

St. Vrain & Boulder Creek Phreatophyte Control & Watershed Restoration

Final Report



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Wildlands Restoration Volunteers
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Prepared by: Claire Morrissy



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Introduction

Invasive species removal is only a piece of landscape scale restoration, but comprehensive and thorough approaches can set the groundwork for long-term macro-level change in an ecosystem. At WRV, our experience shows that phreatophyte removal makes for an appropriate and rewarding volunteer experience. These principles informed the development of the St. Vrain & Boulder Creek Phreatophyte Control & Watershed Restoration projects.

Background

City of Boulder Open Space & Mountain Parks (OSMP): This project aimed to remove non-native phreatophyte and other invasive plant species to create structure more typical of Colorado Front Range riparian and floodplain wetland/grassland plant communities. Removal of phreatophytes will allow for immediate habitat improvements in the floodplain by restoring floodplain grassland and open wetland structure, which is less restrictive to flood flows and supports species such as prairie gentian, Ute ladies' tresses, northern leopard frogs, and various state-tracked wetland plant communities. Within the riparian area, phreatophyte removal will increase channel capacity and chances of recruitment of native riparian plant species such as cottonwoods and will open riparian oxbow wetlands necessary for northern leopard frog breeding and Ute ladies' tresses.

City of Longmont: These projects complemented the City's planned stream restoration of the St. Vrain Creek from County Line Road to the confluence of Boulder Creek. The stream restoration project includes stabilizing critical banks to protect infrastructure, reducing natural hazard risk, and reestablishing recreational trail access. Much of the funding for the stream restoration project is funded through FEMA and is not allowed to be used for revegetation or weed control. However, the western third of the project area (Peschel property) received extensive revegetation thanks to previously awarded grants from CWCB and the Terra Foundation.

Boulder County Parks & Open Space (BCPOS): This project positively impacted approximately ¼ mile of irrigation ditch and a large nearby riparian open space owned by Boulder County. In 2016, we eliminated 1,500 Russian olives, which use an estimated 60,000 gallons of water a day. This will enhance watersheds and protect our water resources for both agriculture and wildlife. Russian olive is considered a list B species under the Colorado State Weed Law. Boulder County is at the headwaters of the South Platte Watershed, which makes it a priority area for treatment of Russian olive to prevent spread downstream. Changes to hydrologic conditions will mean more water available for our agricultural operations and native plant restoration efforts.

Methods

Kolb Property Russian Olive Removal (OSMP):

The City of Boulder Open Space and Mountain Park (OSMP) has been working on restoring parts of Boulder Creek in the White Rocks Open Space for many years. This year's project is a continuation of those efforts. Ongoing restoration has been concentrated on creating a vegetative structure in the riparian area that mimics the historic plant assemblages that existed before modern irrigation projects of the 1800s and 1900s. This includes invasive species removal, passive restoration practices such as prescriptive grazing and mowing, and reintroduction of native species. Decades of ranching on Kolb and surrounding properties led to native vegetation loss and establishment of a dense Russian olive stand. WRV sawyer volunteers returned to Kolb to cut and chip small to medium Russian olive trees, much of which were seedlings that came up since our 2016 project.

The WRV crew was made up of trained sawyers and general volunteers who worked as "swampers", helping to move slash and chip material. Sawyer and swamper pairs worked with OSMP Vegetation Management staff who were responsible for applying herbicide to the cut stumps. Teams spread out into rows to ensure that the whole property was covered. To limit regrowth, cut stumps should be sprayed immediately, so being able to work with a nearly 1:1:1 ratio of sawyers, swampers and sprayers made for a very thorough and efficient work flow.

Once a substantial number of cut trees accumulated, WRV volunteers and OSMP staff chipped the material and broadcast the chips across the worksite, ensuring that chips did not exceed 1" depth.

Boulder Creek Habitat Restoration (OSMP):

Later in the fall, WRV and OSMP partnered on a one-day planting project that followed the contracted removal of large crack willow trees over 0.5 acres on the banks of Boulder Creek. Crack willows are non-native trees that shade-out the native and diverse understory typically found in the area. Some crack willows were selectively left to retain some canopy structure and habitat until the native cottonwoods can mature.

To jumpstart the reintroduction of the native shrubs and trees, WRV volunteers planted over 300 container stock plants including Wood's rose, currant, plains cottonwoods, and chokecherries. Many of these shrubs fulfill the missing vegetative vertical structure in the lower canopy while also providing flowers for pollinators and food and shelter for wildlife. To reduce the need for watering and hinder regrowth of reed canary grass, an invasive grass species, volunteers spread a heavy layer of mulch around each planting zone.

Prior to the planting day, volunteer Crew Leaders from WRV participated in a site visit by OSMP Vegetation Management Coordinator, Eric Fairlee, who outlined project objectives as well as planting specs. WRV coordinated over 40 volunteers who crew led, created technical notes, cooked and fed their fellow volunteers. Overall, volunteers gave 263 hours of service to this project and planted approximately 320 shrubs and trees.

St. Vrain Tamarisk Removal from County Line to Confluence - Spring and Fall (Longmont):

During the Sept. 2013 flooding, the St. Vrain Creek breached several lakes and carved a new channel just east of the Boulder/Weld County line. Continuing the work that began in 2016, WRV helped the City of Longmont restore this area that has been scoured of diverse native vegetation and overrun with invasive tamarisk. Tamarisk (aka salt cedar) has devastated watersheds throughout the west, costing billions of dollars in lost water, lost habitat and lost electricity. It has invaded many Colorado Front Range watersheds, including the St. Vrain Creek and Boulder Creek watersheds.

In 2017, WRV coordinated two volunteer events, one in the spring and one in the fall, to address the growing tamarisk problem along the St. Vrain. In total, 56 volunteers enjoyed panoramic views of the Front Range while hand pulling the small seedlings, pulling with weed wrenches on the medium sized plants, and using "cut and stump" treatment on the larger plants that couldn't be pulled. This treatment involves judicious dabbing of a small quantity of herbicide to the stump. The tamarisk debris was placed in piles, up and away from the shoreline (where the soil was dry), to allow the wind to dry out and kill the plants.

Gilbert Property Russian Olive Removal:

In 2016 WRV spent three sunny days at the Gilbert Property, a 20-acre parcel of land in Hygiene, CO, that was recently acquired by Boulder County Parks and Open Space. The purpose of our project was to cut Russian olive trees that had proliferated throughout the property, consuming vast amounts of water from the nearby irrigation ditches. Once cut, we utilized the "cut stump" treatment where the tree is cut low to the ground and the stump is treated with an herbicide within a few minutes of cutting.

In total, we had eight different volunteers running chainsaws and focusing on larger trees. Volunteer sawyers cut, bucked, and stumped trees over 18 acres of the property. Meanwhile, nine non-sawyer volunteers used handsaws and pruners to remove young trees and apply herbicide to the cut stumps. Lastly, WRV volunteers operated a rented wood chipper to mulch the cut materials. The chipper rental was paid for using CWCB funds. On the final day, we were joined by Boulder County staff who used their larger wood chipper to take care of the bigger limbs and boles.

The Gilbert property borders private residences as well as Pella Crossing. The project was an excellent opportunity to get our sawyers more experience cutting complex trees and to invite new volunteers into the process of Russian olive removal. In 2017, it was determined by the Boulder County Weed Control Supervisor that the small regrowth and recruit trees were not significant enough to warrant a volunteer project.

Results

As related to our proposed tasks, our results are as follows:

1. **Planning & Design**

Results: WRV program staff managed the planning of eight separate volunteer events on four sites with the help of a leadership team comprised of skilled volunteer leaders and stakeholders. Staff and the leadership team met on site several times to discuss project logistics, prepare a final design of technical specs, establish roles and responsibilities, and determine timelines. This refined timeline drove the remainder of the project implementation, including agency sponsor and subcontractor schedules, material availability, other scheduled volunteer events as well as wildlife closures and other access issues.

2. **Phreatophyte Education**

Results: One aspect of volunteer recruitment involves education. For volunteers to be motivated to action they must be empowered with the context and ecological significance of the project-specific work. WRV's website and regular mailings feature educational materials that reach up to 4,000 volunteers.

On site, WRV utilized the expertise of land managers and subject-expert volunteers to give morning debriefs and lunchtime educational talks to volunteers. In feedback surveys sent to every project participant, the educational talk is constantly cited as an enjoyable part of the day as it helps deepen the meaning of their volunteer experience. For example, during the Russian olive removal and Boulder Creek Habitat Restoration with City of Boulder Open Space and Mountain Parks, Eric Fairlee, Vegetation Management Specialist, led talks on the history of the eastern Boulder properties, the impact of ranching and irrigation on the native prairie grasses and other species, the introduction of invasive trees and the ongoing attempts at restoration. Volunteers left the WRV projects with a beyond-the-surface understanding of the prairie ecology that exists in their backyard.

3. **Mechanized Phreatophyte Removal by Contractor**

Results: Some of the phreatophytes at these sites are very large. Russian olive trees can reach up to 30' in height¹ and their width and branch-weight warranted a heavy mechanized approach through a certified contractor that was safer and more effective than using volunteer sawyers. Equipment access required careful scheduling to avoid wet periods and wildlife closures, especially at the Boulder Creek Habitat Restoration site, which is home to a heron rookery. Heavy machinery such as wenchers and bucket trucks and expertise like climbing were required to remove the largest of the phreatophytes on site. The contracted tree removal subcontractor immediately applied herbicide to the cut stumps at the OSMP and BCPOS sites. Selected large trunks were killed onsite (girdling and herbicide treatment) to provide bird and insect habitat at the OSMP site.

a. OSMP Site:

- i. Cut, stump treated, chipped and hauled: ~90 large crack willow trunks, some up to 4 feet in diameter over 1.5 acres
- ii. Killed in place to create habitat: ~36 large crack willow trunks

b. BCPOS Site:

- i. Cut, stump treated, chipped and hauled: 90+ large Russian olive on three densely packed acres of infestation.

4. **Phreatophyte Removal by WRV staff and volunteers**

The majority of the phreatophytes at the project sites ranged from seedling to medium-sized. The smallest of these seedlings (mostly tamarisk) were hand pulled by volunteers, because at their young size of 6" to 18" tall, virtually all of the long tap root can successfully be pulled out, embedded primarily in flood deposited sand. Trees too large to hand pull were cut with loppers or hand saws and stump treated immediately with an appropriate herbicide. For trees large enough to require a chainsaw, chainsaws were operated by trained certified staff or volunteers. Cut-stump treated trees were chipped onsite and broadcast widely to keep chip depth below 1", so as not to adversely affect the grasses and other understory material.

5. **Riparian Revegetation**

Post invasive-species removal, WRV coordinated volunteers to help revegetate the affected riparian areas, as needed, to improve wildlife habitat, natural species and structural composition and to help resist recurrence of primary and secondary invasive species. Active revegetation was employed at the OSMF and Longmont sites after initial removal of phreatophytes.

OSMF: In the riparian zone, after crack willow were removed, volunteers planted approximately 1,000 native trees and shrubs including cottonwood, peach-leaf willow, golden currant, choke cherry, and wild plum, using leftover wood chips to mulch heavily around the trees to reduce initial competition from grasses (at least 6" depth). Knowledge of the water table was integral to guide deeper plantings of conducive species to increase survival in drier parts of the site.

Longmont: The western third of the Longmont site overlaps with the Peschel flood recovery area, already funded by CWCB and Terra Foundation. In this area, wherever passive restoration is not adequate, volunteers planted native seed, spread woodstraw mulch, and planted native trees and shrubs, including thousands of willow cuttings and containerized stock. Because that is funded outside of this grant, associated deliverables not shown here.

BCPOS: The Gilbert site has robust healthy grass communities with few herbaceous weeds and is therefore a good candidate for passive restoration.

6. **Monitoring and management to prevent return of phreatophytes of secondary weeds**

Since the initial projects in 2016, monitoring has begun to determine efficacy of removal techniques by observing and removing re-sprouts and new saplings of the invasive phreatophytes. This will continue for the required 5 years after performance period, along with pulling or cut-stump treating as required. OSMF will also apply herbicides to stop the expected temporary influx of secondary

herbaceous weeds once the dense crack willow canopy had opened. OSMP staff will also monitor the survival rate of planted shrubs using the RAM method, as described in proposal. On the St. Vrain Tamarisk Removal site, Longmont staff will monitor for re-sprouted or sapling tamarisk each year for five years, hiring contractors each year to cut-stump treat these re-sprouts and saplings. BCPOS staff will monitor for re-sprouted or sapling invasive phreatophytes each year for five years, and the same staff will cut-stump treat these re-sprouts and saplings at the Gilbert Russian Olive Removal site.

Conclusions and Discussion

Over the two-year performance period, with eight volunteer events, our findings were consistent with our planning. In developing the proposal, we considered best practices used in integrated pest management (cut-stump treatment for invasive tree removal, hand-pulling for smaller seedlings, using knowledge of the water table to guide plantings of conducive species to increase survival in drier parts of the revegetation sites, etc.) and met the objectives of our proposal using those methods.

On the **Boulder Creek Habitat Restoration** site, Eric Fairlee reported an 80-85% survival rate after the first year of shrubs and trees planted at the fall 2016 volunteer event. That site, and the 2017 planting zones, are being monitored by the OSMP Vegetation Management Crew for the required five years after performance period, pulling or cut-stump treating as required. OSMP will also apply herbicides to stop the expected temporary influx of secondary herbaceous weeds once the dense crack willow canopy has opened. OSMP staff will also monitor the survival rate of planted shrubs using the RAM method, as described in proposal.

At the **Boulder County Gilbert Property Russian Olive Removal**, we saw a significant decrease in regrowth and new recruits a year after the 2016 three-day volunteer event. The County Weed Control Supervisor, Steve Sauer, and his team followed up last year's WRV event with minimal clean up and have committed to monitoring the site for five years.

The **St. Vrain Tamarisk Removal** with the City of Longmont faced challenges in the spring of 2017 due to high-water and access to plants on the shoreline. We were forced to change our tactics, in accordance with the Natural Resource Specialist, and focused on invasive plants located on higher soil. Our fall event reaped higher results as the water was lower and offered greater access to the small tamarisk recruits. Longmont staff will monitor for re-sprouted or sapling tamarisk each year for five years, hiring contractors each year to cut-stump treat these re-sprouts and saplings.

Project Financials

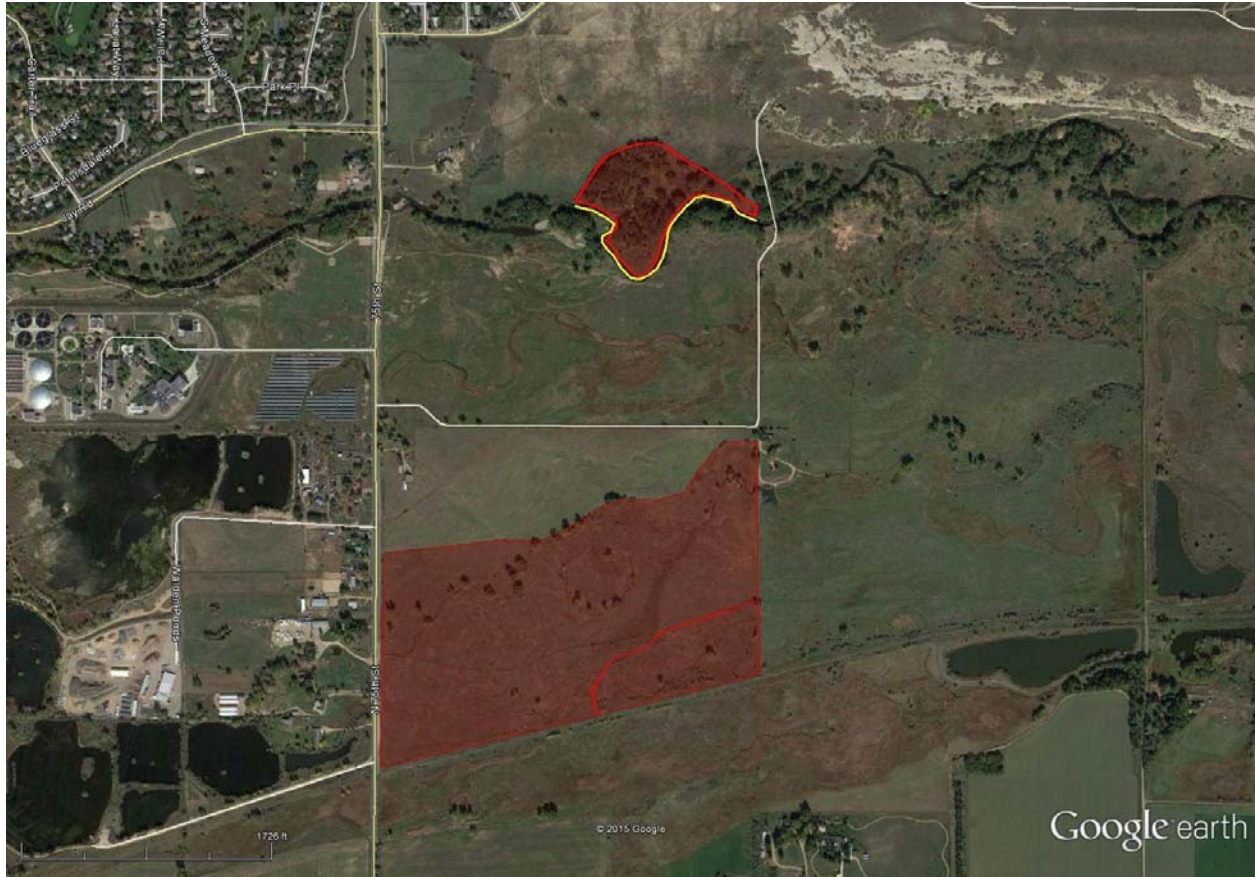
Project Revenue	Received	Budget
CWCB	\$ 100,000	\$ 100,000
BCPOS	\$ 18,000	\$ 19,950
City of Longmont	\$ 14,500	\$ 11,400
OSMP	\$ 45,000	\$ 42,750
Terra Foundation	\$ 38,000	\$ 40,000
Total Project Revenue	\$ 215,500	\$ 214,100

Expenses by Project Site	Actual	Budget
Boulder Creek Phreatophyte Removal and Riparian Restoration	\$ 109,126	\$ 102,698
St. Vrain Tamarisk Removal and Riparian Restoration	\$ 77,281	\$ 76,888
Russian Olive Removal on Boulder County Gilbert Open Space	\$ 32,965	\$ 34,294
Total Project by Project Site	\$ 219,372	\$ 213,880

In-Kind	Actual	Budget
WRV Volunteer Match	\$ 103,889	\$ 95,462
WRV tool purchase	\$ 3,840	\$ 3,840
WRV sawyer removal of Russian olive	\$ 3,033	\$ 3,840
303 Tree Discount	\$ 13,485	\$ 15,192
OSMP staff oversight	\$ 22,000	\$ 25,000
BCPOS staff oversight	\$ 16,000	\$ 17,560
City of Longmont Staff oversight	\$ 13,000	\$ 14,000
Total In-kind	\$ 175,247	\$ 174,894

Appendix

Map 1.0 Boulder Creek Phreatophyte Removal and Riparian Restoration



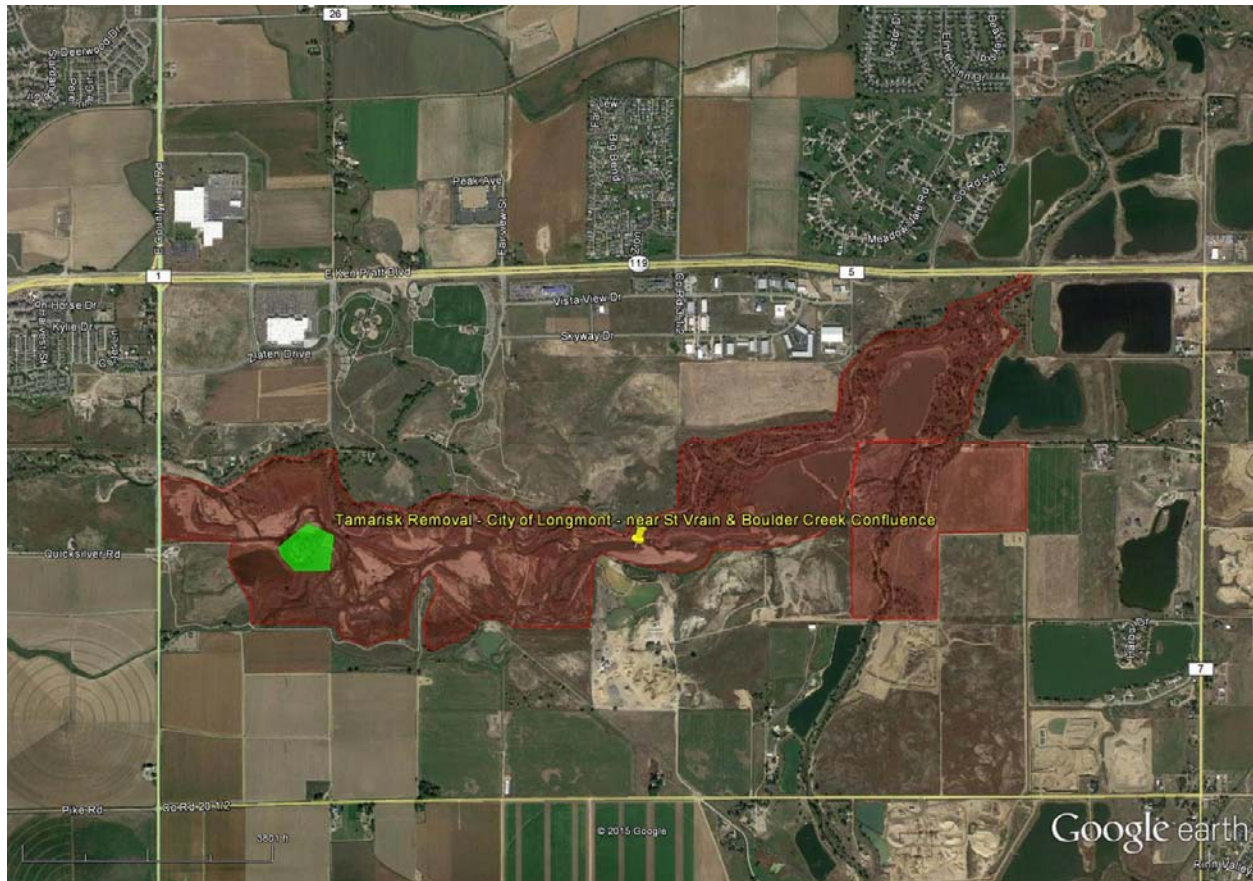
1.0 Southern polygon shows the area of Russian olive removal totaling 84 acres. The northern polygon shows the area of intensive removal of dense mature crack willow on 11 acres, to be followed by riparian restoration with native trees and shrubs. Approximate scale is 860 feet per inch.

Map 2.0 Russian Olive Removal on Boulder County Gilbert Open Space



Boulder County Gilbert Open Space is in the St. Vrain floodplain, about $\frac{1}{2}$ mile north of the creek. The site is infested with Russian olive, including about 1500 small, medium and large individuals. The largest trees are along the south, west and north boundaries. Approximate scale is 240 feet per inch.

Map 3.0 St Vrain Tamarisk Removal and Riparian Restoration (County Line Rd to Confluence)



Map shows area to remove young tamarisk, most of which are currently small enough for hand pulling (but won't be for long). The western quarter of the site will also receive intensive flood-related riparian revegetation. The flood disturbance is the primary reason for the current infestation of tamarisk, which is interspersed with desirable emerging native willow and cottonwood. Approximate scale is 190 feet per inch.

References

1. Russian Olive Identification and Management, Colorado Department of Agriculture-Conservation Services, 07/2015 www.colorado.gov/ag/weeds