Phreatophyte Project

Five-Year Project Plan 2020-2024

Before and After

Satellite View of Russian olive along waterways

Montezuma County Noxious Weed Department

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Plan updated 4-21-2020

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Introduction:

This project was designed to control Russian olives and Salt cedars (phreatophytes) in an effort to conserve water and promote healthy ecosystems. Taking the low economy of Montezuma County into account as well as the extent of the phreatophyte populations we have created a plan to effectively manage them.

History of Russian olives and Salt cedars:

Salt cedars was brought to the United States in the early 1800's. As early as the 1820s Saltcedar was advertised in U.S. horticultural catalogues, and by 1856 it was sold and promoted in California nurseries. In the early 1900s, Saltcedar was widely planted in the Southwestern United States for windbreaks and protection from streambank erosion, being promoted by both government and private land agencies.

Russian olives have a similar story, they were brought into the United States in the early 1900s, and was cultivated in several Western States. Russian olive has widely been promoted for being planted in windbreaks and horticultural settings, often with the encouragement of state and Federal subsidies.

The Colorado Noxious Weed Act was established in 1990, recognizing the severe impacts that non-native invasive species are having on our native ecosystems. Salt cedar and Russian olives were put on the B-List designating them to be controlled and suppressed on all lands within Colorado.

Phreatophyte Impacts

Phreatophyte Extent and Drought / Water Impacts:

MCNWD has mapped 6,996 acres of Russian olive and 6,775 acres of Salt cedar (Tamarisk) on wetland/waterways within Montezuma County (see Appendix A). Total infested acres of these two species comes to 9,371.9 (many areas mapped contain both species). Total miles infested on our major waterways and main canals comes to 221.51 miles (see appendix B for breakdown).

Researchers studying water consumption by classes of riparian vegetation in the Middle Rio Grande Region of New Mexico estimated that one acre infested with Russian olives or Salt cedars would consume 4.5, 4.2, or 3.8-acre feet of water per year. Using our data from treated phreatophytes in 2019 we estimated one acre infested with these phreatophytes would consume about .8 acre feet of water per year. Density is definitely a factor in these water calculations, and it was not clearly defined in this article. We determined the more accurate way to determine evapotranspiration amounts would be to calculate per tree treated as our crew did in 2019.

Using our calculations from 2019 we estimate Montezuma County is losing about 7,377 acre-feet/year. This number does not take into account water loss occurring from flooding as a direct result of phreatophyte debris clogging ditches/waterways. Therefore, the total amount of water loss from these two phreatophyte species is estimated to be much higher.

Using the United States Drought Monitor map archive we can see that Montezuma County has been in the D4 Intensity category documenting exceptional drought in 2002 and 2018. We have been in the D3 Intensity category documenting extreme drought in 2003, 2012, and 2013. We have been in the D2 Intensity category documenting severe drought in 2014. We have been in the D1 Intensity category documenting moderate drought in 2004, 2006, 2007, and 2019. Lastly, the D0 Intensity category documenting abnormally dry was recorded in 2010, 2011, and 2017. In conclusion to this data we can see that since 2002 we have had 13 years of reported drought and only 5 years reporting no drought. The most recent U.S. drought monitor map puts us in the severe drought category, intensity D2.

In Montezuma County, water is a scarce resource. The heart of our county is in agriculture, if we continue to lose water, people will start losing their farms and way of life. It therefore is our duty to do whatever we can to conserve what little water we have.

Nitrogen Impacts of Russian olives:

One study, Russian olive, Elaeagnus angustifolia, alters patterns in soil nitrogen pools along the Rio Grande River, New Mexico, USA, compared nitrogen and debris accumulation between Cottonwoods and Russian olives. The study reported a 55% increase in total nitrogen due to Russian olives. They also saw 73% more debris accumulation under subcanopy Russian olive compared with cottonwood trees alone.

The increased nitrogen in soil does not affect microbial productivity, but it does overall enhance soil nitrogen resources in semi-arid riparian environments, which could be a good thing. One thing the study talked about is how increasing the nitrogen in the soil will make Cottonwoods healthier in these areas; however it also makes Russian olives more competitive which will compete with cottonwoods for other resources, ultimately suppressing the cottonwoods.

John O'Connell / Capital Press Idaho State University stream ecologist Colden Baxter has done research on nitrogen levels directly increased by Russian olives and the impacts those nitrogen levels have. Russian olives accumulate nitrogen in their leaves, Russian olives also have a high die off rate, and therefore they are continuously dropping leaves with this deposited nitrogen. When the trees are along a waterway these nitrogen rich leaves fall into the water, which increases the nitrogen levels in the water itself. Colden Baxter found that these elevated nitrogen levels help increase carp populations. He has seen a 20-fold increase in carp density compared with estimates from the early 1970s in one stream he's studied, in which the primary change has been Russian olive numbers. The problem is that Carp are non-native fish that will out-compete and chase off our native / desirable fish species.

Colden Baxter also discussed that these elevated nitrogen levels may increase algae growth and choke out dissolved oxygen. This creates water-quality problems in reservoirs when combined with olives and leaves that are slow to decompose.

Salinity Impacts of Saltcedar:

Salt glands on the leaves of Salt cedars exude salts and may create saline soil environments. Excessive quantities of soluble salts can be harmful to plants by interfering with water uptake. For native plants competing to establish in the same habitat as Saltcedar, saline soil reduces their survival.

Wildlife Habitat Impacts:

The Saltcedar and Russian olive Control and Demonstration Act Science Assessment written by Heather Bateman and Eben Paxton discusses impacts of these phreatophytes on arthropods and birds. As far as arthropod diversity, it appears to be greater in native vegetation compared to Salt cedar and Russian olive habitats, but they did say that more studies are needed to understand how Saltcedar and Russian olives affect particular specific species and entire communities of arhropods.

As far as birds studies have shown Saltcedar to be suitable for a number of generalist avian species, however Saltcedar is not suitable habitat for all native riparian birds, and bird abundance and diversity is seen to be lower in Saltcedar than in native-dominated riparian vegetation. With regards to Russian olives, a study of birds nesting in Russian olive in New Mexico found that a little more than half of riparian breeding species did not nest in this species. Russian olive does produce abundant fruit that is eaten by a large number of bird species and can provide important structural habitat for birds. However, diversity of birds is lower in Russian olives compared to native species.

A species of concern is the Southwestern Willow Flycatcher, it has been listed as a federally endangered species. This assessment said nearly half of the Flycather's territories are found in riparian patches consisting primarily of native trees such as willows, 6% of known breeding territories are in monotypic salt cedar, 22% are in habitats dominated by Saltcedar, and another 28% are in native habitats where Salt cedar and other exotics provide 10-50 percent of the habitat structure.

The assessment went on to say much of the Saltcedar along riparian systems is not used by flycatchers and is presumably unsuitable; for example, flycatchers are absent today from some areas where they historically bred and where Saltcedar is now dominant and widespread. Furthermore, fire is considered one of the greatest threats to flycatcher breeding sites, and the presence of Saltcedar may increase the likelihood of large fires due to its flammability.

Economic Impact of Phreatophytes:

It has been estimated that the cost incurred by salt cedar infestations in the southwest USA with respect to water supply, flood control, and wildlife to the benefits of eradicating this weed would be a net total benefit between $3.8 billion to $11.2 billion over a 55 year period (Zavaleta 2000, pp. 261-300 in Mooney & Hobbs, Invasive Species in a Changing World).

The cost of irrigation water definitely varies, a median cost is probably $390 per acre-foot. If you take our 6,775 acre-feet of water lost each year it equates to $2,642,250 per year. Now we need to estimate crop loss or forage loss from losing that acre of production, and this price will vary significantly. In this area we raise a lot of timothy grass hay, alfalfa hay, beans, sorghum, and wheat. We are going to use an overall estimate of $600/acre. Therefore if you lose one acre foot of water you lose $600. The total production loss would equate to $4,065,000, that is to say all of this water the phreatophytes are consuming could be used for irrigation. Therefore, we can estimate that in Montezuma County these phreatophytes are causing an economic loss of $4,065,000 each year. This estimate is not including ditch maintenance costs due to phreatophyte debris.

2019 Phreatophyte Project

MCNWD hired a seasonal two-person crew that worked 40-hour weeks from May 1, 2019 to November 31, 2019. The crew was trained as spraying technicians in order to safely and effectively treat Russian olives and Salt cedars with herbicides to kill root systems and hopefully prevent the species from sprouting. The crew was also trained for chainsaw safety.

The crew conducted cut stump treatments on all shrubs/trees with a root collar diameter (RCD) greater than one inch. This work entailed either using snippers or a chainsaw to cut the shrub/tree down, and within five minutes of cutting the stem, they would apply a mixture of Garlon 4, Impel, and Rodeo to the stump with a paintbrush or with a backpack sprayer. Shrubs/trees smaller than 1" RCD were foliar sprayed with the same herbicides with a backpack sprayer.

Areas down McElmo Canyon we ended up renting an excavator and a mulcher attachment to more efficiently treat dense areas of Salt cedar. For every hour using the excavator it would save the crew six hours using chainsaws.

Each day the crew documented how many trees were treated divided into different RCD sizes and by species (see appendix C). By recording this data we could then use those numbers to calculate the water savings. It was determined that calculating water saved per acre was less accurate than keeping track of individual trees treated relative to their RCD size. The golden rule is landscape trees need 10 gallons per inch in diameter each week to be healthy. These phreatophytes work differently because they grow in riparian areas and are known to transpire higher rates of water than native trees. There are not studies that give us a direct number of how many gallons each diameter class of these two species takes up per week. Using an educated guess, on the reserved side, we are estimating these trees are taking up 20 gallons per inch in diameter each week, so twice of that of which an ornamental tree would take up.

Once the trees were cut and treated the crew then piled the slash into slash piles on the properties to be burned or hauled off by the landowner / land manager. Larger tree stems were cut into sections intended for the landowner / land manager to utilize as firewood. Trees were not felled into waterways, in some cases equipment such as side by sides or tractors were used to pull the tree away from the waterway as it was being felled.

The crew has treated Russian olives and Salt cedars on a total of 30 properties and some areas of county roadsides. Waterways that were treated include: private ditches off Lone Pine Canal, private ditches off Upper Arickaree, private ditches south of Trail Canyon, Ritter Draw, McElmo Creek, a drainage off Upper Arickaree and Hermana Canal, drainage off of Rocky Ford Ditch, drainage off Yellow Jacket Canyon, some irrigated pastures off pipelines, Mancos River, private ditch off of Towaoc / Highline Canal, Mud Springs, and Simon Draw.

To sum up this project the crew has treated 8,175 Russian olives and 4,975 Salt cedars. We kept track of the diameter range of each tree treated from >2", 2-4", and <4". We then calculated the amount of water each diameter class of tree used in a 39-week period. Total water savings from treating these 13,150 treated trees comes to be 38,693,750 gallons of water, or 118.7 acre feet. We don't think acreage of treated trees is as important as individual trees treated, however the gross acreage of treated trees comes to be about 150. The goal was 200 acres, however some properties we treated had high density of trees, so acreage isn't the important take home note, individual trees treated is, including diameter class.

A map of treated areas can be found in Appendix D, and photos of the project from 2019 can be found in Appendix F.

2020 Phreatophyte Project:

MCNWD had a few properties that the crew did not get to in 2019, therefore they would be treated in 2020. Two of those properties would require an excavator with a mulcher attachment in order to be efficient. MCNWD strategized an outreach plan that incorporated these properties by identifying neighboring properties within about a mile radius, that also have infestations of phreatophytes. MCNWD sent out letters to these neighboring properties explaining the project and that we would be in their area working on another property; therefore contact MCNWD if they are interested in learning more about the project. As of April, 2020, MCNWD had fifteen properties sign up for the crew's treatments, that were located in these specific areas.

Through other more general noxious weed outreach MCNWD had an additional 17 properties request the crew to treat their phreatophytes. Therefore by April 1st, 2020 MCNWD already had 35 properties on the list for the 2020 season. Therefore at this point in time MCNWD is not actively advertising the project.

In 2019 MCNWD was awarded funding for a mulcher attachment through the Water Supply Reserve Fund. This is very significant because it will save the landowners a significant amount of money. In 2019, our rental cost for the excavator was about $4,000 / month and the mulcher attachment was an additional $4,000 / month. MCNWD is anticipating renting an excavator for three months in the 2020 season, therefore by purchasing this mulcher it will save $12,000 in 2020. The mulcher attachment has been ordered and will utilized by the crew mid to late May, 2020.

MCNWD was also awarded $25,000 from the Colorado Department of Agriculture (CDA), $7,100 from the Habitat Partnership Program (HPP), and has been awarded $326,000 for a five year period from

the Regional Conservation Partnership Program (RCPP). MCNWD has also applied for funds from the Colorado Water Plan and from the National Fish and Wildlife Foundation, but those grants will not be announced until May, 2020.

The funding from the HPP will pay for the crew's salary during the month of April, 2020, therefore MCNWD is charging landowners a match of $20/hour to cover the costs of equipment and herbicide. Funds from the CDA will be going towards the crew's salary for the remaining duration of their season. The purchase order for the RCPP grant has not been finalized but it was for the request of paying for the crew's salary. MCNWD is anticipating hiring an additional one or two crew members for the 2020 season from these grants.

Having a four-person crew will enable MCNWD to break them up into two member crews and have them work different days in order to cover a seven day week. This will allow MCNWD to keep the excavator and mulcher attachment in use seven days a week. MCNWD pays a flat fee for monthly rental of the excavator, therefore the more the crew keeps it running the less MCNWD will have to charge the landowners to cover expenses.

As far as following up with properties that were treated in 2019, the crew will be re-visiting every property to treat any sprouts that may have come up since the treatment. MCNWD purchased a side-by-side in 2019 for the crew to utilize, as well as a sprayer unit that will fit in the back of the side-by-side to treat sprouts. This will most likely be done around July of 2020. If the crew sees that there are a significant amount of sprouts on the previously treated properties the herbicide mix may be changed.

A map of properties to be treated in 2020, as of April, 2020, can be found in Appendix F.

Five-Year Management Plan (2020-2024):

Biological Plan:

MCNWD plans to release the Northern Tamarisk Beetle in Yellow Jacket Canyon, Cow Canyon, Ruin Canyon, Cross Canyon, Dolores River, Trail Canyon, Goodman Canyon, Navajo Wash, Mancos River, Marble Wash, McElmo Creek, and Mariano Wash. These are all remote waterways that mainly have Saltcedar infestations. MCNWD is working with the Palisade Insectary on obtaining five releases, each containing about 500 beetles, for the next five years.

MCNWD has pre-determined five locations to release beetles at in 2020 (see appendix G). Two releases will be in Yellow Jacket Canyon, one release will be in Trail Canyon, one release will be on Navajo Wash, and the fifth release will be on McElmo Creek. Sites will be monitored yearly, photo points will be taken at release point. Satellite images will also be recorded before release and after release.

Mechanical / Herbicide Plan:

MCNWD intends on keeping a crew of two to four people, funding dependent, to continue working at a low cost to be an affordable option for private landowners to get their phreatophytes

removed. As was done in 2019, we will continue to do cut stump treatments on all shrubs/trees with a root collar diameter (RCD) greater than one inch. This work will entail either using snippers or a chainsaw to cut the shrub/tree down, and within five minutes of cutting the stem, the crew will apply a mixture of herbicide to the stump with a paintbrush or with a backpack sprayer. Shrubs/trees smaller than 1" RCD were foliar sprayed with the same herbicides with a backpack sprayer. In 2019 Garlon, Rodeo, and Impel was used for the herbicide treatments. We will be evaluating the results from this mixture in 2020 to decide if we need to change herbicides.

Areas that have high densities of phreatophytes with low root collar diameters the crew will utilize an excavator with a mulcher attachment head. One crewmember will operate the equipment, the other member, or two members, will follow treating the stumps with the herbicide, as well as documenting the number of trees treated within different root collar diameter ranges. Each day the crew will document treatments and take photo points.

Monitoring:

Each property that was treated the previous year will be re-visited the following year. Any sprouts that have come up will be treated by a foliar application with herbicide. After photos will be taken, preferably in the same location as the before photos.

Crew will meet with the landowner and discuss any management needs such as helping the landowner develop a noxious weed plan, or and reclamation plans. MCNWD is hoping to partner with local organizations/businesses to get discounted native/desirable species to re-introduce into areas that were once dense thickets of phreatophytes. These species might include shade trees, native/desirable grasses, or pollinator species.

Outreach:

MCNWD will use the strategic approach that was done in the spring of 2020, focusing on notifying properties that are in an area of which a property has already signed up for the crew. This will allow the crew to be more efficient with their time. Outside of this approach, MCNWD will be sending out informative postcards to the landowners on our list to promote awareness to the impacts of phreatophytes and to make them aware of our project and how we can help.

Expected Five-Year Plan Results:

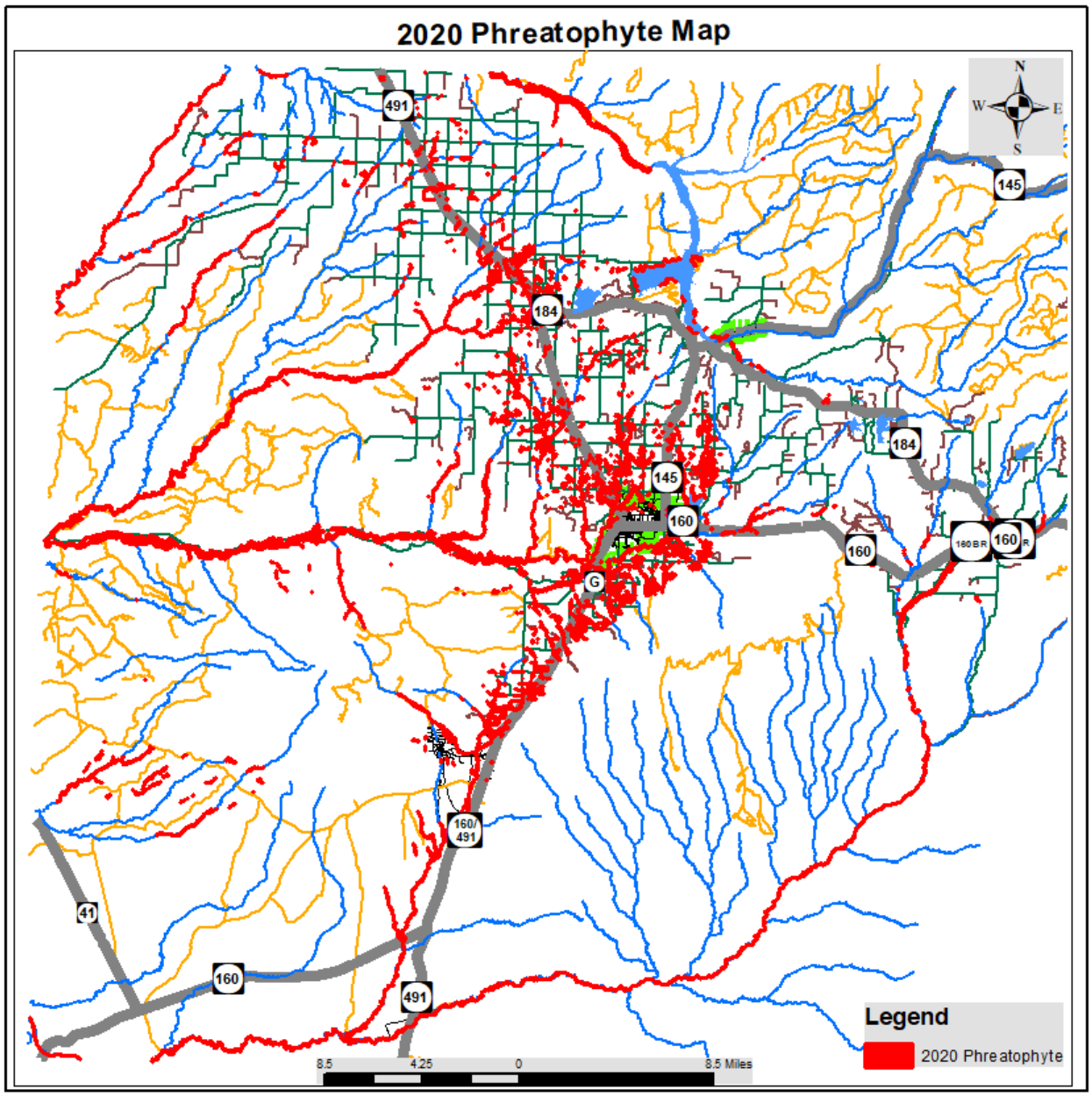
In 2019, with a two-person crew, we were able to treat 12,055 trees or 170 acres. This led to the estimated water savings of 118 acre-feet. In 2020, we are purchasing a mulcher attachment through the Southwest Water Reserve Fund to help lower the cost to the landowners. In 2019, we used the excavator for one month, and in 2020, we are anticipating using the excavator for 3 months. Utilizing this equipment will increase productivity, increasing trees treated and acres treated. We are anticipating treating 20,000 trees in 2020, on 300 acres. Water savings is estimated at about 192 acre-feet. For our next four years we are estimating these same numbers.

By the end of 2020, including results of 2019, we estimate to have saved 310 acre-feet of water,

and estimate to have treated 32,055 trees covering 470 acres. Holding the numbers constant, by the time 2021 season is complete we are estimating to have treated a total of 52,055 trees, covering 770 acres. At the end of the 2022 season we are estimating to have treated 72,055 trees, covering 1070 acres, estimating water savings of 694 acre feet since the project began in 2019. Skipping to year five in 2024 we are estimating total number of trees treated to be 112,055, covering 1,670 acres, with an estimated water savings of 1,078 acre feet since 2019.

Within the five-year period using the biological control we are hoping to have reduced 30% of the Saltcedar populations in Yellow Jacket Canyon, Trail Canyon, Navajo Wash, and McElmo Creek. We are hoping to begin establishment on all of the following waterways by 2024: Cow Canyon, Ruin Canyon, Cross Canyon, Dolores River, Goodman Canyon, Mancos River, Marble Wash, and Mariano Wash.

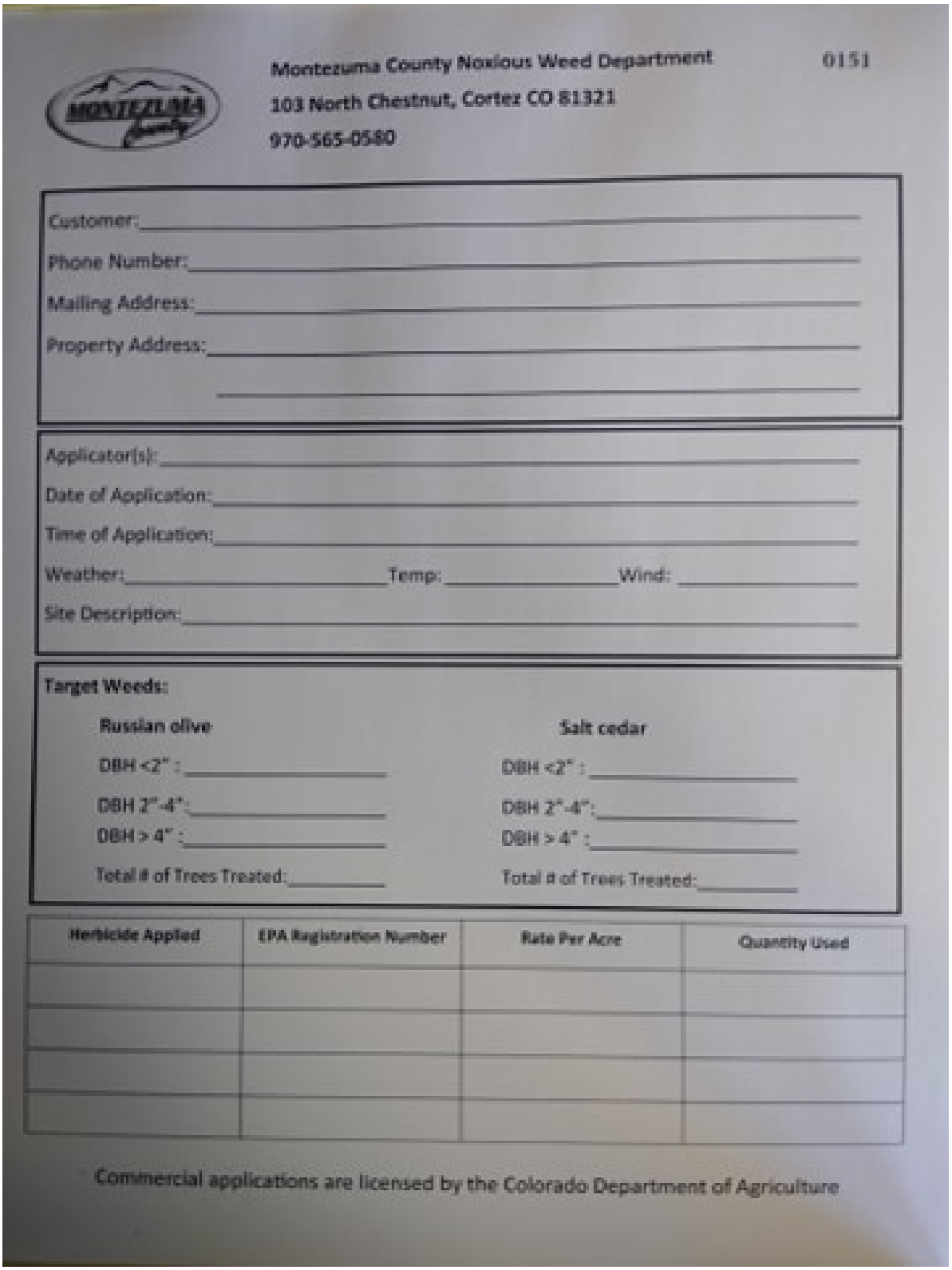
Appendix A:


2020 Phreatophyte Map
N
W
E
S
491
145
184
184
145
160
160
160 BR
160
G
160/
491
41
160
491
Legend
2020 Phreatophyte
8.5
4.25
0
8.5 Miles

Appendix B: Detailed main canals and waterways infested distance.

- Rocky Ford Ditch: 4.76 miles
- Highline Ditch / Towaoc Canal: 1.04 miles
- Dove Creek Canal: .145 miles
- Lone Pine Canal: 1.68 miles
- U Lateral: 2.04 miles
- Garret Ridge Lateral: .12 miles
- Upper Hermana Lateral: .1 miles
- May Lateral: .24 miles
- Marble Wash: 2.13
- Alkali Canyon: 4.62 miles
- Tributary to Little Cahone Canyon: .19 miles
- Tributary to Cow Canyon: .42 miles
- Bowdish Canyon: .18 miles
- Brumley Draw: 1.36 miles
- Cahone Canyon: .7 miles
- Chicken Creek: 2.3 miles
- Cottonwood Wash: 2.02 miles
- Cow Canyon: 1.04 miles
- Cross Canyon: 2.8 miles
- Crow Canyon: 2.79 miles
- Dawson Draw: 1.83 miles
- East Fork Mud Creek: .66 miles
- Tributary to Sandstone Canyon: .87 miles
- Ferris Canyon: .2 miles
- Fisher Creek: 1.03 miles
- Goodman Canyon: 2.62 miles
- Hartman Draw: 9.23 miles
- Head Draw: .2 miles
- Hovenweep Canyon: 4.45 miles
- Tributarys to McElmo Creek: 4.23 miles
- Kernan Creek: 1.57 miles
- Little Cahone Canyon: .11 miles
- Littlewater Canyon: .11 miles
- Lost Canyon: 1.02 miles
- Mancos River: 25.51 miles
- Dolores River: 8 miles
- Rock Canyon: .8 miles
- Mud Creek: .14 miles
- Narraguinnep Canyon: 2.1 miles
- Negro Canyon: .14 miles
- Pine Creek: 2.08 miles
- Rincon Canyon: .52 miles
- Ruin Canyon: 1.61 miles
- Ryman Draw: .08 miles
- Salter Canyon: .16 miles
- San Juan River: .71 miles
- Sandstone Canyon: 1.13 miles
- Simon Draw: .4 miles
- Stinking Springs Canyon: .36 miles
- West Fork Mud Creek: .46 miles
- West Mancos River: .27 miles
- Woods Canyon: .38 miles
- Yellow Jacket Canyon: 36.44 miles
- Navajo Wash: 13.54 miles
- Weber Canyon: 12.4 miles
- Tributary to Yellow Jacket: 1.33 miles

Appendix C: Field Documentation



Montezuma County Noxious Weed Department 0151
103 North Chestnut, Cortez CO 81321
970-565-0580

Customer:_____
Phone Number:_____
Mailing Address:_____
Property Address:_____
_____

Applicator(s):_____
Date of Application:_____
Time of Application:_____
Weather:_____ Temp:_____ Wind:_____
Site Description:_____

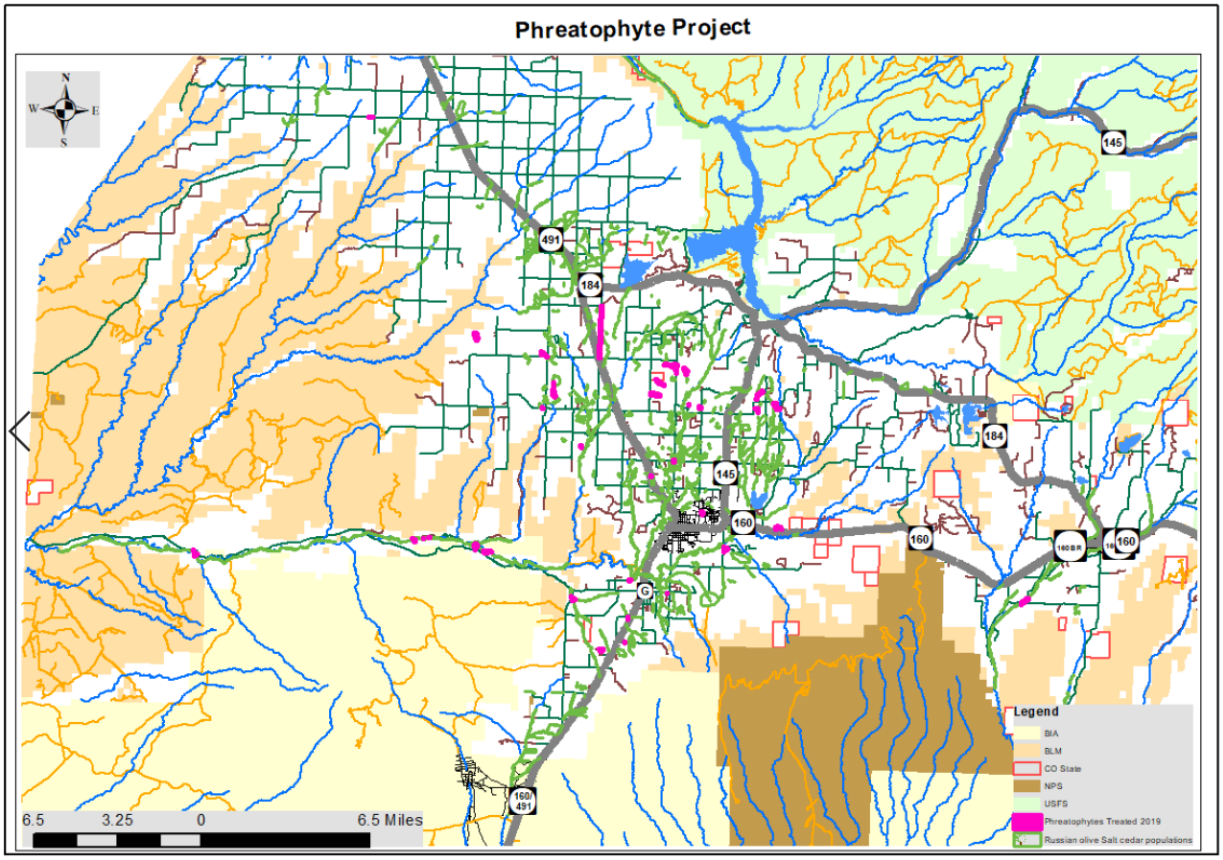
Target Weeds:

Russian olive	Salt cedar
DBH <2" :_____	DBH <2" :_____
DBH 2"-4":_____	DBH 2"-4":_____
DBH > 4" :_____	DBH > 4" :_____
Total # of Trees Treated:_____	Total # of Trees Treated:_____

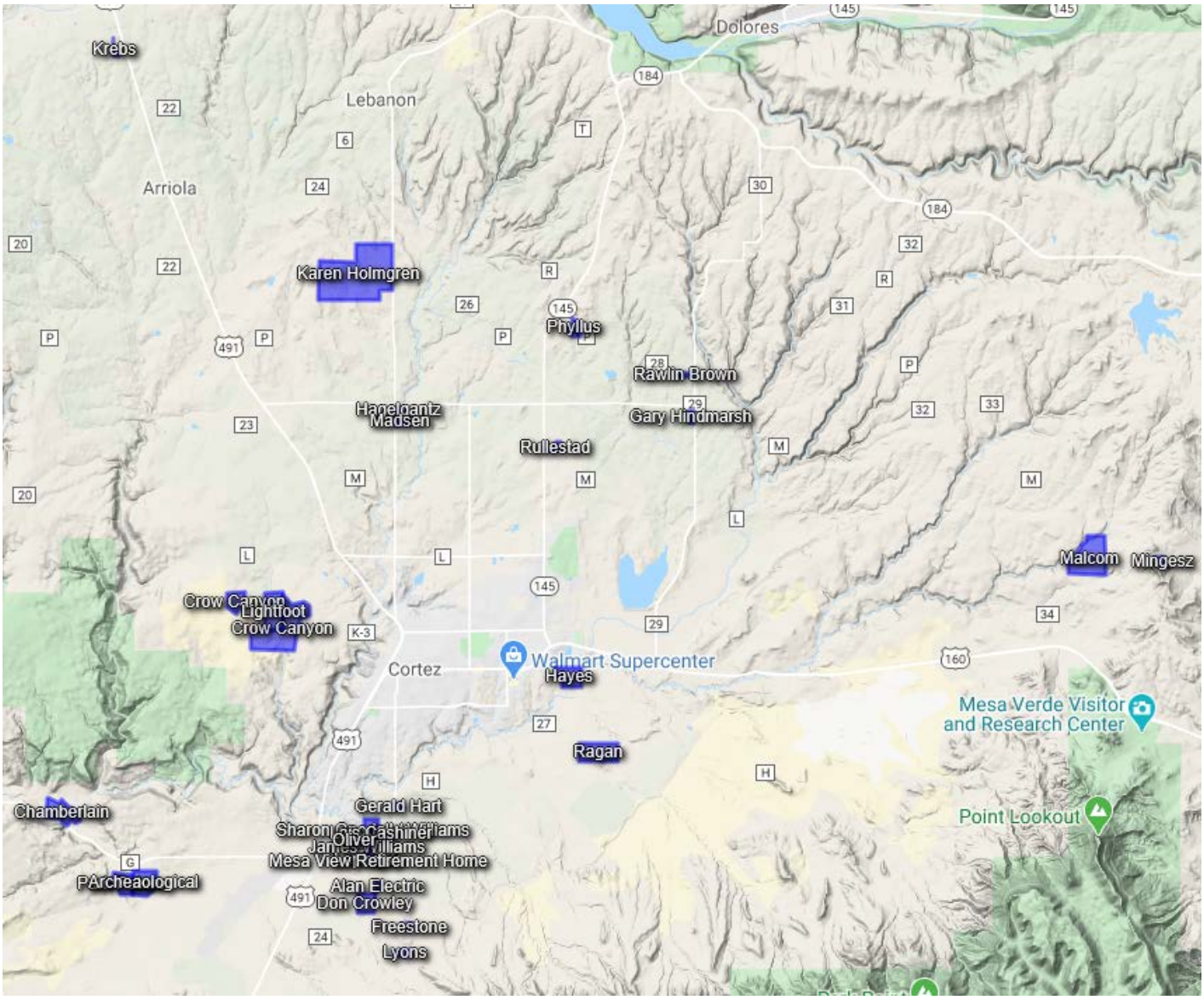
Herbicide Applied	EPA Registration Number	Rate Per Acre	Quantity Used

Commercial applications are licensed by the Colorado Department of Agriculture

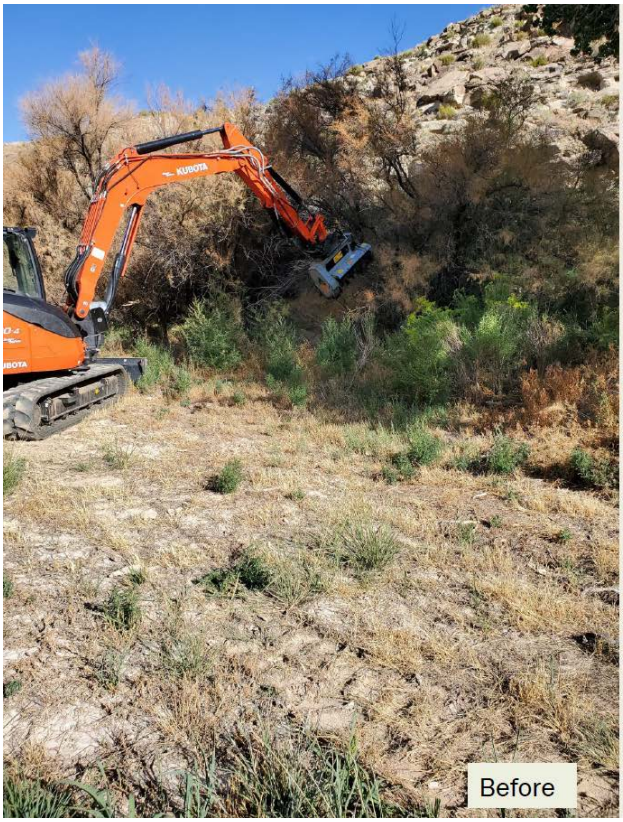
Appendix D: Map of 2019 treatments.

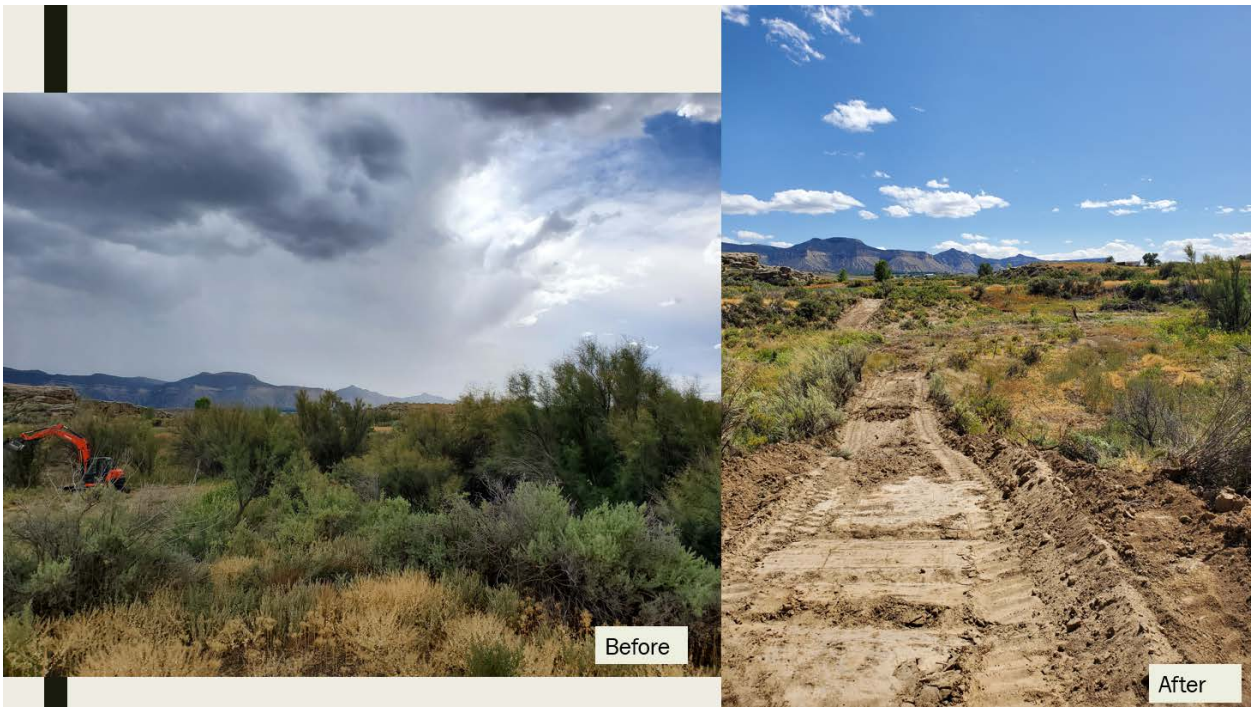


Appendix E: Photos of treatments in 2019.



Appendix F: Photos of treatments in 2019.




Before
After


Before
After


Before
After


Before
After


Before
After


Before
After

<u>Appendix G:</u> 2020 Bio control release points