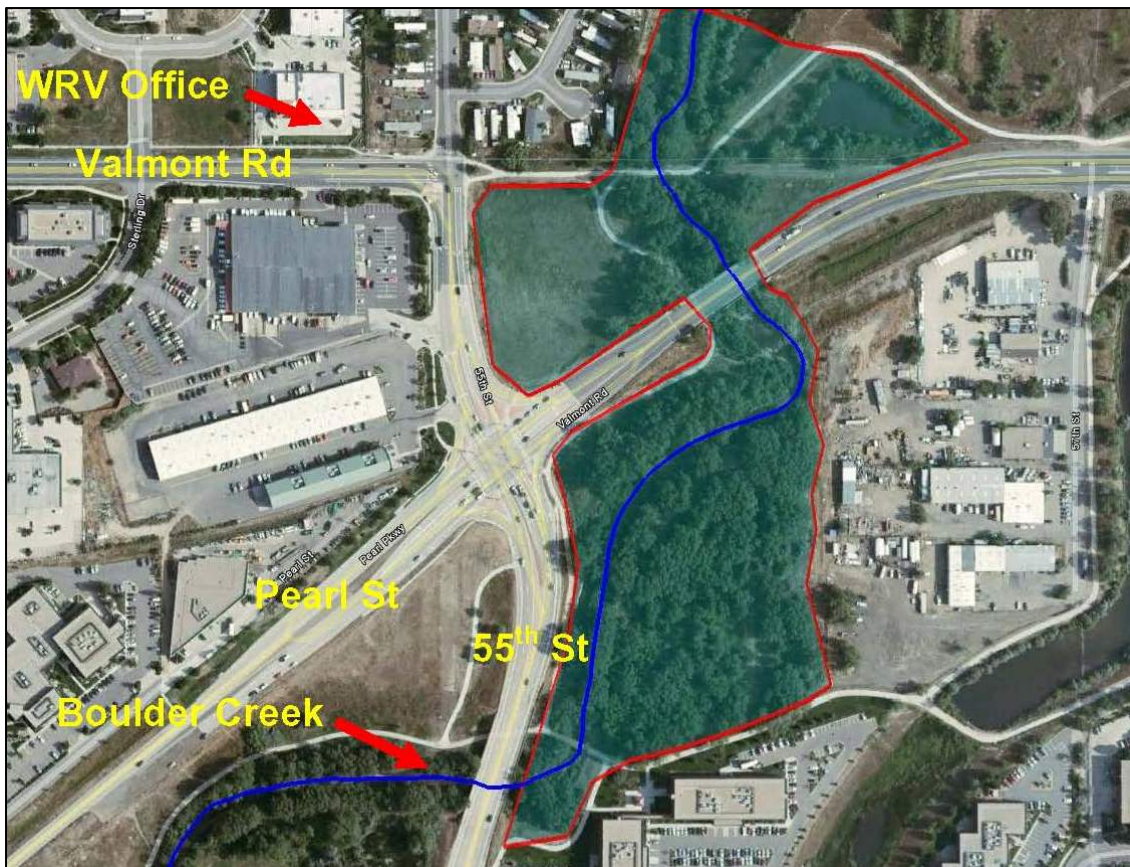


Boulder Creek Volunteer Restoration 2012 Final Report

Implemented by

Wildlands Restoration Volunteers

January 1 – June 30, 2012



Note: This report covers one of multiple phases of both the Boulder Creek Adopt Site Volunteer Restoration Project. The continuation of the larger restoration effort affecting many miles of stream and the larger watershed could be continued for 5-7 years assuming sufficient funding can be obtained.

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Timeline:

Project Planning and Project Team Coordinating -----January-June, 2012
Volunteer Leader Training -----February-April, 2012
Volunteer Recruitment -----January-June, 2012
Technical Design -----May-June, 2012
Project Implementation -----June 20, 2012
Project Debriefs/Evaluation -----June 25, 2012
Follow-Up Youth Watering Project-----June 27, 2012

Each year, WRV scouts dozens of sites that could eventually qualify for a project. There are always more to do than resources allow, so choices must be made. These choices are made primarily by the WRV Project Selection Committee. These engaged volunteers review all potential projects for a given year and rank them on a spectrum of criteria. WRV staff and committee members then evaluate the master list to determine how many projects WRV can accomplish with resources likely to be available in the coming year. This list is presented to the WRV Board of Directors for final approval. During any project year, weather conditions and bureaucratic timetables often change projects or postpone them.

Four Boulder Creek Adopt-Site projects (three of which will occur after the performance period) were among a slate of about 60 projects approved for implementation in 2012. Committee members were asked to evaluate projects on ecological importance, overlap with WRV's mission, logistical requirements, available partnerships to help, leadership needs, financial resources needed and available, geographic availability, number of obstacles to project completion, number of volunteer-days necessary to complete the project, the ability of the project to satisfy volunteers, and how the project would complement others in the WRV project season. Additional watering projects are currently being scheduled for the Boulder Creek site in 2012 to help counteract drought effects on recent native plantings.

WRV volunteers and staff have so far trained 232 volunteer leaders in a variety of roles for mentorship in 2012, who then were encouraged to co-lead with more experienced volunteers and staff at a variety of projects. Four well-attended events were hosted for the purpose of recruiting leaders and volunteer participants in February of 2012. Four recent trainees were mentored as a part of the Boulder Creek Adopt-Site Project on June 20, 2012.



WRV staffer Brian Rasmussen demonstrates to a High School Crew Leader the proper method for removing teasel seed-heads at the Boulder Creek Adopt Site Crew Leader Orientation on June 13, 2012.

Further recruitment for the entire WRV project calendar was done through outreach events at Boulder Creek Festival, Colorado State Capitol – Outdoor Stewardship Day – April 21, Naropa, Boulder Bioneers Salon, Colorado State University, 20/20 Tax Resolutions, Fort Collins Winter Farmer’s Market, New Belgium Brewing Tap Room, Patagonia – Boulder, REI – Denver flagship store, O’Dell’s Small Batch Festival, REI Get Involved Day in Boulder, and Boulder Microbrews for the Environment. Finally, announcements of the entire project calendar were made through the WRV newsletter (~5,500 readers), the Colorado Mountain Club’s weekly e-GPS listserv, using Facebook posts on WRV’s ~700 member fan page, and emails to WRV’s 4,500-member listserv.

Project Team

The project team was assembled including volunteer leaders with extensive expertise, and met prior to the project date for planning. Team members are listed below:

Eric Fairlee, Agency Liaison
Sarah Egolf, WRV Staff Liaison
Elizabeth Slokar, Project Lead
Brian Rasmussen, Technical Advisor
Mentor
Zach Wentz, Youth Technical Advisor
Mentee
Amy (Kumiko) Iwata, Tool Manager
Raymond Bridge, Assistant Tool
Manager

Amy Ansari, Lead Camp Cook
April Andujar, Camp Cook
Susan Flack, Auxiliary Camp Cook
Nancy Martin, Auxiliary Camp Cook
Seth Blum, High School Crew Leader
Rob Pudim, Crew Leader
Dave Fletcher, Crew Leader Mentor
Ian Oeser, Crew Leader
Alex Aleu, Crew Leader Mentee

Crew Membership included corporate groups from Kaiser Permanente and Celestial – Seasonings among others.



Project Leader, Technical Assistants, and Crew Leaders gather onsite to demonstrate proper planting techniques, tool usage, identify targeted weed species, and test soil moisture on June 13, 2012.

Project Schedule

May 20	"Teaser" email sent to registrants to build enthusiasm
May 31	Site visit for Technical Advisor & Assistant Technical Advisors
June 8	Additional site visit for Technical Advisor & Assistant Technical Advisor
June 11	Project details email sent to registrants with directions, timeline, waiver and "to-bring" list
June 13	
5:00 pm	Crew Leader Orientation
June 19	
5:00 am	WRV Staff liaison sends out reminder email to volunteers
3:00 pm	Volunteer picks up donated coffee & bagels
4:00 pm	Tool Manager picks up tool truck
4:30 pm	Tool Manager & Assistant Tool Manager load tools
June 20	
7:00 am	Project Team & Tool Truck arrive, set up signs
7:15 am	Begin unloading and staging tools
7:45 am	Crew Leaders arrive
8:00 am	Volunteers begin to arrive
8:15 am	Welcome, introductions, morning announcements, crew formation
8:30 am	Form crews, safety talk, begin to work
Noon-ish	Lunch for about 45 minutes with educational talk
3:30 pm	End of work and begin cleanup
4:00 pm	Finish loading clean tools and leave site
4:30 pm	Tool manager & Assistant Tool Manager unload tools
5:00 pm	Tool manager returns tool truck
June 25	
5:00 pm	Volunteers & staff gathered to evaluate survey results & project successes/failures
June 27	
9:00-11 am	Elementary school-aged students from a nearby low-income neighborhood watered plants as part of an environmental education day-camp.

Youth Project

This follow-up watering project was led in June 27 by: Meghan Mosher, an AmeriCorps VISTA member, and Youth & Inclusiveness Coordinator at WRV, Matteo de Valenzuela, Multicultural Education and Outreach Director at partner organization CLACE (Latino Center for Art and Science Education) high school student leader Harnek Guladi. Outreach & recruitment was conducted at a low-income housing development called Red Oak Park. WRV has developed a relationship with this neighborhood over several months with an after-school environmental education program and a weekly environmental education day camp in the summer. Both of these programs are in a pilot stage. This relationship development over time has helped WRV educate and engage a wider diversity of youth. Eric Fairlee served as the City Liaison, and planning was undertaken the previous week. Five elementary-school aged students participated in watering plants planted in 2012 and 2011. An educational component helped students learn about water spiders, the life cycle of the site and restoration goals for its future, plant identification, invasive species and algae. Follow-up youth watering projects are planned for the next two following Wednesdays.



Students and leaders waded in the Creek to cool off after watering in the heat.

Grant Budget

WRV Boulder Creek 2011-2012 Budget & Timeline Table

Task	Description	Target Start Date	Target Completion Date	CWCB Funds	City of Boulder OSMP Cash	Cummins Rocky Mountain, Inc.	Eco-Products Cash	City of Boulder OSMP In-Kind	Sun-Belt Rentals In-Kind	303 Tree In-Kind	WRV In-Kind	Total
1	Staff (site visits, design, planning, vol. recruitment, project mgt)	1/15/12	6/30/12	\$7,900	\$1,000	\$600	\$700	\$3,600				\$13,800
2	Materials (plants, cage & irrigation, seeds, amendments, etc.)	1/15/12	6/30/12	\$1,500				\$800				\$2,300
3	Transportation (truck rental to haul tools/materials, staff mileage)	1/15/12	6/30/12	\$240				\$100				\$340
4	Food for volunteers (\$8/day/person)	1/15/12	6/30/12	\$350								\$350
5	Professional services (invasive tree removal) - 2 person-days w/ chainsaws & chipper	1/15/12	6/30/12							\$1,500		\$1,500
6	Project Implementation - volunteers (420 hours @ \$21.62 Independent Sector Rate)	1/15/12	6/30/12								\$9,080	\$9,080
7	Tools and Equipment	1/15/12	6/30/12	\$300					\$1,500			\$1,800
8	Volunteer leader training (riparian restoration skills, project support, first aid, crew leadership, etc.)	1/15/12	6/30/12	\$1,000	\$500	\$800	\$300				\$1,000	\$3,600
9	Volunteer appreciation (awards program, celebrations)	1/15/12	6/30/12	\$200								\$200
10	Accident Insurance for Volunteers	1/15/12	6/30/12	\$150								\$150
11	Postage, Printing and misc. office costs	1/15/12	6/30/12	\$300								\$300
12	Overhead	1/15/12	6/30/12			\$1,800						\$1,800
	TOTALS			\$11,940	\$1,500	\$3,200	\$1,000	\$4,500	\$1,500	\$1,500	\$10,080	\$35,220

Project Planning:

Once specific projects are selected and scheduled, a WRV leadership team is assembled to plan and implement projects, typically including a project leader, technical advisor(s), camp cooks, crew leaders, agency liaison, staff liaison, tool manager, and a WRV staff liaison. WRV staff collaborates with many skilled volunteers who have professional backgrounds in ecology, botany, hydrology, and civil engineering in the planning and design process. Teams typically meet twice in the months before a volunteer project and conduct a couple of field visits to complete technical designs and logistical plans. Detailed technical specifications are prepared and reviewed by the public land agency partner(s). The site is flagged and staked, as appropriate for hand labor or equipment operators. Crew leaders and other project leadership staff meet in the weeks before the volunteer event to finalize logistical plans to help ensure a safe, smooth project implementation phase. After completion, the team evaluates each project in logistical and ecological categories.



Project Technical Assistant Brian Rasmussen demonstrates proper use of a weed wrench to Crew Leaders.

Project Summary:

WRV implemented this project in order to improve riparian habitat on Middle Boulder Creek, near the intersection of 55th Street and Pearl Parkway in west Boulder, in June of 2012. The project continued the restoration and enhancement of 6 acres of riparian habitat bordering 1,700 linear feet of Boulder Creek. WRV staff and pro bono consultants (volunteers) worked with City of Boulder Open Space and Mountain Parks (OSMP) to carry out technical design and implementation. WRV assisted in restoration design, recruited the volunteers, trained volunteer leaders, planned and executed volunteer work at the site, and provided on-site environmental educational programs. OSMP will continue to conduct monitoring.

The site had been composed of mostly non-native riparian forest, which more closely resembled an eastern U.S. forest than a native Colorado Front Range riparian forest, with a native plains riparian community. In 2010 and 2011, OSMP and WRV had worked to remove many non-native woody trees and shrubs and some selected understory noxious herbaceous weeds. The primary woody species which were removed include Russian olive, crack willow, eastern box elder, and green ash. An estimated 300 trees per acre will eventually be removed. A minimally treated buffer was left near bike paths and along Pearl Parkway to reduce near-term public concern about tree and shrub removal.

In 2012 with the help of Colorado Water Conservation Board's Watershed Restoration Program, WRV implemented a project with the following objectives: 1) Restoration of 6 acres of native riparian habitat along 1,700 feet of stream; 2) Conversion of a non-native-plant dominated system to a native plant dominated system; 3) Six exotic species removed from six acres. During this specific period, approximately 528 native plants were planted. Thousands of weeds were removed, prioritizing Scotch thistle, musk thistle, houndstongue, teasel, box elder and green ash, and hundreds of previously planted native shrubs and trees were watered during approximately 50 volunteer days, yielding 460 volunteer hours valued at \$10,134, based on the most recent estimate for the value of volunteer labor by the Independent Sector in Colorado (2010 - \$22.03) were contributed. Eric Fairlee represented OSMP at the project.

Background:

The Boulder Creek watershed encompasses approximately 447 square miles in the geographic center of the upper reaches of the South Platte Watershed, and includes the quickly-growing communities of Boulder, Erie, Lafayette, Louisville, Nederland, Superior and parts of Arvada, Broomfield, and Frederick. Stream flow has been monitored on Boulder Creek at the Orodell gauging station since 1906. After flowing through St. Vrain Creek, the water influenced by the Boulder Creek Watershed finally reaches the South Platte. The flow of Boulder Creek is driven by the snow pack near the continental divide, and so varies substantially from one season to the next. Peak flows typically occur in June and low flows occur between October and March.

Some segments of Boulder Creek have been put on the 303(d) list (impaired stream) for *E. coli* and ammonia, and some have been put on the M&E list for aquatic life because of those contaminants as well as selenium and chromium VI. Surrounded in the proposed work-site by urban development, contaminants from human activities gather on impervious surfaces until a storm washes them into nearby storm drains, and then, untreated, into Boulder Creek. While all of Boulder Creek is considered safe for swimming, contaminant levels peak right after storms.

In this area, historic wetlands had been degraded or eliminated and much of the historic native plains riparian community had been replaced by a non-native mixture of trees, with substantially reduced value to wildlife. The non-native tree canopy was unnaturally dense, overly shading the ground and preventing native understory shrubs, grasses and wildlife from thriving. About 50 fish species, 18 of which are non-native, inhabited Boulder Creek as of 2006. Rainbow trout, brown trout, and brook trout were stocked in Boulder Creek and out-compete the native greenback cutthroat trout (a Threatened species) in lower elevations. Additionally, two introduced species, the New Zealand mudsnail, and the Eurasian watermilfoil, threaten ecosystems in Boulder Creek, and diatomaceous blooms have resulted from human alteration of its natural flow.

WRV's agreement with the City of Boulder to formally "adopt" this section of Boulder Creek and provide a certain amount of work each year is the first of its kind in the area. It is hoped that this type of agreement can be replicated by other organizations, and since WRV encourages collaboration with multiple partnerships with other groups our efforts will create more opportunities to participate in active stewardship.

The creek will benefit from volunteers' creation of a more natural and sustainable streamside plant community that will increase wildlife diversity.

Methodology:

Work was planned and implemented by WRV using a collaborative approach to watershed conservation. Eric Fairlee presented an educational talk about the life cycle of the site at the event. Tools, gloves, and other safety gear were staged by the project team prior to the event. Crews were apportioned throughout the site in accordance with numbers and types of work. One day-long project was held on June 20, 2012, and one small follow-up youth project was held on June 27, 2012. Volunteer activities mostly involved continued exotic species removal (mostly biennial weeds, and some non-native tree saplings) watering of approximately 1,100 and planting of approximately 582 native plants.

The City of Boulder flagged areas for work in color coordination with the map provided to crew leaders and staged plants for volunteers to plant (see below). Four City staff joined the Crew Leaders and Technical Assistants on site to provide leadership the day of the event. Due to hot, dry conditions, planting in the northwestern red zone was cancelled

Each group of 6 volunteers was assigned a Crew Leader and a zone for treatment. Each Crew Leader was equipped with photo identification guides to both the targeted weeds and native plants for watering. Crews were advised of safety hazards, and instructed about proper tool use and glove protocol. Orange hazard cones were set up in the bike path.

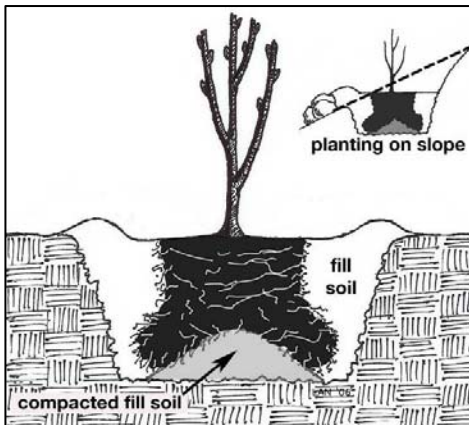
Volunteers cut and bagged flowering heads of houndstongue, musk thistle, Scotch thistle, and teasel, and chopped down plants at base, cutting all basal leaves, and leaving non-flowering material on the ground. Biennial weeds were not pulled if they were not flowering. Volunteers hand pulled young green ash and box elder adjacent to the creek using weed wrenches in order to minimize herbicide use. Soil was packed down again after trees were pulled to minimize disturbance.



Fewer volunteers were instructed to plant, to accommodate the climatic changes due to the drought and City capacity to water. In one zone, volunteers dug 1-2 inch deep “cells” in which to plant multiple herbaceous plants, so that watering would be more quickly

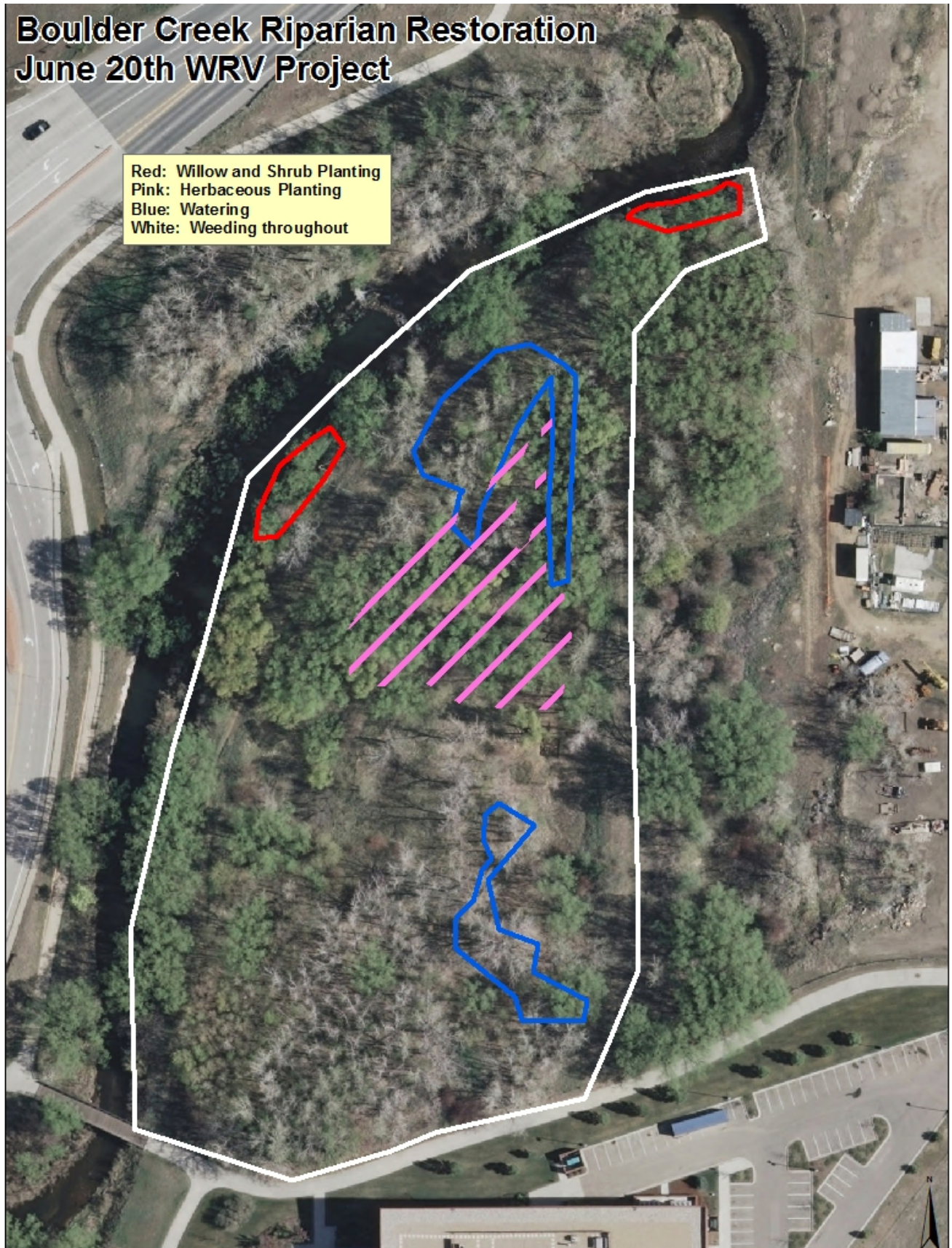
accomplished than with individual berms or watering pipes. Plants were mulched. See photos to the right and below to demonstrate planting “cells.”

Herbaceous plants were installed on 10 to 12 inch centers and the cells are typically 18 to 36 inches apart. Some cells will be added at subsequent projects. Trees and shrubs were planted as depicted in the diagram below.



Boulder Creek Riparian Restoration June 20th WRV Project

Red: Willow and Shrub Planting
Pink: Herbaceous Planting
Blue: Watering
White: Weeding throughout



Results:

- Grant Objective 1) Remove two exotic biennial species (houndstongue and thistle) from zones throughout the six acres;
- Achievement 1) Thousands of biennial weeds removed from zones throughout the six acres, prioritized in areas prepared for native planting – not just two species but four (houndstongue, musk thistle, Scotch thistle, and teasel).



- Grant Objective 2) Continue to remove invasive mature trees in concert with city efforts, including cut-stump and dragging debris off-site;
- Achievement 2) Objective modified due to a Colorado Department of Transportation mitigation project planned in the future to remove a large berm and remove non-native trees. Instead, volunteers focused on hand-pulling non-native tree saplings that had grown up in the same zone where cut-stumping occurred in prior year projects (green ash and box elder).
- Grant Objective 3) Plant approximately 2,500 riparian and wetland plants in appropriate zones.
- Achievement 3) This objective had to be drastically changed due to serious drought and hot weather. As the project date drew close, daily peak

temperatures at the site hovered around 99 degrees Fahrenheit, reaching over 100 multiple times the next week. Agency liaison Eric Fairlee made the judgment call that most plants would die if planted, especially trees, and that the city staff didn't have the capacity to water them enough. WRV is in the process of coordinating multiple follow-up watering events to ensure native plants survive the drought to establish successfully – both those planted in 2012 as well as 2011 and 2010. The 2009 plants are well established and not threatened by drought. The rest of the plants purchased with CWCB funds for Boulder Creek were delivered and currently reside at the City nursery and will be planted at the site by city staff and WRV volunteers in 2012 and early 2013, assuming drought conditions do not persist or worsen.

Planted species include:

- plains cottonwood -5,
- coyote willow 10,
- peachleaf willow (*Salix exigua*)-3,
- emoryi sedge (*Carex emoryi*) - 30,
- prairie cordgrass (*Spartina pectinata*) - 122,
- clustered-field sedge (*Carex praeegracilis*) - 100,
- creeping spikerush (*Eleocharis palustris*) - 113,
- western iris (*Iris missouriensis*) - 4,
- inland saltgrass (*Distichlis spicata*) -31,
- marsh sunflower (*Helianthus nuttallii*) - 26,
- switchgrass (*Panicum virgatum*) - 44,
- Arctic (Baltic) rush (*Juncus arcticus (balticus)*) – 26,
- blue vervain (*Verbena hastata*) - 14

Hand-watering of approximately 1,100 native plants from WRV plantings in 2010 & 2011 continued the process of converting an exotics-dominated system to a native-dominated system.

Follow-up actions planned in 2012 include multiple evening watering events, two youth-group events in July, and one corporate half-day event in October in preparation for a full-day event in October, and follow-up planting and irrigation by the City. Dates include July 20, July 21, October 4, and October 6.

Monitoring:

Six GPS photo points were created at the Boulder Creek site during 2010 for before-after sequences and general visual qualitative estimates of plant community makeup. A 20-year flood event ensued after the June, 2011 planting, and some of the immediate stream-side plantings were lost. Repeated plantings throughout 2011 and 2012 helped replace some of what was lost.

Continued long-term monitoring will be necessary to accurately evaluate the effectiveness of restoration treatments. The following information will be gathered in the future:

- Plant survival rates will be visually estimated to determine the success of the planting plan, and vegetation response to existing hydrologic, climatic, and soil conditions. The diversity and abundance of specific shrubs and trees established will be used to project future structural diversity (i.e., the diversity of high, mid, and low canopy layers) along the restored riparian areas, based on known heights and architectures of the established species. This monitoring will be undertaken by agency staff, and subsequent plantings scheduled if survival rates are not up to par.
- City staff will visit the site to qualitatively estimate need for future weed management, which would be implemented by WRV on a maintenance basis.



Photopoint 1 looking north at the dense box elder community, 2010.



Photopoint 1 looking north following clearing, June 2011.



Photopoint 1 looking north, June 2012. Understory vegetation is a mix of native and non-native species. Invasive species are being actively managed.



Photopoint 2 looking SW into a dense crack willow grove, June 2010.



Photopoint 2 looking SW prior to completion of clearing, June 2011. Area completed in 2011.



Photopoint 2 looking SW, June 2012. The area was planted with sedge, rush, and grass species during the June 20, 2012 WRV event.



Photopoint 2 looking SE, into a dense crack willow grove, June 2010.



Photopoint 2 looking SE, clearing was completed in December 2011, June 2011. Several crack willow were left dead standing.



Photopoint 2 looking SE, June 2012. Clearing will be completed in 2012, planting and seeding will be completed by 2013.



Photopoint 3 looking NE along Boulder Creek at a cottonwood-crack willow community, June 2010.



Photoopint 3 lookng NE prior to clearing, June, 2011. clearing was completed in December, 2011.

Contractors were unable to complete work for the City next to Photopoint 3 in 2012, so no change is evident and a photo was not taken. This view is next to a public bike path and will not be further treated for many years to address public aesthetic concerns about tree cutting.



Photopoint 4 looking NW into a dense crack willow grove, June 2010.



Photopoint 4 looking NW following clearing, June, 2011
Note several crack willow left dead standing.



Photopoint 4 looking NW. Reed canarygrass and creeping buttercup area being sprayed so the area can be seeded and planted with various native grass and forb species.



Photopoint 5 looking east at a clump of box elder under a canopy of cottonwood trees, June 2010.



Photopoint 5 looking east following clearing, June, 2011.



Photopoint 5 looking east, June 2012. The sprayed reed canary grass (brown area) was sprayed in 2011 and will be seeded with native tallgrass prairie species in October 2012.



Photopoint 5 looking south at the dense box elder community, June, 2010.



Photostation 5 looking south following clearing, June, 2011.



Photopoint 5 looking south. Sprayed in 2011, this former reed canarygrass-dominated area will be seeded to native tallgrass species in October, 2012.



Photopoint 6 looking NE in the dense box elder community, June 2010.



Photopoint 6 looking NE following clearing, June, 2011.



Photopoint 6 looking NE, June 2012. This area was seeded with native grasses (not visible in photo) in October, 2011.

Photopoint locations.

