Bear Creek Watershed Restoration Project
Final Project Report
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Dedicated to the conservation and stewardship of public lands in Southern Colorado

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Project Background

The Bear Creek Watershed Restoration Project is an effort of the United States Forest Service (USFS), with collaboration from various partner groups and agencies, to protect the habitat of the sole remaining genetically pure population of greenback cutthroat trout. In order to better manage the trout’s habitat, the USFS initiated an Environmental Assessment (EA), a documentation process that falls underneath the National Environmental Policy Act (NEPA). After extensive review of the environmental impacts, public comments, and scientific information that were included in the EA, the USFS issued their draft decision in July of 2015. The final decision notice—Finding of No Significant Impact—was signed in June of 2016, allowing on-the-ground work to commence.

The Rocky Mountain Field Institute (RMFI) has been involved in the Restoration Project since its inception in 2009, helping land managers with consultation, assessment, and active restoration of system and non-system trail routes in the Bear Creek Watershed. RMFI has also been an active member of the Bear Creek Roundtable, a group comprised of various partners, user groups, and other stakeholders helping guide the planning and implementation processes. In August of 2016, RMFI entered into a new Supplemental Project Agreement with the USFS under the Master Challenge Cost Share Agreement (14-CS-11021200-026) finalized in August of 2015. Under the terms of that agreement, RMFI received funding to support maintenance of the Bear Creek trail system and implementation of the recommended actions detailed in the Bear Creek Environmental Assessment.

Members of the Bear Creek Roundtable group have been eager for the implementation phase to begin. To maximize work on the ground in 2016, the USFS and RMFI prioritized several ‘low-hanging fruit’ projects for implementation, which included the decommissioning of the Josephine Falls Social Trail, construction of the Buckhorn Connector Trail, and the continued maintenance of sediment detention structures built to protect trout habitat. These three projects are summarized in the following pages.

Josephine Falls Social Trail Decommissioning

In spring of 2016, RMFI and the Cheyenne Mountain Chapter of Trout Unlimited (CMCTU) came to an agreement to complete the Josephine Falls Social Trail Decommissioning Project, a component of the Bear Creek Watershed Restoration Project. The primary objective for the 2016 CMCTU—RMFI partnership project was the decommissioning of the well-established non-system route (hiking trail) that parallels Bear Creek, from its origin at the City of Colorado Springs—USFS boundary to its terminus at Josephine Falls, referred to as the Josephine Falls Social Trail (Figure 1). The 1.1-mile trail was not sanctioned by either of the landowners, but was well-established and received moderate use. Efforts to close the trail in 2013 by installing post and rail fence at the intersection with Trail #666 were mostly unsuccessful. However, the decommissioning of the entire length of trail was expected to be more effective. The trail (and adjoining drainages) were located within the Water Influence Zone, an area defined as within 100-feet of the riparian corridor, as designated by the USFS Bear Creek Watershed Assessment document. Because of its location, the Josephine Falls social trail was contributing sediment into Bear Creek, potentially impacting trout habitat. The trail was not included for adoption into the trail system under the EA. Therefore, the primary concern was eliminating sediment loading into Bear Creek and returning the impacted area to the surrounding landscape.

During a trails assessment completed in 2013, RMFI evaluated the Josephine Falls Social Trail for hotspots and few areas of concern were found. While this held mostly true for a subsequent
assessment RMFI completed in 2015, RMFI staff documented 6 instances of sediment deposition into Bear Creek from the Josephine Falls Social Trail. These 6 locations were given close attention during de-commissioning. In order to minimize the amount of alluvium depositing into Bear Creek from the non-system route, RMFI recommended utilizing the methods and techniques that have been previously applied throughout the watershed, as well as utilizing techniques the organization has refined at other project sites in the region. Those methods were outlined in the *Josephine Falls Trail Decommissioning Project Proposal*, which was submitted to CMCTU and the USFS in March of 2016.

The primary focus of the project was the obliteration of the social trail, to standards identified by the USFS and agreed upon by CMCTU. Initially, RMFI recommended dropping trees with a diameter breast height (DBH) of 12-18 inches at a maximum of 10 feet apart along the trail corridor. After much discussion amongst project partners, this amount of felling was determined to be excessive. Instead, RMFI used best judgement to identify which trees would be most effective at deterring users and encouraging new growth on the forest floor. After a first pass at felling trees, project partners re-visited the site and an additional 15 trees were marked for felling. In most cases, the down trees have a minimum of 50% contact with the trail tread.

In addition to the dozens of trees felled throughout the corridor, slash from felling and bucking was placed on the trail, to modest success. This technique was used on the entirety of the 1.1-mile of trail to deter users and to expedite the re-integration of the impacted area into the surrounding landscape. However, some sections of slash were removed presumably by inconvenienced hikers. Intensive scarification and seeding, as well as construction of erosion control structures such as brush and rock check dams were built to retain the movement of sediment and to help bring channelized sections of trail back to grade (see Figures 3-7 on the following pages).

RMFI is confident the work completed will help to deter the majority of use along the social trail. The hiking experience now requires a visitor to navigate around thousands of obstacles in the trail corridor. However, some moderate use is still continuing and some slash has been removed. RMFI expects use of the trail to continue to decline into the winter months. Once enacted, off-trail forest closures that were included in the NEPA decision will further help to protect the area from erosion exacerbated by human impacts. In addition, RMFI will continue to work with USFS and City of Colorado Springs officials to develop interpretive signage informing the public of the trail closures and of the overall goals of the Bear Creek Watershed Restoration Project. It is critical to remember that the decommissioning project, while complete for the 2016 season, is ongoing for many years. RMFI expects to re-visit the site in early 2017 to monitor effectiveness of closure and restoration efforts.

**Deliverables**

RMFI planned for 2 weeks of contract labor with the Mile High Youth Corps (MHYC), to include project supervision by at least two RMFI field instructors at all times. The youth corps crews camped on site and worked 10-hour days. The following is a breakdown of the time spent on the project:

- 11 total work days
- 9 youth corps work days (583 hours)
- 2 volunteer work days with 21 total volunteers (137 hours valued at $3,228)
- 11 staff work days (208.5 hours combined for all days)
- 928.5 total work hours (youth corps, volunteers, and staff combined)
The following is a breakdown of the work accomplished on the project:

- 1.1 mile of trail decommissioned
- 20 check dams constructed
- 18 sills constructed
- 11.5 pounds of native seed distributed
- 26 trees felled
- 30 linear feet

**Education**

Education is one of the major tenets of both RMFI and CMCTU. Therefore, it was important to both organizations that this project include a focus on education in addition to the work objectives. RMFI sub-contacted with the MHYC, non-profit organization whose mission is to provide young adults with professional development through meaningful service opportunities and educational experiences. Throughout the two hitches of work, RMFI field instructors provided opportunities for natural resource management skills development, outdoor leadership, and environmental education. Project partners, including a representative from the USFS, visited the youth crew to provide a place-based lecture that included content about the biological significance of the trout, the NEPA process, and the opportunities for a professional track with the USFS.

In addition to education, volunteer engagement is also core to the missions of RMFI and CMCTU. Therefore, RMFI supervised two volunteer events over the course of two weekends in early July. A total of 21 volunteers attended the events.

**Expenditures**

This project was supported through a contract agreement between RMFI and CMCTU. A breakdown of expenditures was included in the Project Proposal document. Expenses covered most of RMFI’s involvement in the planning, implementation, and post-project evaluation for the Josephine Falls Trail Decommissioning Project. RMFI exceeded the expected cost due to adding additional staff time to ensure satisfaction of project completion.

The Bear Creek Watershed is home to the threatened Greenback Cutthroat Trout. Interpretive signing is a key component of protecting the fish’s habitat.
Figure 1. Map of the Josephine Falls Social Trail within the Bear Creek Watershed.
Photographs of Decommissioning Project

**Figure 2 (above & right):** Before and after photos of fencing at junction of Josephine Falls Trail and Trail #666. This is a critical juncture to inform users of the closure. Three segments of fencing were added to this area.

**Figure 3 (above & right):** Before and after images of rock check dam above Bear Creek. This structure is keeping sediment from entering the stream.
**Figure 4 (above):** Before and after images of check dam structures designed to prevent sediment from entering Bear Creek.

**Figure 5 (above):** Before and after images of log sill structures designed to bring channelized trail tread back to grade.
Figures 6 & 7 (above & below): Examples of felled trees, slash, and seeding used to deter users from trail corridor.

Additional photo documentation available upon request.
Mount Buckhorn Connector – Trail Construction

The second project that RMFI completed in the Bear Creek Watershed in 2016 was the construction of approximately 0.89 miles of new trail, known as the Buckhorn Connector Trail (see Figure 8 on page 10). This trail was identified through the NEPA process as a key addition to the trail circuit, as it will serve as the only connection of Trail #667 to Trail #666 once the existing connection is closed. The USFS identified construction of the trail as an ‘early win’ for the project if it could be completed in 2016. RMFI searched for and found a way to complete the project using funding sources other than those tied to the USFS agreement.

The alignment for the multi-use Buckhorn Connector Trail was chosen by USFS personnel. In late spring, RMFI staff met with USFS personnel to complete a preliminary walk-through of the trail corridor. Through that process, RMFI determined that the trail could be constructed over the duration of about 2 weeks by utilizing a partnership with the MHYC. By mid-July, the USFS had pin-flagged the centerline of the trail, providing the necessary guidance work crews needed to clear an 8-foot wide corridor and install a 36-inch tread, with minimal in-trail structures.

By late July, the entirety of the 0.89-mile trail had been built. Some finishing work was requested by USFS, so a third week of MHYC work was added in early September, paid for by the USFS. This final week focused on defining the critical edge of the trail, removing stumps and stumps leftover from corridor clearing, and constructing in-slope and out-slope retaining walls. The project concluded in late September when a crew of 6 RMFI staff worked to refine the Buckhorn Connector Trail with Trail #666, at the suggestion of USFS personnel. The adjacent section of Trail #666 was elevated to meet the Buckhorn at a more acute angle in a steep scree field. RMFI and USFS staff members agreed that the scree field was not an ideal location to locate the junction, but few other options exist. The RMFI crew gathered green logs from trees fallen during corridor clearing, peeled them, and placed them in a low retaining structure on the outslope of Trail #666 to elevate a 40-foot stretch of the trail by about one foot. A large native shrub was transplanted to provide a new ending alignment for the last 15 yards of the Buckhorn Connector Trail to help discourage the cutting of the switchback tangent. The USFS and RMFI agreed that this site will require a timber or rock retaining wall between the junction, and it is listed as a priority project for early 2017.

Deliverables

RMFI partnered with the MHYC for 13, 10-hour days of work on the project. The MHYC camped on-location, improving efficiencies and time spent on the project. In addition, RMFI opened two of the days to community volunteers. An additional RMFI crew-day was spent on the project. The following is a breakdown of time spent on the project:

- 14 total work days
- 13 youth corps project days (933.25 hours)
- 1 volunteer day with 8 volunteers (64.25 hours valued at $1,514)
- 14 RMFI staff days (291.5 hours combined for all days)
- 1,289 total work hours (youth corps, volunteers, and staff combined)

The following is a breakdown of the work accomplished on the project:

- 0.89-miles of trail corridor cleared and tread constructed
- 133 linear feet of retaining wall constructed
- 18 transplants
- 3 check dams
Figure 8: Map of Trails in Bear Creek Watershed, as of October 2016. Map courtesy of the USFS.
Photographs of Buckhorn Trail Construction

Figures 9 (above) & 10 (below): Before and after images of new Buckhorn Connector Trail.
Maintenance of Habitat Protection Structures

A well-established trail network exists within the Bear Creek Watershed, crossing properties managed under the jurisdiction of the USFS and El Paso County (EPC). However, the highly erodible Pikes Peak Granite soils, fall-line trails, steep slopes, and monsoon rains have combined to increase sedimentation originating from the trails and depositing in the stream channel, which is impeding food production and spawning of the Colorado greenback cutthroat trout. Since 2009, RMFI has constructed sediment detention structures (SDS) and completed high priority trail work in an effort to minimize sediment depositing into Bear Creek. The structures installed by RMFI help capture sediment before it reaches the stream, however these structures fill to capacity within the course of a year and, therefore require regular maintenance to ensure they continue to function properly.

In 2016, RMFI built off the efforts of the past 7 years to protect the habitat for the greenback by minimizing the amount of sediment deposition to Bear Creek. Restoration activities over 3 workdays (two of which were on EPC property) focused on keeping displaced sediment originating from Trail #667 from entering the stream. Work on USFS property focused on the maintenance of three drains that allow for springs to flow across Trail #667 without carrying excess sediment. The map on the following page includes all maintenance sites in the watershed.

Deliverables

RMFI maintained all at-capacity SDS on EPC property in 2016, five total, during one of the two workdays. Maintenance of SDS included cleaning out captured sediment, refreshing the pine boughs that serve to slow the flow of water through the structures and allowing the sediment to drop, and building a secondary back-up detention structure where needed. Sediment excavated from the structures was shoveled into sandbags that were piled off-trail, covered with tarps, and labeled with a sign informing users of the purpose of the sandbags.

Over the course of the second workday, RMFI continued the ongoing process of consolidating sandbags from throughout the watershed. Working in partnership with students from the United States Air Force Academy, RMFI oversaw the consolidation of 202 sandbags to the area identified by USFS personnel in 2013. The location of sandbags is identified by the number “5” in Figure 11. It is expected that sediment from the sandbags can be used in future restoration efforts. RMFI achieved the stated objectives of restoring at-capacity SDS in the watershed. RMFI continues to remind project partners this maintenance is a short-term fix until sediment displacement from Trail #667 can be fully addressed through decommissioning.

The following is breakdown of time spent on the project:

- 2 work days (1 volunteer & 1 staff)
- 1 volunteer workday with 66 volunteers for combined 363 hours (valued at $8,552)
- 39 staff hours (combined hours for both days)

The following is a breakdown of work accomplished:

- 3 drains maintained (on USFS property)
- 5 SDS maintained (Numbers 4, 6, 8, 10, & 11 identified in Figure 11)
- 216 sandbags filled
- 2 timber outslope structures maintained (#7 in Figure 11)
- 1 waterbar maintained (#12 in Figure 11)
- 3 tarps replaced
Figure 11: 2016 maintenance sites within the Bear Creek Watershed.
Photographs of Maintenance Projects

Figure 12 (above): Before (left) and after images of SDS maintenance.

Figures 13 (above): Before and after images of re-tarping and sandbag storage.
Project Conclusion

In conclusion, 2016 was a banner year for the Bear Creek Watershed Restoration Project. RMFI, in partnership with the USFS, EPC, MHYC, and CMCTU, successfully completed all three projects that were identified as top priorities for 2016. However, RMFI continues to stress that the projects are ongoing and therefore finding time for effectiveness monitoring is critical. It is also important to remember that not all sediment originating from the trail system can be stopped from entering Bear Creek. Maintenance of sediment detention structures is labor and time intensive. It is not an efficient way to manage the protection of the stream, but it is an effective stopgap until long-term solutions are discovered.

Total Personnel Statistics

- 27 total project work days
- 22 youth corps work days
- 4 volunteer work days with 95 volunteers
- 1 RMFI staff work day
- 1,516.25 youth corps hours
- 564.25 volunteer hours ($13,294 in value @ $23.56/hour)
- 539 RMFI staff hours
- 2,619.5 project hours (volunteer, youth corps, & staff combined)

Total Work Statistics

- 0.89-miles of trail corridor cleared and tread constructed
- 1.1-miles of trail decommissioned
- 3 drains maintained
- 5 SDS maintained
- 216 sandbags filled
- 2 timber outslope structures maintained
- 1 waterbar maintained
- 3 tarps replaced
- 133 linear feet of retaining wall constructed
- 18 transplants
- 18 sills
- 26 trees felled
- 11.5 pounds of seed
- 23 check dams

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