## Habitat Improvement & Angler Access to Upper Fountain Creek Soda Springs Park, Manitou Springs, CO



Project Final Report



Prepared by

**FIN-UP** Habitat Consultants, Inc.

J. Peter Gallagher 220 Illinois Ave Manitou Springs, CO 80829 (719) 685-9768 (Office) (719) 332-2550 (Cell)

Fountain Creek within the City of Manitou Springs has been dramatically altered throughout much of its length through channelization, construction of concrete retaining walls, and urban encroachment within the active floodplain. In 2006, a group of concerned citizens, business owners, and watershed advocacy groups formed the Fountain Creek Restoration Committee (FCRC), to explore strategies to restore Fountain Creek and improve the fishery from "Arch to Arch" within the city limits of Manitou Springs. In the first year, the FCRC developed a master plan to provide a pathway to restoring the stream. Initial assessments of existing stream conditions were begun, and key segments of the stream were identified for restoration. Potential funding partners and stakeholders were identified, and fundraising began in 2007 for the first projects.

In early 2007, the FCRC determined that a segment of Fountain Creek within Soda Springs Park in downtown Manitou Springs would be the first reach of the stream to be restored. Several factors influenced this decision; chief of which was that a concurrent planning effort was underway by the City to do major renovations to the park. The city planning staffs were looking for alternative plans for improving the stream, and this appeared to be an excellent opportunity for the FCRC to conduct a demonstration project in the Soda Springs Reach.

A detailed aquatic assessment of the Soda Springs Reach was conducted in March, 2007. The assessment indicated that the project reach exhibited generally poor quality aquatic habitat. Sedimentation from local erosion sources, as well as from sources upstream,

were negatively impacting aquatic habitat within the reach. Stream bank stability was generally poor, primarily due to lack of vegetation on the steep banks resulting from heavy recreational use. Other limiting factors to the fishery included poor quality pool habitat, and limited in-channel object cover in the low gradient riffles. Additional infrastructure problems included exposed utility crossings and failed drop structures. An aquatic and riparian enhancement plan was developed for the park at this time, based on the findings of the assessment.

A project budget was developed for the FCRC, and active fund raising in the community began immediately. Significant funds were pledged by the local chapter of Trout Unlimited to provide important "non-Federal"



matching money for grant applications. With the encouragement and support of the Colorado Division of Wildlife, the FCRC and the City of Manitou Springs applied for funding for the Soda Springs Reach under the U.S. Fish & Wildlife Service Fishing is Fun Grant Program. In August, 2007, the FCRC was notified that their request for \$48,300.00 through the Fishing is Fun Program was approved for use in 2008. Further local funding of \$17,600.00 was secured by the end of 2007.

## **Soda Springs Reach Project Implementation:**

In early 2008, the FCRC and the City of Manitou Springs selected FIN-UP Habitat Consultants, Inc. to oversee the implementation of the project. FIN-UP, a local Manitou Springs aquatic consulting company, had previously conducted the initial assessments of the project reach, and developed the restoration plan in 2007. Initially, the FCRC and the City wanted to schedule the project for early spring of 2008, before the spring run-off began. It quickly became clear that this ambitious timeline for completion was fraught with risk, including the possibility of early run-off flows potentially impacting the project schedule, and concerns that the newly planted vegetation would not survive heavy summer recreation use, particularly if there were delays in installing the fence along the creek. A more conservative timeline for completion was adopted, scheduling the work for the fall, after Labor Day. This would provide adequate time for pre-project preparations, including contracting and acquisition of boulders, as well as assuring that suitable flow conditions would be present during the construction phase. Scheduling the project in the fall had the added benefit of allowing the new vegetation to be transplanted when the plants were dormant, increasing the success rate of these efforts.

A Request for Bids (RFB) was prepared by the City of Manitou Springs in June, 2008, for a heavy equipment contractor to provide equipment to install the habitat features outlined the enhancement plan, and to cut and remove the concrete retaining wall adjacent to the playground on the west side of the park. Fifteen contractors attended the pre-bid meeting and walk-through, and six formal bids were received by the City. The initial estimate for heavy equipment for the Soda Springs Reach was \$23,280.00 (\$20,080.00 equipment contract & \$3,200.00 for wall demolition). The six bids received by the City ranged from \$28,750.00 to \$193,270.00. The low bidder, Chaparral Construction, LLC, from La Veta, CO was selected to provide equipment and demolition services. Cost of services was not the only factor in determining the selection of Chaparral for the contract. The company brought to the project an excellent record of previous stream work in the region, including similar habitat enhancement work on Fountain Creek in Colorado Springs, as well as the US Forest Service / Coalition for the Upper South Platte "Trees for Tout" projects on the South Platte River and Tarryall Creek.

With the heavy equipment contract coming in significantly above the estimated budget, the FCRC sought to find savings on other aspects of the project, without significantly altering the overall project goals and objectives. After the heavy equipment and demolition costs, the next most expensive part of the project involved the bank stabilization treatments and re-vegetation efforts. The initial plan to contract the work out to a local landscaping company would likely break the project budget, and further

delay the work. In June, the FCRC contacted the Rocky Mountain Field Institute (RMFI), a local environmental education and restoration non-profit organization active in Colorado and Utah, to inquire if they would be interested in becoming a partner in the efforts to restore Fountain Creek. The Fountain Creek effort proved to be a good fit for RMFI's organization, and they brought to the table a considerable knowledge in ecological restoration, as well as a unique ability to provide opportunity for community involvement and participation in the project. The Rocky Mountain Field Institute would organize and implement the stream bank stabilization portion of the project, including identifying and acquiring the specific species of plants to be used. RMFI would also organize public volunteer work days to construct the bank stabilization features, and the re-vegetation of the banks at the end of the project. This work would be done at cost, with the added benefit of significantly increasing the public participation in the project.

By late August, 2008, the final hurdles in putting together the project were complete, with a realistic plan to complete the work within the existing budget of \$65,900.00. Contracts were drawn up for approval by the Manitou Springs City Council, and construction was scheduled to begin on September 8, 2008. During the first week of September, City work crews dismantled the playground on the west end of the park, and the fence contractor removed the existing iron fencing surrounding the playground for use later along the edge of the stream. At the same time, City street crews began to harvest boulders from a borrow pit on the west side of Manitou Reservoir, high on the eastern flank of Pikes Peak. Approximately 250 boulders were transported down to the park during the first week of September.



Two small excavators and a bob-cat loader mobilized to the site on September 8. At the same time, work began on cutting the concrete retaining wall on the west side of the park. The concrete wall proved to be problematic, with considerably more steel and hardened

concrete than initially expected. The wall finally succumbed to our effort; with the 120 foot long cut being completed in four and ½ days. Concurrent with the wall demolition, work began in the stream immediately downstream of the wall, and progressed downstream at a rapid rate. Boulder cross-vanes and micro-vortex in-channel object cover structures were installed, with tree and boulder stream bank toe-slope foundations constructed to provide a base for the hand construction of walls to support the later revegetation efforts. Work on the in-channel structures and toe-slope features, downstream to the project boundary at the bridge adjacent to the Spa Building, was completed by Thursday afternoon, September 11, 2008.

On the evening of Sept. 11, a cold front backed up against the mountains immediately west of Manitou Springs, and the ensuing heavy rains resulted in major flooding throughout the Pikes Peak Region. Stream flows within the Soda Springs Project Reach climbed from 11 cubic feet per second (cfs) to over 100 cfs in a matter of a few minutes. Fortunately, the work completed over the previous four days functioned as designed, and no damage occurred as a result of this unexpected high flow event. The rains continued through the following morning, resulting in a postponement of further work until the following week. Work to remove the concrete retaining wall continued through the weekend, in order to get the project back on schedule.



Work continued through a second week, with the concrete retaining wall being broken into small pieces and hauled from the park. Once the wall was removed, final stream bank grading was accomplished, and the in-channel work within the upper, west side of

the project reach was completed. The three pieces of heavy equipment were removed from the park on Wednesday, Sept. 17. The construction of stream bank stone walls continued throughout the week, using volunteers organized by RMFI. On the weekend of Sept. 20-21, over twenty-five volunteers completed the stone work and stream bank preparation for re-vegetation efforts scheduled later in the fall.



One month later, on the weekend of October 25 -26, 2008, the re-vegetation and planting of the stream banks was completed. On Saturday, with permission from the Colorado Springs Storm Water Enterprise, volunteers from the Cheyenne Mountain Chapter of Trout Unlimited harvest several hundred sedges from a concrete lined drainage channel

where Camp Creek flows through the Hidden Valley neighborhood on the west side of Colorado Springs. These sedges, along with sand bar willow cuttings from Monument Creek near Colorado College, and supplemented with purchased upland plant species and native seed, were transplanted along the stream banks in the Soda Springs Reach, utilizing 39 community volunteers organized by the Rocky Mountain Field Institute. A temporary barrier fence was installed to protect the re-vegetation effort, and the permanent iron fence was installed in December, 2008, bringing the project to completion.



## **Soda Springs Reach Project Treatments:**

The following section documents the treatments that were accomplished in the project, based on the four priorities that were outlined in the Aquatic Habitat Restoration Plan developed for the reach. This will serve to document changes that may have been necessary between the design and implementation of the plan, to provide an "as-build" project reference for the City, and for future post-project monitoring efforts by the FCRC.

The four priority restoration efforts included stream bank stabilization and re-vegetation, in-channel stream habitat enhancement, relocation of the playground and removal of the concrete retaining wall from the upstream segment of the reach, and in-channel structural enhancements in the concrete confined channel below the stone bridge. We will describe the treatments accomplished under each priority, and any changes or variation to the original plan and the rationale behind these alterations.

**Priority #1** identified the actively eroding stream banks in the project reach for treatment. All eroding stream banks identified in the enhancement plan were treated and re-vegetated, in accordance with the plan. A minor variation concerning the types of materials used was proposed by RMFI, and adopted by the FCRC. This change concerned the use of landscape timbers to provide stability to the eroding stream banks. RMFI pointed out that not only were the timbers expensive, but they would require some additional maintenance over time, as the timbers began to rot. RMFI proposed using small stone walls in lieu of the timbers. While this would increase the amount of time necessary to install these features, the work would be accomplished by volunteer labor, and would reduce the overall cost of the work by eliminating sever thousand dollars of timber costs.



Stream banks were re-vegetated using native sand bar willow and sedge harvested from stream reaches within the City of Colorado Springs that had been scheduled by Colorado Springs Storm Water Enterprise for future riparian vegetation removal. The table below shows the species of plants and native seed mix used to further enhance the stream bank restoration work.

Plant Species					
Quantity	Species	Common Name			
5	Alnus incana ssp. tenuifolia	Thinleaf Alder			
10	Cornus sericea (C. stolonifera)	Redosier Dogwood			
5	Prunus virginiana	Chokecherry			
10	Rosa woodsii	Wood's Rose			
10	Rubus deliciosus	Boulder Raspberry			

A	a 1	× c.
Native	Seed	M <sub>1</sub> x:

% Mix	Species	Common Name
Gra	asses	
7%	Bouteloua gracilis	Blue Gramma var. Bad River
15%	Pascopyrum smithii	Western Wheatgrass
8%	Sporobolus cryptandrus	Sand Dropseed
10%	Bouteloua curtipendula	Side Oats Gramma
5%	Koeleria macrantha	
	(sub) Elymus elymoides	Bottlebrush Squirreltail
For	rbes	
10%	Ratibida columnifera	Prairie Coneflower
5%	Artemisia frigida	Fringed Sage
5%	Argemone polyanthemos	Prickly Poppy
5%	Penstemon virgatus	
	(sub) Asclepias speciosa	Showy Milkweed
15%	Penstemon secundiflorus	One-Sided Penstemon
15%	Coreopsis tinctoria	
	(sub) <i>Hetertheca villosa</i>	Hairy Golden Aster

A total of seven access paths were constructed down to the creek within the project reach. This was two less than initially planned for the project, but was determined to be adequate to provide reasonable access to the river while still protecting the newly restored stream banks. A temporary barrier fence was installed along the top of the restored stream banks to protect the vegetation until the permanent iron fence was completed in December, 2008.

**Priority #2** included the in-channel habitat enhancements throughout the upper 2/3rds of the project reach, from the stone bridge across from the Park Pavilion upstream to the bridge at Park Avenue. In-stream habitat features were successfully installed as designed in the enhancement plan with the exception of the two cross-vane pools that were planned near the upstream boundary of the reach. In the process of installing the cross vane near the upstream boundary of the removed concrete wall, we discovered that a layer of solid



bedrock was present immediately below the existing grade of the stream channel, limiting the effectiveness of a scour feature at this point. With considerable effort, we were able to excavate enough material to create an adequate pool. It was apparent that this geologic feature extended to the project boundary, necessitating the elimination of the cross-vane upstream, due to the difficulty in excavating the channel for footings and concerns over possibly damaging the historic greenstone wall forming the right side of the channel.

**Priority #3** treatments involved the cutting and demolition of the concrete retaining wall adjacent to the playground. Work included re-contouring and re-vegetation of the newly exposed stream bank, and construction of a boulder cross-vane to aggrade the existing stream channel elevation, hopefully covering an exposed 10 inch cast iron water main crossing the stream at this point. The initial plan called for cutting the wall around the water main and leaving this section in place to stabilize the pipe. After excavating the back side of the wall, it became apparent that this would not be possible, and a decision was made to cut the entire length of the wall, just below the bank full elevation of the channel, and use the remaining wall as a toe-slope foundation for the restored stream bank. Fortunately, the wall foundation is perforated, allowing for good saturation of the soil behind the footing and allowing for adequate sub-irrigation of the willow and riparian sedge planted along the bank full bench adjacent to the stream. The mid channel island that had formed upstream of the utility crossing was removed, with the willow preserved for transplantation along the new stream bank.



A boulder cross vane constructed below the utility crossing effectively eliminated the fish barrier created by the old log drop structure protecting the water main. This structure was set at an elevation sufficiently high enough to allow sediment to accumulate behind the structure and bury the exposed pipe. A slight increase in channel elevation could be accomplished here without significant increase in flood risk due to the increase in channel cross-sectional area resulting from the removal the concrete retaining wall from the right stream bank.

**Priority #4** treatments, involving the installation of in-channel habitat features in the retaining wall confined segment of the project reach downstream of the stone bridge proved to be every bit as challenging as predicted in the enhancement plan. Work in this segment was accomplished using a small Komatsu PC45 excavator, operated by a remarkably skilled operator. The equipment was "walked" under the stone bridge, at one point with less than 1 inch of clearance, and work was commenced at the downstream end of the segment, working back upstream.



Two minor modifications were necessary to the original design in this segment. A small rock vane was added downstream of the first cross-vane plunge pool in the project. The vane provides additional protection to the foundation of the building forming left side of

the channel, deflecting the stream away from an eroding section of the foundation. A second minor change involved the substitution of a series of boulder vanes for a planned cross-vane, due to the lack of clearance necessary underneath the buildings to install the originally planned structure. It was agreed that installing vanes upstream and downstream of the inaccessible segment would provide the sought after velocity shelter and object cover, while providing additional protection to the building foundations on the left side of the channel. A deep sigh of relief was expressed by all when the excavator emerged back on the upstream side of the stone bridge, signaling the completion of this phase of the project.



## **Project Goals/Objectives and Post Project Monitoring:**

Although it was necessary to adopt some minor changes to the specific treatments outlined in the Habitat Enhancement Plan, we are confident that we have achieved the overall goals and objectives of the project. Actively eroding stream banks throughout the project reach were treated and re-vegetated, flood plain function was improved and inchannel object cover and pool habitat for resident trout was dramatically increased. The goal of creating multiple fish viewing areas within the park met with nearly immediate success. Within a few days of completion of the heavy equipment work, resident brown trout from upstream and from Ruxton Creek were observed in significant numbers in the newly constructed pools and habitat features within the project reach. Trout can be easily spotted from the stone bridge, as well as along the sidewalk on Manitou Avenue near the west side of the park. Informal sampling, using a rod and reel, appears to indicate that resident trout are utilizing the new habitat, with several anglers reporting catching and releasing 15 or more trout in a single visit to the park.



The project has brought a renewed interest within the community to preserve Fountain Creek as a valuable resource for our town and the region. Local community participation in the project was exemplary, and credit should be given to the Rocky Mountain Field Institute and Trout Unlimited for recruiting these crucial resources. Recently, a local television station carried a story about the Cheyenne Mountain Chapter of Trout Unlimited receiving the coveted National "Golden Trout" Award, and featured the Soda Springs Reach, with plenty of footage of brown trout swimming in the newly created pools, as an example of the Chapters' efforts in cold water conservation. With the successful completion of the Soda Springs Project, the FCRC is pursuing further restoration efforts, as part of the master plan to restore the river from arch to arch. Assessments and planning have been completed on an additional two stream reaches, and funding has been secured to complete the next phase; a renovation of Shryver Pond and Fountain Creek through Shryver Park in early 2009.

Our responsibility to the project does not end when the last piece of equipment leaves the project site. Post-Project monitoring of the effectiveness of the treatments will be critical to evaluate the success of the project, as well as to help us ensure that we are using treatments in future projects that have a good chance of success. To this end, post-project photo-point monitoring stations have been established in the project reach to allow for easily repeatable monitoring over time of vegetation and stream bank treatments. Inchannel habitat treatments will be monitored in the short term by measuring the residual pool depth of these features, to determine whether adequate scour has been accomplished to keep these habitats from accumulating sediment. It is recommended that monitoring of in-channel habitat features be accomplished approximately one year following the installation of the project, after at least one significant bank-full event has occurred. Long term monitoring of the project may include re-surveying the project reach, using the same basin wide survey protocol used in the initial assessment, evaluating the changes to limiting factors identified in the initial assessment over a longer period of time. A full assessment should be considered four to five years following the project installation. The FCRC is working with several local colleges and universities to assure that this monitoring effort can be completed without significant impact to resources available for future restoration projects.

Fountain Creek Restoration Project