Desert Rivers Collaborative Monitoring Report 2021

Colorado Parks and Wildlife

Connected Lakes State Park

Prepared by Western Colorado Conservation Corps and RiversEdge West

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Introduction

The Desert Rivers Collaborative (DRC) was formed in 2012 to collectively address the proliferation of invasive vegetation species and overall riparian health along the Colorado and Gunnison Rivers and their tributaries in Mesa and Delta County. The DRC serves as a platform to work together, share resources, and address riparian health at a watershed-scale. The DRC connects different landowners and land managers and works across boundaries to create efficiencies, share best-practices, and cultivate relationships focused around riparian and river health. Restoration work involving initial tamarisk and Russian olive (TRO) removal, TRO re-treatments, secondary weed treatments, and active revegetation has occurred on almost 3,000 acres since 2012 in the DRC area. The DRC utilizes a comprehensive Implementation Plan to guide restoration work, which is available on RiversEdge West's (REW) DRC webpage.

Vegetation monitoring on restoration sites is a critical step in understanding the ecological condition of a site pre-and-post restoration activities. However, monitoring has been inconsistent on DRC sites given funding and capacity limitations, the patchwork of land ownership where restoration work has occurred, and other barriers.

In 2021, with funding from the Colorado Water Conservation Board (CWCB), REW worked with a committee of DRC partners to refine the Rapid Monitoring Protocol and delineate DRC sites to be monitored. REW and Western Colorado Conservation Corps hired and trained a two-person Vegetation Monitoring Crew for eleven weeks in the summer of 2021 to monitor 145 sites in riparian areas in the DRC area.

Monitoring Summary and Recommendations

Site Background:

Connected Lakes State Park was divided into 4 monitoring polygons (Figure 1) with the following IDs:

- DRC_CPW_CL_1 (CL1): 17.7 acres
- DRC_CPW_CL_2 (CL2): 12.5 acres
- DRC_CPW_CL_3 (CL3): 15 acres
- DRC_CPW_CL_4 (CL4): 9.3 acres

Figure 1 Locations of the 4 monitoring polygons in Connected Lakes State Park

Monitoring Summary:
The following is a summary of monitoring data collected during summer 2021. Individual site maps and raw data are available in the Site-by-Site Rapid Monitoring section. Raw data is available to download or view online from the DRC's AGOL account here: https://arcg.is/0qLiKq

Relative cover of tamarisk and Russian olive was low, less than 20% across all 4 polygons. Cheatgrass, kochia, and Russian thistle infestations were documented in all 4 polygons and CL_1 and CL_3 had the highest coverages of these invasives. The Invasive Species Inventory documented an additional 6 invasive plant species, of these Russian knapweed was the most prolific, covering approximately 13 acres across the 4 monitoring polygons. Links to treatment recommendations for these invasive plants from UC Davis are listed below.

Relative cover of native vegetation ranged between 61% and 80% in CL_1, 2, and 3, and was lowest in CL_4 at 51%-60%. Cottonwood was the most common native plant in all monitoring polygons except CL_4, which had rabbitbrush as the most common native plant. Sumac and willow were the second most common native plants in all 4 polygons.

Monitoring at this site occurred in 2013, 2016, and 2018. This data, along with previous restoration actions, are available in Appendix B.

Potential Restoration Actions Based on Monitoring Report:

- All polygons except CL_4 have cottonwood galleries with diverse age classes. Foster these young cottonwoods to maintain the health of these galleries.
- Consider revegetation with native woody species in CL_4, since the relative native cover is low and the most common native plant documented was rabbitbrush.
- Establishing native grasses and forbs will help crowd out some of the herbaceous weed species.
- Russian olive and tamarisk levels are low, but these populations can grow quickly. Continue monitoring these sites for the regrowth of these species.
- The following are links to UC Davis documents for treating the invasive plants documented on the site
    - Siberian elm
    - Russian knapweed
    - Perennial pepperweed
    - Canada thistle
    - Hoary cress
    - Musk thistle
    - Cheatgrass
    - Kochia
    - Russian thistle

Monitoring Maps

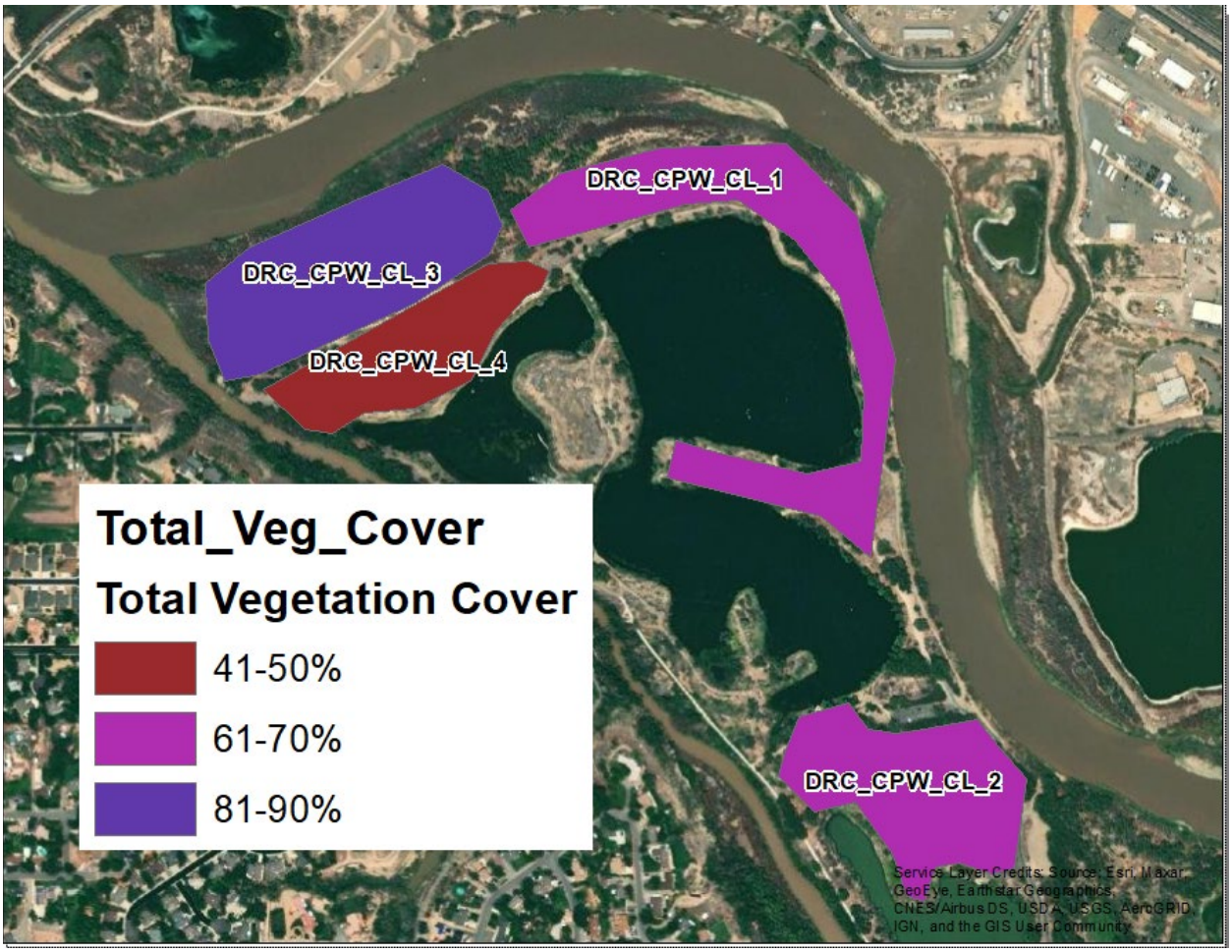


Figure 2 Total vegetation cover (native and invasive)

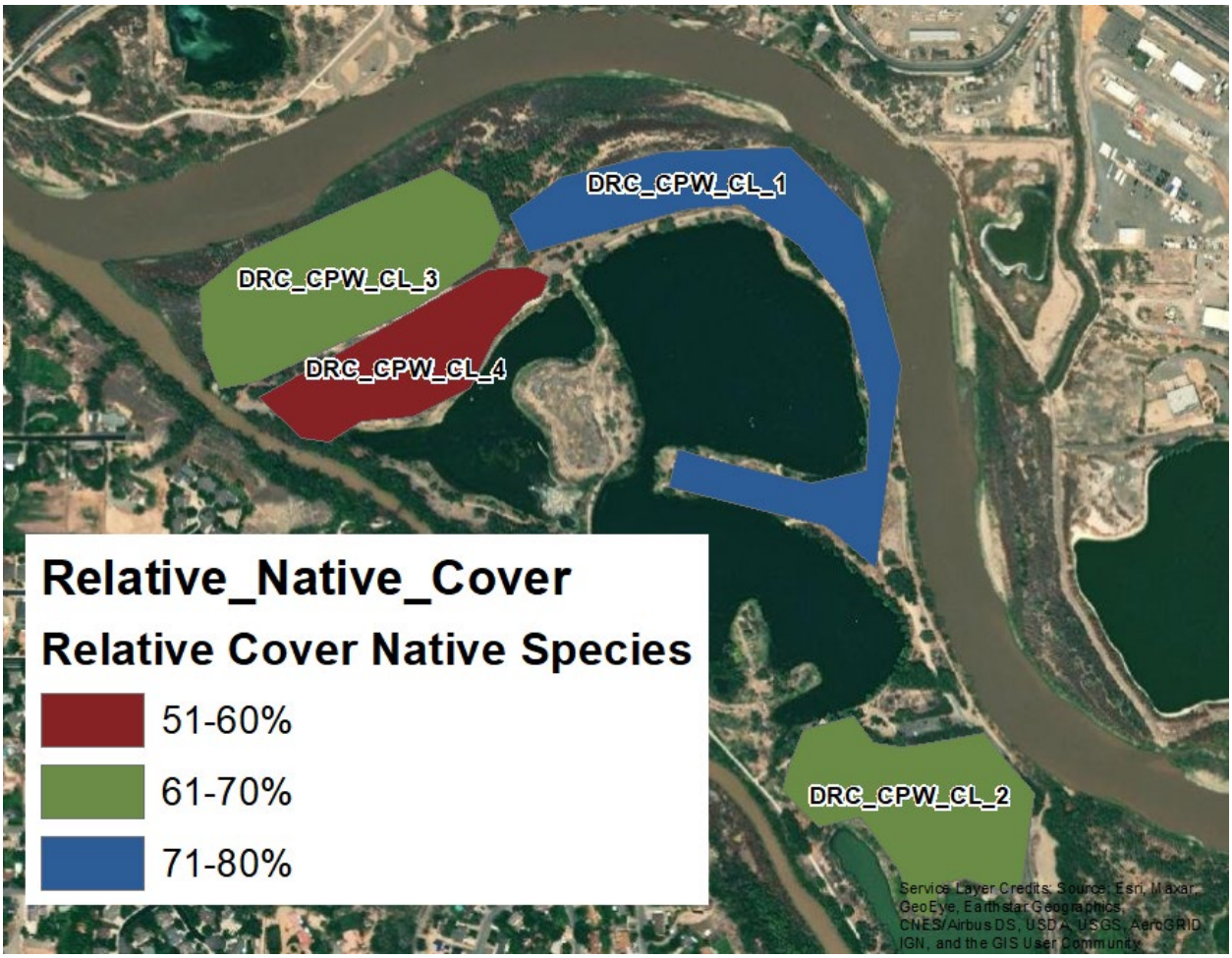


Figure 3 Relative cover of native vegetation

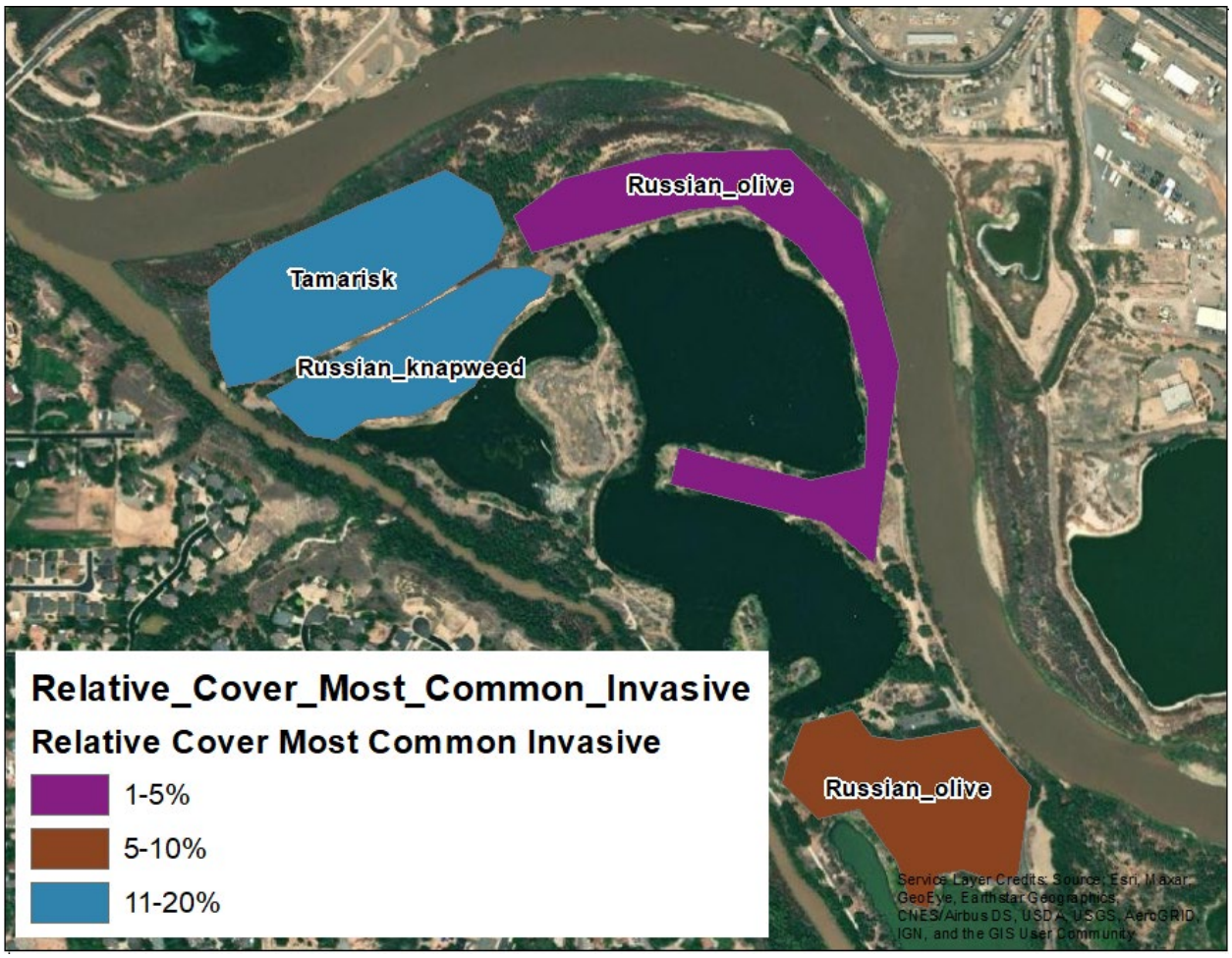


Figure 4 The most common invasive plant in each polygon and its relative cover

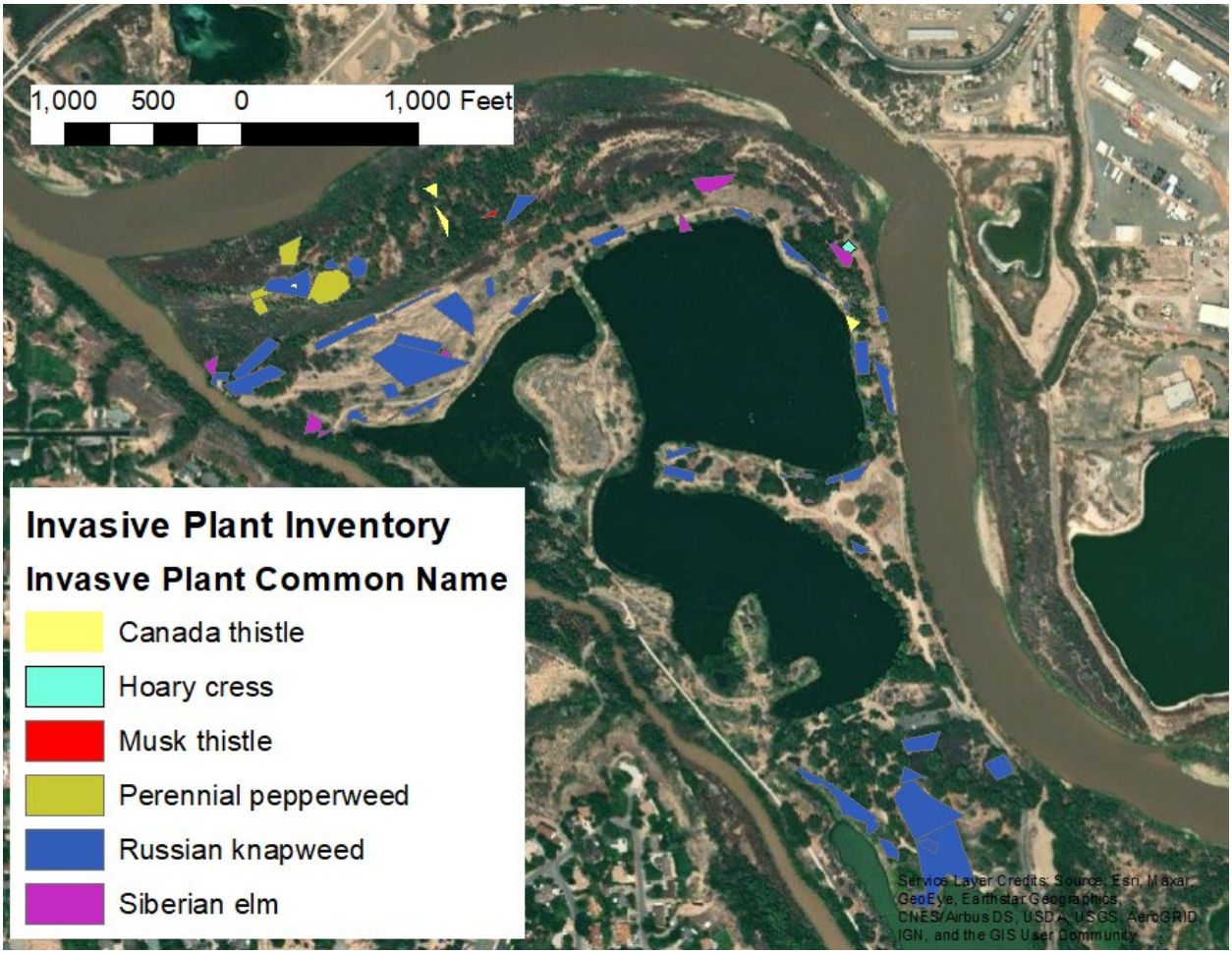


Figure 5 Locations of invasive species inventoried and area of infestation (acres). See individual site monitoring reports for more detailed maps.

Table 1 Total area of infestation of secondary invasive plant species

Invasive Plant Common Name	Infestation Size (ft2)	Infestation Size (acres)
Canada thistle	11,999	0.28
Hoary cress	3,630	0.08
Musk thistle	1,769	0.04
Perennial pepperweed	58,481	1.34
Russian knapweed	600,429	13.78
Siberian elm	42,972	0.99

The following chart summarizes the Rapid Monitoring Results for the 4 sites monitored at Connected Lakes.

DRC Site ID	DRC_CPW_CL_1	DRC_CPW_CL_2	DRC_CPW_CL_3	DRC_CPW_CL_4
Property Owner/Manager	CPW	CPW	CPW	CPW
Acres	17.78	12.55	15.40	9.39
Year of Monitoring	2021	2021	2021	2021
Date and Time of Monitoring	2021-05-21 22:32	2021-06-13 20:21	2021-06-13 20:22	2021-06-13 20:22
Total Vegetation Cover Native and Invasive (%)	61 to 70	61 to 70	81 to 90	41 to 50
Relative Cover All Native Vegetation (%)	71 to 80	61 to 70	61 to 70	51 to 60
Most Common Native Species	Fremont_Cottonwood	Fremont_Cottonwood	Fremont_Cottonwood	Rabbitbrush
Second Most Common Native Species	3_leaf_Sumac	3_leaf_Sumac	Coyote_Willow	Coyote_Willow
Most Common Invasive Species	Russian_olive	Russian_olive	Tamarisk	Russian_knapweed
Relative Cover Most Common Invasive Species (%)	0 to 5	6 to 10	11 to 20	11 to 20
2nd Most Common Invasive Species	Tamarisk	Russian knapweed	Russian knapweed	Kochia
Relative Cover 2nd Most Common Invasive Species (%)	0 to 5	6 to 10	6 to 10	6 to 10
3rd Most Common Invasive Species	Siberian elm	Tamarisk	Perennial pepperweed	Tamarisk
Relative Cover 3rd Most Common Invasive Species (%)	0 to 5	6 to 10	6 to 10	0 to 5
4th Most Common Invasive Species	Kochia	Siberian elm	Russian olive	Siberian elm
Relative Cover 4th Most Common Invasive Species (%)	0 to 5	0 to 5	0 to 5	0 to 5
Evidence of Natural Recruitment?	YES	YES	YES	NO
Has Active Revegetation Occurred?	NO	YES	NO	YES
Presence of Tamarisk Leaf Beetle?	None	None	Beetle_larva	None
Presence of Tamarisk Weevil	None	None	None	None
Tamarisk/Russian Olive Resprout Notes	very few of both	minimal	lots of tamarisk some RO	some tam and olive resprouts
Wildlife	fox birds lizards		birds bugs lizards	ducks insects other birds
Cottonwood_Gallery	>15 trees with diverse age classes	>15 trees with diverse age classes	>15 trees with diverse age classes	A few scattered trees
Cheatgrass	Moderate	Minimal	Severe	Minimal
Kochia	Severe	Minimal	Moderate	Moderate
Russian Thistle	Moderate	Minimal	Moderate	Severe
Logistics		thick vegetation	thick veg near bank	
Monitors	CR ZR	ZR and CR	CR ZR	ZR and CR

Site-by-Site Rapid Monitoring Summary

DRC Site ID: DRC_CPW_CL_1

Rapid Monitoring Assessment

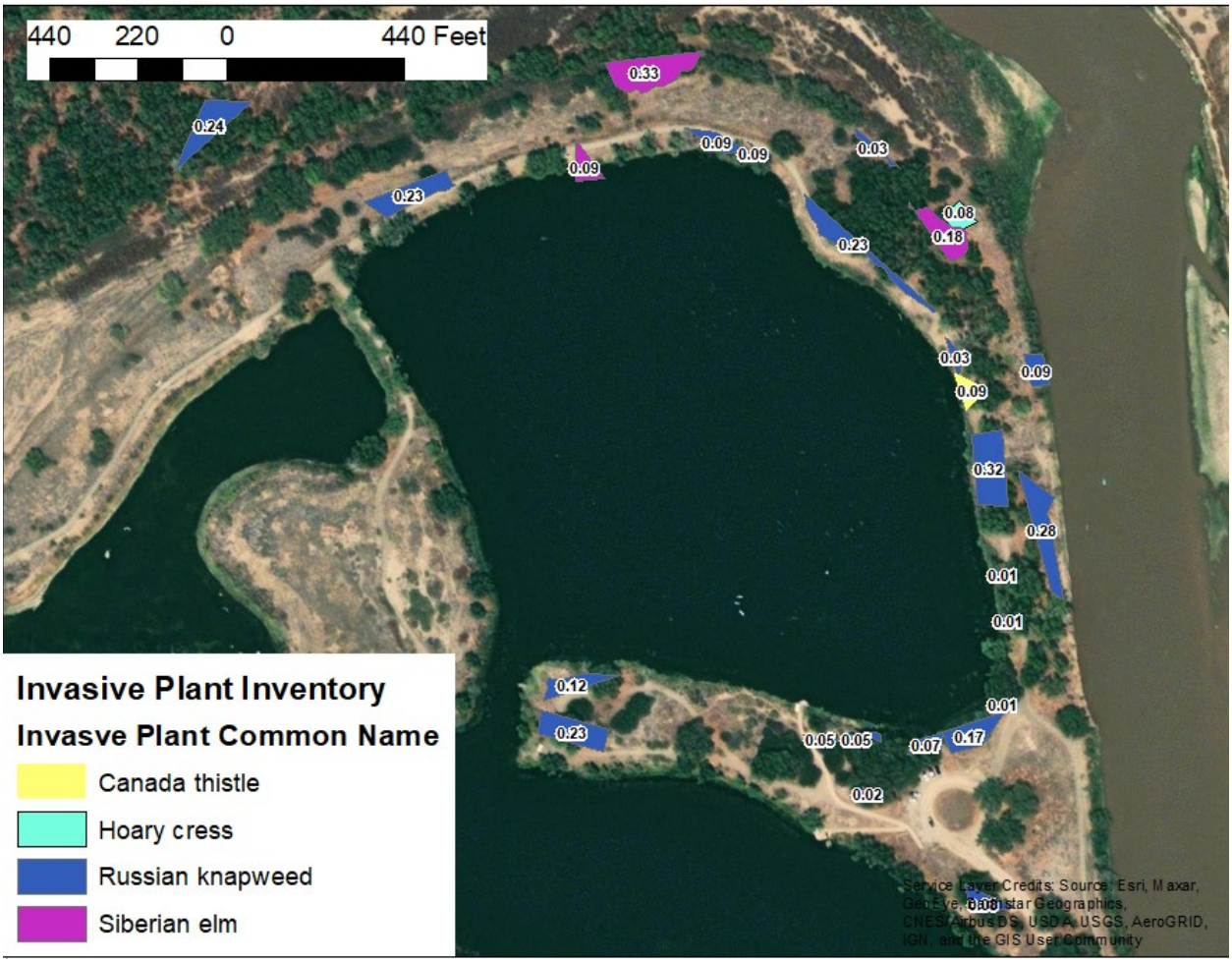
DRC Site ID	DRC_CPW_CL_1
Property Owner/Manager	CPW
Acres	17.78
Year of Monitoring	2021
Date and Time of Monitoring	2021-05-21 22:32
Total Vegetation Cover Native and Invasive (%)	61 to 70
Relative Cover All Native Vegetation (%)	71 to 80
Most Common Native Species	Fremont_Cottonwood
Second Most Common Native Species	3_leaf_Sumac
Most Common Invasive Species	Russian_olive
Relative Cover Most Common Invasive Species (%)	0 to 5
2nd Most Common Invasive Species	Tamarisk
Relative Cover 2nd Most Common Invasive Species (%)	0 to 5
3rd Most Common Invasive Species	Siberian elm
Relative Cover 3rd Most Common Invasive Species (%)	0 to 5
4th Most Common Invasive Species	Kochia
Relative Cover 4th Most Common Invasive Species (%)	0 to 5
Evidence of Natural Recruitment?	YES
Has Active Revegetation Occurred?	NO
Presence of Tamarisk Leaf Beetle?	None
Presence of Tamarisk Weevil	None
Tamarisk/Russian Olive Resprout	
Notes	very few of both
Wildlife	fox birds lizards
Cottonwood_Gallery	>15 trees with diverse age classes
Cheatgrass	Moderate
Kochia	Severe
Russian Thistle	Moderate
Logistics	
Monitors	CR ZR

Passive Recruitment Assessment

Passive Recruitment DRC view - Point layer

BANK TYPE	Undercut
Box_Elder	minimal
Comments	lake side was gradual bank, riverside
Cottonwood_Count	>50
Date_Collected	June 28, 2021
Inventory Count Rigor	THRESHOLD MET
Native Grass Count	>50 sq ft
SALINITY/ALKALINITY/WHITE CRUST	Yes, minimal
Skunkbrush	extensive
Willow_Count	>100

Invasive Species Inventory



DRC Site ID	Inventory Date	Invasive Plant Common Name	Infestation Size (ft2)	Infestation Size (acres)	Life_Cycle	Treatment Season	Notes
DRC_CPW_CL 1	2021-06-28	Hoary cress	3,630.40	0.08	Creeping_Perennial	Spring	
DRC_CPW_CL 1	2021-06-28	Russian knapweed	3,670.08	0.08	Creeping_Perennial	Fall	
DRC_CPW_CL 1	2021-06-28	Russian knapweed	9,815.28	0.23	Creeping_Perennial	Fall	
DRC_CPW_CL 1	2021-06-28	Russian knapweed	2,896.83	0.07	Creeping_Perennial	Fall	
DRC_CPW_CL 1	2021-06-28	Russian knapweed	7,593.97	0.17	Creeping_Perennial	Fall	
DRC_CPW_CL 1	2021-06-28	Russian knapweed	13,787.52	0.32	Annual	Fall	
DRC_CPW_CL 1	2021-06-28	Russian knapweed	1,396.22	0.03	Creeping_Perennial	Fall	
DRC_CPW_CL 1	2021-06-28	Russian knapweed	10,208.26	0.23	Creeping_Perennial	Fall	
DRC_CPW_CL 1	2021-06-28	Russian knapweed	10,085.60	0.23	Creeping_Perennial	Fall	
DRC_CPW_CL 1	2021-06-28	Russian knapweed	1,421.12	0.03	Creeping_Perennial	Fall	
DRC_CPW_CL 1	2021-06-28	Russian knapweed	3,717.38	0.09	Creeping_Perennial	Fall	
DRC_CPW_CL 1	2021-06-28	Siberian elm	702.85	0.02	Creeping_Perennial	Fall	
DRC_CPW_CL 1	2021-06-28	Siberian elm	3,813.03	0.09	Creeping_Perennial	Fall	
DRC_CPW_CL_1	2021-06-28	Canada thistle	3,714.19	0.09	Creeping_Perennial	Fall	
DRC_CPW_CL_1	2021-06-28	Russian knapweed	5,227.77	0.12	Creeping_Perennial	Fall	
DRC_CPW_CL_1	2021-06-28	Russian knapweed	2,325.29	0.05	Creeping_Perennial	Fall	
DRC_CPW_CL_1	2021-06-28	Russian knapweed	351.42	0.01	Creeping_Perennial	Fall	
DRC_CPW_CL_1	2021-06-28	Russian knapweed	518.65	0.01	Creeping_Perennial	Fall	
DRC_CPW_CL_1	2021-06-28	Russian knapweed	500.59	0.01	Creeping_Perennial	Fall	
DRC_CPW_CL_1	2021-06-28	Russian knapweed	3,772.37	0.09	Creeping_Perennial	Fall	
DRC_CPW_CL_1	2021-06-28	Russian knapweed	12,310.07	0.28	Creeping_Perennial	Fall	
DRC_CPW_CL_1	2021-07-06	Russian knapweed	10,538.41	0.24	Creeping_Perennial	Fall	
DRC_CPW_CL_1	2021-06-28	Siberian elm	14,353.58	0.33	Creeping_Perennial	Fall	elms growing next to cwoods
DRC_CPW_CL_1	2021-06-28	Siberian elm	7,888.24	0.18	Creeping_Perennial	Fall	elms growing next to cwoods

Photo Points

DRC Site ID: DRC_CPW_CL_2

Rapid Monitoring Assessment

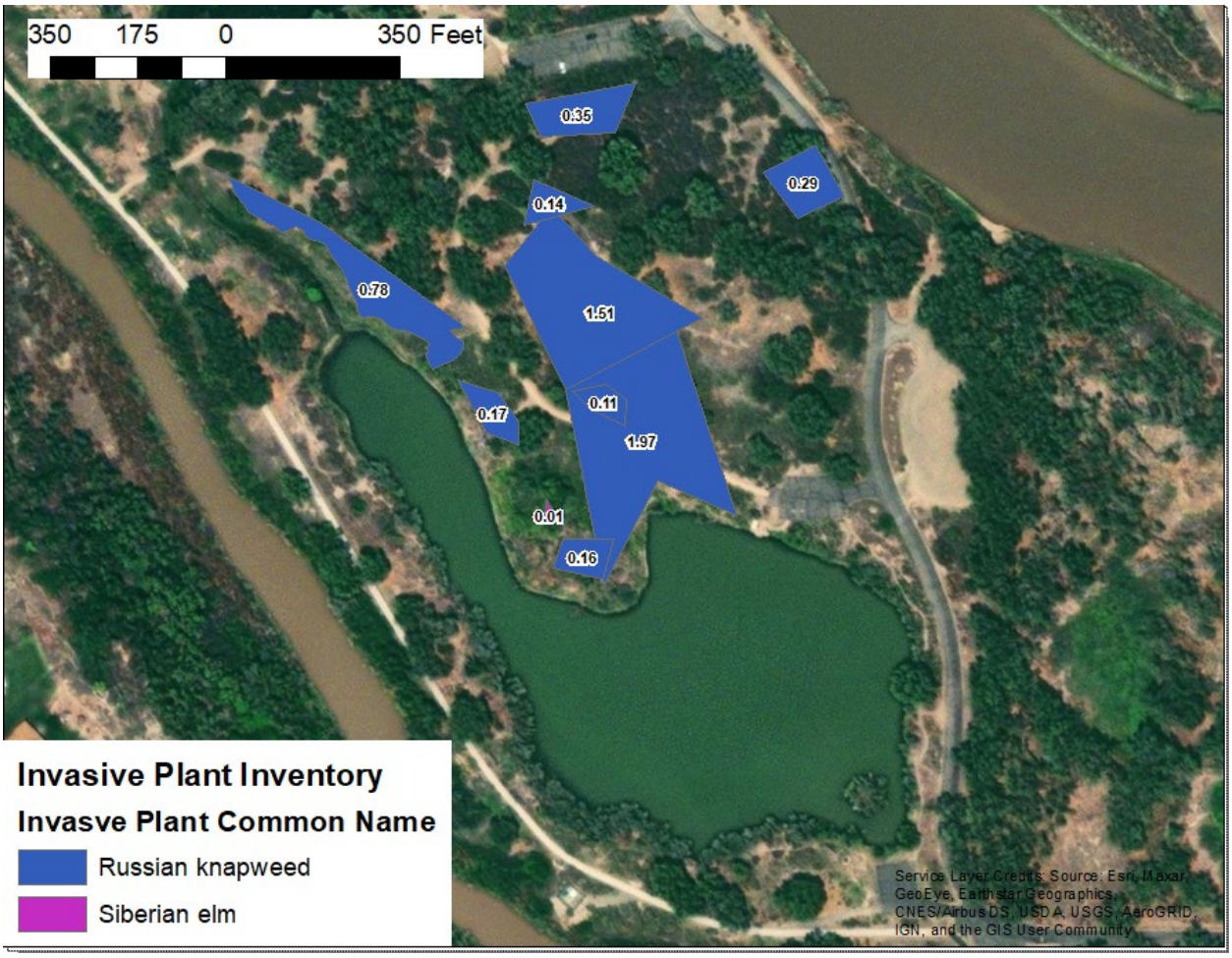
DRC Site ID	DRC_CPW_CL_2
Property Owner/Manager	CPW
Acres	12.55
Year of Monitoring	2021
Date and Time of Monitoring	2021-06-13 20:21
Total Vegetation Cover Native and Invasive (%)	61 to 70
Relative Cover All Native Vegetation (%)	61 to 70
Most Common Native Species	Fremont_Cottonwood
Second Most Common Native Species	3_leaf_Sumac
Most Common Invasive Species	Russian_olive
Relative Cover Most Common Invasive Species (%)	6 to 10
2nd Most Common Invasive Species	Russian knapweed
Relative Cover 2nd Most Common Invasive Species (%)	6 to 10
3rd Most Common Invasive Species	Tamarisk
Relative Cover 3rd Most Common Invasive Species (%)	6 to 10
4th Most Common Invasive Species	Siberian elm
Relative Cover 4th Most Common Invasive Species (%)	0 to 5
Evidence of Natural Recruitment?	YES
Has Active Revegetation Occurred?	YES
Presence of Tamarisk Leaf Beetle?	None
Presence of Tamarisk Weevil	None
Tamarisk/Russian Olive Resprout Notes	minimal
Wildlife	
Cottonwood_Gallery	>15 trees with diverse age classes
Cheatgrass	Minimal
Kochia	Minimal
Russian Thistle	Minimal
Logistics	thick vegetation
Monitors	ZR and CR

Passive Recruitment Assessment

Passive Recruitment DRC view - Point layer

BANK TYPE	Gradually Sloping
Box_Elder	0
Comments	some thick veg
Cottonwood_Count	20>
Date_Collected	June 28, 2021
Inventory Count Rigor	MAY HAVE MISSED WILLOWS
Native Grass Count	>50 sq ft
SALINITY/ALKALINITY/WHITE CRUST	None
Skunkbrush	100>
Willow_Count	50

Invasive Species Inventory



DRC Site ID	Inventory Date	Invasive Plant Common Name	Infestation Size (ft2)	Infestation Size (acres)	Life_Cycle	Treatment Season
DRC_CPW_CL 2	2021-06-28	Russian knapweed	85,788.27	1.97	Creeping_Perennial	Fall
DRC_CPW_CL 2	2021-06-28	Russian knapweed	65,992.57	1.51	Creeping_Perennial	Fall
DRC_CPW_CL_2	2021-06-28	Russian knapweed	15,401.32	0.35	Creeping_Perennial	Fall
DRC_CPW_CL_2	2021-06-28	Russian knapweed	6,175.91	0.14	Creeping_Perennial	Fall
DRC_CPW_CL_2	2021-06-28	Russian knapweed	33,760.33	0.78	Creeping_Perennial	Fall
DRC_CPW_CL_2	2021-06-28	Russian knapweed	4,802.66	0.11	Creeping_Perennial	Fall
DRC_CPW_CL_2	2021-06-28	Russian knapweed	7,061.73	0.16	Creeping_Perennial	Fall
DRC_CPW_CL_2	2021-06-28	Russian knapweed	7,213.44	0.17	Creeping_Perennial	Fall
DRC_CPW_CL_2	2021-06-28	Russian knapweed	12,765.90	0.29	Creeping_Perennial	Fall
DRC_CPW_CL_2	2021-06-28	Siberian elm	646.64	0.01	Creeping_Perennial	Fall

Photo Points

DRC Site ID: DRC_CPW_CL_3

Rapid Monitoring Assessment

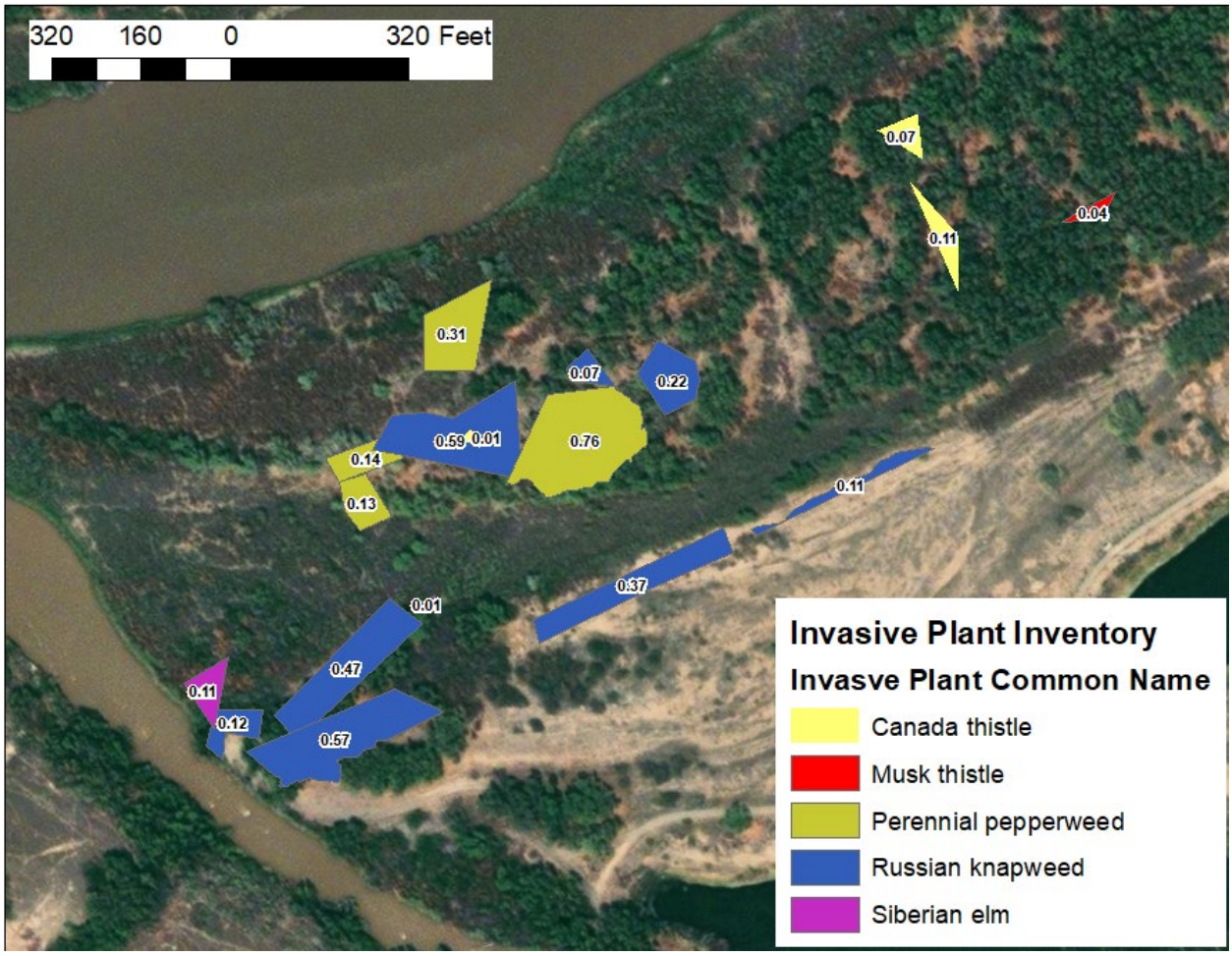
DRC Site ID	DRC_CPW_CL_3
Property Owner/Manager	CPW
Acres	15.40
Year of Monitoring	2021
Date and Time of Monitoring	2021-06-13 20:22
Total Vegetation Cover Native and Invasive (%)	81 to 90
Relative Cover All Native Vegetation (%)	61 to 70
Most Common Native Species	Fremont_Cottonwood
Second Most Common Native Species	Coyote_Willow
Most Common Invasive Species	Tamarisk
Relative Cover Most Common Invasive Species (%)	11 to 20
2nd Most Common Invasive Species	Russian knapweed
Relative Cover 2nd Most Common Invasive Species (%)	6 to 10
3rd Most Common Invasive Species	Perennial pepperweed
Relative Cover 3rd Most Common Invasive Species (%)	6 to 10
4th Most Common Invasive Species	Russian olive
Relative Cover 4th Most Common Invasive Species (%)	0 to 5
Evidence of Natural Recruitment?	YES
Has Active Revegetation Occurred?	NO
Presence of Tamarisk Leaf Beetle?	Beetle_larva
Presence of Tamarisk Weevil	None
Tamarisk/Russian Olive Resprout Notes	lots of tamarisk some RO
Wildlife	birds bugs lizards
Cottonwood_Gallery	>15 trees with diverse age classes
Cheatgrass	Severe
Kochia	Moderate
Russian Thistle	Moderate
Logistics	thick veg near bank
Monitors	CR ZR

Passive Recruitment Assessment

Passive Recruitment DRC view - Point layer

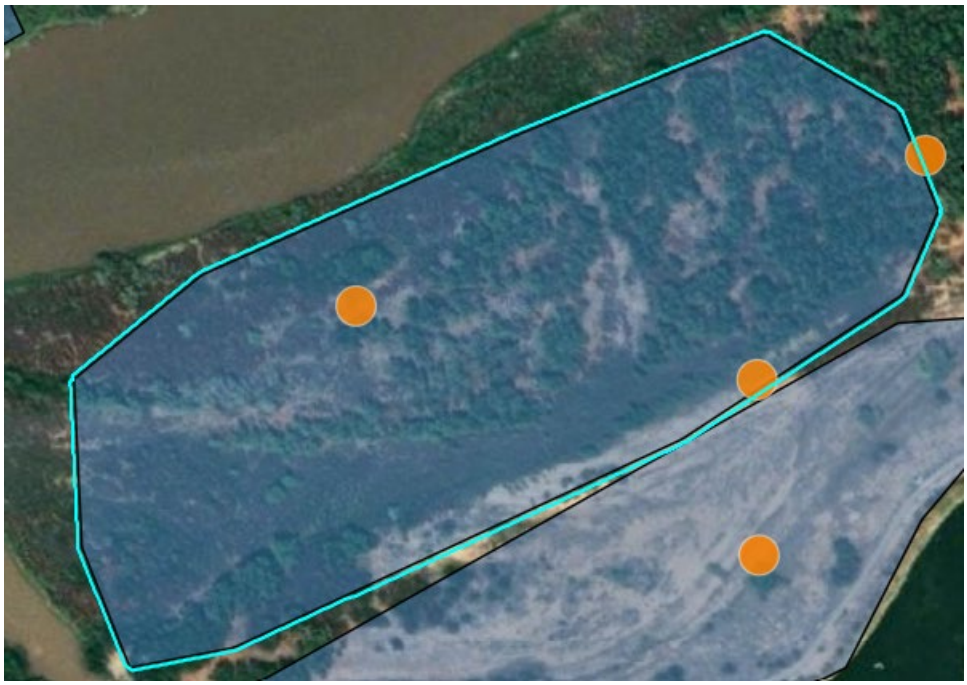
BANK TYPE	Undercut
Box_Elder	none
Comments	
Cottonwood_Count	>50
Date_Collected	July 6, 2021
Inventory Count Rigor	THRESHOLD MET
Native Grass Count	>50 sq ft
SALINITY/ALKALINITY/WHITE CRUST	None
Skunkbrush	>15
Willow_Count	>100

Invasive Species Inventory



DRC Site ID	Inventory Date	Invasive Plant Common Name	Infestation Size (ft2)	Infestation Size (acres)	Life_Cycle	Treatment Season	Notes
DRC_CPW_CL_3	2021-07-06	Canada thistle	4,603.27	0.11	Creeping_Perennial	Fall	
DRC_CPW_CL_3	2021-07-06	Canada thistle	566.61	0.01	Creeping_Perennial	Fall	
DRC_CPW_CL_3	2021-07-06	Canada thistle	3,115.22	0.07	Creeping_Perennial	Fall	
DRC_CPW_CL_3	2021-07-06	Musk thistle	1,768.84	0.04			only one I pulled it
DRC_CPW_CL_3	2021-07-06	Perennial pepperweed	5,731.10	0.13	Creeping_Perennial	Fall	
DRC_CPW_CL_3	2021-07-06	Perennial pepperweed	6,313.51	0.14	Creeping_Perennial	Fall	
DRC_CPW_CL_3	2021-07-06	Perennial pepperweed	32,941.64	0.76	Creeping_Perennial	Fall	
DRC_CPW_CL_3		Perennial pepperweed	13,495.11	0.31		Fall	
DRC_CPW_CL_3	2021-07-06	Russian knapweed	5,028.68	0.12	Creeping_Perennial	Fall	
DRC_CPW_CL_3	2021-07-06	Russian knapweed	20,428.92	0.47	Creeping_Perennial	Fall	
DRC_CPW_CL_3	2021-07-06	Russian knapweed	16,290.25	0.37	Creeping_Perennial	Fall	
DRC_CPW_CL_3		Russian knapweed	4,696.35	0.11	Creeping_Perennial	Fall	
DRC_CPW_CL_3	2021-07-06	Russian knapweed	25,038.43	0.57	Creeping_Perennial	Fall	
DRC_CPW_CL_3	2021-07-06	Russian knapweed	25,552.04	0.59	Creeping_Perennial	Fall	knapweed resprouts under treated areas
DRC_CPW_CL_3		Russian knapweed	2,914.53	0.07	Creeping_Perennial	Fall	
DRC_CPW_CL_3	2021-07-06	Russian knapweed	9,401.00	0.22	Creeping_Perennial	Fall	
DRC_CPW_CL_3	2021-07-06	Siberian elm	4,577.19	0.11	Creeping_Perennial	Fall	
DRC_CPW_CL_3	2021-07-06	Siberian elm	225.60	0.01	Creeping_Perennial	Fall	

Photo Points



DRC Site ID: DRC_CPW_CL_4

Rapid Monitoring Assessment

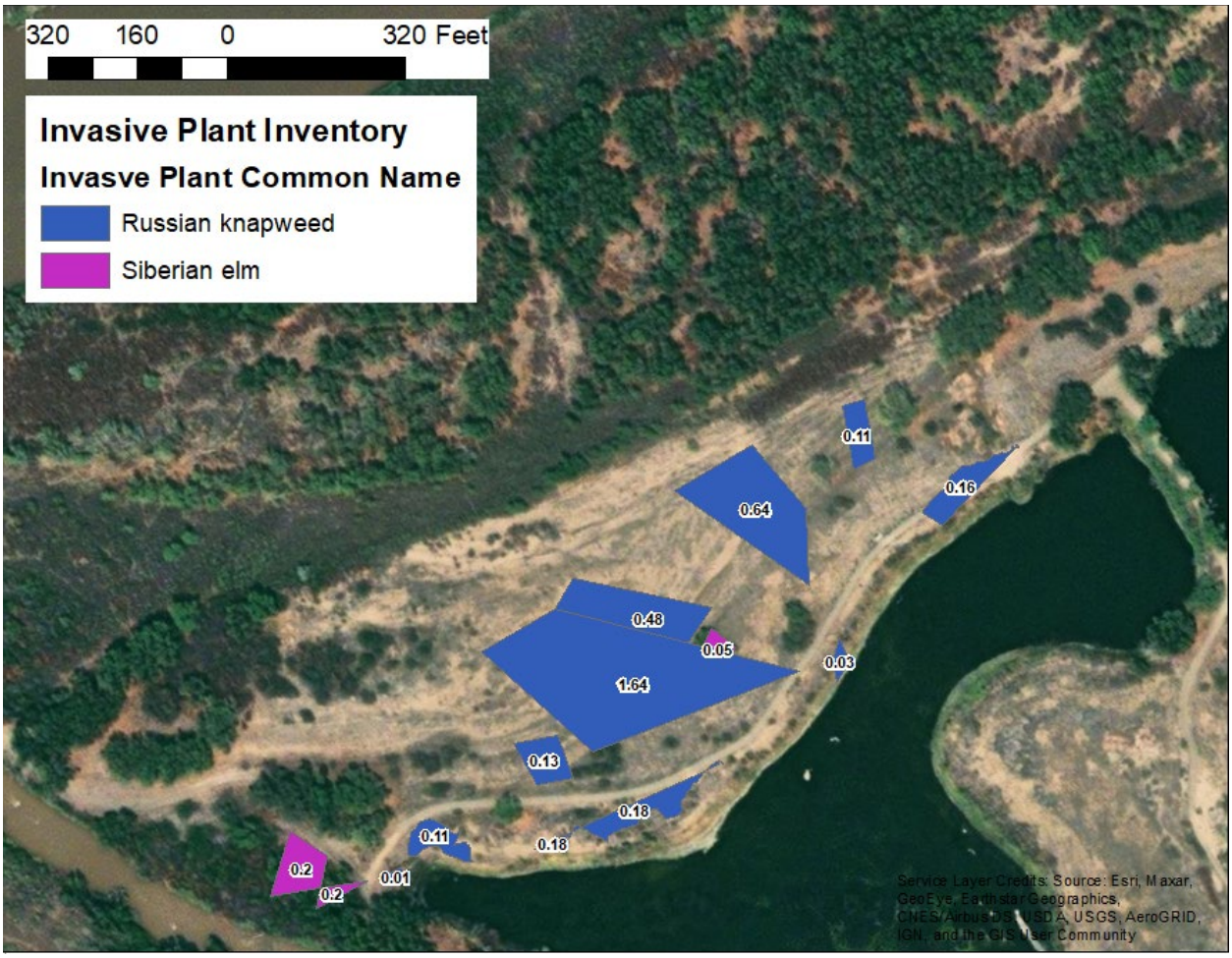
DRC Site ID	DRC_CPW_CL_4
Property Owner/Manager	CPW
Acres	9.39
Year of Monitoring	2021
Date and Time of Monitoring	2021-06-13 20:22
Total Vegetation Cover Native and Invasive (%)	41 to 50
Relative Cover All Native Vegetation (%)	51 to 60
Most Common Native Species	Rabbitbrush
Second Most Common Native Species	Coyote_Willow
Most Common Invasive Species	Russian_knapweed
Relative Cover Most Common Invasive Species (%)	11 to 20
2nd Most Common Invasive Species	Kochia
Relative Cover 2nd Most Common Invasive Species (%)	6 to 10
3rd Most Common Invasive Species	Tamarisk
Relative Cover 3rd Most Common Invasive Species (%)	0 to 5
4th Most Common Invasive Species	Siberian elm
Relative Cover 4th Most Common Invasive Species (%)	0 to 5
Evidence of Natural Recruitment?	NO
Has Active Revegetation Occurred?	YES
Presence of Tamarisk Leaf Beetle?	None
Presence of Tamarisk Weevil	None
Tamarisk/Russian Olive Resprout Notes	some tam and olive resprouts
Wildlife	ducks insects other birds
Cottonwood_Gallery	A few scattered trees
Cheatgrass	Minimal
Kochia	Moderate
Russian Thistle	Severe
Logistics	
Monitors	ZR and CR

Passive Recruitment Assessment

Passive Recruitment DRC view - Point layer

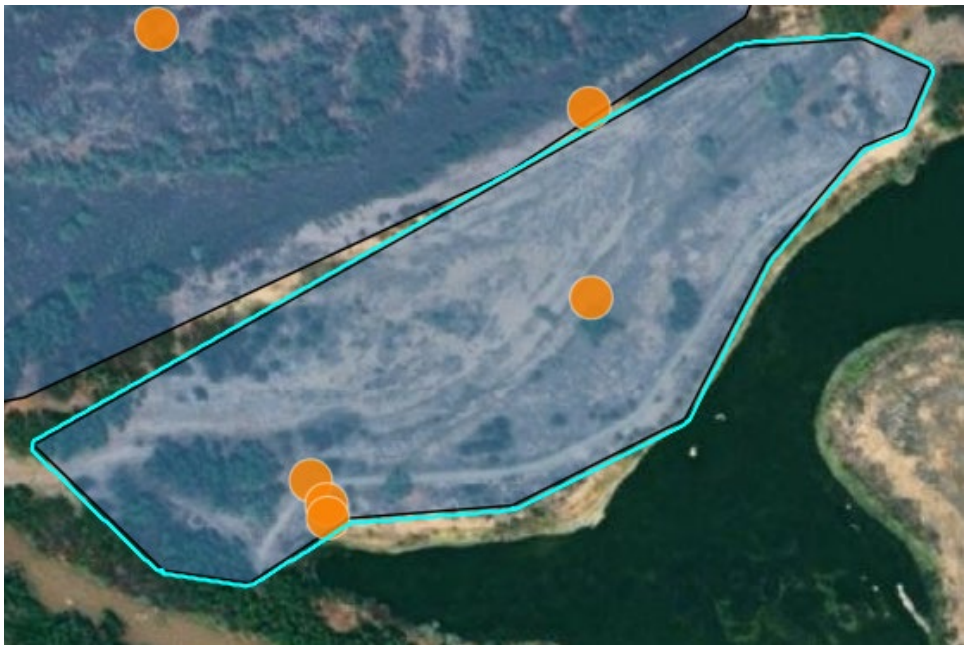
BANK TYPE	Gradually Sloping
Box_Elder	0
Comments	
Cottonwood_Count	20
Date_Collected	July 6, 2021
Inventory Count Rigor	THRESHOLD MET
Native Grass Count	>50 sq ft
SALINITY/ALKALINITY/WHITE CRUST	None
Skunkbrush	20>
Willow_Count	100

Invasive Species Inventory



DRC Site ID	Inventory Date	Invasive Plant Common Name	Infestation Size (ft2)	Infestation Size (acres)	Life_Cycle	Treatment Season
DRC_CPW_CL_4	2021-07-06	Russian knapweed	4,590.99	0.11	Creeping_Perennial	Fall
DRC_CPW_CL_4	2021-07-06	Russian knapweed	27,822.10	0.64	Creeping_Perennial	Fall
DRC_CPW_CL_4	2021-07-06	Russian knapweed	21,121.44	0.48	Creeping_Perennial	Fall
DRC_CPW_CL_4	2021-07-06	Russian knapweed	71,381.34	1.64	Creeping_Perennial	Fall
DRC_CPW_CL_4	2021-07-06	Russian knapweed	5,809.46	0.13	Creeping_Perennial	Fall
DRC_CPW_CL_4	2021-07-06	Russian knapweed	6,785.15	0.16	Creeping_Perennial	Fall
DRC_CPW_CL_4	2021-07-06	Russian knapweed	1,234.85	0.03	Biennial	Fall
DRC_CPW_CL_4	2021-07-06	Russian knapweed	7,941.98	0.18	Creeping_Perennial	Fall
DRC_CPW_CL_4	2021-07-06	Russian knapweed	4,844.61	0.11	Creeping_Perennial	Fall
DRC_CPW_CL_4	2021-07-06	Russian knapweed	447.98	0.01	Creeping_Perennial	Fall
DRC_CPW_CL_4	2021-07-06	Siberian elm	2,105.28	0.05	Creeping_Perennial	Fall
DRC_CPW_CL_4	2021-07-06	Siberian elm	8,659.17	0.20	Creeping_Perennial	Fall

Photo Points



Appendix A: Rapid Monitoring Methods

The monitoring objectives are as follows:

- Determine implementation and maintenance needs for the upcoming season;
- Track progress/success towards land manager site-specific restoration goals by tracking consistent metrics over time using the same protocol and data collection intervals;
- Inventory and track invasive weed infestations of concern for rapid detection and treatment;
- Track progress towards watershed wide restoration; and
- Formally evaluate restoration method effectiveness and inform adaptive management;
- Inform progress reports and other grantor deliverables.

Rapid Monitoring Products

- Rapid Assessments
- Invasive Species Inventory
- Passive Revegetation Recruitment
- Photo Points

Rapid Assessment:

Rapid assessments include ocular estimates of relative cover of native species as a whole within each polygon. Each site is split into polygons that are less than 30 acres. Each monitored site will have had restoration treatments in the past or have treatments scheduled in the future.

This assessment includes both woody and herbaceous species. Additionally, the protocol quantifies the relative cover of the top two native species and the top four invasive species. Relative cover is defined as the proportion of native vegetation on site in comparison to the total vegetation cover including woody and herbaceous species. For example, all of the vegetation on site is 100%, and 50% may be invasive and 50% native, therefore, the relative cover of native species would be 50%.

This assessment also includes an estimate of absolute vegetation cover, which is defined as the total vertical projection area of live native and non-native vegetation on site compared to bare-ground. For example, a polygon may be 3 acres with 45% of the ground covered with live vegetation and the other 55% bare ground or otherwise.

Cottonwood gallery presence, size, and age diversity was documented with the following scores: 1 - none, 2- a few scattered trees, 3 – seven to ten trees over 12 ft., 4- 10-15 trees with diverse age classes, 5 - large gallery over 15 mature trees with varied age classes

Additional attributes that are collected in the Rapid Assessment include the year, person monitoring, acreage, land ownership, if and when a site has received active revegetation, presence or absence of the tamarisk beetle or weevil, notes on tamarisk and Russian olive re-sprouts, any signs of wildlife, and any relevant notes regarding site access or logistics.

Invasive Species Inventory:

This is different from the common invasive species, in that these are species that will be treated annually or are species of interest (e.g., List A). Monitors will draw a polygon around infestations of invasive species of concern found in each site. This process can occur at the same time as the rapid assessments. The monitors will fill out the attribute table in Figure 2 for each infestation area they map. Having exact polygons of species of concern will help land managers and landowners target treatments in a streamlined and efficient manner.

List of invasive species of concern:

- Perennial pepperweed – *Lepidium latifolium*
- Purple loostrife – *Lythrum salicaria*
- Hoary cress – *Lepidium draba*
- Russian knapweed - *Rhaponticum repens*
- Canada thistle – *Cirsium arvense*
- Musk Thistle - *Carduus nutans*
- Siberian elm - *Ulmus pumila*
- Russian thistle - *Salsola tragus*
- Yellow toadflax – *Linaria vulgaris*
- Himalayan blackberry - *Rubus armeniacus*

Passive Recruitment Assessment:

The passive recruitment protocol adapted from the Dolores River Restoration Partnership (DRRP) will measure the naturally recruiting woody and herbaceous vegetation on all monitoring sites (i.e., vegetation occurring not from active re-vegetation.)

Monitors collect a passive recruitment point and fill out an associated attribute table for each site. This information informs whether the “Evidence_Natural_Recruitment” attribute in the Rapid Assessment is a “Yes” or “No.” Other information collected for passive recruitment includes presence of white crust on soil and evidence of bank erosion.

Monitors will assess passive recruitment on all sites where rapid monitoring is being performed, which includes sites that have undergone restoration activities or are planned for restoration. Monitoring is performed by a team of 2 people. Monitors will walk through the entirety of a site and count the species in the thresholds (coyote willow, cottonwoods, box elder, etc.) as they move through the site. If a threshold is reached for a species, monitors can stop counting that species and record >100, >20, etc. based on the threshold level for that species.

Monitors will collect passive recruitment data in Arc Collector by dropping a point within each site and filling out the associated data form. The data is then used to inform the Evidence of Passive Recruitment attribute in the Rapid Monitoring protocol. If a site meets one of the passive recruitment thresholds, then monitors mark “YES” for Evidence of Passive Recruitment. If no passive recruitment threshold is met, monitors mark “No” for Evidence of Passive Recruitment. The passive recruitment thresholds are:

- ≥ 20 cottonwoods greater than 1 meter in height and between 1 and 10 years of age and/or
- ≥ 100 willow stems that are at least 0.5 meters in height
- ≥ 20 New Mexico prevent, 3 leaf sumac, or box elder

Species Richness:

Species diversity will help understand how diverse each site is along the riparian area. Each site will be measured using a tape measure making two lines of 100 feet in length, one near the shoreline and one inland. If the 100 feet goal cannot be met, try to get the longest distance possible or take ocular measurements of the area. Any large objects in the way off the line will not be added to the length and measurements will be continued on the other side of the obstacle. The location of the line will be randomly selected starting at any point in the polygon. In order to count species diversity every different species touching, near, or above, either of the lines will be counted and the total number of different species on each line will be added up and the number of species will be recorded, regardless if the species is native or invasive. A species that appears on both lines should not be counted twice towards the total but noted that it is on both lines. In the notes section write down each species found on both lines, and if any line had to be done ocularly due to thick vegetation or other factors. If the polygon has no shoreline then do not do a shoreline measurement and take the total from only an inland line.

Photo Points:

For each site, at least two photo points will be established. Photo-points are taken for every monitored site every two-three years as part of rapid monitoring.

Monitors will use GIS enabled tablets with Arc Collector or Arc Field Maps. Monitors drop a point at each photo-point, fill out the associated attribute table, and attach the photo to each point. Data is then synced from Collector/Field Maps to ArcOnline. If photo-points already exist for a site, monitors should take another photo at that exact location and try to capture the same area in the photo.

Appendix B: Previous Restoration Actions and Monitoring

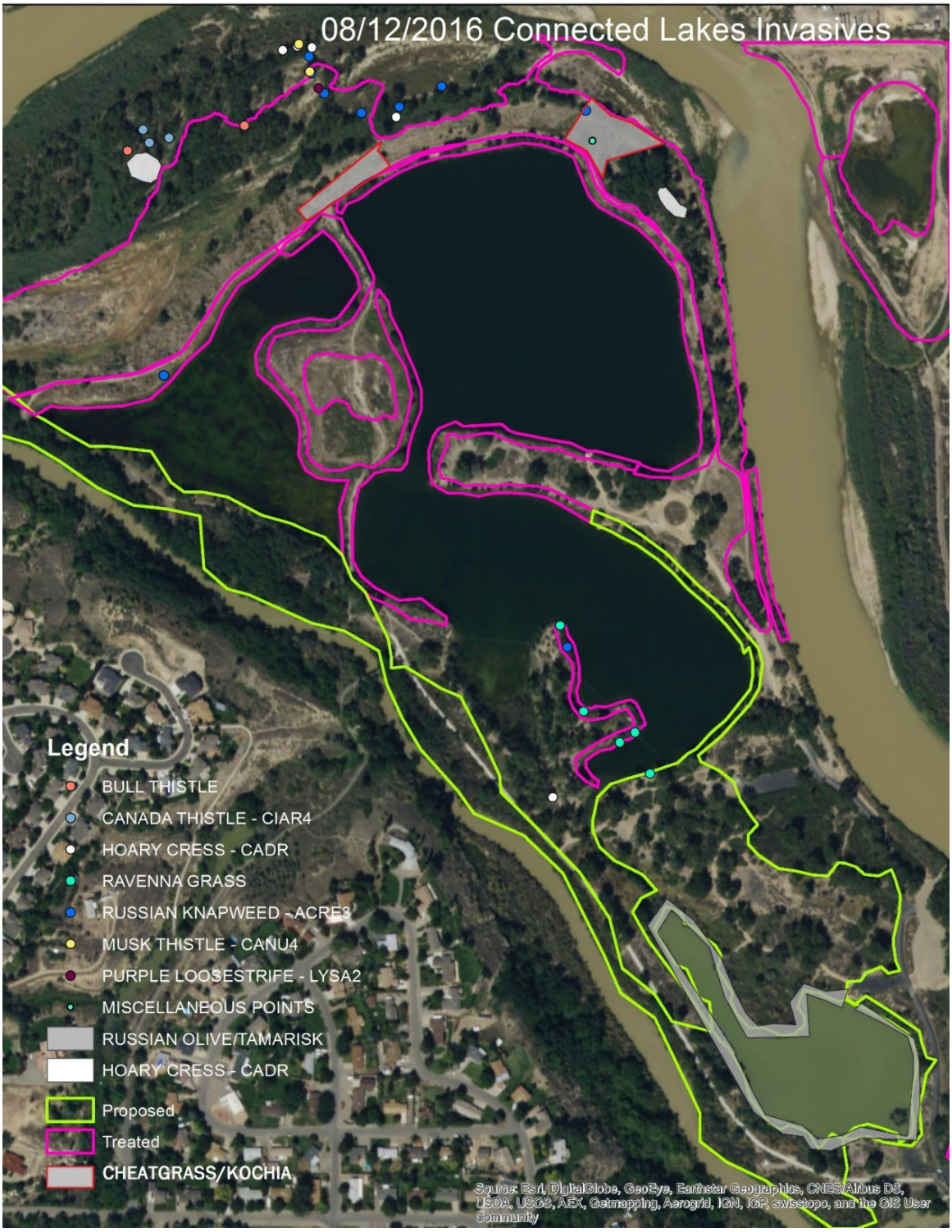
Connected Lakes has a volunteer coalition that meets once a month to do weed management, planting, etc. Their efforts on ongoing through the summer, and work towards management of some of the secondary weeds found on the site. This volunteer group began in 2022 and work through the summer months.

Previous Monitoring Data:
Connected Lakes was monitored in 2013, 2016, and 2018.

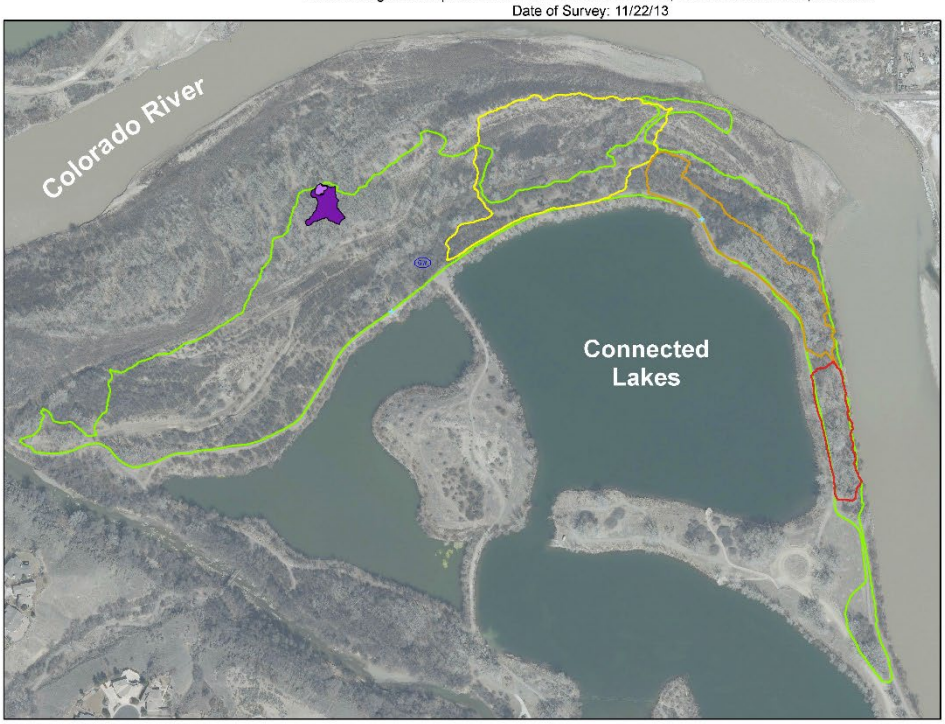
2018

2018 Monitoring Data

FID	39	44	58	120
Monitoring	39	44	58	120
olute_Veg Co	50	50	50	50
tive Native C	25	0	10	25
ative_Species		alkali sacaton	cottonwood	sumac
Native_S_1		rabbitbrush		
Invasive_S	tamarisk		tamarisk	tamarisk
Relative_1	10	0	10	10
Invasive_1	cheatgrass		cheatgrass	cheatgrass
Relative_2	0	0	0	0
Invasive_2			kochia	kochia
Relative_3	0	0	0	0
Invasive_3				Russian thistle
Relative_4	0	0	0	0
Evidence_N	0	0	0	0
Notes	RO dominate, inland saltgrass and cattail dominates	Some native grasses present, primarily alkali sacaton.	mostly kochia	Sparse top canopy, dense mid and understory.
Monitori_1	Connected Lakes	Connected Lakes	Connected Lakes - project	Connected Lakes
Desirable_	inland saltgrass	4-wing saltbush		
Desirable1	cattail			
EditDate	2018-11-26	2018-11-26	2018-11-26	2018-11-26


08/12/2016 Connected Lakes Invasives
Legend
BULL THISTLE
CANADA THISTLE - CIAR4
HOARY CRESS - CADR
RAVENNA GRASS
RUSSIAN KNAPWEED - ACRE3
MUSK THISTLE - CANU4
PURPLE LOOSESTRIFE - LYSA2
MISCELLANEOUS POINTS
RUSSIAN OLIVE/TAMARISK
HOARY CRESS - CADR
Proposed
Treated
CHEATGRASS/KOCHIA
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Connected Lakes Site Map
Invasive Vegetation Species of the Connected Lakes area, near Grand Junction, Colorado
Date of Survey: 11/22/13



Background Image: 2012 Mesa County

Explanations

- Groundwater Monitoring Well
- Photo Point
- 20% Bull Thistle
- 100% Bull Thistle
- Section 1
- Section 2
- Section 3
- Revised Project Area

0 300 Feet

N W E S

NOTES:

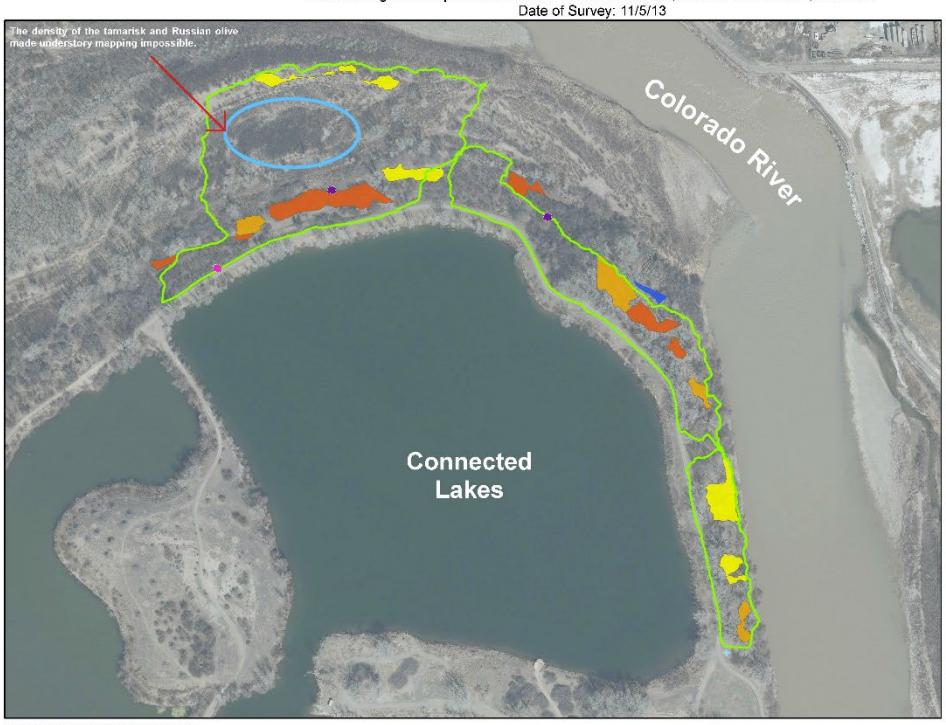
Section 1: Vegetation was cleared using the thumb attachment.

Section 2: The northern and western perimeter was cleared using the hydro-ax; the southern boundary and center of the section were cleared via the thumb attachment. The Russian olive along the bank was cleared by the Conservation Corps with the girdling or cut stump and herbicide methods.

Section 3: The vegetation along the southern and eastern boundary was cleared using the hydro-ax, and the vegetation along the western and northern boundaries was cleared using the thumb attachment and the Conservation Corps.

The tamarisk in the area around the bull thistle polygons had less than 10% cover, but had greater concentrations closer to the river.

Connected Lakes Site Map
Invasive Vegetation Species of the Connected Lakes area, near Grand Junction, Colorado
Date of Survey: 11/5/13



Background Image: 2012 Mesa County

Explanations

- 100% Knapweed
- Bull or Scotch Thistle
- Photo Point
- Section
- 100% Whitetop

Knapweed Percent Cover

- 10% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

0 200 Feet

N W E S

The knapweed point represents an area of approximately 400 square feet that was too dense to properly map but was almost entirely covered with knapweed.

The whitetop polygon was nearly 100% covered with whitetop.

Previous Tamarisk and Russia Olive Removal

Previous Active Revegetation

Year: 2011
Species Planted: Cottonwood sapling
Park staff planted narrowleaf Fremont cottonwood poles after tree removal