Wildlands Restoration Volunteers Monitoring Report Summary for Year 2016

Brief Monitoring Project Summaries (date of the original project in parentheses)

Anemone Hill (2015)

Project goal(s): Close and restore redundant and unsustainable parts of the Anemone Hill trail system, both official and unofficial, on City of Boulder Open Space & Mountain Parks land.

Key lessons: 1) Site preparation by heavy equipment, seeding, installation of erosion mat, and scattering woody debris were successful in establishing vegetation on parts of the obliterate trails. 2) However, lack of control over use of the restored areas by hikers led to re-establishment of some of social trails and creation of new ones. 3) Make it clear to project partners that project success depends on appropriate follow-up. If the project partner can't guarantee such a commitment, the project should be postponed until such assurance can be made.

Boslough (2016)

Project goal(s): (1) Speed up post-flood revegetation of approximately one acre of cobble deposition plus scoured-out areas of the upper bank of South St. Vrain Creek 9 miles above Lyons; (2) plant trees on the old jeep trail on the slope above river right to prevent vehicle access.

Key lessons: 1) Involve the local fire department; several fire fighters came by during project day and offered to help; 2) getting an on-the-spot weather report from canyon residents was very helpful during the iffy weather forecasts; 3) careful supervision of each planting contributes to success.

Georgia Pass (20

Project goal(s): Revegetate and reduce erosion along nearly two miles of illegal road above tree-line. One-fourth of this project area as on a steep slope and the rest along a ridge.

Key lessons: 1) Erosion matting was installed on roughly half of the steep sloped section. Overall it proved very effective for controlling erosion and helping plant establishment. Preliminary analysis reveals that very high rock cover and erosion matting produced similar total plant cover, but the very high rock cover cost less; 2) large undulations in the ground surface produced high levels of plant establishment, perhaps due to trapped moisture and minimal erosion; 3) use heavy equipment to stage materials when possible.

Heil Valley Ranch (2001)

Project goal(s): Reclaim the dirt road up Plumely Canyon by preventing erosion and promoting growth of native species.

Key lessons: 1) The epic flood of September 2013 washed out sections of the restoration work performed in 2001. Nature provides both sudden transformations and the sources for natural revegetation; 2) the project was effective in areas not washed out by the flood, with dense native

vegetation, a variety of native plant species, few weeds, and minimal erosion – this in spite of the drought that soon followed the project

High Park Fire (2013-2015)

Project goal(s): Test the effects of a) post-fire reclamation seed mixes and mulching on ground cover and plant community composition; and b) effect of raking on vegetation cover.

Key lessons: 1) Seeding and mulching are likely required if the project goal involves establishing vegetation cover quickly and reducing the risk of erosion. Raking may be ineffective (and impractical) except is special situations.

Kenosha Wetland (2008)

Project goal(s): Jump-start the process of shallow-water wetland plant community establishment on 2.75 acres of a reclaimed surface gravel mine on Boulder County Parks & Open Space land. (This project goal was not stated on project day, but was inferred from the nature of the project.)

Key lessons: 1) Each project should have a concise, clearly stated goal that will help determine if the project was successful or not. 2) Establish at least one (preferably more) permanent photo-monitoring point (e.g., using a metal T-post) on project day to facilitate comparing pre-project and post-project photographs. 3) A dispute over water rights in the wetland led to water levels in the project area that were higher than anticipated. Higher water levels downed some of the plants that were installed by WRV on project day.

Peschel (2015)

Project goal(s): (1) Establish vegetation along the south bank of Peschel Pond to reduce wave erosion; and (2) increase the diversity of native wetland species present on the south bank of Peschel Pond.

Key lessons: 1) As much as possible, demarcate the locations of planting areas based on expected growing season water levels. 2) Make sure that plugs are planted deeply and with good contact between the soil and the root system. This is especially important for plants that are planted in / under water. 3) Clearly mark as-built planting areas on the ground and / or on an aerial image for accurate monitoring

Summit Lake (2011)

Project goal(s): Revegetation of newly graded slope next to new trail construction, study effects of rock cover on plug establishment, survivorship and growth. Data was collected and is being analyzed but was not completed at the time of this quick monitor from. Please follow up with Jarret Roberts. Also note that in 2015 the flags were pulled from this site that marked individual plants, this made observations in 2016 extremely difficult.

Key lessons: 1) Add lots of rock cover; rocks do not need to be very large; 2) keep people out of the planted areas; 3) consider a more diverse seed mix if available or using collected native seed; 4) plugs of plants perform far better than seeds; 5) the environment is exceptionally harsh at Summit Lake, with intense winds, freeze-thaw cycles, and s short growing season.

WRV QUICK MONITOR

Project Name: Anemone Hill
Location: Western edge of City of Boulder
Project date(s): October 4, 2014 **Monitoring Date**: September 21, 2016
Monitor(s): Alan Carpenter, Tim Seastedt

Project goal(s): Close and restore redundant and unsustainable parts of the Anemone Hill trail system, both official and unofficial.

Techniques used and their effectiveness: Road obliteration with heavy equipment (Buddy Kihm and his backhoe). The road obliteration was very effective at creating a suitable seed bed at a reasonable slope for restoration. Erosion blanket on especially steep slopes was very effective. Seeding all disturbed areas along the obliterated roadway and on segments of social trails slated for restoration was not as effective, judging from the abundance of non-seeded, alien plant species observed during monitoring. Transplanting small ponderosa pines was ineffective. The effectiveness of spreading wood straw mulch was difficult to evaluate. Scattering of coarse woody debris appeared to be effective.

General observations (e.g., weediness, erosion): In spots where subsequent social trail did not develop, the restoration appeared to be effective in reducing erosion to minimal levels and in establishing plant cover. Much of the plant cover on the restored areas had a high component of alien, annual species, such as Japanese brome, alyssum, and cheatgrass. However, the vegetation adjacent to the restored areas also had a high component of alien plant species. Of the seeded plant species (western wheatgrass, thickspike wheatgrass, slender wheatgrass, green needlegrass, blue grama, and little bluestem), slender wheatgrass and thickspike wheatgrass contributed nearly all of the seeded species plant cover in the restored areas. We observed no green needlegrass, blue grama, and little bluestem in the restored areas. Numerous native plant species were present in the restored areas but at low cover. Survival of transplanted ponderosa pines was minimal (one survivor).

Did the project meet the goals? No. The main problem seems to be insufficient follow-up by City of Boulder OSMP. Use of the project area by visitors appears to have increased post-project. We did not observe any signage directing users to stay off restored areas and to stay on designated trails. If the human usage of the project site had been controlled post-project, the project probably would have been successful

Did the project cause any untended consequences? Yes. Lack of follow-up by City of boulder OSMP appeared to have made matters worse on the steep east-facing slopes of Anemone Hill. A new social trail has developed parallel to and south of the social trail on the old roadway that WRV obliterated and restored. .

Corrective or Maintenance activities needed: The City of Boulder OSMP needs to follow up with its commitments previously made to control usage of the closed / restored sections of official and unofficial trail and to construct new trail segments.

Other pertinent information (flood, fire, construction, wildlife observations): Not applicable.

Important lessons for future WRV projects: Make it clear to project partners that project success depends on appropriate follow-up. If the project partner can't guarantee such a commitment, the project should be postponed until such assurance can be made.

Comparison Photos: Attach labeled photos and aerial photo marked with photo locations and compass directions.

Anemone Hill Monitoring Photographs

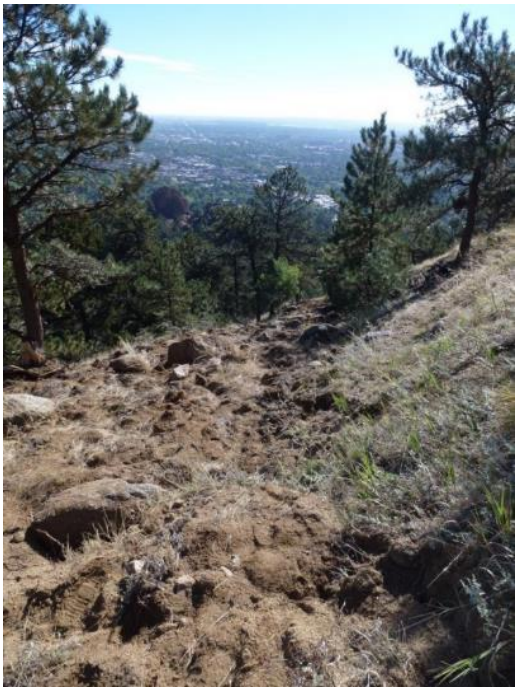
Looking west at the lower portion of the project area, which begins at the turn in the trail just above the human figure in the red jacket. The bare, scarified old roadbed is visible trending uphill. Project day, October 4, 2014

Looking west at the lower portion of the project area. The scarified area visible in the previous photograph is now not visible. September 21, 2016.

Looking west at the lower portion of the road obliteration project area prior to road obliteration by heavy equipment. October 2014.

Looking west at the lower portion of the road obliteration project area after road obliteration by heavy equipment. The site is ready for seeding and scattering of course woody debris. Barring excessive human traffic, the restoration would most likely have been successful. October 2014.

Looking west at the lower portion of the road obliteration project area. Note the drastically reduced amount of bare soil. A social has re-established following the project. September 21, 2016.



Looking east at the middle portion of the road obliteration project area after road obliteration by heavy equipment. The site is ready for seeding and scattering of course woody debris. Barring excessive human traffic, the restoration would most likely have been successful. October 2014.

Anemone Hill Monitoring Photographs

Looking east near the middle of the project area at erosion mat being installed on a particularly steep slope. Project day, October 4, 2016

Looking east near the middle of the project. The erosion mat is invisible and the bare soil has largely been revegetated except for the social trail that re-established after the project.

Looking west at a segment of level trail being scarified prior to seeding and application of wood staw.

Looking west at a segment of level trail. The restoration was a complete failure due to continued human use. The wood staw is completely gone.

Looking east at the top of the project area. The restoration was unsuccessful due to continued human use of the trail. The wood straw mulch was completely gone.

Looking northeast near the top of the project area. The restoration was successful here due to lack of excessive human use post-project. No social trail is visible here.

BOSLOUGH PROPERTY, SOUTH ST. VRAIN CREEK, 2016 MONITORING RESULTS
WRV Quick Monitor

Project Name: South St. Vrain Creek at the Boslough Property - Post-flood Restoration
Location: South St. Vrain Creek at the Boslough property, 9.1 miles above Lyons
Project date(s): 05/15/2016 **Monitoring Date**: 08/19/2016
Monitors: Laura Backus, Tracy Halward

The stream channel and low flood plains of Saint Vrain Creek reach of the Boslough property were scoured during the September, 2013 floods

Project goals: The project goals were: (1) Speed up post-flood revegetation of approximately one acre of cobble deposition plus scoured-out areas of the upper bank; (2) Plant trees on the old jeep trail on the slope above river right to prevent vehicle access.

Techniques used and their effectiveness:

- Planted 400 locally-sourced willow poles (*Salix exigua, S. irrorata*): Even with stinger holes, planting in the cobbles of the shallow water was exceptionally difficult, but people persisted. The willow-planting trench that Buddy dug with his back hoe was an effective techniques.
- Seed and mulch Buddy's backhoe tracks, place cobbles: revegetation is well underway.
- Planted 115 purchased bare-root and containerized native shrubs and trees, plus ponderosa pine and cottonwoods donated by Mark Boslough. Best survivorship was observed for narrow-leaf cottonwood, dogwood, Douglas fir, aspen, with some survivorship of chokecherry, Wood's rose, alder, gooseberry.
- Seeded with a mix of native grasses and some forbs specifically suited to the site. We observed Canada wildrye, as well as other species likely from the seeding.
- Lightly applied Biosol to boost plant establishment without encouraging weed growth. Unable to determine effect, but revegetation was proceeding well.
- Spread WoodStraw mulch throughout the entire site: Probably contributed to post-project vegetation growth. Most WoodStraw spread on the upper slopes was gone, possibly blown off.
- Plant trees on old jeep trail: many transplants took and were growing well.

General observations of plant survival, weediness, erosion:
Many plantings survived their initial summer, especially cottonwood, dogwood, aspen, Douglas fir. Willow pole plantings were doing well in the backhoe trench on river right. Good late-spring rains very likely contributed to the success of both the plantings and the volunteer species. Low streambank plantings had good survival as well as some of the plantings in the stream cobbles.

Did the project meet the goals? Meeting of the goals is in progress and is expected to continue.

Did the project cause any untended consequences? None observed.

Corrective or Maintenance activities needed: None observed.

Other pertinent information (flood, fire, construction, wildlife observations): Excellent rain conditions occurred on project day and following the project. We did not observe beaver depredation, but this could still be an issue as the willows and cottonwoods grow.

Important lessons for future WRV projects:
Involve the local fire department: Firefighters are helpful people by nature and very knowledgeable about local resources, both materials and volunteers. Several came by during project planning and offered help with local willow cuttings and watering.
Getting an on-the-spot weather report from canyon residents was very helpful during the iffy weather forecasts.
Protect those native volunteer seedlings!
Careful supervision of each planting contributes to success.

Comparison Photos: See following pages.

May 15, 2016 - project day

August 19, 2016 - 3 months post-project: note vegetation developing on low floodplain of river left.

View downstream from bridge

May 2016

August 2016: Note good growth of planted ponderosa pine
that will help block the old jeep trail from vehicle use.

	
May 2016: Note high water covering low floodplain.	August 2016: Note good vegetation growth in exposed cobbles of low floodplain.

	
May 2016, upstream end of Section 2 in center of photo. Note tall stalks of weedy mullein.	August 2016: Note increase in vegetation density of low floodplain (both sides of creek), survival of some cottonwood and willow plantings, and decomposition of woodstraw mulch. Weedy mullein has increased.

GEORGIA PASS, 2016 MONITORING
WRV Quick Monitor

Project Name: Georgia Pass Restoration
Location: South side of Glacier Peak along Continental Divide between Breckenridge and Jefferson, Colorado
Project date(s): 8-29-12 **Monitoring Date**: 7-20-16
Monitors: Jarret Roberts, Tim Seastedt, Elizabeth Drozda Freedman, Sonya LeFebre, Eve Gasarch, Roy Cook, Zeb Delk

Notes: This is part of a larger monitoring effort that involves quantitative data and analysis. That data is being analyzed as part of a project by Jarret Roberts. This form will focus on bigger picture observations of the entire project site.

Project goal(s): Revegetate and reduce erosion along nearly two miles of illegal road above tree-line. 1/4 this project area as on a steep slope and the other ¾ ran along a ridge.

Techniques used and their effectiveness:
Erosion Matting: Erosion matting was installed on roughly half the steep sloped section. Overall it proved very effective as controlling erosion matting and helping in plant establishment. Preliminary analysis reveals that with very heavy rock cover there is not a difference in total cover or the major species between this treatment and rock cover. We were concerned about not burying the sides of the matting and having high winds pull it loose over winter. In the end we just used thick gauge 6" staples and have not seen any issues. Volunteers did a great job installing the matting with minimal tenting.

Rock Cover: Rock cover was used as a more cost effective treatment on the other half of the steep slopes. Due to the rocky nature of the area we were able to use heavy rock cover ~ 1 softball sized rock every 6 inches. Upon returning to the site in 2014 we observed more Draba species in this treatment but this has not held true in 2016 under analysis. Rock cover also seems to have prevented erosion allowing seed and planted vegetation to establish.

Undulations: Small and large undulations were added throughout the project site. On the more flat upper section of the site small undulations were used to close one track on a two track road. Here depressions and small hills were created ~ 6 inches above and below ground depth. The depressions have seen significant plant growth from seeding and natural recruitment. The high spots remain more bare but are starting to see some establishment. On the steep slopes, large and small undulations were added. The large undulations or water traps appear to trap moisture, prevent erosion and have high levels of plant establishment.

Straw wattles: 50+ sections of 6' long straw wattles were added to the site to help prevent erosion. There is evidence of sediment build up behind the wattles showing they are working. It is debatable as to their necessity on the project. Areas without wattles appear to be doing as well as those with them. There were only a few failures where wattles were blow away by wind. Using two stakes in a cross pattern at both ends seems to prevent this.

Seeding: Seeding seems moderately successful. *Deschampsia cespitosa, Poa alpina* and *Trisetum spicatum* were all seeded. *Poa* seems to have done the best and while the other two are present they are not the majority of species. It is encouraging that there is a diversity of naturally recruited species and perhaps the seeded species have facilitated natural recruitment.

Transplants: Transplants were done in two sizes. Large transplants were installed via a

backhoe and small transplants were installed with volunteers. One major thing to note is that the holes where the transplants were taken have still not recovered with the exception of places where they were filled in. The larger transplants are doing well. The edges appear to have died back a little, especially where the plug was planted at all above ground level. Even in these cases much of the vegetation survived adding a great diversity to the restored area.

General observations of plant survival, weediness, erosion: Overall the site is looking very good and the restoration has been very successful. Erosion is almost completely controlled and visually vegetation has filled some areas to a point they are blending into the surrounding area. There are some sections doing better than others but given more time we suspect the site will recover completely.

Did the project meet the goals? Yes.

Did the project cause any untended consequences? None, known.

Corrective or Maintenance activities needed: None needed.

Other pertinent information (flood, fire, construction, wildlife observations): In 2016 another project was done adjacent to both ends of this project. Overall this should improve the chances of full recovery as it will make it even harder for any OHV vehicles to get into the project area.

Important lessons for future WRV projects: Consider the value of and time of straw wattles. Use heavy equipment to stage materials when possible.

See Comparison Photos on the following pages.

2016: Rock cover area in foreground shows old road blending into existing vegetation. You can still see the outline of the road in lower sections but it is largely vegetated at this point.

2016: Close up of erosion matting 4 years after installation at elevation ~ 11,500ft. It is largely decomposed but still providing some structure. Tufts of vegetation are from seeded species and natural recruitment.

2015: Note undulations and rock cover

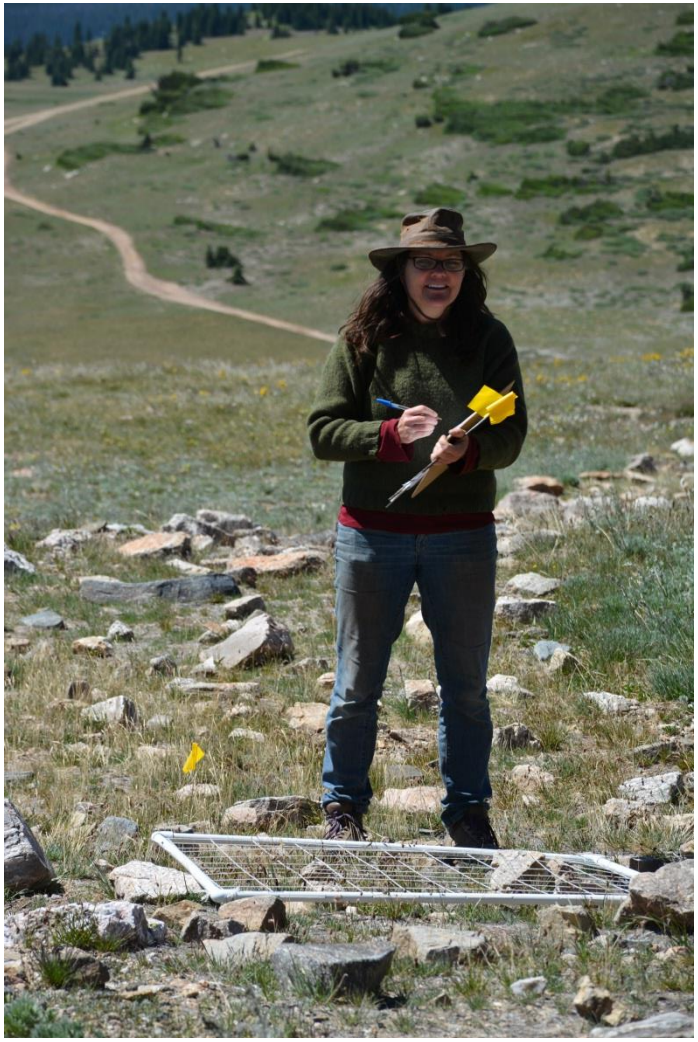
2011: Year prior to project.

2015

2014

2012

2016: Erosion matted area up higher that is doing very well. Note there is still some rock cover on top of the matting and you can see a straw wattle at the very bottom of the photo.



2016: Sonya standing in center of restored road, rock cover area.

PLUMELY CANYON ROAD RECLAMATION AT HEIL VALLEY RANCH, 2016 MONITORING
WRV Quick Monitor

Project Name: Plumely Canyon Road Reclamation
Location: Heil Valley Ranch, Boulder County Parks and Open Space
Project date(s): 9-22-2001 **Monitoring Date**: 8-31-2016
Monitors: Laura Backus and Tracy Halward of WRV and Kevin Grady of Boulder County

Note: The Plumely Canyon Road reclamation project demonstrates both the result of native seeding and placement of water control structures conducted 15 years prior to monitoring as well as the very intense floods of September 2013 that washed out project areas adjacent to the stream. Although the site experienced drought following project implementation, Kevin noted that road revegetation surged after the heavy rains and flooding of 2013.

Project goal(s): Reclaim the dirt road up Plumely Canyon by preventing erosion and promoting growth of native species.

Techniques used and their effectiveness (areas not washed out by 2013 floods):
- **Water Bars, Drainage Crossings, and Log Check Dams:** Effective - in areas not washed out by flood waters, except for some lower canyon sections where flood waters caused severe gulleying. Immediately above the log check dams that were still visible, fine materials had accumulated and were supporting grasses, forbs, and woody species. These structures appeared to have been effective at gully prevention during the extreme rains of 2013.
- **Seeding of native grasses:** We noted side-oats grama, possible mountain brome, and possible Canada wildrye from the seed mix which also included western wheatgrass, slender wheatgrass, blue grama, and regreen. Additionally, we noted native bluebunch wheatgrass, Canada bluegrass, prairie junegrass, wildrye species, little bluestem, side-oats grama, purple three-awn, squirrel tail, fringed sage, lupine, geranium, yarrow, and scorpion weed. Volunteer woody species included ponderosa pine, Douglas fir, smooth sumac, and wild rose. Reclamation areas out of the flood path were well-vegetated.
- **Biosol, Erosion Control Blankets with large rocks on top, Debris Scattering in areas without erosion control blankets:** Unable to determine which sections received these treatments, but sections still intact post-flood had good vegetation cover.

General observations of plant survival, weediness, erosion: The old roadway is, for the most part, well-vegetated with few weeds and little erosion. We noted non-native cheatgrass, smooth brome, orchard grass, Japanese brome were also present.

Did the project meet the goals? Yes, for sections not washed out by the 2013 floods.

Did the project cause any untended consequences? None observed.

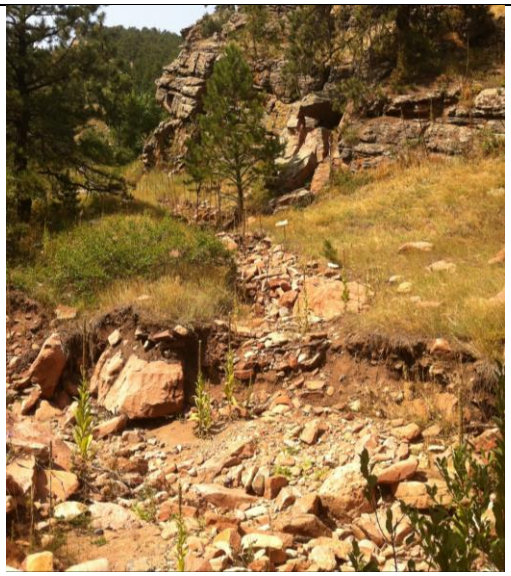
Corrective or Maintenance activities needed: None needed for sections not washed out by the 2013 floods. It is possible to speed up revegetation of boulder and cobble deposition in the flooded areas, but probably low priority.

Other pertinent information (flood, fire, construction, wildlife observations): We observed bobcat and elk scat although there was not a well-developed wildlife trail along the old roadway.

Important lessons for future WRV projects: We just don't know what will happen to our projects following project day. Nature provides both sudden transformations and the sources for natural revegetation.

See Comparison Photos on the following pages.

2001: Note double track road, the project revegetation target.



2016: Note flood-scoured creek drainage in foreground and, in the middle of the old road, an erosion gulley from the 2103 flood.

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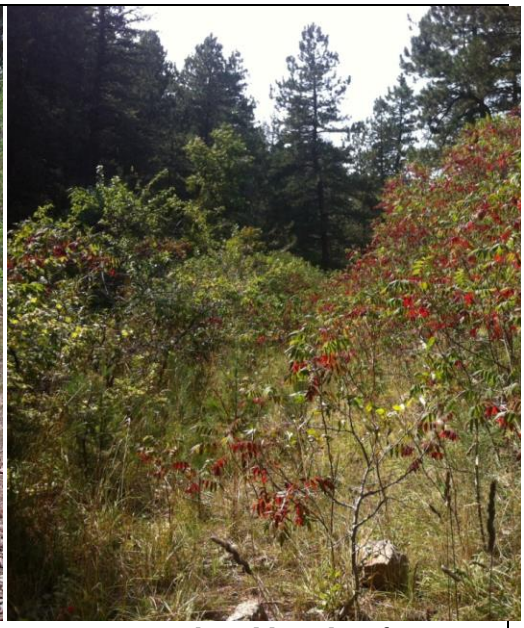
2001: Note shallow ruts and vegetation only in center of road.



2016: Note that old road surface is densely vegetated with grasses and volunteer sumac.

HIGH PARK FIRE – MONITORING 2013-2015
WRV Quick Monitor

Project Name: High Park Fire
Location: Larimer County, Colorado – Mostly in the Roosevelt National Forest in the foothills west of Fort Collins
Project date(s): **Monitoring Date**: 2013 - 2015
Monitor(s): John Giordanengo

Project goal(s): Test the effects of a) post-fire reclamation seed mixes and mulching on ground cover and plant community composition; and b) effect of raking on vegetation cover.

Techniques used and their effectiveness: Treatment 1: Seed with aggressive native species (mountain brome, slender wheatgrass, western wheatgrass, Sandberg bluegrass) and triticale plus mulch; Treatment 2: Seed with aggressive native species and triticale plus mulch and rake; Treatment 3: Control (do nothing). The combination of seeding and mulching was effective at increasing cover of vegetation and for reducing the cover of weedy species relative to the control treatment. Raking was marginally effective at increasing plant cover, but was very time consuming. Mulch was weed-free agricultural straw applied at a rate of one ton per acre. Treatments initiated in April 2013.

General observations of plant survival, weediness, erosion: Certain native species reappeared (apparently from the soil seed bank and from re-sprouting) following the fire. Weed cover and soil erosion were considerably lower in the seeded plots compared to the unseeded plots.

Did the project meet the goals? This was primarily a research project. Thus, the goal was to acquire knowledge useful for future fire-related restoration projects. The findings that seeding was effective at increasing cover of perennial, native seeded grasses and at decreasing the cover of weeds, and decreasing soil erosion should be useful.

Did the project cause any untended consequences? None.

Corrective or Maintenance activities needed: Not applicable.

Other pertinent information (flood, fire, construction, wildlife observations): The study sites had steep slopes and sandy loam soils, about 6,150 feet in elevation in the Lawrence Creek watershed.

Important lessons for future WRV projects: Seeding and mulching are likely required if the project goal involves establishing vegetation cover quickly and reducing the risk of erosion. Raking may be ineffective (and impractical) except is special situations.

Comparison Photos: Insert labeled photos with an aerial photo marked with photo locations and compass directions.

The left side of this photo was seeded and mulched; the right side was a control (do nothing) plot. Note the high abundance of grasses on the left side and the abundance of horseweed (*Conyza canadensis*) on the right side.

KENOSHA WETLAND – 2016 MONITORING
WRV Quick Monitor

Project Name: Kenosha Wetland
Location: North of Kenosha Road in Eastern Boulder County
Project date(s): June 14, 2008 **Monitoring Date**: September 20, 2016
Monitor(s): Alan Carpenter, Jean-Pierre Georges

Project goal(s): Jump-start the process of shallow-water wetland plant community establishment on 2.75 acres of a reclaimed surface gravel mine. (This project goal was not stated on project day, but was inferred from the nature of the project.)

Techniques used and their effectiveness: Plant approximately 10,388 container-grown, 10-cubic-inch wetland plants. Numbers of plants by species: 6,370 hard-stem bulrush (*Schoenoplectus acutus*); 1,176 soft-stem bulrush (*Schoenoplectus tabernaemontani*); 882 *Schoenoplectus pungens* (American three-square); 294 giant burreed (*Sparganium eurycarpum*); 784 blackcreeper sedge (*Carex praegracilis*); 392 common spikerush (*Eleocharis palustris*); and 490 Baltic rush (*Juncus balticus*).

General observations of plant survival, weediness, erosion: Of the planted species, the most evident were hard-stem and soft-stem bulrush and common spikerush. We did not observe any giant burred or blackcreeper sedge, although the latter could have been overlooked. We observed some American three-square and Baltic rush plants, but we could not determine if these were planted or were volunteers. The project area is dominated by narrowleaf cattail, even though this species are scarce in 2008. Cattail is generally considered to be undesirable in shallow-water wetland situations, because it tends to form mono-specific stands. Canada thistle was abundant in a few areas. We observed no evidence of erosion. The Areal extent of open water has shrunk considerably reflecting establishment and growth of emergent plant species, mostly cattail.

Did the project meet the goals? Maybe, but it's difficult to tell. It appears that the project area would have become vegetated with wetland plant species without planting them because cattail is highly invasive in such situations. Planting the bulrush and spikerush may have speeded the process of wetland plant establishment and may have increased the wetland plant species diversity over what it otherwise would have been.

Did the project cause any untended consequences? Not that we could discern.

Corrective or maintenance activities needed: It's not clear if controlling cattail to prevent it from taking over the wetland would have been effective or practical. We suspect not. It may be that cattail will inevitably become a dominant in shallow-water wetland such as this. The Canada thistle might continue to expand if it's not controlled – but control might not be practical in areas of standing water.

Other pertinent information (flood, fire, construction, wildlife observations): Soon after the Kenosha wetland planting project in 2008, Boulder County found itself in water court due to objections from other water users over augmentation rights. At various times the water levels at Kenosha wetland have fluctuated drastically. At one time, catttails took over much of the pond, before being drowned out by high water held in the pond for storage. That high water also flooded out much of the plantings. Cattails have since proliferated.

Kenosha wetland is one of the richest birding areas in Boulder County (see Appendix). For example, the project site hosts a number of breeding yellow-headed blackbirds, a rare breeder in Boulder County.

We noted only a few volunteer plains cottonwood trees around the perimeter of the project area. It's was not clear to us why more cottonwood trees did not colonize the uplands adjacent to the project site. As part of the project, we might have planted plains cottonwoods and peach-leaf willows on somewhat drier sites adjacent to the wetland planting sites.

Important lessons for future WRV projects: We should have established half a dozen permanent photo-monitoring points on project day. Metal T-posts each with a numbered aluminum tag would have been ideal. Photos taken from those points on project day, with the focal length of the camera lens and the direction of the photo recorded, would have made the monitoring much more informative. During the monitoring visit, it was difficult to determine exactly where wetland plants were installed.

Each project should have a concise, clearly stated goal that will help determine if the project was a success or not.

This project reminds us that risks, possibly unanticipated prior to the project, exist that could jeopardize project success. In this case, negotiations over water rights have complicated management of the wetland. As a consequence of this and perhaps other factors, water levels in the wetland have varied greatly, adversely impacting the success of the wetland planting.

Comparison Photos: Insert labeled photos with an aerial photo marked with photo locations and compass directions.

Looking northeast across Area #2; wetland dominated by narrow-leaf cattail; photo taken 9/20/16.

Looking east along the edge of water in Area #1 (?); the green bunches are spikerush; a few American three-square plants present; photo taken 9/20/16.

Looking northwest at volunteer plains cottonwoods on uplands northwest of Area #1; photo taken 9/20/16.

Looking west at bulrush plants and cattails in Area #1 (?); photo taken 9/20/16.

Looking east at bulrush plants at southern edge of Area #3 (?)

Looking south-southeast at bulrush plants and cattails in Area #5 (?); spikerush also present; photo taken 9/20/16.

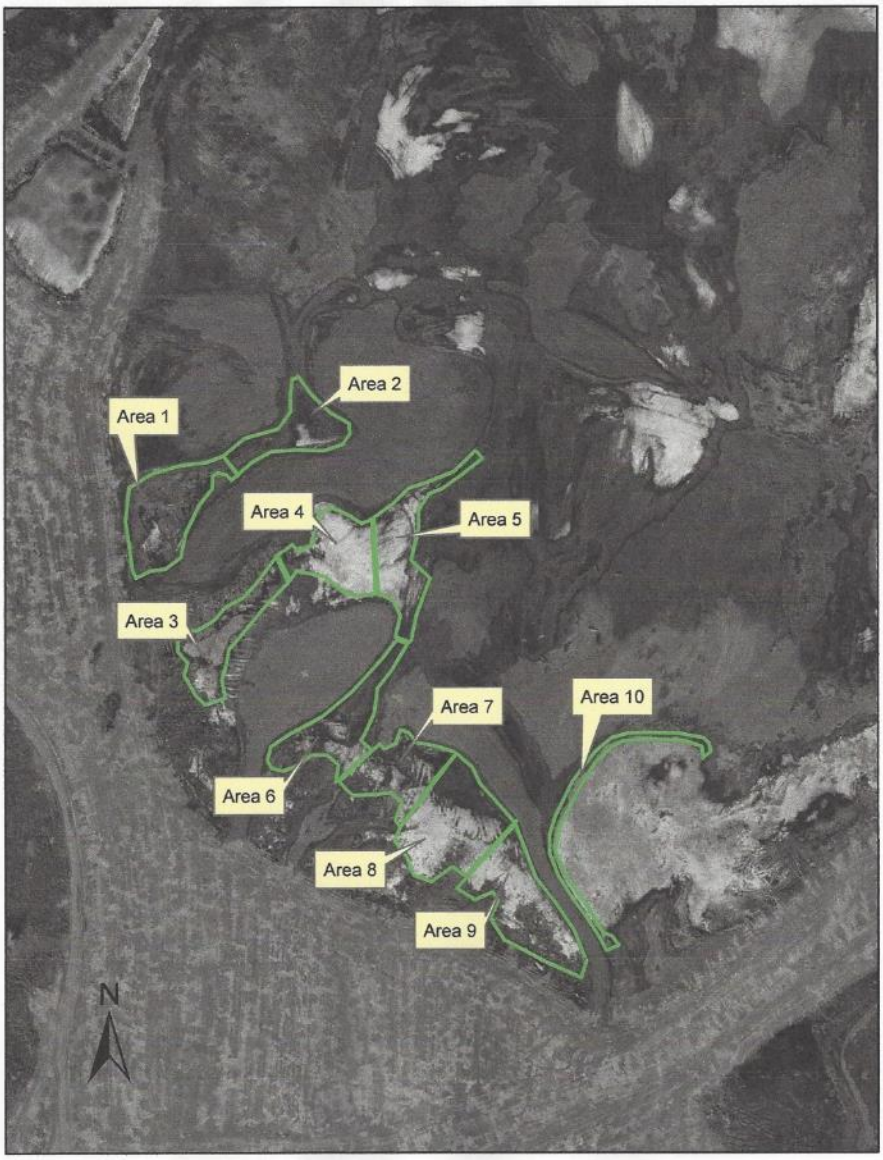
Looking north-northwest at bulrush along western edge of Area #10; abundant Canada thistle plants; photo taken 9/20/16.

Looking north at dense stand of American three-square at southern edge of Area #10; photo taken 9/20/16.

From hill top, looking north at dense stand of American three-square and bulrush a southern edge of Area #10; photo taken 9/20/16.

Looking north at dense stand of American three-square and bulrush a southern edge of Area #9; photo taken 9/20/16.

Kenosha wetland – Spring 2008. Looking northwest across the project site prior to planting. Note the abundance of bare ground and sparse vegetation. The cover of native wetland plant species is vastly greater now than it was prior to the project. Unfortunately, most of that cover comes from cattails.



Kenosha Ponds WRV Crew Work Areas

Appendix - Bird species that have been observed at Kenosha wetland

Ducks: Mallard, Common merganser, Hooded merganser, Ring-necked duck, American widgeon, Northern shoveler, Lesser scaup, Common goldeneye, Bufflehead, Green-winged teal, Cinnamon teal, Gadwall, Northern pintail, Canvasback, Redhead, Wood duck

Grebes: Pied-billeed grebe, Western grebe, Horned grebe

Shorebirds: Killdeer, Sora, Avocet, Spotted sandpiper, Wilson's phalarope, Wilson's snipe

Heron types: Great blue heron, Great egret, Snowy egret, Black-crowned night heron

Aquatic birds: Tundra swan, Canada goose, Cackling geese, White-faced ibis, Double-breasted cormorant, White pelican

Others: Bald eagle, Osprey, Belted kingfisher, Yellow-headed blackbird

PESCHEL POND, 2016 MONITORING RESULTS
Wildlands Restoration Volunteers Quick Monitor

Project Name: Peschel Pond Flood Restoration **Location**: Peschel Pond, Longmont, CO
Project date(s): October 10, 2015 **Monitoring Dates**: July 27, 2016
Monitor(s): Brian Sechler, Laura Backus, Tracy Halward August 17, 2016

Project goal(s): (1) Establish vegetation along the south bank of Peschel Pond to reduce wave erosion; (2) increase the diversity of native wetland species present on the south bank of Peschel Pond.

Techniques used and their effectiveness: Plugs of seven native wetland species were planted along the south bank of Peschel Pond. Wildlife exclusion cages were placed around planting areas. No bank erosion was evident, however, plantings were compromised by pond drawdown and resultant desiccation.

Dominant species below are in **bold**. Note that exact determination of planting boundaries was not possible.

Planting Zone 1: softstem bulrush
Species present: **bulrush**

Planting Zone 2: Softstem bulrush
Species present: softstem bulrush (often stunted and yellowish), **cottonwood and peach-leaved willow seedlings, dwarf spikerush**, cattail, Torrey's rush
Note: Did Sections 2 and 3 in the southeast corner get fenced? Although well-vegetated, almost no softstem bulrush are present.

Planting Zone 3: Prairie cordgrass
Species present: a few possible cordgrass clumps (lacking flowering heads), goosefoot, **alkali bulrush**, Torrey's rush, **alfalfa**, sweetclover, kochia, smartweed, rabbitfoot, cocklebur, horseweed
Note: Did Sections 2 and 3 in the southeast corner get fenced? No prairie cordgrass, but many alkali bulrush.

Planting Zone 4: Sedges (Nebraska, wooly, possibly others)
Species present: very few sedges, **rabbitfoo**t, alkali bulrush, possible three-square, smartweed, dwarf spikerush, cocklebur, witchgrass, **Torrey's rush**, very minor softstem bulrush

Planting Zone 5: Three-square bulrush
Species present: **sweetclover**, rabbitfoot, stunted smartweed, common sunflower, grass clumps

Planting Zone 6: Alkali bulrush
Species present: Very few, stunted alkali bulrush, **rabbitfoot**, alfalfa, cocklebur, goosefoot, prickly lettuce, curly dock, stunted blue vervain, **sweetclover**
Note: dry, cracked soil, lower areas have surface salts.

Planting Zone 7: Baltic rush, planting flags indicate sedges
Species present: minor sedges, **rabbitfoot**, **sweetclover**, alkali bulrush

General observations of plant survival, weediness, erosion:
No erosion observed. Plug survival low, many weedy species establishing in planting areas. Many native wetland plants volunteering both in and around wetter planting sites, especially in drawdown zone. Plug survival, especially for Baltic rush and alkali bulrush had decreased by the August monitoring. Many of the plots were dominated by non-native weedy grasses (most notably rabbit foot grass and foxtail barley) and / or alfalfa; however, some surviving plugs could be observed under the grasses. Other common weedy species included: cocklebur, thistle, sunflower, and curly dock. We also observed blue vervain, a native wetland species, in Plot #6.

Did the project meet the goals? Yes, but mainly due to establishment of volunteer species, both native and non-native in the drawdown zone.

Did the project cause any untended consequences? The exclusion cages protected not only the plugs that were planted, but also the non-native grasses and alfalfa from being eaten or pulled up by wildlife, allowing non-native species to dominate the plots. The dominance of the non-native grasses and alfalfa within the plots was striking compared to the sparse establishment of these same species outside of the exclusion cages.

Corrective or Maintenance activities needed: Remove fencing - the plants are well-established. Determine if water levels in pond can or should be made constant.

Recommendation for Future Projects: Deep-plant native cottonwood, peach-leaved willow and sandbar willow in areas above the drawdown zone. Changing water levels will probably prevent long-term natural woody recruitment in the drawdown zone.

Other pertinent information (flood, fire, construction, wildlife observations): During WRV site visits, we observed approximately one dozen pelicans, three cormorants, one prairie vole, numerous frogs, and occasional carp feeding in the shallow water.
Additionally, in mid-August, large flocks of yellow headed blackbirds, several great blue herons, spotted sand pipers, greater yellow legs, and black-crowned night herons were observed by the Bird Monitoring Group for the City of Longmont Parks Deptartment during bird monitoring. Except for the herons, these birds are becoming more rare in Boulder County. Sighting of these species indicates the importance of Peschel Pond and wetland habitat to wildlife.
Ground water levels dropped significantly following the project, reducing the survival of the wetland plantings and allowing for establishment of weedy grasses and forbs.

Important lessons for future WRV projects:
As possible, base location of planting areas on what is expected to be possible for growing season water levels. Significant native wetland plant diversity is developing in the wet soils of the drawdown zone. Most of the upper planting areas, however, are now densely vegetated with non-native alfalfa, rabbitfoot, and sweetclover.
Make sure plugs are planted deeply and that good soil contact is made with the root system. This is especially important for plants that are planted in / under water. Work from the bottom to the top of wetland zones to avoid tramping new plantings.
Clearly mark as-built planting areas on the ground and / or on an aerial image for accurate monitoring.

WILDLIFE AT PESCHEL PROPERTY

East Longmont on the St Vrain River

Bird Monitoring Group for the City of Longmont Parks Deptartment

Taxonomic list of avian use of this property as part of a city wildlife study. This list is for the baseline part of the study (first 6 months of post-2013-flood assessments; note that duck migration season is not yet a part of this list, nor are any nocturnal species):

Canada Goose	Northern Rough-winged Swallow
Cackling Goose	Bank Swallow
Wood Duck	Cliff Swallow
Gadwall	Barn Swallow
Mallard	Black-capped Chickadee
Blue-winged Teal	House Wren
Cinnamon Teal	American Robin
Northern Shoveler	Eur. Starling
Green0winged Teal	Common Yellowthroat
Bufflehead	Yellow Warbler
Common Merganser	Vesper Sparrow
Ring-necked Pheasant	Song Sparrow
Wild Turkey	White-crowned Sparrow
Double-crested Cormorant	Darn-eyed Junco
American White Pelican	Blue Grosbeak
Great Blue Heron	Red-winged Blackbird
Black-crowned Night Heron (juv.)	Western Meadowlark
Turkey Vulture	Yellow-headed Blackbird
Bald Eagle	Common Grackle
Sharp-shinned Hawk	Brown-headed Cowbird
Red-tailed Hawk	Bullock's Oriole
Sora	House Finch
American Coot	American Goldfinch
Killdeer	House Sparrow
Spotted Sandpiper	
Wilson's Snipe	Mammal use
Gull sp.	Coyote
Eur. Collared-dove	White-tailed Deer
Mourning Dove	Mule Deer
Belted Kingfisher	Bobcat (staff report)
Downy Woodpecker	
Northern Flicker	Herpetofauna
American Kestrel	Not yet surveyed
Western Wood-pewee	
Say's Phoebe	
Western Kingbird	
Eastern Kingbird	
Warbling Vireo	
Blue Jay	
Black-billed Magpie	
Common Raven	
Horned Lark	
Tree Swallow	
Violet-green Swallow	

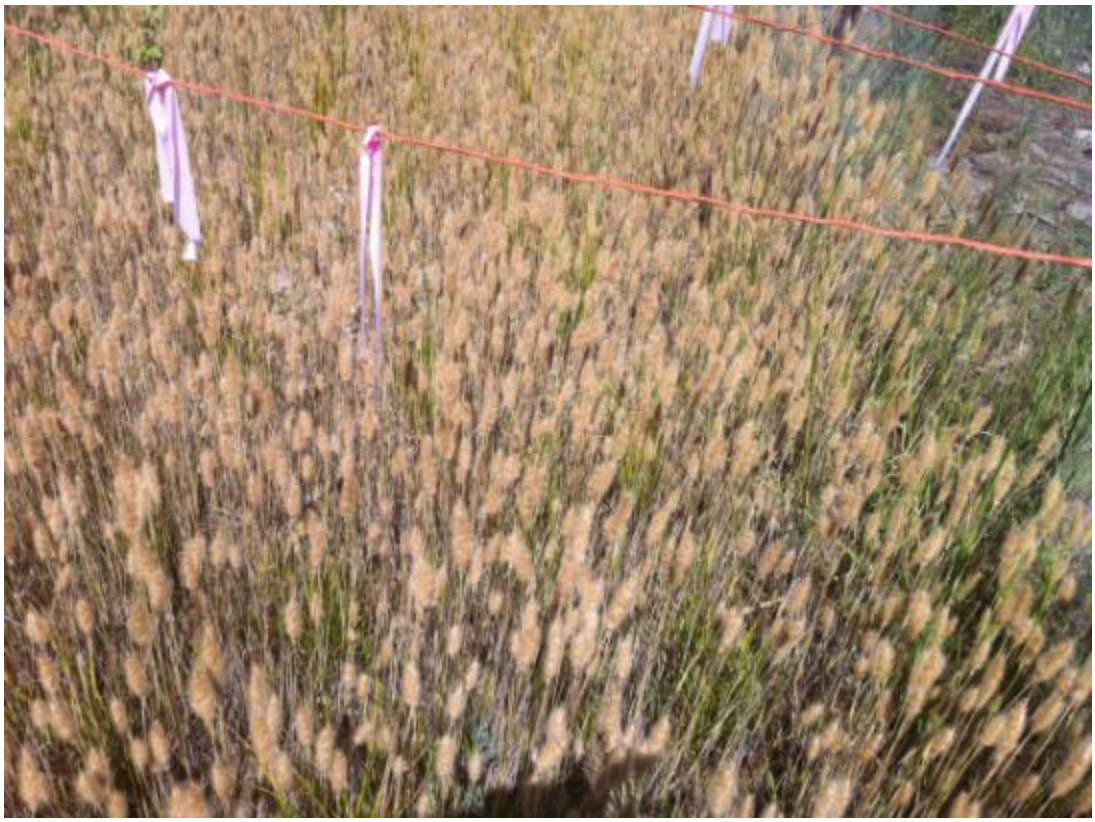
Site Photographs:

Stunted plantings of alkali bulrush among rabbitfoot grass in Zone 6. Note cracked soils. August 17, 2016

Western Zone 3 at left dominated by alfalfa and Zone 2 at right with poorly developing plantings of softstem bulrush. August 17, 2016

Torrey's rush developing in sedge planting area. August 17, 2016

Possibly Zone 4 sedge planting area, dominant rabbitfoot with sweet clover. August 17, 2016



Possibly Zone 7, Baltic rush understory in rabbitfoot cover. August 17, 2016

Zone 7 softstem bulrush planting area. The bulrush probably have rooted from the planting area out into the standing water. August 17, 2016

April 1, 2016 - 5 months post-project. Note plantings are dormant.

August 17, 2016 - end of 1st growing season. Note minor plantings of softstem bulrush at edge of water and dominance of non-native alfalfa in upper area.

South shore softstem bulrush and prairie cordgrass planting area (Site 2A / 3A), view to east

April 1, 2016 - 5 months post-project. Note plantings are dormant.

August 17, 2016 - end of 1st growing season. Note few native wetland plants are visible.

West shore planting areas alkali bulrush and sedges (Sites 4 and 6), view to west northwest

April 1, 2016 - start of first growing season. Note plants are mainly dormant.

August 17, 2016 - end of 1st growing season. Note dominance by non-native rabbitfoot grass in alkali bulrush planting area.

Southwest shore corner planting area 6, view to east

SUMMIT LAKE PLUG AND ROCK COVER, 2016 MONITORING
WRV Quick Monitor

Project Name: Summit Lake Alpine Restoration
Location: Summit Lake on the road to Mt. Evans, Colorado
Project date(s): 9-9-2011 **Monitoring Date**: 9-21-2016
Monitors: Jarret Roberts, Cathy Tate, Liz Kellogg

Notes: This monitoring report covers the area directly adjacent to the beginning of the Chicago Lakes Overlook Trail that is the first ~300 feet, not the entire Summit Lake project site. This area was planted with plugs grown out from a 2010 seed collection in the same area.

Project goal(s): Revegetation of newly graded slope next to new trail construction, study effects of rock cover on plug establishment, survivorship and growth. Data was collected and is being analyzed but was not completed at the time of this quick monitor from. Please follow up with Jarret Roberts. Also note that in 2015 the flags were pulled from this site that marked individual plants, this made observations in 2016 extremely difficult.

Techniques used and their effectiveness:
Alpine Plugs-Five years after planting survivorship of the planted plugs is estimated at ~ 50%. The initial experimental set up included two species, *Deschampsia cespitosa* and *Trisetum spicatum.* Plugs were placed in three rows roughly 1 ft apart. Please contact Jarret Roberts for other details. Rock cover did appear to influence the presence of a plug five years later. Though rock cover was placed around 75% of plugs in varying heights many of the setups were disturbed where the rock had been moved or was completely absent. The surviving plants were more often than not surrounded by rock cover (placement of 3 rocks on the windward side). Many of these plugs had grown to the point where the rock cover was not containing their horizontal growth. It will be interesting to re-examine them in a year or two and see if they remain constrained or are able to root under/around the rocks. Surviving plants were healthy and fruiting. Likely causes of plant death and disturbance of rock cover include foot traffic before fence was installed, mountain goats causing foot traffic, mountain goats eating the plugs, erosion exposing roots, and freeze thaw heaving plugs out of the ground.

Backhoe plugs: Some larger transplants were installed by a backhoe or excavator. These plugs appear to be doing very well. Many of these included abundance of *Geum rossii.*

Seeding- The area was also seeded with the same species. Seeding seems to me minimally effective. Very few of the seeded species were observed. Natural recruitment appears to be a larger player as many of the newly established plants are not the seeded species.

Fencing- A buck and rail fence was installed in 2012 to keep users out of the area. The fence likely helped prevent disturbance but also was placed on the edge of the planting area, partly covering the third planted row. The fence also likely provides a bit of a wind break/moisture accumulation due to snow for the plugs close by and may reduce sunlight slightly.

General observations of plant survival, weediness, erosion: Overall the site is recovering, but at a very slow pace. Other project areas at Summit Lake appear to be recovering at a more rapid pace. Many of these other areas are steeper slopes but had more rock cover added. Overall, cover is estimated at ~35% up from 0%. No invasives observed. Some minimal erosion was seen though not nearly as much as in 2012.

Did the project meet the goals? Yes, it appears to be close to a tipping point where natural

recruitment is filling in.

Did the project cause any untended consequences? None observed. The fence was unexpected when planting was done in 2011.

Corrective or Maintenance activities needed: Possible additional rock cover could be added as well as supplemental plantings. These would expedite the recover process.

Other pertinent information (flood, fire, construction, wildlife observations): Mountain goat and sheep have been observed in the area eating plugs. Human foot traffic is limited by the fence but some people may climb the fence. Wind is a huge issue. In 2014 wind over winter was strong enough to lift and move over 100' of buck and rail fence hundreds of feet. This fence was staked in with rebar so this is an impressive feat.

Important lessons for future WRV projects: Add lots of rocks cover; it does not need to be very large. Keep people out of the planted areas. Consider a more diverse seed mix if available or seeding from native collected seed.

See Comparison Photos on the following pages.

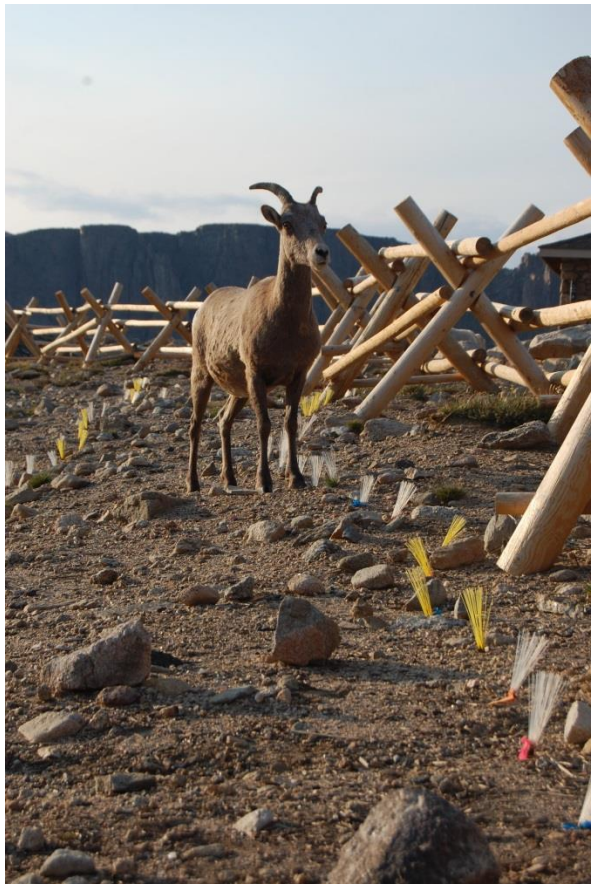
2011: Bare ground after planting and seeding. Note the disturbed round is a slight slope from the rock lined trail on the right to the natural vegetation on the left.

2012: One year later. Note the growth of some of the plugs (offset slightly to the right from the flags in this photo. There is minimal natural recruitment. The fence is now in place.

2016: Area re-flagged. Fence has moved after 2014 wind event when it had to be re-installed. Note: increased cover via natural recruitment and size of surviving plugs.

Plug that did not survive. Note that it is ~1 inch above ground level. Either freeze thaw or erosion cause this.

Large plug from backhoe above three planted plugs that had rock cover (marked with orange flags). Note the growth of the plugs and how they have filled the area between placed rocks.



Wildlife continually observed in planting area.