and trail systems that see extensive use, the Garden of the Gods will always require annual maintenance. In this sense, the work will never be done, but a commitment to annual maintenance projects that are implemented in a strategic, coordinated, and integrated way will help proactively address key issues and needs before they become too significant and/or costly to correct.

LIMITATIONS OF THE PROJECT

The data collected for the purposes of this trail assessment project represent a certain point in time. Inevitably, conditions in the Garden of the Gods Park have changed since the data were collected and analyzed in the spring of 2018. Consequently, additional site visits and ground truthing should occur prior to determining work objectives and priorities in subsequent years.

CONCLUSION

The Garden of the Gods Trail Assessment is not an end, but a beginning. RMFI often talks about a goal for trails in the Park: that the best City Park in America should have the best trails in America. This Assessment and associated recommendations are a continuation of that goal. There have been many great successes in the Park since the last trail assessment was completed 18 years ago. Miles of social trails have been closed, erosional gullies and “pedestals” have been stabilized, trails have been improved from both an ecological and a user’s perspective, and dozens of acres of wildlife habitat have been protected. Preserving and restoring the Garden of the Gods’ ecological resources is the primary management objective of stewardship organizations working in the Park, and any future work must be thoroughly evaluated within this context. The strength of partnerships, involvement of the community, and a passion to protect this treasured landscape for the future will all contribute to the realization of these goals. It is our hope that when the next Trail Assessment is completed in 5 or 10 years, that we will have measurable data to substantiate the success of these efforts. Now, we must get to work!

TABLES

Table 1. Grading scale used to score conditions of the 23 primary trails in the Garden of the Gods Park.

From	To	Letter Grade
9.700	10.000	A+
9.300	9.699	A
9.000	9.299	A-
8.700	8.999	B+
8.300	8.699	B
8.000	8.299	B-
7.700	7.999	C+
7.300	7.699	C
7.000	7.299	C-
6.700	6.999	D+
6.300	6.699	D
6.000	6.299	D-
0.000	5.999	F

Table 2. Trail name and length for the 23 primary trails in the Garden of the Gods Park.

Trail Name	Trail Length (ft.)	Trail Length (miles)
Rockledge Ranch Overlook	518	0.10
Cottonwood	522	0.10
Columbia	678	0.13
Hamp	682	0.13
Valley Reservoir	872	0.17
Arnold	966	0.18
Ute Trail Connection	1,288	0.24
Upper Loop	1,326	0.25
Ridge Trail Loop	1,649	0.31
Chambers	2,182	0.41
Gateway	2,210	0.42
Dakota	2,290	0.43
Strausenback	2,491	0.47
Bretag	2,496	0.47
Balanced Rock	2,869	0.54
Siamese Twins	3,063	0.58
Old Colorado City	3,253	0.62
Cabin Canyon	3,386	0.64
Niobrara	4,905	0.93
Scotsman	5,599	1.06
Ute	5,769	1.09
Buckskin Charlie	5,791	1.10
Palmer	9,065	1.72
TOTAL	***63,870***	***12.10***

Table 3. Trail name and feature conditions for the 23 primary trails in the Garden of the Gods Park.

Trail Name	Install New	Failed	Near Failed	Repair	Maintain	No Action
Arnold	6	-	-	2	4	2
Balanced Rock	1	-	-	-	6	5
Bretag	4	-	-	4	11	6
Buckskin Charlie	17	-	-	2	42	24
Cabin Canyon	8	-	4	-	23	25
Chambers	-	-	-	-	2	1
Columbia	2	2	-	-	4	-
Cottonwood	2	-	-	-	1	2
Dakota	9	1	-	-	-	-
Gateway	-	-	-	-	3	7
Hamp	-	-	-	-	-	2
Niobrara	17	-	-	-	7	9
Old Colorado City	6	1	-	-	22	23
Palmer	16	12	6	4	50	71
Ridge Trail Loop	1	-	-	-	13	27
Rockledge Ranch Overlook	3	-	-	-	2	2
Scotsman	32	-	-	-	15	44
Siamese Twins	2	1	-	-	27	41
Strausenback	5	-	-	-	21	36
Upper Loop	1	-	-	-	2	34
Ute	15	-	-	-	22	12
Ute Trail Connection	6	3	-	-	3	6
Valley Reservoir	5	-	-	-	-	2
TOTAL	***158***	***20***	***10***	***12***	***280***	***381***

Table 4. Natural resource issues observed on the 23 primary trails in the Garden of the Gods Park.

Trail Name	Erosion (ft^3)	Braiding (ft^3)	Widening (ft^3)
Arnold	-	-	-
Balanced Rock	-	36	-
Bretag	229	-	-
Buckskin Charlie	3,265	1	-
Cabin Canyon	2,664	2	1,344
Chambers	-	-	-
Columbia	-	-	-
Cottonwood	-	-	-
Dakota	540	9	-
Gateway	-	-	-
Hamp	-	-	-
Niobrara	1,929	32	56
Old Colorado City	2,400	50	-
Palmer	23,618	124	1,077
Ridge Trail Loop	-	-	-
Rockledge Ranch Overlook	-	-	-
Scotsman	-	-	-
Siamese Twins	2,320	-	-
Strausenback	7,111	14	-
Upper Loop	-	3	-
Ute	4,338	13	-
Ute Trail Connection	-	34	-
Valley Reservoir	-	-	-
TOTAL	***48,414***	***318***	***2,477***

Table 5. Condition and quantity of natural resource issues observed for the 23 primary trails in the Garden of the Gods Park.

Trail Name	Severe	Major	Moderate	Routine
Arnold	-	-	-	-
Balanced Rock	-	-	-	2
Bretag	-	-	2	-
Buckskin Charlie	-	-	14	2
Cabin Canyon	-	2	8	2
Chambers	-	-	-	-
Columbia	-	-	-	-
Cottonwood	-	-	-	-
Dakota	-	-	2	2
Gateway	-	-	-	-
Hamp	-	-	-	-
Niobrara	-	-	14	4
Old Colorado City	-	-	8	-
Palmer	6	8	77	10
Ridge Trail Loop	-	-	-	-
Rockledge Ranch Overlook	-	-	-	-
Scotsman	-	-	4	2
Siamese Twins	-	-	4	-
Strausenback	-	4	2	2
Upper Loop	-	-	-	2
Ute	-	-	8	4
Ute Trail Connection	-	-	-	3
Valley Reservoir	-	-	-	-
TOTAL	***6***	***14***	***147***	***35***

Table 6. Trail scores and associated letter grades for the 23 primary trails in the Garden of the Gods Park.

Trail Name	Trail Score	Letter Grade
Hamp	**10.00**	**A+**
Ridge Trail Loop	**9.52**	**A**
Gateway	**9.10**	**A-**
Cottonwood	**8.50**	**B**
Upper Loop	**8.28**	**B-**
Scotsman	**8.06**	**B-**
Valley Reservoir	**8.00**	**B-**
Chambers	**8.00**	**B-**
Arnold	**7.87**	**C+**
Balanced Rock	**7.83**	**C+**
Rockledge Ranch Overlook	**7.59**	**C**
Dakota	**6.93**	**D+**
Ute Trail Connection	**6.89**	**D+**
Buckskin Charlie	**6.29**	**D-**
Niobrara	**6.16**	**D-**
Strausenback	**6.14**	**D-**
Ute	**6.11**	**D-**
Cabin Canyon	**5.91**	**F**
Old Colorado City	**5.66**	**F**
Bretag	**5.55**	**F**
Palmer	**5.53**	**F**
Columbia	**5.00**	**F**
Siamese Twins	**4.87**	**F**
AVERAGE	***7.12***	**C-**

Table 7. Trail score by trail use for the 23 primary trails in the Garden of the Gods Park.

MTB / HIKER / EQUESTRIAN		
Trail	**Score**	**Letter Grade**
Gateway	**9.10**	**A-**
Cottonwood	**8.50**	**B**
Chambers	**8.00**	**B-**
Valley Reservoir	**8.00**	**B-**
Rockledge Ranch Overlook	**7.59**	**C**
Ute Trail Connection	**6.89**	**D+**
Niobrara	**6.16**	**D-**
Ute	**6.11**	**D-**
AVERAGE	***7.54***	***C***
HIKER / EQUESTRIAN		
Trail	**Score**	**Letter Grade**
Hamp	**10.00**	**A+**
Scotsman	**8.06**	**B-**
Arnold	**7.87**	**C+**
Balanced Rock	**7.83**	**C+**
Dakota	**6.93**	**D+**
Buckskin Charlie	**6.29**	**D-**
Strausenback	**6.14**	**D-**
Cabin Canyon	**5.91**	**F**
Old Colorado City	**5.66**	**F**
Bretag	**5.55**	**F**
Palmer	**5.53**	**F**
Columbia	**5.00**	**F**
Siamese Twins	**4.87**	**F**
AVERAGE	***6.59***	***D-***
HIKER ONLY		
Trail	**Score**	**Letter Grade**
Ridge Trail Loop	**9.52**	**A**
Upper Loop	**8.28**	**B-**
AVERAGE	***8.90***	***B+***

Table 8. Trail name and length for the 30 connector trails in the Garden of the Gods Park.

Trail Name	Trail Length (ft.)	Trail Length (miles)
Connector A *Balanced Rock/Cabin Canyon Connector*	264	0.05
Connector B *Spring Canyon Picnic Connector*	265	0.05
Connector C *Spring Canyon/Balanced Rock Connector*	325	0.06
Connector D *Strausenback Connectors 1-2-3*	683	0.13
Connector E *Siamese Twins/Cabin Canyon Connector*	216	0.04
Connector F *Palmer/Strausenback Connector*	183	0.03
Connector G *Strausenback Connector 4*	386	0.07
Connector H *Buckskin Connector*	631	0.12
Connector I *Scotsman Connector 1*	318	0.06
Connector J *Scotsman Connector 3*	298	0.06
Connector K *Central Garden P6 Connector*	169	0.03
Connector L *Palmer Trail Connector 1*	475	0.09
Connector M *Ute/Niobrara Connectors 2-3*	277	0.05
Connector N *Niobrara/Buckskin Connector 2*	293	0.06
Connector O *Niobrara/Buckskin Connector 1*	697	0.13
Connector P *Niobrara Connector 1*	453	0.09
Connector Q *Niobrara Connector 4*	428	0.08
All others (13)	1,091	0.21
TOTAL	***7,452***	***1.41***

Table 9. Trail name and feature conditions for 17 connector trails in the Garden of the Gods Park.

Trail Name	Install New	Failed	Near Failed	Repair	Maintain	No Action
Connector A *Balanced Rock/Cabin Canyon Connector*	-	-	-	-	2	1
Connector B *Spring Canyon Picnic Connector*	-	-	-	-	1	1
Connector C *Spring Canyon/Balanced Rock Connector*	-	-	-	-	-	1
Connector D *Strausenback Connectors 1-2-3*	-	-	-	-	3	4
Connector E *Siamese Twins/Cabin Canyon Connector*	-	-	-	-	3	3
Connector F *Palmer/Strausenback Connector*	2	-	-	-	1	1
Connector G *Strausenback Connector 4*	3	-	-	-	-	-
Connector H *Buckskin Connector*	7	-	-	-	3	-
Connector I *Scotsman Connector 1*	-	-	-	-	-	1
Connector J *Scotsman Connector 3*	-	-	-	-	-	5
Connector K *Central Garden P6 Connector*	1	-	-	-	1	5
Connector L *Palmer Trail Connector 1*	1	-	-	2	3	6
Connector M *Ute/Niobrara Connectors 2-3*	3	-	-	-	-	-
Connector N *Niobrara/Buckskin Connector 2*	1	-	-	-	1	3
Connector O *Niobrara/Buckskin Connector 1*	-	-	-	-	3	4
Connector P *Niobrara Connector 1*	2	-	-	-	4	10
Connector Q *Niobrara Connector 4*	2	-	-	-	6	5
TOTAL	***22***	***0***	***0***	***2***	***31***	***50***

Table 10. Condition and quantity of natural resource issues observed for 17 connector trails in the Garden of the Gods Park.

Trail Name	Severe	Major	Moderate	Routine
Connector A *Balanced Rock/Cabin Canyon Connector*	-	-	-	-
Connector B *Spring Canyon Picnic Connector*	-	-	-	-
Connector C *Spring Canyon/Balanced Rock Connector*	-	-	-	-
Connector D *Strausenback Connectors 1-2-3*	-	-	-	-
Connector E *Siamese Twins/Cabin Canyon Connector*	-	-	-	-
Connector F *Palmer/Strausenback Connector*	-	-	-	-
Connector G *Strausenback Connector 4*	-	-	-	-
Connector H *Buckskin Connector*	-	-	-	-
Connector I *Scotsman Connector 1*	-	-	-	-
Connector J *Scotsman Connector 3*	-	-	-	-
Connector K *Central Garden P6 Connector*	-	-	-	-
Connector L *Palmer Trail Connector 1*	-	-	-	-
Connector M *Ute/Niobrara Connectors 2-3*	-	-	-	-
Connector N *Niobrara/Buckskin Connector 2*	-	-	-	-
Connector O *Niobrara/Buckskin Connector 1*	-	-	4	-
Connector P *Niobrara Connector 1*	-	-	2	-
Connector Q *Niobrara Connector 4*	-	-	2	-
TOTAL	***0***	***0***	***8***	***0***

Table 11. Trail scores and associated letter grades for 17 connector trails in the Garden of the Gods Park.

Trail Name	Trail Score	Letter Grade
Connector C *Spring Canyon/Balanced Rock Connector*	**10.00**	**A+**
Connector I *Scotsman Connector 1*	**10.00**	**A+**
Connector J *Scotsman Connector 3*	**10.00**	**A+**
Connector K *Central Garden P6 Connector*	**8.75**	**B+**
Connector D *Strausenback Connectors 1-2-3*	**8.71**	**B+**
Connector M *Ute/Niobrara Connectors 2-3*	**8.67**	**B**
Connector N *Niobrara/Buckskin Connector 2*	**8.63**	**B**
Connector B *Spring Canyon Picnic Connector*	**8.50**	**B**
Connector E *Siamese Twins/Cabin Canyon Connector*	**8.50**	**B**
Connector F *Palmer/Strausenback Connector*	**8.25**	**B-**
Connector L *Palmer Trail Connector 1*	**8.18**	**B-**
Connector A *Balanced Rock/Cabin Canyon Connector*	**8.00**	**B-**
Connector G *Strausenback Connector 4*	**8.00**	**B-**
Connector H *Buckskin Connector*	**6.84**	**D+**
Connector P *Niobrara Connector 1*	**5.50**	**F**
Connector Q *Niobrara Connector 4*	**5.09**	**F**
Connector O *Niobrara/Buckskin Connector 1*	**4.81**	**F**
AVERAGE	**8.03**	***B-***

FIGURES

Figure 1. An example of an A-rated primary trail in the Garden of the Gods Park (Ridge Trail).

Figure 2. An example of a B-rated primary trail in the Garden of the Gods Park (Chamberlain Trail).

Figure 3. An example of a C-rated primary trail in the Garden of the Gods Park (Arnold Trail).

Figure 4. An example of a D-rated primary trail in the Garden of the Gods Park (Dakota Trail).

Figure 5. An example of an F-rated trail in the Garden of the Gods Park (Palmer Trail).

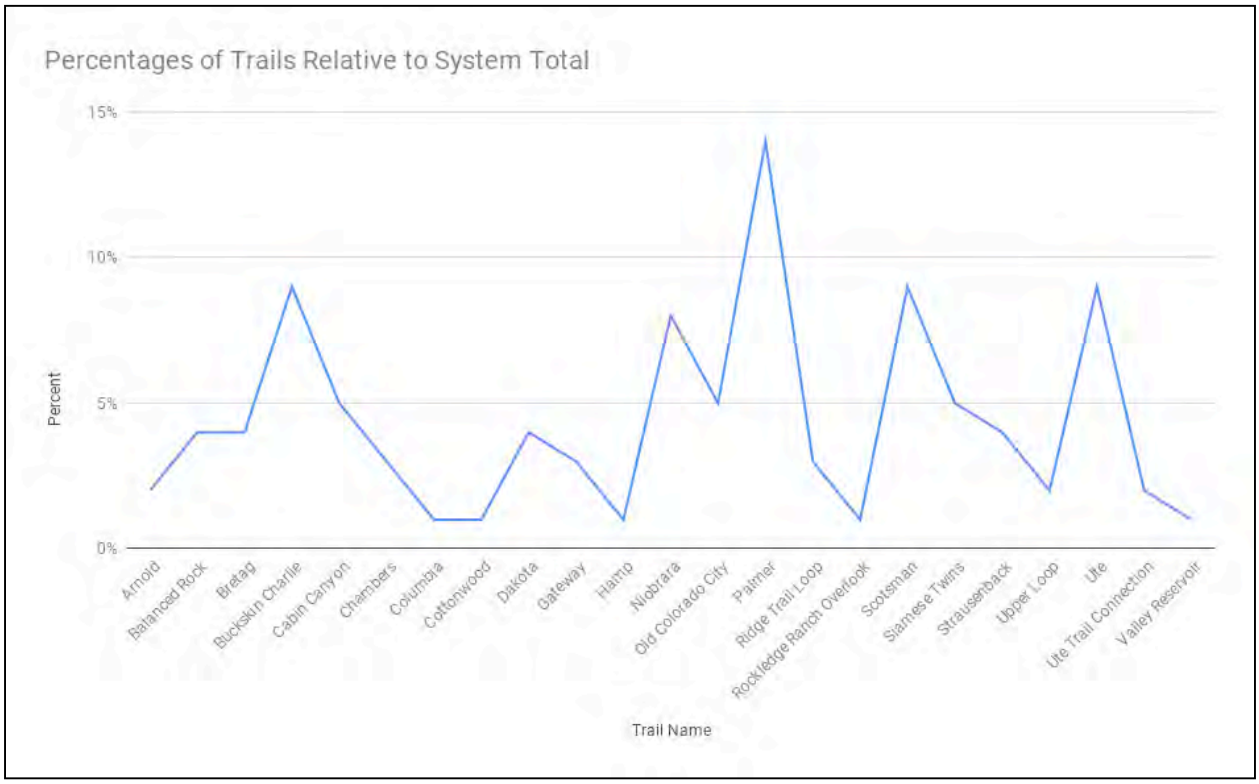

Figure 6. Percentage that each individual trail accounts for relative to the entire trail system in the Garden of the Gods Park.

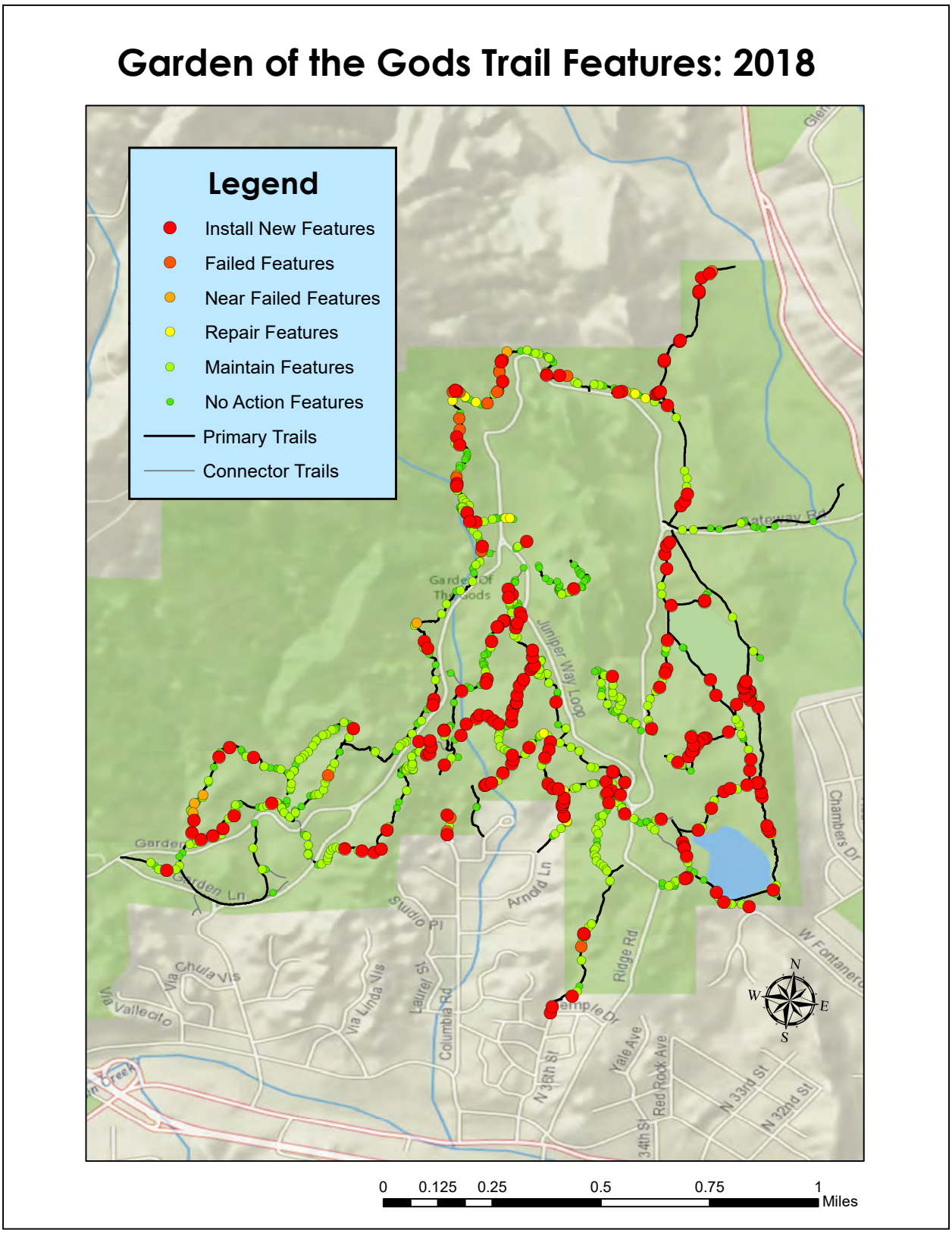

Figure 7. Trail features and condition for the 23 primary trails in the Garden of the Gods Park.

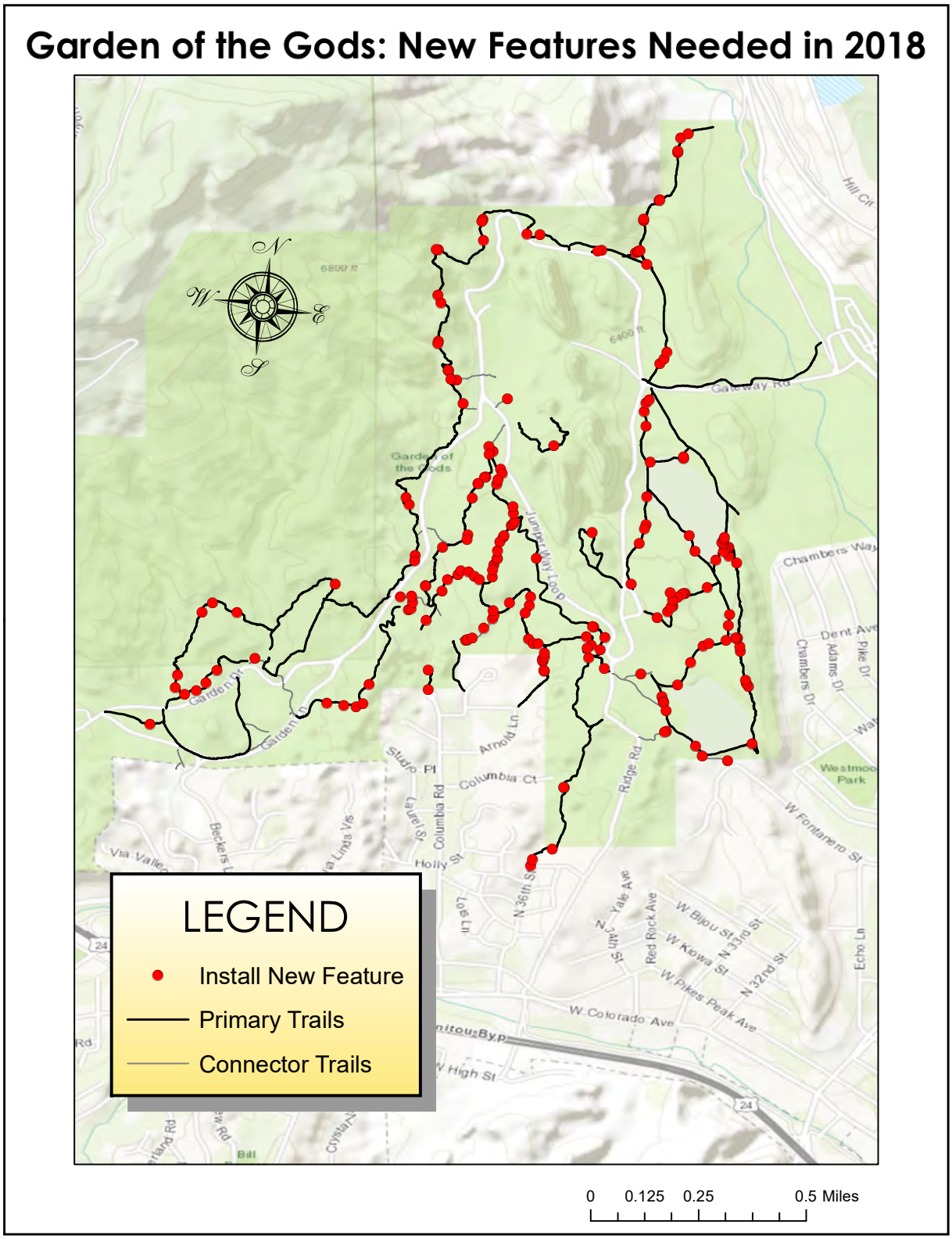

Figure 8. New features needing to be installed for the 23 primary trails in the Garden of the Gods Park.

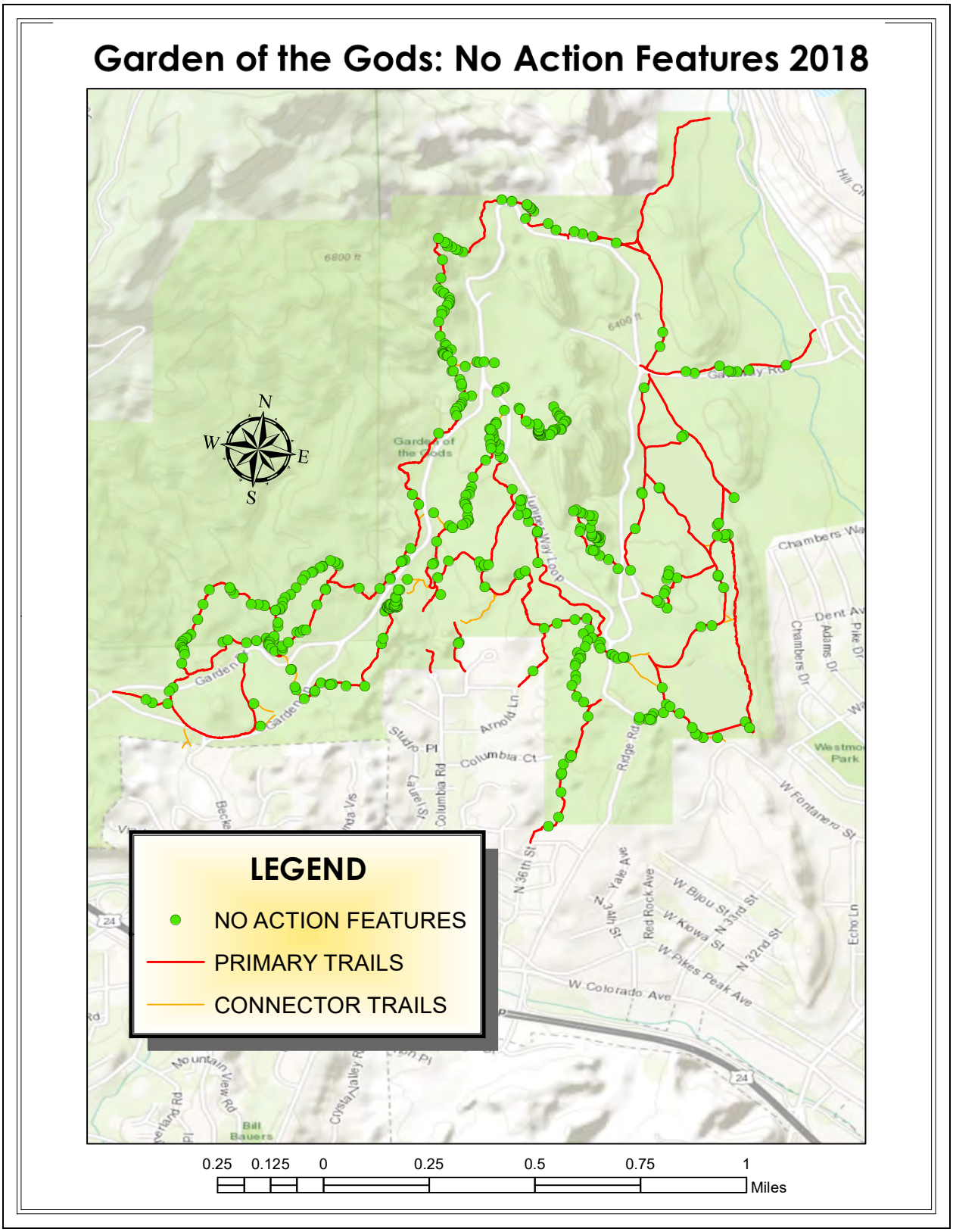

Figure 9. Features requiring no action at this time for the 23 primary trails in the Garden of the Gods Park.

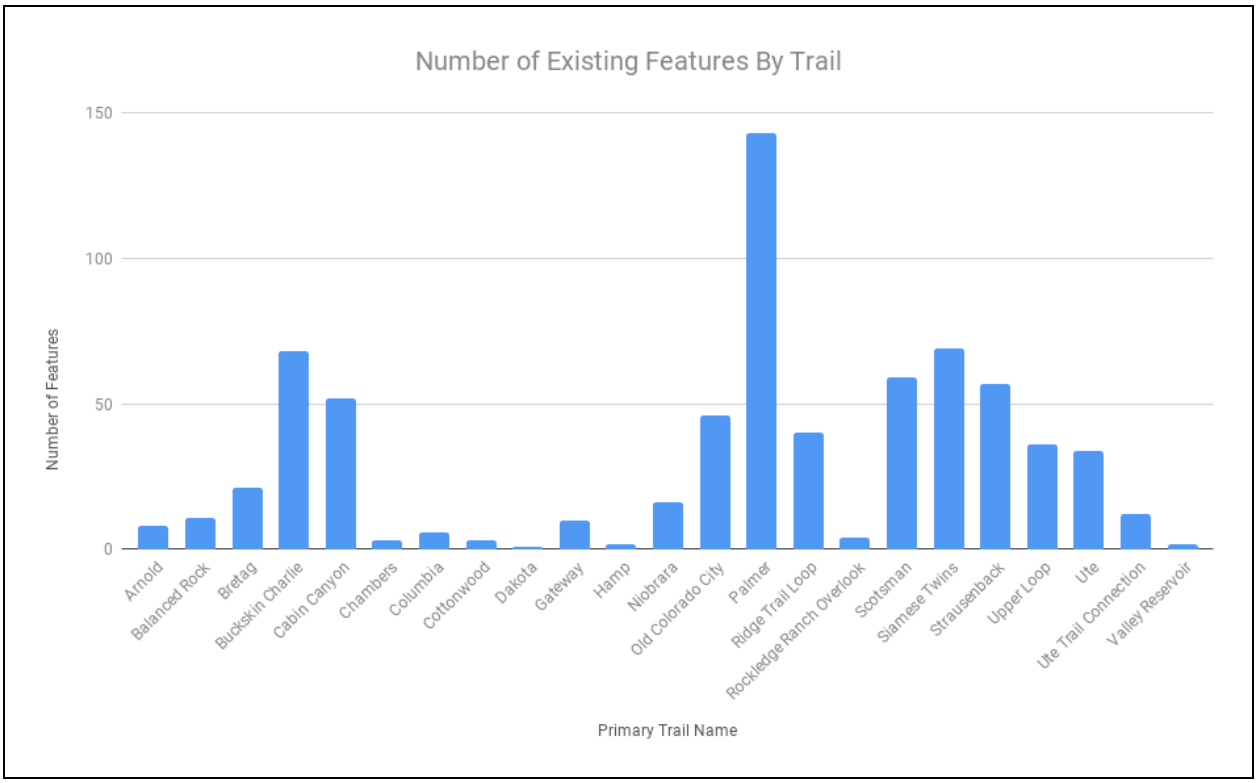

Figure 10. Number of existing features on the 23 primary trails in the Garden of the Gods Park.

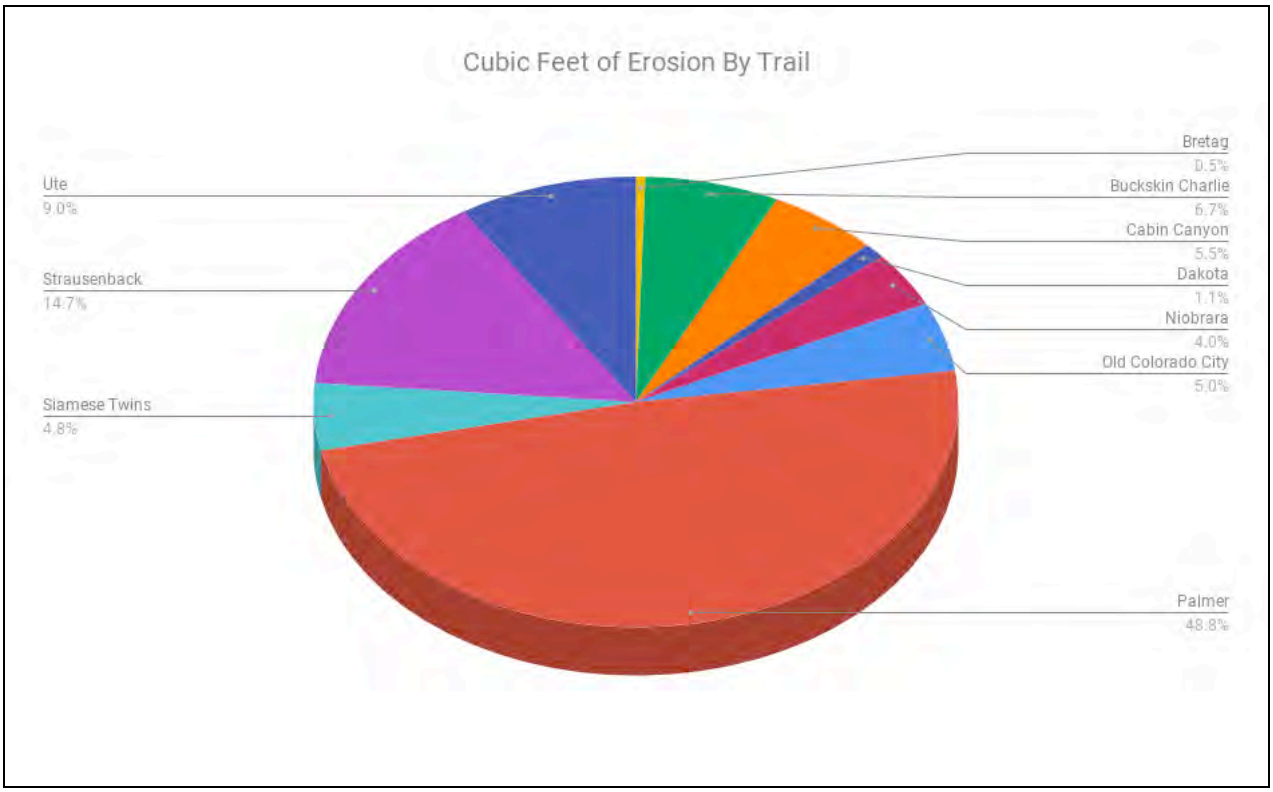

Figure 11. Cubic feet of erosion recorded on the 23 primary trails in the Garden of the Gods Park.

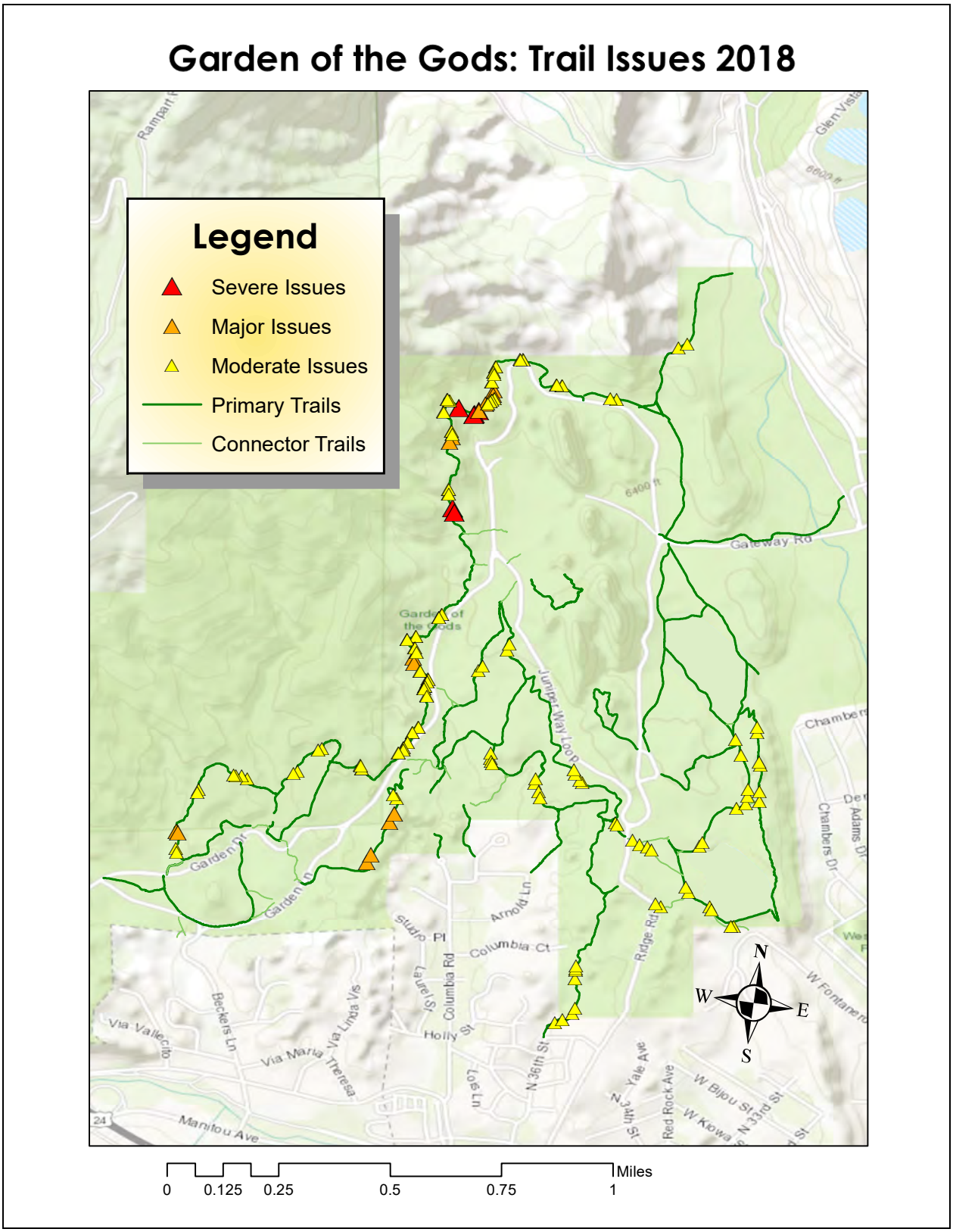

Figure 12. Issues of natural resource degradation observed for the 23 primary trails in the Garden of the Gods Park.

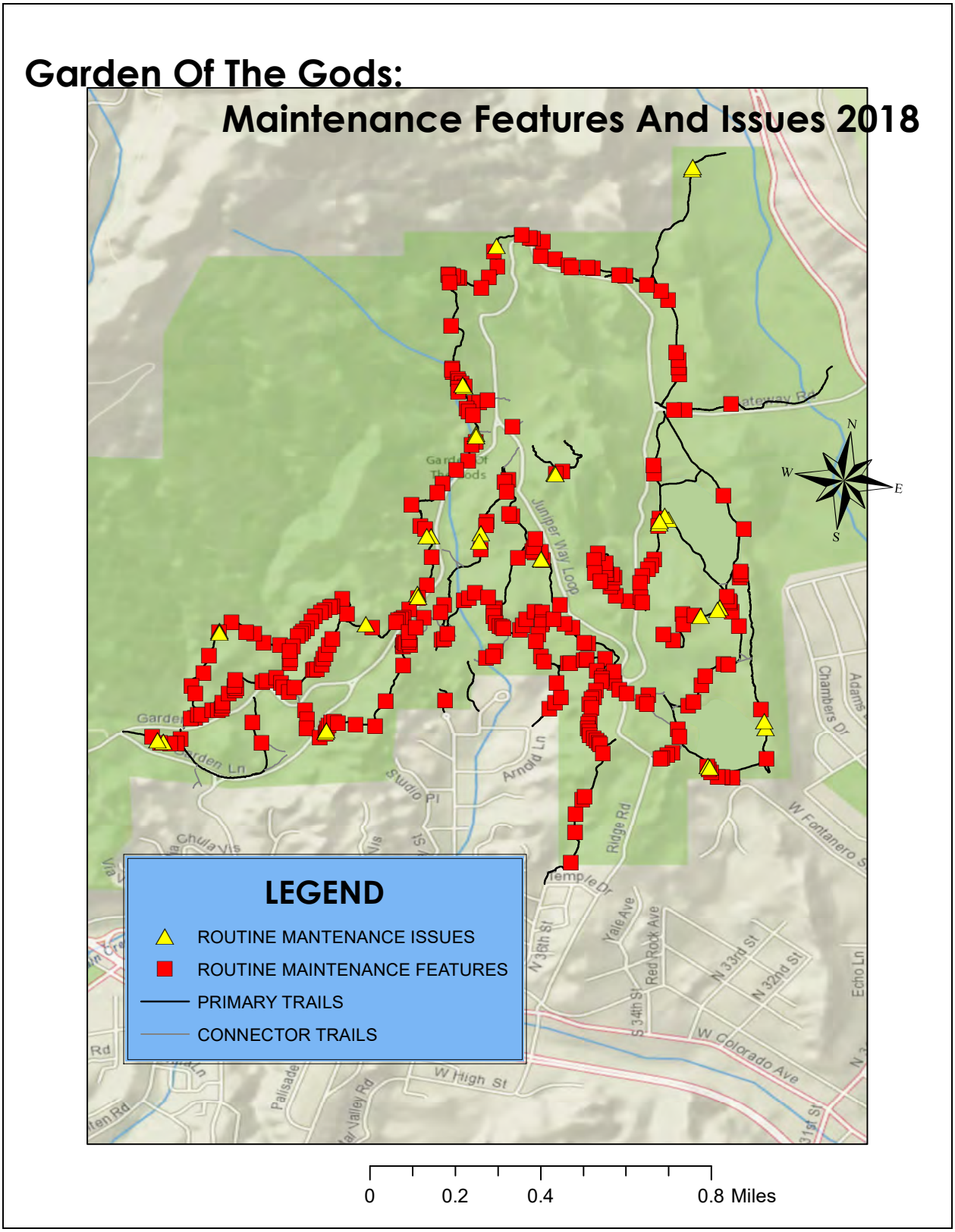

Figure 13. All features and issues located on the 23 primary trails in the Garden of the Gods Park requiring routine annual maintenance.

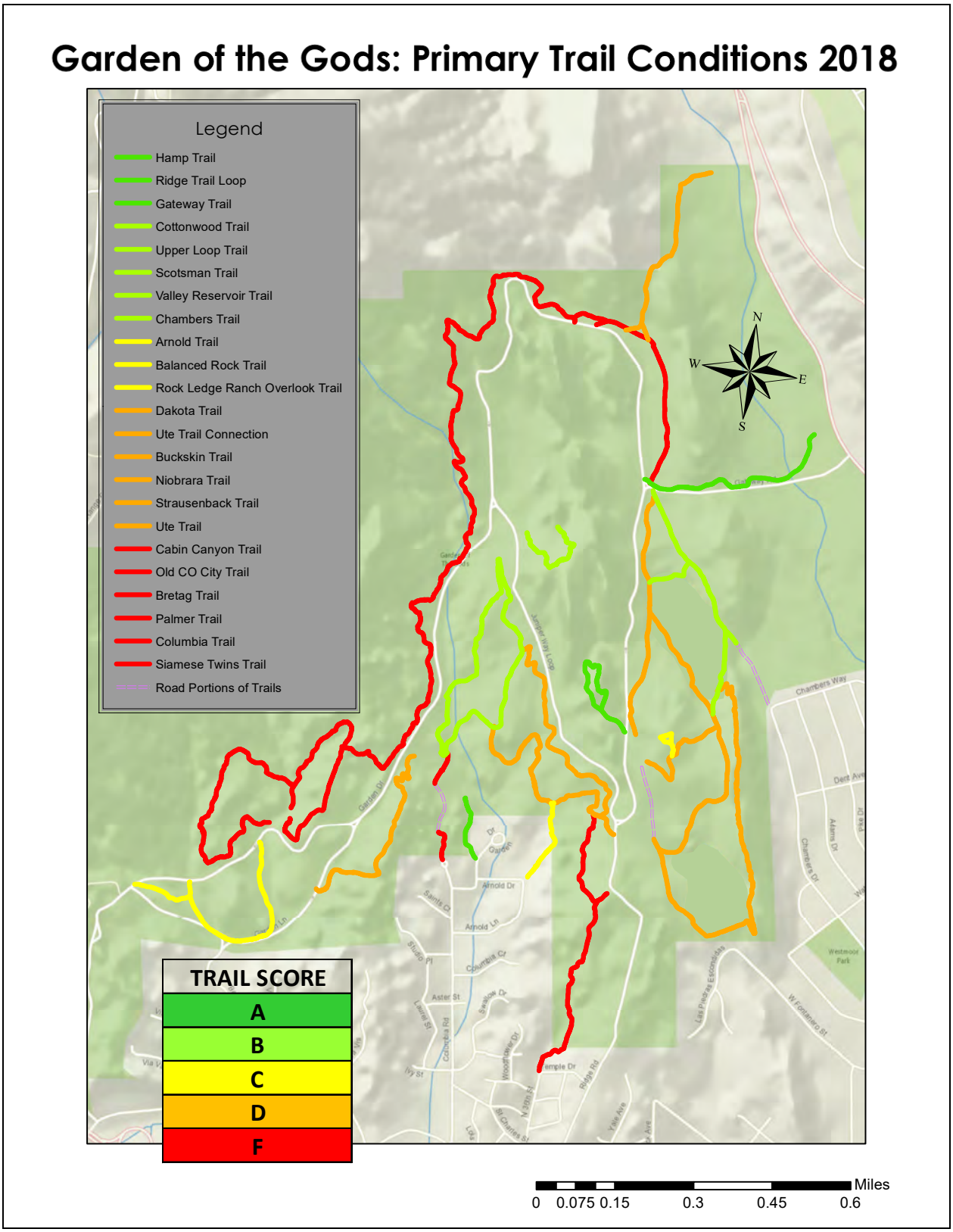

Figure 14. Trail conditions scores for the 23 primary trails in the Garden of the Gods Park.

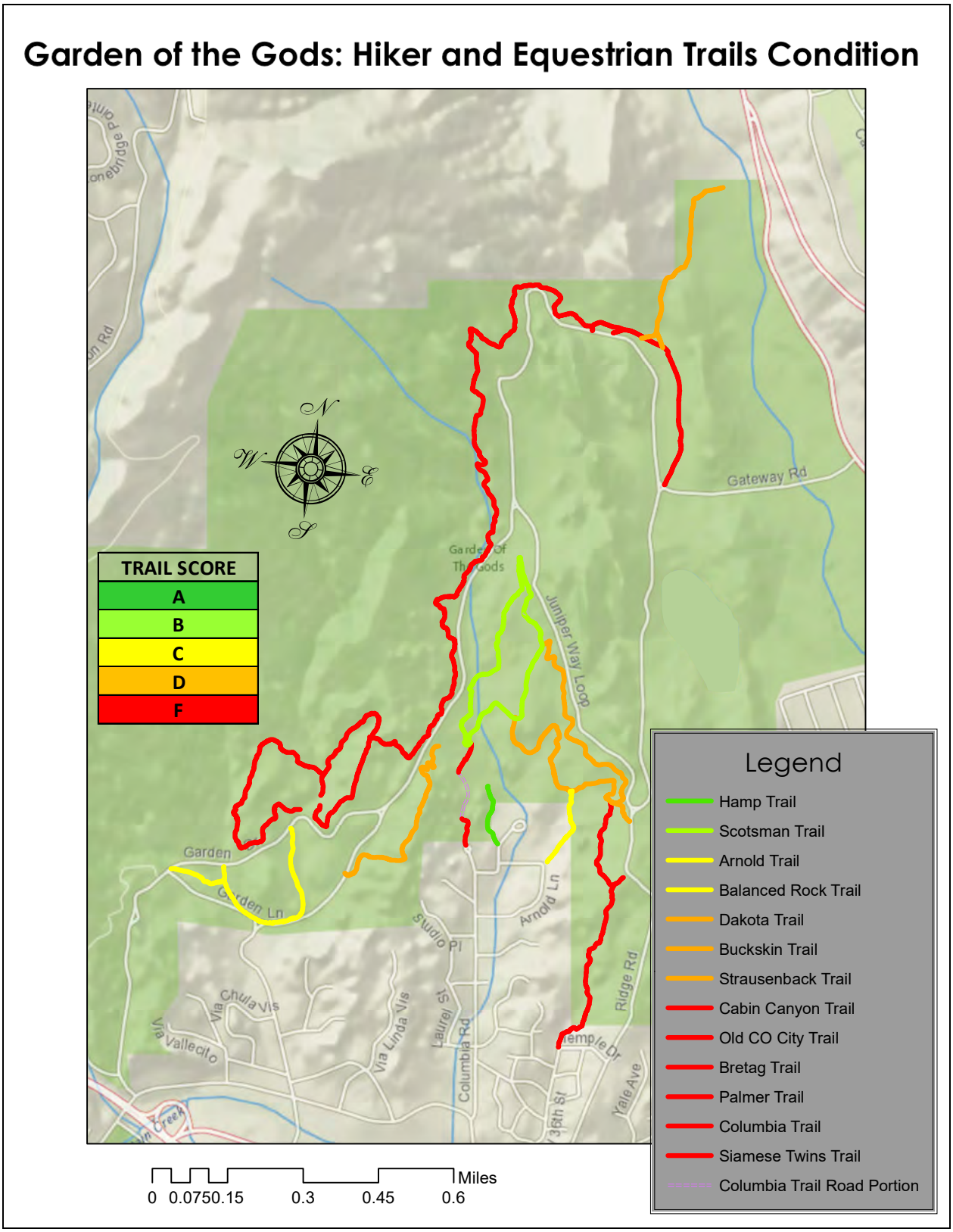

Figure 15. Trail condition scores for the 23 primary trails in the Garden of the Gods Park that accommodate hiking and equestrian use.

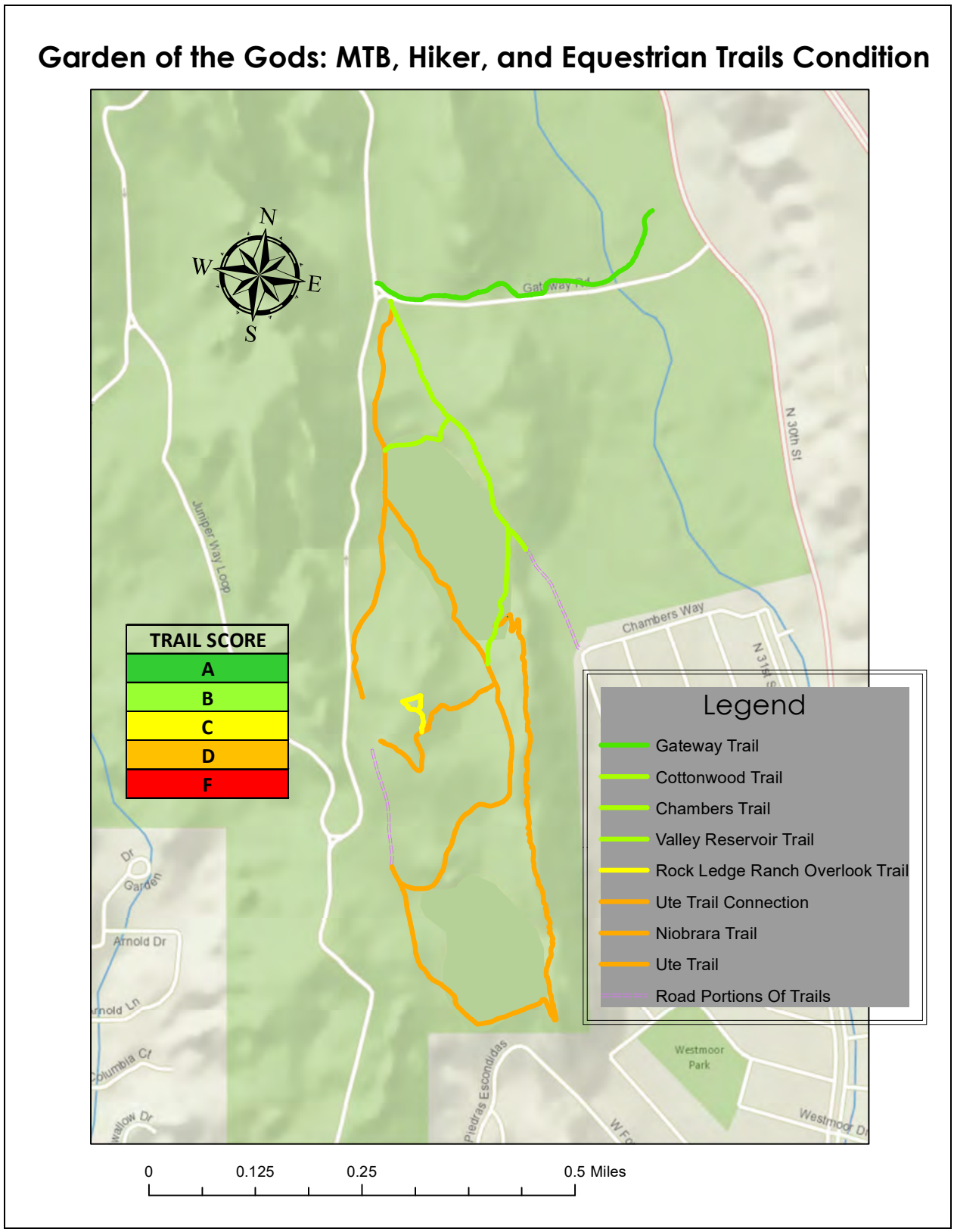

Figure 16. Trail condition scores for the 23 primary trails in the Garden of the Gods Park that accommodate mountain biking, hiking, and equestrian use.

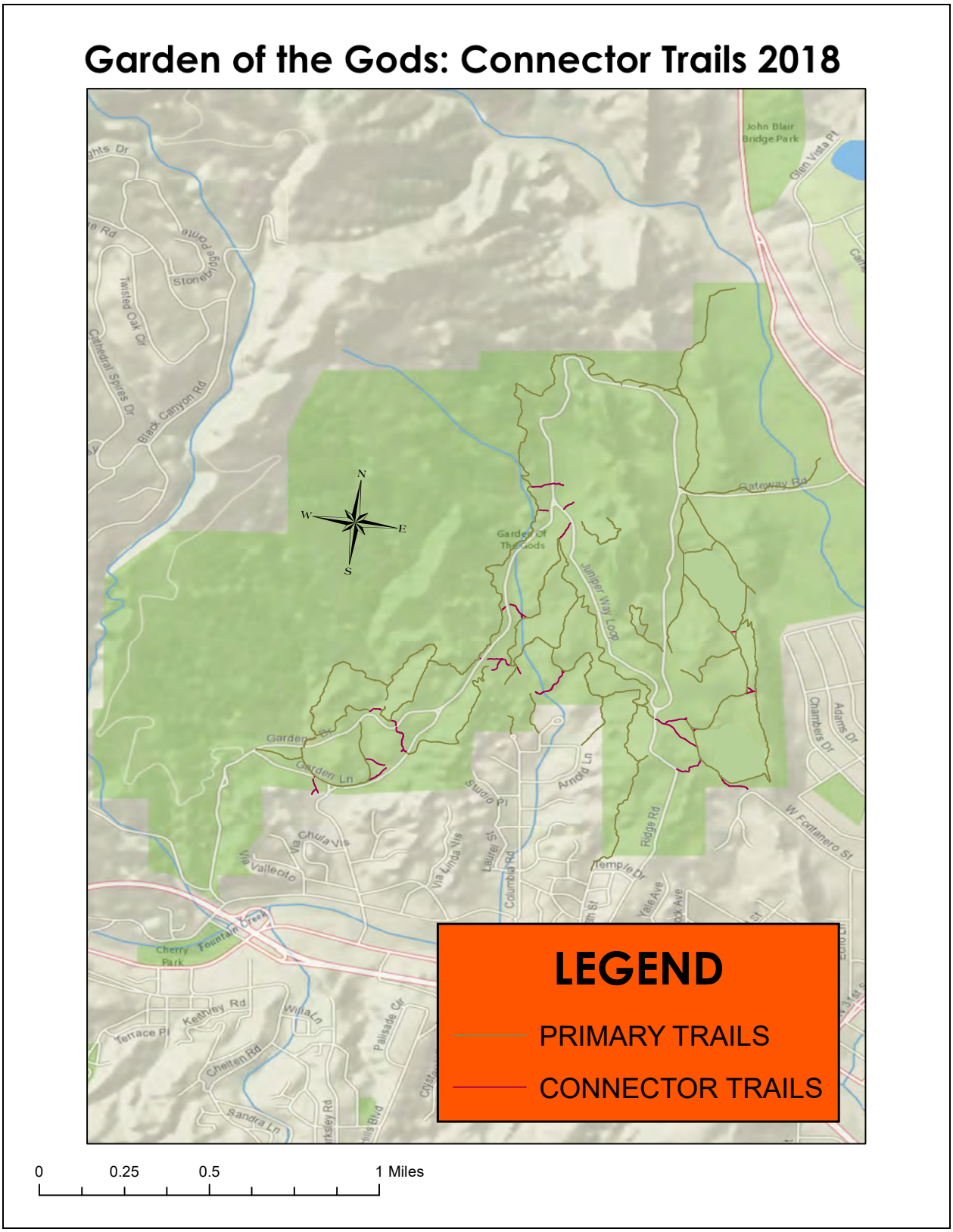

Figure 17. Connector trails mapped in the Garden of the Gods Park.

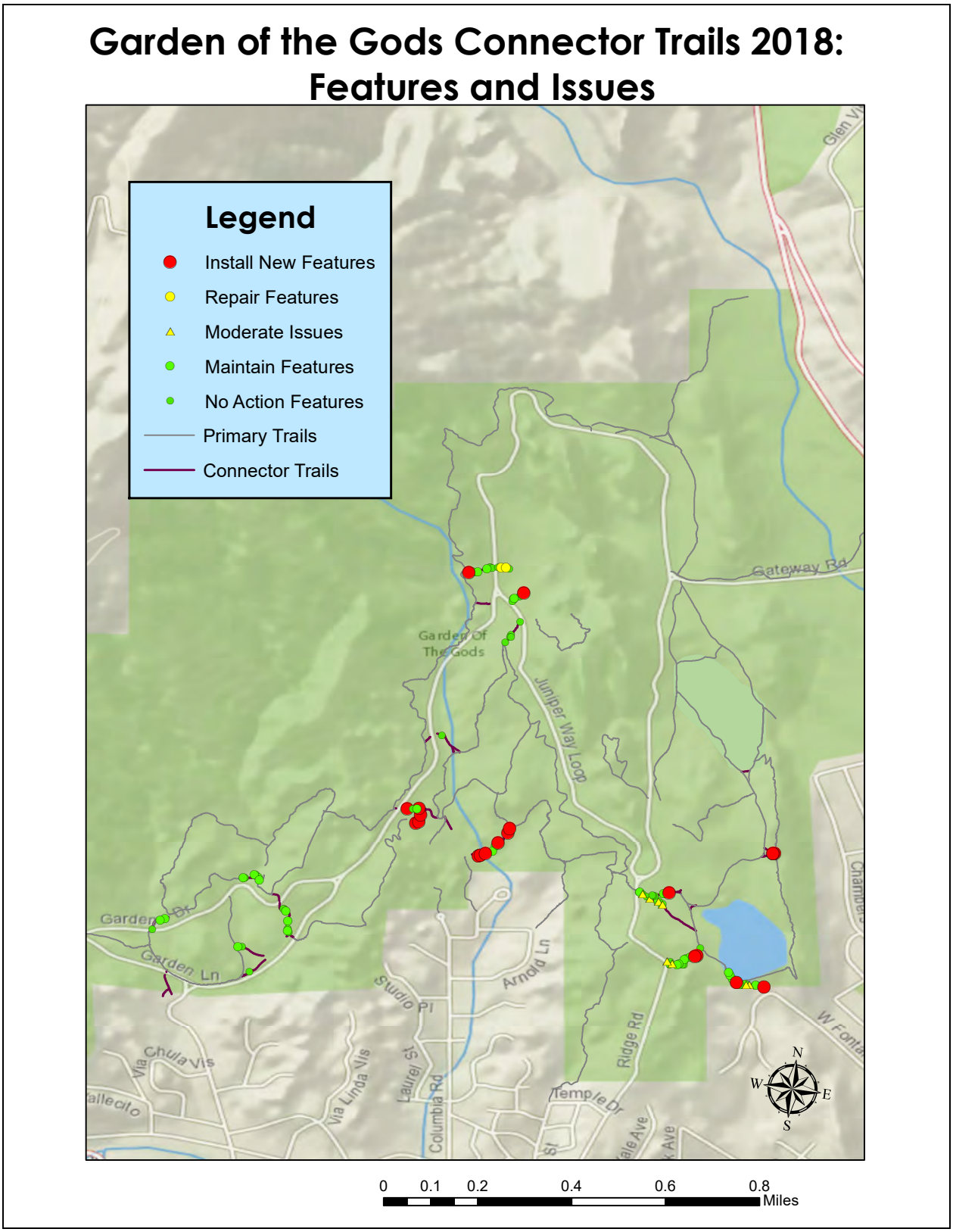

Figure 18. Features and issues documented on 17 of the 30 connector trails in the Garden of the Gods Park.

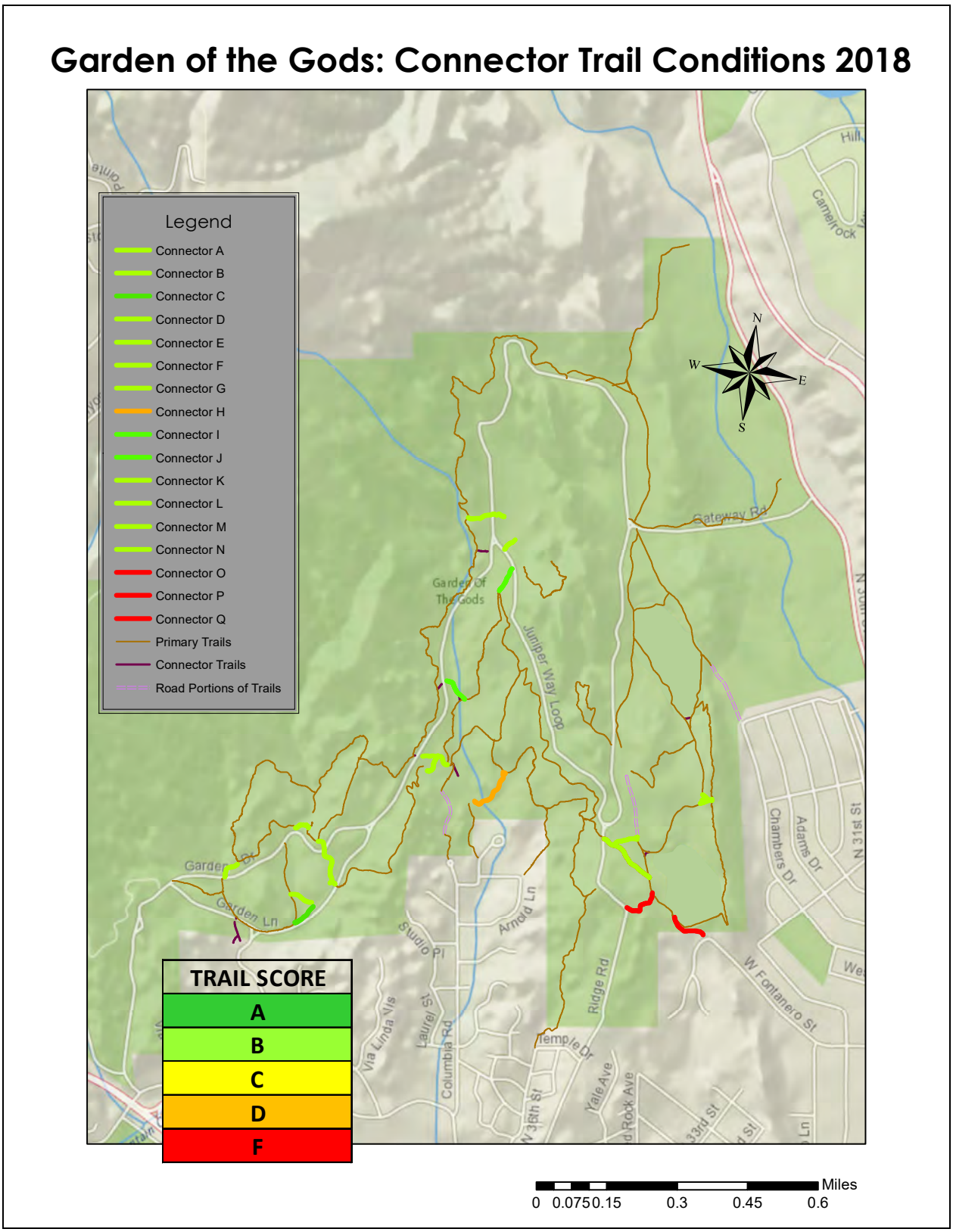

Figure 19. Trail condition scores for 17 of the 30 connector trails scored for the purposes of the trail assessment project in the Garden of the Gods Park.

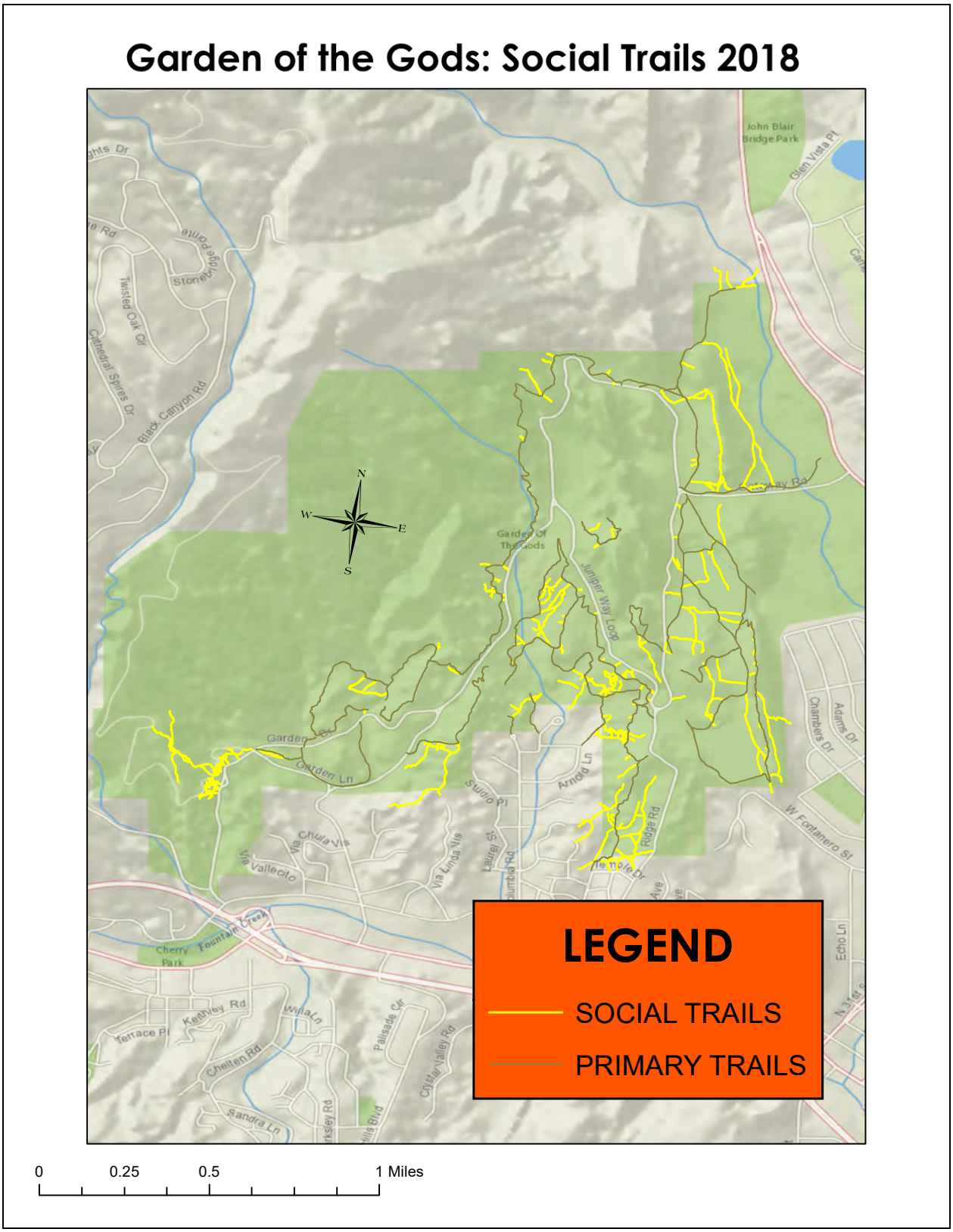

Figure 20. Social trails mapped in Garden of the Gods Park as part of the trail assessment project.