ESTES VALLEY WATERSHED COALITION

WATERSHED GRANT ESTES VALLEY WC MAINTENANCE SVCS 13 PROJECTS

FINAL REPORT

PREPARED FOR: COLORADO WATER CONSERVATION BOARD, WPG PROGRAM
ATTN: CHRIS STURM

OCTOBER 19, 2022
GRANT AMOUNT: $18,684.25

PREPARED BY

ESTES VALLEY WATERSHED COALITION
WILYNN FORMELLER, PROGRAM & DEVELOPMENT COORDINATOR
WILYNN.FORMELLER@EVWATERSHED.ORG
970-290-1829

TABLE OF CONTENTS

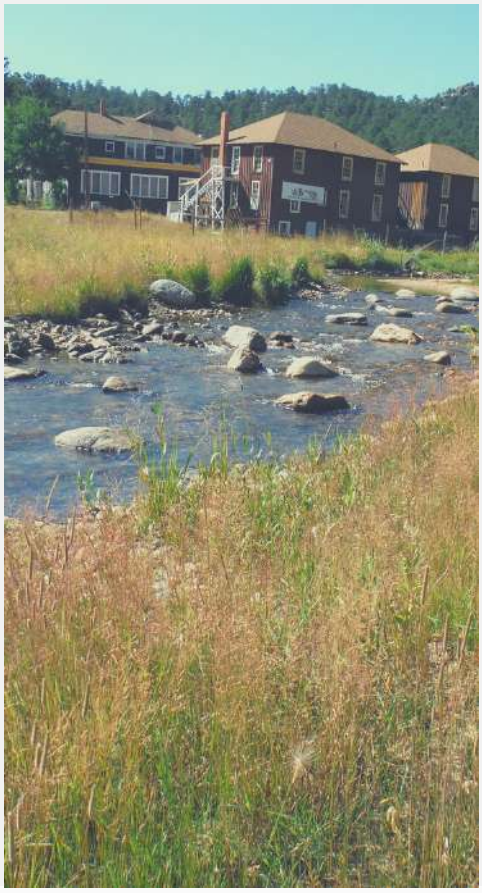
PROJECT DESCRIPTION

In the aftermath of the 2013 flood, EVWC planned and implemented fourteen watershed restoration projects from 2016-2018, along Fall River, the Big Thompson River, and Fish Creek –all within the Estes Valley Watershed. The coalition had an obligation to maintain the sites for three years in order to ensure the long-term resiliency of the designs. Since maintenance of one large site was fully resourced, EVWC focused on the other 13 sites. These sites needed additional fence and weed control measures to support the project success.

The maintenance services included weed control, elk fence repair and removal, post-warranty replanting on an as needed basis, and project oversight. Since this project overlapped with Covid challenges, EVWC was also able to use this project as an opportunity to build on its community stewardship efforts. The coalition had the unique ability to use the project to provide opportunities for the community to support the environment and safely interact outdoors.

PROJECT GOALS & OBJECTIVES

- Determine the resiliency of 13 of the original flood restoration sites
- Remove noxious weeds and repair or remove fencing
- Re-seed or replant areas that need it
- Provide an opportunity for community and property-owner involvement
- Strengthen EVWC community and agency partnerships
- Engage with volunteer groups to provide materials and labor to support the project



METHODS

Initially, EVWC contractors and board members reviewed the projects sites to assess the need for weed control and re-planting (see Appendix A). EVWC was also able to coordinate a walk through the sites once a year (2019-2021) with a hydrologist and engineer from Stillwater Sciences who had been involved with the original project designs.

EVWC contracted with the Larimer County Weed District to review the 13 project sites for noxious weeds. The Larimer County Weed District was able to take photos and provide an initial treatment that involved both herbicide and hand pulling of the noxious weeds. Subsequent weed treatments were performed over the duration of the project that included spraying, hand removal, and a specific cheat grass treatment.

EVWC reached out to the private landowners in the project area who were concerned about replanting and were able to coordinate reseeding and willow stake planting along 4 of the sites. EVWC board members and volunteers harvested willow stakes and replanted them along the Bugle Point project and three sites along Fish Creek. The Weed District helped with reseeding of the Fish Creek sites in October of 2019.

In order to monitor desirable versus undesirable plants in the project areas, EVWC coordinated with the weed district and was able to access EWP monitoring data. These photo points and vegetation surveys, along with regular site visits, provided opportunities to monitor the site vegetation with input from professionals.

PROJECT TIMELINE

APRIL 2019

Completed walk through of original flood restoration sites to assess weeds and replanting.

MAY-JUNE 2019

Purchased seed and contracted with Larimer County Weed Control for noxious weed control and reseeding of sites.

JUNE-OCTOBER 2019

Larco Weed Control treated multiple sites and recommended focusing reseeding along Fish Creek.

MARCH-JUNE 2020

Project delayed by Covid.

JULY-OCTOBER 2020

Organized volunteer days and coordinated with Larco Weed District to resume project.

MAY 2021-SEPTEMBER 2022

Continued monitoring and weed removal on sites and hired support for fence removal.

CONCLUSIONS

This project was a great community-supported effort that provided some opportunities for people to spend time outside during Covid and to learn more about the coalition. At the Larimer County Weed District's recommendations, EVWC was able to shift some funding to provide more weed control to certain sites, along with reseeding in areas that needed more cover.

EVWC board members and other volunteers also worked to replant willow stakes along four different project sites. Since we had project delays with the pandemic, EVWC was able to coordinate fence removal along all of the project sites. One of the properties, the Elkhorn site, was sold during this time and with new construction, the landscape around the project site was altered. EVWC did not revisit this site after 2020.

We were also able to donate some of the fence material to local landowners and reuse some of the posts to place bluebird boxes around the valley.

544 WILLOW STAKES
(HARVESTED & PLANTED)

1500 POUNDS OF NATIVE SEED BROADCAST

59 VOLUNTEERS
435+ HOURS DONATED

72% WEIGHTED COVER OF NATIVE VEGETATION
(ACHIEVED IN 2019)

LESSONS LEARNED & PROJECT ADDITIONS

Lessons Learned

Overall we are pleased with how the project turned out, but we will consider the following on future projects:

- Work with a consultant or monitoring team to follow a specific monitoring protocol for the vegetation.
- EVWC will coordinate fence removal with a contractor earlier in project or verify landowners are okay with removal.
- We were able to form new partnerships due to the Covid restrictions that impacted gatherings and indoor work. The Estes Valley Rec & Parks District was able to help with some of the fence removal and we met many new volunteers.

Project Additions

With approval, we changed the following:

- Expanded weed control measures on certain sites that needed more work.
- EVWC received additional outside funding that allowed us to hire a contractor to remove the remaining fence/posts along the Fish Creek reaches.
- Changed the scope from fence repair to fence removal due to Covid delays adding time to the project.

BUDGET

Project Name: Watershed Grant Estes Valley WC Maintenance Svcs 13 Projects

Billing/Timeline: June 2019-September 2022 *In-kind rate = $28.54

TASK	TOTAL BUDGET	CWCB BILLED	EVWC MATCH FUNDS	IN KIND*	DESCRIPTION
1	$0.00				Project Start Monitoring for 13 Project Sites: Inventory Undesirable/Desirable Plant populations and percentage of cover
2	$7,539.00	$2,850.00			Winter reseeding of areas with no perennial grass establishment, if ground not frozen. Remaining funds reallocated to weed control of project sites
3	$4,830.00	$2,415.00	$2,415.00	$5,708.00	Lower Fish Creeek, Middle Fish Creek, and Elkhorn: mechanical weed removal (hand pulling & bagging). We had approximately 260 volunteer hours.
4	$3,864.00	$2,338.73	$1,932.00		Lower Fish Creek, Middle Fish Creek, and Elkhorn: follow up visit for herbicide application once hand pulling is complete; follow up in June 2021 ($1983.99)
5	$3,864.00	$1,932.00	$1,932.00		Lower Fish Creek, Middle Fish Creek, and Elkhorn: fall herbicide application. Cheat grass treatment per weed district recommendations on Reach 4 in early summer 2021 ($384.33)
6	$161.00	$600.00			Cheley herbicide treatment
7	$161.00	$80.50	$80.50		Cheley follow up herbicide treatment
8	$161.00	$80.50	$80.50		Cheley fall cheat grass treatment
9	$2,979.00	$2,557.67	$1,436.00		Broadview, Rock-n-Roll, Livingston, Riverside, Vistor Center, Rivers Edge, Fawn Valley, Bugle Pointe, Antlers Pointe: herbicide application
10	$2,656.50	$2,039.33	$1,328.25		Broadview, Rock-n-Roll, Livingston, Riverside, Vistor Center, Rivers Edge, Fawn Valley, Bugle Pointe, Antlers Pointe: second herbicide treatment
11	$700.00			$3,803.78	Elk fence repair on an as-needed basis (volunteers will also weed if needed, and remove general debris from Project Sites). We estimated $700 in kind for the project but ended up having volunteers donate 93+ hours.
12	$300.00				Erosion control log repair on an as-needed basis. Larco weed district recommended shifting money since they didn't think this was needed. Money was shifted to help cover extra reporting and project management.
13	$1,910.00		$2,262.00	$3,685.60	Elk fence removal. We had a board member become injured during a fence removal event so were able to work with the EV Rec & Parks District and use outside funds to hire a contractor to finish the removal. EVWC coordinated 135 hrs of volunteer time.
14	$1,200.00		$1,200.00	$416.00	EVWC hired a contractor to help manage projects in May 2019, until then board members managed the project and grant.
15	$2,400.00		$2,400.00		Monthly monitoring of the 13 project sites
16	$75.00		$300.00		Six month report(s) to CWCB. Covid delays resulted in more reports being submitted.
17					Project End Monitoring for 13 Project Sites: Inventory Undesirable/Desireable Plant population and estimate percentage. We were able to use the EWP numbers from the 2019 visit to determine success.
18	$75.00		$150.00		Write final report
Multiple	$568.00	$568.00			Herbicides; extra visits per the weed district recommendations mean we still have a bill for this task
Multiple	$805.00	$805.00			Weed Contractor travel time;extra visits per the weed district recommendations mean we still have a bill for this task
PROJECT TOTALS	$38,950.00	$16,266.73	$15,516.25	$13,613.38	We were able to shift some of the grant funds to help cover EVWC project reporting/monitoring and extra weed control. EVWC was able to secure additional outside funds to support the extended project.
GRANT TOTALS		$18,684.25	$14,004.25	$4,680.00	

Budget Narrative

The original grant timeline was delayed due to Covid restrictions and supply chain issues, so the CWCB extended the grant until 2024. Originally, the project was on track to be completed in the Fall of 2020.

EVWC was able to move funds to support additional weed control measures that were recommended by the Larimer County Weed District. After an initial site review and treatment, it was determined that some sites needed extra weed removal. These tasks were covered by shifting excess funds that had been previously allocated for re-seeding efforts.

Covid delays also impacted some treatments and EVWC's ability to coordinate volunteer events. After the initial restrictions, EVWC was able to support the Estes community with outdoor and educational opportunities using these volunteer events. As a result, EVWC well exceeded the estimates for in-kind match for the grant.

The timeline extension provided EVWC the time to source additional funding that we used to remove the rest of the fencing and fence posts. Initially we were able to use volunteers to remove the fencing and the posts, but since installation in some areas was done with mechanical equipment, hiring a contractor was the best solution.

THANK YOU

WE WANT TO THANK THE CWCB AND THE TOWN OF ESTES PARK FOR THE FUNDING SUPPORT!

AND ALSO TO OUR MANY COMMUNITY VOLUNTEERS AND THE PROPERTY OWNERS FOR HELPING US GET THE PROJECT FINISHED ON THE GROUND!

APPENDIX

A. INITIAL PHOTOS OF SITES

Riverside: Slope coverage, note mix of grasses and weed species.

Visitors Center: Ground coverage is approximately 35%.

Rock-n Roll: Canada thistle, penny cress, and lambsquarter, as should be controlled before becoming more problematic.

Rock-n Roll: Note initiation of rill erosion.

APPENDIX A - CON'T

Elkhorn: Overview for zone 2 and 3 showing scentless chamomile and other weed species mixed with native grasses.

Broadview: Weed species present included hoary cress, cheatgrass, and Canada thistle.

Lower Fish Creek R1: Where unimpacted from scour and blowout, containerized and staked willows are doing well.

Lower Fish Creek R1: Pollinators are utilizing seeded revegetation.

Elkhorn: Up-Stream portion of project showing cottonwood establishment

APPENDIX A CON'T

Lower Fish Creek R2 – R3: Superb establishment from combination of containerized and cutting materials.

Lower Fish Creek R1: Erosion from adjacent roadway runoff as well as upland blowout areas is impacting planting through sediment accumulation.

Lower Fish Creek R1: Where unaffected by erosion and bank scour, planted, seeded, and recruited vegetation is doing well.

Lower Fish Creek R3: Excellent zone 1 – 2 response from combination of planted materials and existing seed and propagule bank

Lower Fish Creek R2 – R3: Excellent response from exclusion from elk browse from existing riparian vegetation.

APPENDIX A CON'T

Middle Fish R2: Extensive Canada thistle needing control by river left fence line.

Middle Fish R1: Poor seed establishment within zone 4, better in zone 3.

Middle Fish Creek R1: Note mix of native grasses, and noxious weeds.

Lower Fish Creek R4: Note damaged elk fence and excellent zone 1, zone 2 establishment

Lower Fish Creek R4: Excellent vigor displayed from containerized thinleaf alder installed Fall 2016.

APPENDIX A CON'T

Middle Fish R2: Note variable coverage on overflow versus non-overflow areas.

Middle Fish R2: Excellent natural recruitment from existing native seed and rhizome bank.

Middle Fish R5: Overall photo, showing coverage and weed presence.

Middle Fish R4: Showing flanking around Beaver dam analogues and bank erosion and Vegetation Regrowth

Middle Fish R4: Note degree of weed infestation through zone 3 and zone 4.

Middle Fish R4: Natural recruitment in zones 1 and 2 includes three-stamened rush and sedge.

APPENDIX

B. LARIMER COUNTY WEED DISTRICT REPORT

LARIMER COUNTY | NATURAL RESOURCES

Larimer County Weed District, 2649 E. Mulberry St., Suite 6, Fort Collins, CO 80524 | (970) 498-5768 | larimer.org/weeds

Larimer County Land Stewardship 6 Month Report for Estes Valley Watershed Coalition Flood Recovery Sites

September 2019

Prepared by Bill Pawleshyn

Summary: Larimer County staff conducted monitoring, vegetation assessments and noxious weed management on Estes Valley Watershed Coalition flood recovery sites along Fish Creek, Fall River, and the Upper Big Thompson River. Following construction completion of these sites it appears erosion control measures, re-seeding and minimal weed management was conducted. However, on-site state listed noxious weeds persist, and post construction re-seeding efforts is slow to establish in some locations, causing concern that without more aggressive noxious weed management, the re-seeding efforts and long-term health of the site(s) could be greatly impacted by the plant's competitive nature. To control noxious weed populations in the restoration sites, a combination of cultural, mechanical and chemical control measures will be integrated for the most effective treatments.

Inventory: Currently, the sites are a mix of troublesome annual forbs, noxious weeds, invasive exotic annual grasses, desirable perennial grass species and forbs. Below is a list of non-native plants and native plants present on the sites but may not be present at all sites. (yellow highlighted plants represent state listed noxious weeds both List B and List C) No List A plants are present on these sites.

APPENDIX B CON'T

Species
Canada thistle *(Cirsium arvense)* CT
Musk thistle *(Carduus nutans)* MT
Scotch thistle *(Onopordum acantium)* ST
Bull thistle *(Cirsium vulgare)* BT
Common mullein *(Verbascum thapsus)* CM
Spotted knapweed *(Centaurea masculosa)* SK
Diffuse knapweed *(Centaurea diffusa)* DK
Hoary alyssum *(Berteroa incana)* HA
Reed Canary grass *(Phalaris arundinacea)* RCG
Red clover *(Trifolium pratense)* RC
Mayweed chamomile *(Chamomile spp.)* MC
Scentless Chamomile *(Chamomile spp.)* SC
Oxeye daisy *(Chrysanthemum leucanthemum)* OD
Sulfur cinquefoil *(Potentilla recta)* SCF
Houndstongue *(Cynoglossum officinale)* HT
Yellow Toadflax *(Linaria vulgaris)* YT
Dalmatian toadflax *(Linaria dalmatica)* DT
Common burdock *(Arctium minus)* CB
Bouncing bet *(Saponaria officinalis)* BB
Downy brome *(Cheatgrass) (Bromus tectorum)* DB
Chicory *(Cichorium intybus)* C
Bladder campion *(Silene vulgaris)* BC
White campion bladder *(Silene latifolia)* WCB
Kochia *(Kochia scoparia)* K
Russian thistle *(Salsola tragus)* RT
Poison hemlock *(Conium maculatum)* PH
Field bindweed *(Convolvulus arvensis)* FB
Redstem filaree *(Erodium cicutarium)* RF
Smooth brome *(Bromus inermis)* SB
Japanese brome *(Bromus arvensis)* JB
Flixweed *(Descurainia sophia)* FW

APPENDIX B CON'T

Species
Blue flax *(Adenolinum lewisii)*
Blanket flower *(Gaillardia aristata)*
Western yarrow *(Achillea lanulosa)*
Rocky Mountain beeplant *(Cleome serrulata)*
Prairie coneflower *(Ratibida columnifera)*
Sulphur flower *(Erigonium umbellatum)*
Penstemon *(Penstemon spp.)*
Wild raspberry *(Rubus idaeus)*
Golden Banner *(Thermopsis divaricarpa)*
Sunflower *(Helianthus spp.)*
Nuttall's sunflower *(Helianthus nuttallii)*
Woods rose *(Rosa woodsii)*
Common Harebell *(Campanula rotundifolia)*
Wax currant *(Ribes cereum)*
Wild geranium *(Geranium caespitosum)*
Colorado columbine *(Aquilegia coerulea)*
Wild bergamot *(Monarda fistulosa)*
Alpine bluebells *(Mertensia alpina)*
Lupine *(Lupinus argenteus)*
Aster *(Aster spp.)*
Yellow salsify *(tragopogun dubius)*
Missouri goldenrod *(Solidago missouriensis)*
Golden aster *(Heterotheca spp.)*
Yellow evening primrose *(Oenothera spp.)*
Shrubby cinquefoil *(Pentaphylloides floribunda)*
Virgins bower *(Clematis ligusticifolia)*
Ponderosa Pine *(Pinus ponderosa)*
Thinleaf alder *(Alnus incana)*
Bebb willow *(Salix bebbiana)*
Rocky Mountain willow *(Salix monticola)*
Geyer's willow *(Salix geyeriana)*
Western Wheatgrass *(pascopryum smithii)*
Thickspike Wheatgrass *(Elymus lanceolatus)*
Green Needlegrass *(Nassella viridula)*
Sandberg bluegrass *(Poa secunda)*
Tufted hairgrass *(Deschampsia cespitosa)*
Baltic rush *(Juncus balticus)*
Torrey's rush *(Juncus torreyi)*
Indian ricegrass *(Achnatherum hymenoides)*
Fringed sage (Artemesia frigida)

APPENDIX B CON'T

Assessment per site:

-Lower Fish Creek:

- Multiple troublesome noxious weeds persist
- CT, MT, HA, YT, CM, DK, SK, HT, SC, BT, SCF, DB, BB, FB
- M. thistle, C. mullein, D. knapweed and H. Alyssum primary noxious weed species
- Hand pulling and see head clipping of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low to medium density coverage of noxious weeds
- Natural recruitment of desirable vegetation observed
- Perennial grass community slow to take hold
- Desirable forb growth favorable
- Good stake survival
- Minimal mortality of container plantings
- 40% desirable vegetation estimated early on. Potential increase to 50% to date

-Middle Fish Creek R1:

- Multiple troublesome noxious weeds persist
- CT, MT, HA, YT, CM, DK, SK, HT, SC, BT, SCF, DB, BB, FB
- M. thistle, C. mullein and H. Alyssum primary noxious weed species
- Hand pulling and seed head clipping of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low to medium density coverage of noxious weeds
- Natural recruitment of desirable vegetation observed
- Perennial grass growth more favorable as summer progressed
- Desirable forb growth slower to take hold
- Good stake survival
- Container survival excellent
- BMP's on site are damaged and no longer in compliance. Need replacement or removal
- Elk fencing damaged multiple times. Removed in mid-summer. Could cause grazing concerns from Elk and seed dispersal
- 60% desirable vegetation estimated early on. Potential increase to 75% to date

-Middle Fish Creek R2:

- Multiple troublesome noxious weeds persist
- CT, MT, HA, YT, CM, DK, SK, HT, SC, BT, SCF, DB, BB, FB
- M. thistle, C. mullein and H. Alyssum primary noxious weed species
- Hand pulling and seed head clipping of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low to medium density coverage of noxious weeds
- Natural recruitment of desirable vegetation observed
- Perennial grass growth more favorable as summer progressed
- Desirable forb growth slower to take hold
- Good stake survival

APPENDIX B CON'T

- Perennial grasses slow to take hold initially in isolated areas on river right upland. Summer progress positive.
- Overall desirable plant community excellent
- Desirable forb growth slower to take hold
- Good stake survival
- Container survival excellent
- 60% desirable vegetation estimated early on. Potential increase to 70% to date

-Upper Fish Creek (Cheley):

- Multiple troublesome noxious weeds persist
- CT, MT, HA, YT, CM, DK, SK, HT, SC, BT, SCF, DB, BB
- M. thistle, C. mullein and H. Alyssum primary noxious weed species
- Cheatgrass medium density coverage
- Hand pulling and seed head clipping of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low to medium density coverage of noxious weeds
- Natural recruitment of desirable vegetation observed in isolated patches
- Cheatgrass outcompeting forbs and other desirable vegetation
- 40% desirable vegetation estimated early on. Potential increase to 45% to date

-Broadview:

- Multiple troublesome noxious weeds persist
- CT, MT, HA, YT, CM, HT, SC, BT, SCF
- M. thistle, C. thistle and H. Alyssum primary noxious weed species
- Hand pulling and clipping seed heads of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low density coverage of noxious weeds
- Natural recruitment of desirable vegetation observed. Wood's rose, Wax currant, etc.
- Perennial grasses mixed with non-native Smooth brome stand
- Overall desirable plant community excellent
- 70% desirable vegetation estimated early on. 75% to date
- BMP's on site are no longer in compliance and need replacement

-Riverside:

- Multiple troublesome noxious weeds persist
- CT, MT, HA, YT, CM, HT, SC, BT, SCF, DB, DK
- M. thistle, and H. Alyssum primary noxious weed species
- Cheatgrass present on upland section in patches
- Hand pulling and clipping seed heads of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low to medium density coverage of noxious weeds
- Slope to river slow to establish native desirable grasses
- 40% desirable vegetation estimated early on. Potential increase to 55% to date

APPENDIX B CON'T

- Container survival excellent
- 60% desirable vegetation estimated early on. Potential increase to 70% to date

-Middle Fish Creek R3:

- Multiple troublesome noxious weeds persist
- CT, MT, HA, YT, CM, DK, SK, HT, SC, BT, SCF, DB, BB
- M. thistle, C. mullein and H. Alyssum primary noxious weed species
- Hand pulling and seed head clipping of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low to medium density coverage of noxious weeds
- Natural recruitment of desirable vegetation observed
- Perennial grass growth more favorable as summer progressed
- Desirable forb growth slower to take hold
- Good stake survival
- Container survival excellent
- BMP's on site are damaged. No longer in compliance. Need replacement or removal
- 65% desirable vegetation estimated early on. Potential increase to 75% to date

-Middle Fish Creek R4:

- Multiple troublesome noxious weeds persist
- CT, MT, HA, YT, CM, DK, SK, HT, SC, BT, SCF, DB, BB, PH
- M. thistle, C. mullein and H. Alyssum primary noxious weed species
- Hand pulling and seed head clipping of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low to medium density coverage of noxious weeds
- Natural recruitment of desirable vegetation observed
- Perennial grass growth more favorable as summer progressed
- Desirable forb growth slower to take hold
- Good stake survival
- Container survival excellent
- 65% desirable vegetation estimated early on. Potential increase to 75% to date

-Upper Fish Creek:

- Multiple troublesome noxious weeds persist
- CT, MT, HA, YT, CM, DK, SK, HT, SC, BT, SCF, DB, BB, DB
- M. thistle, C. mullein and H. Alyssum primary noxious weed species
- Hand pulling and seed head clipping of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low to medium density coverage of noxious weeds
- Natural recruitment of desirable vegetation observed

APPENDIX B CON'T

-Rock-n Roll:

- Multiple troublesome noxious weeds persist
- CT, HA, YT, CM, HT, SC, SCF, OD, DK
- C. thistle, and H. Alyssum primary noxious weed species
- Hand pulling and clipping seed heads of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Scattered density coverage of noxious weeds
- Desirable vegetation well established in area
- 70% desirable vegetation estimated early on. Potential increase to 80% to date

-Livingston:

- Multiple troublesome noxious weeds persist
- CT, HA, YT, CM, HT, SC, SCF, DK, DB
- C. thistle, and H. Alyssum primary noxious weed species
- Hand pulling and clipping seed heads of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Scattered density coverage of noxious weeds
- Desirable vegetation well established in area
- 50% desirable vegetation estimated early on. Potential increase to 70% to date

-Elkhorn:

- Multiple troublesome noxious weeds persist
- CT, HA, YT, CM, HT, SC, SCF, DK, MT, SCF, DB
- C. thistle, S. chamomile and H. Alyssum primary noxious weed species
- Hand pulling and clipping seed heads of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low to medium density coverage of noxious weeds
- High density of S. chamomile specifically
- Desirable vegetation establishing well on site
- Native forbs establishing well on site
- Stakes mortality high. Container survival considerably better than stakes
- 70% desirable vegetation estimated early on. Potential increase to 80% to date

-Bugle Point:

- Multiple troublesome noxious weeds persist
- CT, HA, YT, CM, HT, SC, DK, MT, BT, OD, SCF, DB
- C. thistle, C. mullein and H. Alyssum primary noxious weed species
- Hand pulling and clipping seed heads of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low density coverage of noxious weeds
- Desirable vegetation slow to establish on site
- Cuttings establishing very well on river right
- 40% desirable vegetation estimated early on. Potential increase to 50% to date

APPENDIX B CON'T

-Fawn Valley:

- Multiple troublesome noxious weeds persist
- CT, HA, YT, CM, HT, SC, SCF, DK, MT, BT, OD, DB
- C. thistle, M. thistle and H. Alyssum primary noxious weed species
- Hand pulling and clipping seed heads of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low to medium density coverage of noxious weeds
- High density of H. alyssum specifically near bowling alley
- Desirable vegetation heavily impacted by adjacent landowners but showing signs of establishment, although nominal
- Bowling alley an area of concern. Minimal establishment of desirables
- 20% desirable vegetation estimated early on. Potential increase to 30% to date
- Recommend re-seeding

-River's Edge:

- Multiple troublesome noxious weeds persist
- CT, HA, YT, CM, HT, SC, DK, MT, BT, OD, DB, SCF
- M. thistle, C. mullein and H. Alyssum primary noxious weed species
- Hand pulling and clipping seed heads of noxious weeds during initial visits to site
- Follow-up herbicide treatments on re-growth and perennial plants
- Low to medium density coverage of noxious weeds
- Low mortality of stakes on river left. Higher mortality on river right
- Desirable vegetation slow to establish in area
- Minimal natural recruitment
- 25% desirable vegetation estimated early on. Potential increase to 40% to date

Recommendations:

- Continue selective herbicide treatments on noxious weeds and troublesome annual weeds that will translocate into the root system and halt flowering and subsequent seed dispersal.
- Follow up treatments in fall of 2019
- To be most effective, timing of application is essential.
- For herbaceous noxious weeds, apply herbicides when the plant is not stressed and actively growing or in the fall prior to dormancy.
- Continued manual control necessary as well to eliminate seed production and minimize soil seed bank
- For treatment of invasive exotic annual grasses, hand pull and weed whip prior to setting seed
- apply appropriate pre-emergent herbicide with proper timing. Ideally late July or early winter. Only treat with herbicide if some perennial grasses are established. Weed whip remaining invasive annual grasses prior to setting seed.
- Consider re-seeding in areas with no perennial grass establishment between Dec. 1 and May 15th if ground is not frozen.
- Continued monitoring, mapping, photo points as needed

APPENDIX B CON'T

Densities are defined as follows:
High = (>70%) area dominated by a nearly solid infestation or very high cover of the species;
Medium = (40-70%) less cover and is less homogeneous than high;
Low = (10-40%) individuals of species are present in fewer numbers, are not visually dominating the landscape, but are beginning to establish a foothold in the plant community;
Scattered = (<10%) indicates a sporadic occurrence of the species.
Density averages were estimated where more than one population was identified in the study areas.
List B = Subject to eradication, containment, or suppression in designated portions of the state.
List C = Control is recommended but not required by the state; although, local government may require management.
Watch List = No management required but documenting and reporting occurrences to the state is recommended.

Riverside site-H. alyssum

APPENDIX B CON'T

Bugle Point site-C. mullein

APPENDIX B CON'T

Fawn Valley site (Bowling alley)-H. alyssum and M. thistle

Middle Fish Creek 2- M. thistle and H. alyssum

APPENDIX B CON'T

Elkhorn site- S. chamomile

Broadview site: M. thistle and H. alyssum

APPENDIX B CON'T

Upper Fish Creek: M. thistle and H. alyssum

Upper Fish Creek (Cheley) site: M. thistle, cheatgrass

APPENDIX B CON'T

Reviewed: Wilynn Formeller, EVWC Staff
Jay Blackwood, EVWC Board

APPENDIX

C. 2019 FALL SITE REVIEW

ESTES VALLEY WATERSHED COALITION
REPORT ON MAY 16, 2019 INSPECTION OF 7 OF THE 14
FLOOD RECOVERY/RESTORATION PROJECTS COMPLETED 2016 -2017

INSPECTION TEAM:
Estes Valley Watershed Coalition: Jay Blackwood, Jim Daugherty, Wilynn Formeller and Jennifer Waters
Town of Estes Park: Greg Gladov and David Hook
Stillwater Sciences: Julie Ash and Johannes Beeby (Note: Julie and Johannes were with Otak when the projects were designed and constructed).

The Coalition completed flood recovery/restoration projects for priority areas on Fall River and Fish Creek. Inspection summaries are provided below. Projects were also completed on the Big Thompson River, but are not included in this report.

The Morten Reach restoration was designed by Five Smooth Stones (instream) and AloTerra (revegetation) and built by North State Environmental. Lower Fish Creek was a revegetation effort, led by Great Ecology. All others were designed by Otak and built by Tezak Heavy Equipment, L4 Construction, and North State Environmental. For the Middle Fish Creek project, Otak was teamed with CH2MHill.

FALL RIVER

Elkhorn Reach
The Elkhorn Reach is the first stretch of low gradient floodplain in Fall River after it leaves the National Park. Alluvial deposits in the area are fine soils and subject to erosion. There is a manmade drop at the east end (downstream) of the Elkhorn Lodge property that controls the elevation of the river.

Photo 1. Manmade drop on Fall River at downstream end of Elkhorn Reach.

APPENDIX C CON'T

Over the years the stream channel has moved back and forth across this area. Before the current channel alignment, the channel was on the north edge of the property along West Elkhorn Avenue.
There was existing riprap, (installed under emergency response activities post-flood), along the south edge of West Elkhorn Avenue. The riprap was left in place to protect the street, but was buried by the EVWC project.

Photo 2. Buried riprap next to West Elkhorn Avenue (along fence line). Some water in the riparian area.

The plans show offset riprap on the south side to river to protect two buildings. Per owners agreement, the offset riprap was not installed. The channel of the river was not changed by the rehabilitation project. Riffles were added to the river to create pools and to control velocity. Some bank treatments were installed, and a significant amount of vegetation was planted. A low area on the north side of the property was planted with riparian vegetation.

Observations:
The stream channel is functioning as planned. Vegetation has been impacted by elk grazing (in spite of the fencing) but a reasonably good survival rate was noted. The fencing has eliminated horse grazing in this area allowing the vegetation to take hold. The fencing is in great shape except for a few sections. No recommended actions other than maintaining the fencing and adding to the vegetation if needed.

APPENDIX C CON'T

Photo 4. Fall River at Elkhorn Lodge showing riffles and pools and a meandering channel.

Bugle Pointe Reach

Existing riprap (installed under emergency response activities post-flood) at the upstream end of the reach was not altered. 1.5-year flow benches were added where possible, the largest being at the downstream end of the reach. Three pool-riffle sequences were added. Habitat boulders were placed in the stream including one large boulder, strategically placed to encourage scour.

Observations:

Stream channel looks good. Habitat boulders continue to provide intended function. On the day of the visit, flow had just increased to the point where some water was flowing on the 1.5-year flow benches. Poor survival of the willow plantings was observed. The willow stakes that were to be planted among the existing riprap on the upstream part of the reach either were either not planted or did not survive.

APPENDIX C CON'T

Photo 3. Fall River at Elkhorn Lodge. Good vegetative cover (many rushes, bunch grasses and willow sprouts) and stream flow.

APPENDIX C CON'T

Photo 5. Fall River at Bugle Point showing riprap along banks (installed before the rehabilitation project) and poor willow stake survival.

Photo 6. Fall River at Bugle Point - habitat boulders in place and some bank vegetation.

APPENDIX C CON'T

Photo 7. Fall River at Bugle Point - 1.5-year flow bench (right side) with some flow across it.

Fawn Valley (includes Antlers Pointe, Workshire and Fawn Valley Reaches)
Bankfull benching was constructed in the Antlers Point and Workshire areas. One of the benches was created by removing the Antlers Point parking lot on the south side of the river. Existing riprap was supplemented where necessary or moved slightly to soften some bends. All riprap was buried where practical. Habitat boulders were added throughout the reach. The existing overflow channel was not altered due to landowner constraints. Setback riprap was installed to protect one of the Workshire buildings and the Banken-Rizzuti home.

Willow cuttings were installed to provide long-term bank stability. Individual cages were used to protect the plantings, instead of area fences. Most of the cages are still in place.

Along the Fawn Valley property, the only work performed was some bank stabilization including the construction of some rockery walls. Habitat boulders were placed in the stream.

Observations:
River channel looked good. Some flow was noted in the overflow channel. Vegetation survival was just OK. The section of the river next to the Fawn Valley property was not inspected due to lack of time and the fact that the work consisted of mostly bank stabilization.

APPENDIX C CON'T

Photo 8. Fall River at Workshire showing bank stabilization and flow in the overflow channel (left).

Photo 9. Overflow channel, foreground, and Fall River main channel, background.

Rivers Edge Reach

The reach is characterized by a high gradient of 3.2%. Five step-pool sequences were added. Several large 1.5-year flow benches were constructed. It was noted that the riffles were constructed in a way that they could adjust naturally as large material comes down the stream during high flows. A split flow channel was

constructed at the downstream end of the reach. New offset riprap was installed (and buried) in front of the upstream building. Existing riprap was re-vegetated.

Observations:
River channel looks good. Riffle crests don't show signs of significant adjustment. Benching still intact and split flow channel was flowing on the day of the visit.

Photo 10. Fall River at River's edge - river channel flowing well, showing riffles and habitat boulders.

Photo 11. Fall River at River's edge - split flow channel at downstream end of the Reach.

APPENDIX C CON'T

Photo 7. Fall River at Bugle Point - 1.5-year flow bench (right side) with some flow across it.

Fawn Valley (includes Antlers Pointe, Workshire and Fawn Valley Reaches)
Bankfull benching was constructed in the Antlers Point and Workshire areas. One of the benches was created by removing the Antlers Point parking lot on the south side of the river. Existing riprap was supplemented where necessary or moved slightly to soften some bends. All riprap was buried where practical. Habitat boulders were added throughout the reach. The existing overflow channel was not altered due to landowner constraints. Setback riprap was installed to protect one of the Workshire buildings and the Banken-Rizzuti home.

Willow cuttings were installed to provide long-term bank stability. Individual cages were used to protect the plantings, instead of area fences. Most of the cages are still in place.

Along the Fawn Valley property, the only work performed was some bank stabilization including the construction of some rockery walls. Habitat boulders were placed in the stream.

Observations:
River channel looked good. Some flow was noted in the overflow channel. Vegetation survival was just OK. The section of the river next to the Fawn Valley property was not inspected due to lack of time and the fact that the work consisted of mostly bank stabilization.

APPENDIX C CON'T

Morten Reach (Morten property and 450 feet of Fish Hatchery Reach)

The reach is also characterized by a high gradient of 2.8%. Eleven riffles were constructed along the 1000 feet of this reach. Many have log j-hooks at one end of the riffle. The riffles designed by Five Smooth Stones and constructed by North State Environmental were intended to be permanent - resisting movement even in the highest flows (time will tell if this is the case). At the upstream end of the reach a side channel was constructed with a low gradient. The low velocity was intended to support fish spawning. Offset riprap was placed (and buried) in front of the Morten home. Pre-2013, there was low area east of the house. Historically it was one of the fish hatchery ponds. It was filled with sediment during the 2013 flood. The sediment was removed, and a riparian area was created and planted with riparian vegetation.

Photo 12. Fall River at Fish Hatchery Reach – large wood anchored in bank.

Observations:
In the two years since construction, no movement has been detected in the large riffles.
Some of the buried riprap west of the Morton home has been exposed by erosion. The riparian area was moist, but no standing water. The low velocity side channel for fish spawning was blocked with sediment and boulders at the first curve.

APPENDIX C CON'T

Observations:
The channel re-construction created a large meander pattern. Now at moderate flow, threading is starting to occur. Three separate channels were observed at (approximate) peak flow this year. This was anticipated due to the low gradient; the fine, easily eroded substrate; and the shallowness of the channel. It is best to allow the stream to move naturally within the floodplain (as long as assets requiring protection are covered (e.g., by offset riprap).) No intervention is recommended; the vegetation is surviving well, and the fencing is in great shape.

Photo 14. Multithreading in the low gradient section of Fish Creek - Country Club to Brook Drive.

Reach 4 – Brook Drive

As in most reaches, sediment was removed to open up the floodplain, transforming it to a healthy, connected floodplain condition from unstable conditions with several active headcuts that had developed post–flood. Prior to the impacts of the flood, beaver were active in Fish Creek. Beaver dams, in concert with stabilizing root mass of healthy riparian vegetation, were effectively "holding things together" in this steep, fine grained system that has experienced extensive development throughout its watershed. The ideal outcome for restoration of Fish Creek is to support the return of beaver to the system (noting that beaver management will need to be addressed to navigate localized negative impacts to private property owners). The stabilizing effect of beaver dams is a critical component of long-term self-sustaining stable conditions in Fish Creek. Adequate food supply such as willows, aspens, and other woody vegetation is one of the necessary components to supporting beaver populations. In Fish Creek, it will take many years before trees and shrubs are re-established to the extent they can support beaver.

Until (or if) beaver are able to return to Fish Creek, the goal of this Fish Creek project is to replace the functions provided by beaver – specifically to reconnect floodplains for robust habitat value and natural function. Encouraging the system to utilize as much of the valley floor as it's been allowed (i.e., in this case,

APPENDIX C CON'T

within the outer boundaries set by the offset riprap treatments) is the best way to maximize diversity and function.

For the Middle Fish Creek restoration, design focused on mimicking beaver activity. A beaver mimicry technique that is starting to increase in use in Colorado is beaver dam analogues (BDAs). A series of these features were installed in the Brook Drive reach with construction consisting of wood posts and woven branchy materials. Each BDA has a primary "check structure" (i.e., set of posts with woven branches) and a secondary check structure, located several feet downstream of the primary check. The primary check slows velocities and creates pool habitat, critical for overwintering on the upgradient side of the features. The secondary check is intended only as a grade control to resist undercutting to protect the primary check. Functional BDAs help reconnect the channel to the floodplain, trap sediment and raise the ground water table. The higher ground water table supports riparian vegetation, a benefit to wildlife. Observations:
On this site, the vegetation is surviving well and the fencing is in great shape. Additionally, the BDAs are still in good shape and providing intended functions after two years. A significant amount of sediment has collected upstream of the first two, less for the other three. Flanking was noted in four of the five BDAs. Flanking is not unexpected and was actually part of the design intent, especially as sediment builds up above the BDA. As long as pool habitat is maintained, the flanking does not constitute a reduction in benefits delivered. Conversely, trying to prevent flanking is a static approach that works against the intent of project design (as described above.)

The best option for maintenance on this project is to install additional small BDAs, especially as replacements when older ones fill in and/or flank. Monitoring and evaluation currently underway by Colorado State University (CSU) geomorphologists is suggesting that a higher number of smaller BDAs performs better for sustaining pool habitat and adjusting with the system over time. CSU is implementing strategies developed by Dr. Joe Wheaton at Utah State University and studying results on the ground at several Colorado project sites. The recommendation is to continue to monitor this BDA (along with the others) and either: (1) buy time by extending the woven portion of the primary check farther across the floodplain, and/or (2) installing additional small BDAs below this feature. The maintenance action to extend the woven portion can be easily accomplished via hand work as soon as the stream returns to low flow.

This beaver mimicry approach to maintenance will best manage existing conditions without negatively affecting the intent of design. Because the Fish Creek system is beaver-dependent – and until beaver return to take over maintenance, repairs will be best guided by the question, "what would a beaver do?"

APPENDIX C CON'T

Photo 15. BDAs and channel doing well along with successful re-vegetation.

APPENDIX C CON'T

Photo 16. Fish Creek at Brook Drive - upper BDA showing sediment buildup and minor flanking.

Photo 17. Fish Creek at Brook Drive - middle BDA functioning as expected (primary check structure in center of photo).

APPENDIX C CON'T

Photo 18. Fish Creek at Brook Drive - lowest BDA with largest extent of flanking (note this is a secondary check structure serving as grade control for the primary check located just upstream (and out of the photo) – pool habitat is not the goal of this structure.)

Reach 5 - Inglis Reach (Cousineau property)

As with the other reaches, sediment was deposited here. Banks were steeply cut, and the channel was incised and disconnected from the floodplain. Reconstruction opened up the floodplain and included channel enhancements through the entire reach. Benches were installed and bank hardening was placed to protect the Cousineau property and house. Habitat structures and woody material were added to the stream.No work was done to the driveways and culverts.

Observations:
The stream channel and floodplain are functioning as designed. The vegetation is surviving well; the fencing is in great shape.

Report prepared by Jim Daugherty and Wilynn Formeller. Reviewed by Jay Blackwood and Jennifer Waters.

APPENDIX

D. 2022 PHOTOS

CHELEY CAMP

APPENDIX D CON'T

REACH 4 FISH CREEK

APPENDIX D CON'T

HYDROPLANT

APPENDIX D CON'T

RIVERS EDGE