

**2023
CCH-3 Vegetation Monitoring,
Bronco, Colorado, Site**

October 2023



U.S. DEPARTMENT OF
ENERGY

Legacy
Management

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Abbreviations

AEC	U.S. Atomic Energy Commission
BLM	U.S. Bureau of Land Management
CCH-3	Colorado Core Hole No. 3
DPC	desired plant community

1.0 Introduction

This report documents revegetation success monitoring following reclamation work at the Bronco, Colorado, Site at the Project Bronco U.S. Bureau of Mines and U.S. Atomic Energy Commission (AEC) Colorado Core Hole No. 3 (CCH-3) well. Reclamation work included CCH-3 well plugging and abandonment, soil stabilization, downed timber distribution, seed bed preparation, and broadcast seeding the area surrounding the well and the road leading to the well pad. The well was drilled by AEC, a predecessor agency to the U.S. Department of Energy, in 1967. The Bronco site is on land managed by the U.S. Bureau of Land Management (BLM) in SWSW, Section 14, T1N, R98W 6th PM, in Rio Blanco County, Colorado (Figure 1), within U.S. Geological Survey right-of-way COC49117. The well was successfully abandoned in October 2020, and reclamation activities were completed in November 2020. Revegetation success monitoring was completed in April 2021 (DOE 2021), June 2022 (DOE 2022), and June 2023. Revegetation success monitoring will be conducted annually until success criteria are met.

2.0 Reclamation and Success Criteria

Reclamation activities (including soil stabilization and revegetation) followed methods listed in the *Reclamation Plan for Project Bronco Well Abandonment, Rio Blanco County, Colorado* (DOE 2020) and took place October 26 through November 6, 2020.

Vegetation monitoring methods follow the *Surface Reclamation Plan* (BLM 2007) and *BLM Core Terrestrial Indicators and Methods, Tech Note 440* (MacKinnon et al. 2011). Vegetation monitoring will be conducted annually until success criteria goals are met. Annual vegetation monitoring data (Appendix A) are compared to the desired plant community (DPC) data and the following criteria:

- (1) Self-sustaining vegetative groundcover is (1) consistent with the site DPC and (2) adequately established, as described below, on disturbed surfaces to stabilize soils through the life of the project.
- (2) Vegetation¹ will have 80% similarity of foliar cover, bare ground, and shrub or forb density in relation to the identified DPC.
- (3) To ensure that site species diversity is achieved, the resulting plant community (i.e., species richness) must be composed of at least five desirable plant species, and no one species may exceed 70% relative cover. Desirable species may include native species from the surrounding area; species listed in the range or ecological site description, assessment, inventory, and monitoring data, or reference site; or species from the BLM-approved seed mix. If nonprescribed or unauthorized plant species (e.g., yellow sweetclover [*Melilotus officinalis*]) appear in the reclamation site, BLM may require their removal.
- (4) If monitoring results do not demonstrate successful reclamation after 2 years, additional revegetation efforts may be implemented.

¹ Vegetative cover values for woodland or shrubland sites (such as at Bronco CCH-3) are based on the capability of those sites in a herbaceous state.

3.0 Results

Six permanent monitoring locations were established for annual vegetation monitoring data collection. A seventh monitoring location was added during 2021 monitoring to ensure that data collection adequately captured the entire project area. Average values from the monitoring locations, comparisons to the DPC data, and success criteria are in Table 1. Photographs of each monitoring location are in Figure 2 through Figure 8.

Table 1. Data Comparison of DPC, Success Criteria, and Monitoring Results

Metric	DPC	Success Criteria (80% similarity of DPC)	2021	2022	2023
Total foliar cover (% absolute cover)	40	40 ± 8	13	31	47
Bare ground (% absolute cover)	31	31 ± 6	46	31	18¹
Desirable foliar cover (% relative cover)	67	67 ± 13	62	51	70
Undesirable foliar cover (% relative cover)	8	8 ± 2	11	40	25
Forb foliar cover (% relative cover)	20	20 ± 4	10	57¹	49¹
Shrub foliar cover (% relative cover)	49	49 ± 10	33	16¹	11¹
Species richness (Number of dominant species)	25	25 ± 5	13	23	23

Note:

Bold values indicate data are within success criteria

4.0 Discussion

Data collected from the 2023 monitoring showed progression toward revegetation success criteria and much of the site is blending into the surrounding landscape (Figure 9). Mean values from all monitoring locations indicated that six of the seven success criteria was met. The amount of undesirable foliar cover is primarily attributed to desert madwort (*Alyssum desertorum*) and prickly Russian thistle (*Salsola tragus*), non-noxious annual weeds, and cheatgrass (*Bromus tectorum*) and common mullein (*Verbascum thapsus*) Colorado “List C” noxious weeds². The presence of these species represent the most significant hinderance to achieving success criteria. Common mullein was mechanically removed in June 2023 to prevent

² List C Species are species for which local governments and other interested parties develop and implement state noxious weed management plans designed to support the efforts of local governing bodies to facilitate more effective integrated weed management on private and public lands. The goal of such plans will not be to stop the continued spread of these species but to provide additional education, research, and biological control resources to jurisdictions that choose to require management of List C species (Sections 35-5.5-104.5 to 35-5.5-118, Colorado Revised Statutes).

seed production (e.g., hand pulled at rosette stage). Grazing by livestock and wildlife has been observed onsite. As of 2023, grazing does not appear to significantly impede revegetation success, but it should continue to be monitored. Based on 2023 monitoring results, ecologists anticipate that vegetation establishment will continue and success criteria will be achieved within the next 1–5 years.

5.0 References

BLM (U.S. Bureau of Land Management), 2007. *Surface Reclamation Plan*, White River Field Office.

CRS 35-5.5-104.5 to 35-5.5-118. “Colorado Noxious Weed Act,” *Colorado Revised Statutes*.

DOE (U.S. Department of Energy), 2020. *Reclamation Plan for Project Bronco Well Abandonment, Rio Blanco County, Colorado*, LMS/S28743, Office of Legacy Management, March.

DOE (U.S. Department of Energy), 2021. *2021 CCH-2 Vegetation Monitoring, Bronco, Colorado, Site*, LMS/BRO/S36443, Office of Legacy Management, October.

DOE (U.S. Department of Energy), 2022. *2022 CCH-2 Vegetation Monitoring, Bronco, Colorado, Site*, LMS/BRO/42782, Office of Legacy Management, October.

MacKinnon, W.C., J.W. Karl, G.R. Toevs, J.J. Taylor, M. Karl, C.S. Spurrier, and J.E. Herrick, 2011. *BLM Core Terrestrial Indicators and Methods, Tech Note 440*, U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, Colorado.

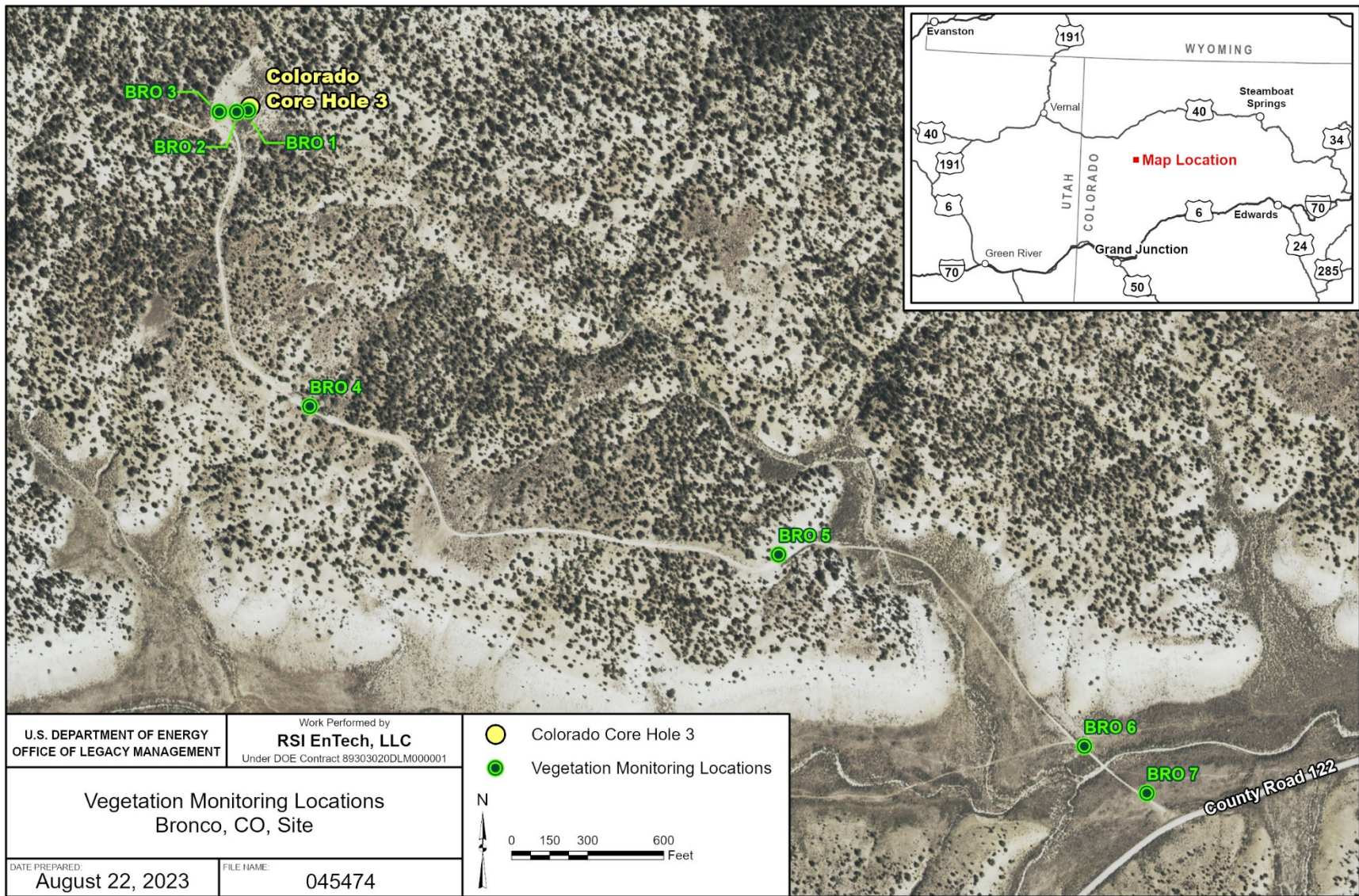


Figure 1. Vegetation Monitoring Locations at Bronco CCH-3

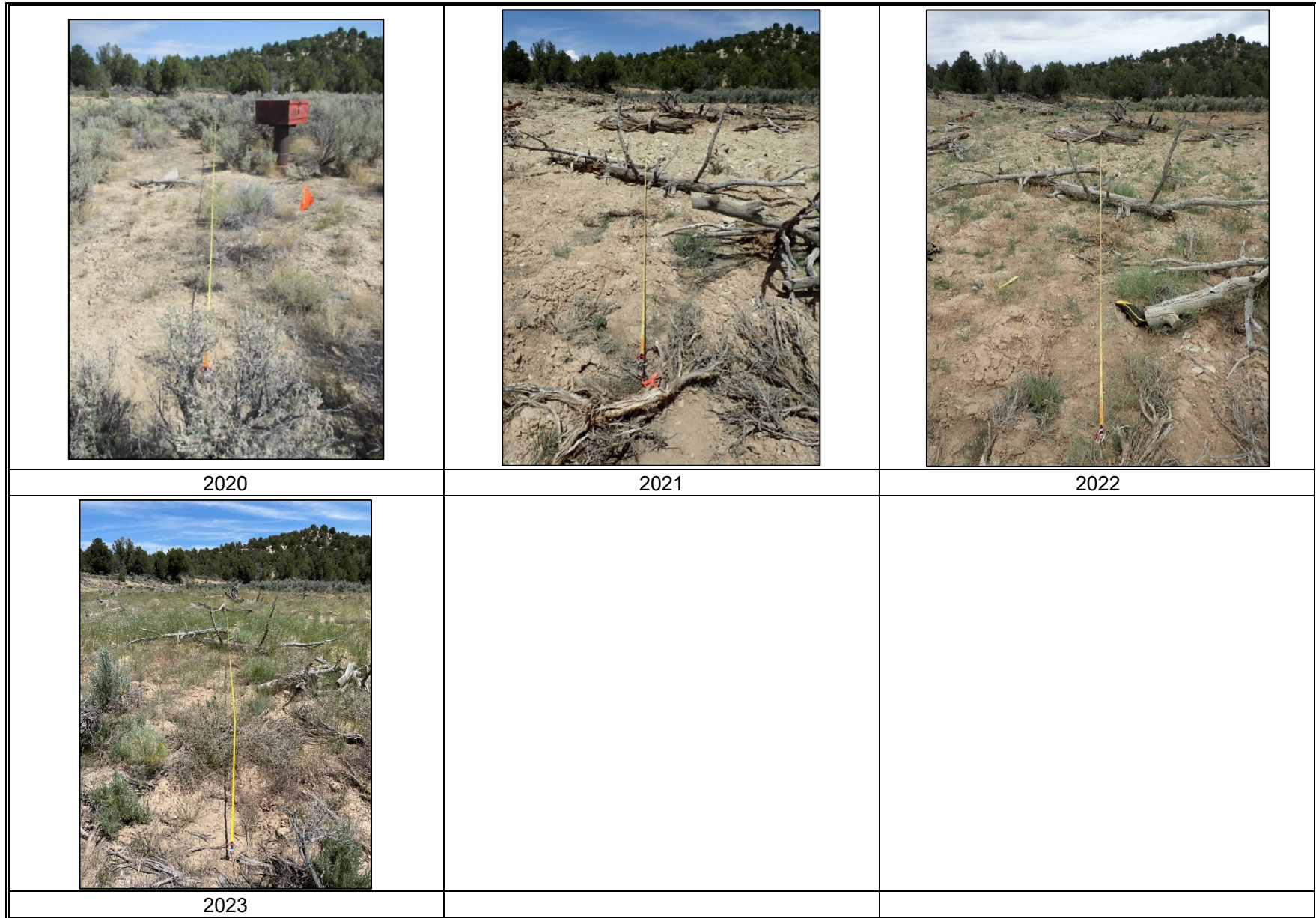


Figure 2. Monitoring Location 1, Bronco, Colorado, Site

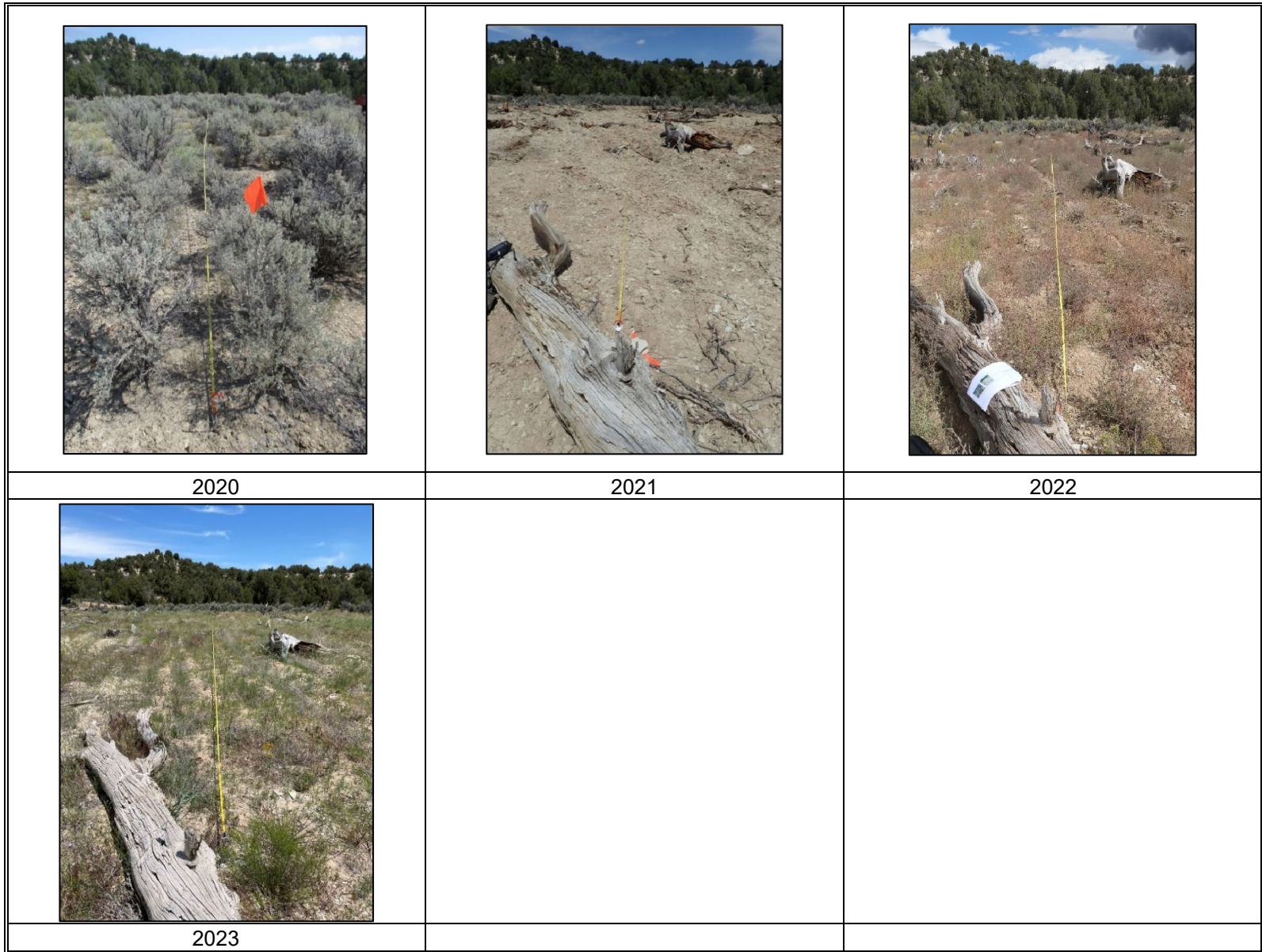


Figure 3. Monitoring Location 2, Bronco, Colorado, Site

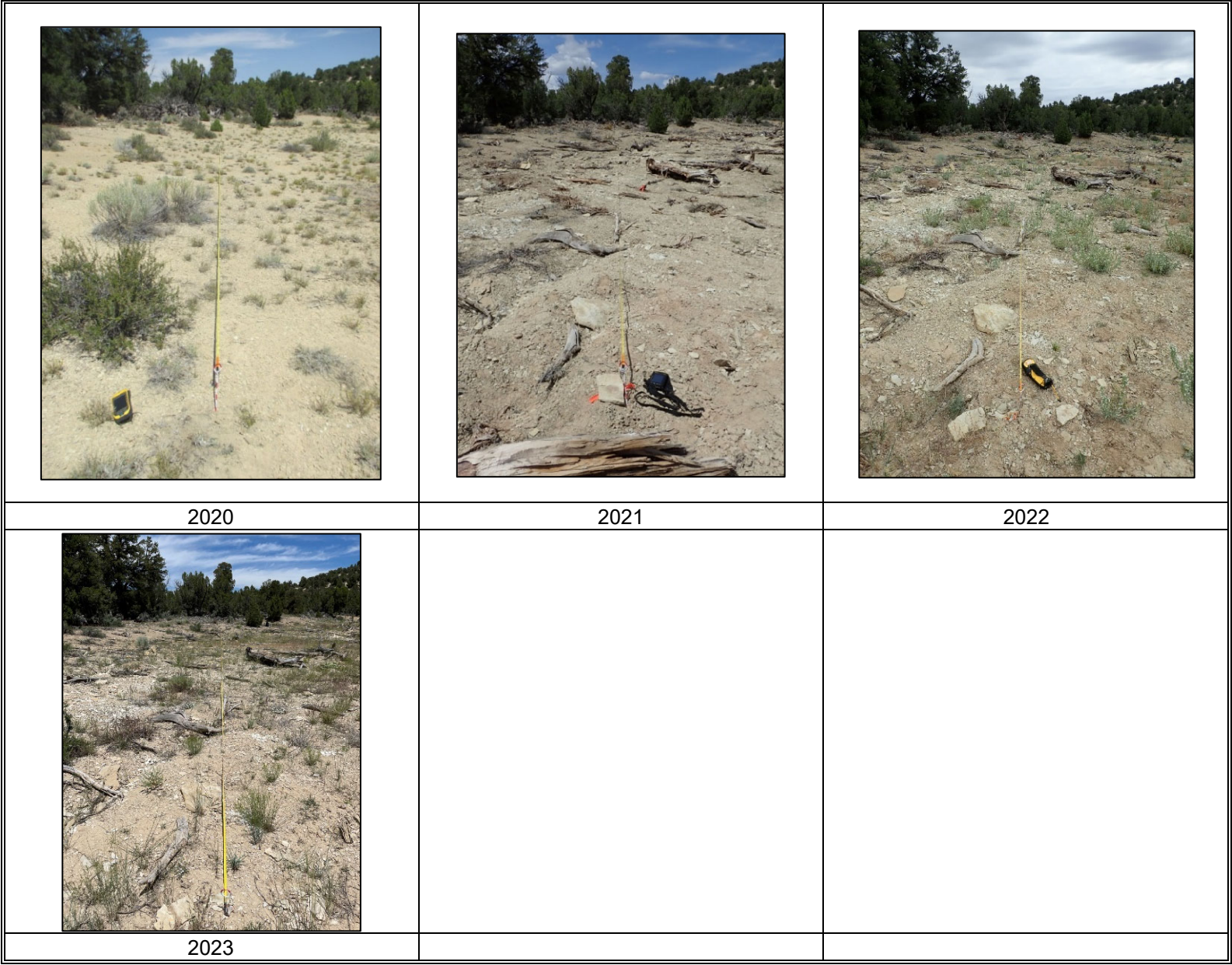


Figure 4. Monitoring Location 3, Bronco, Colorado, Site

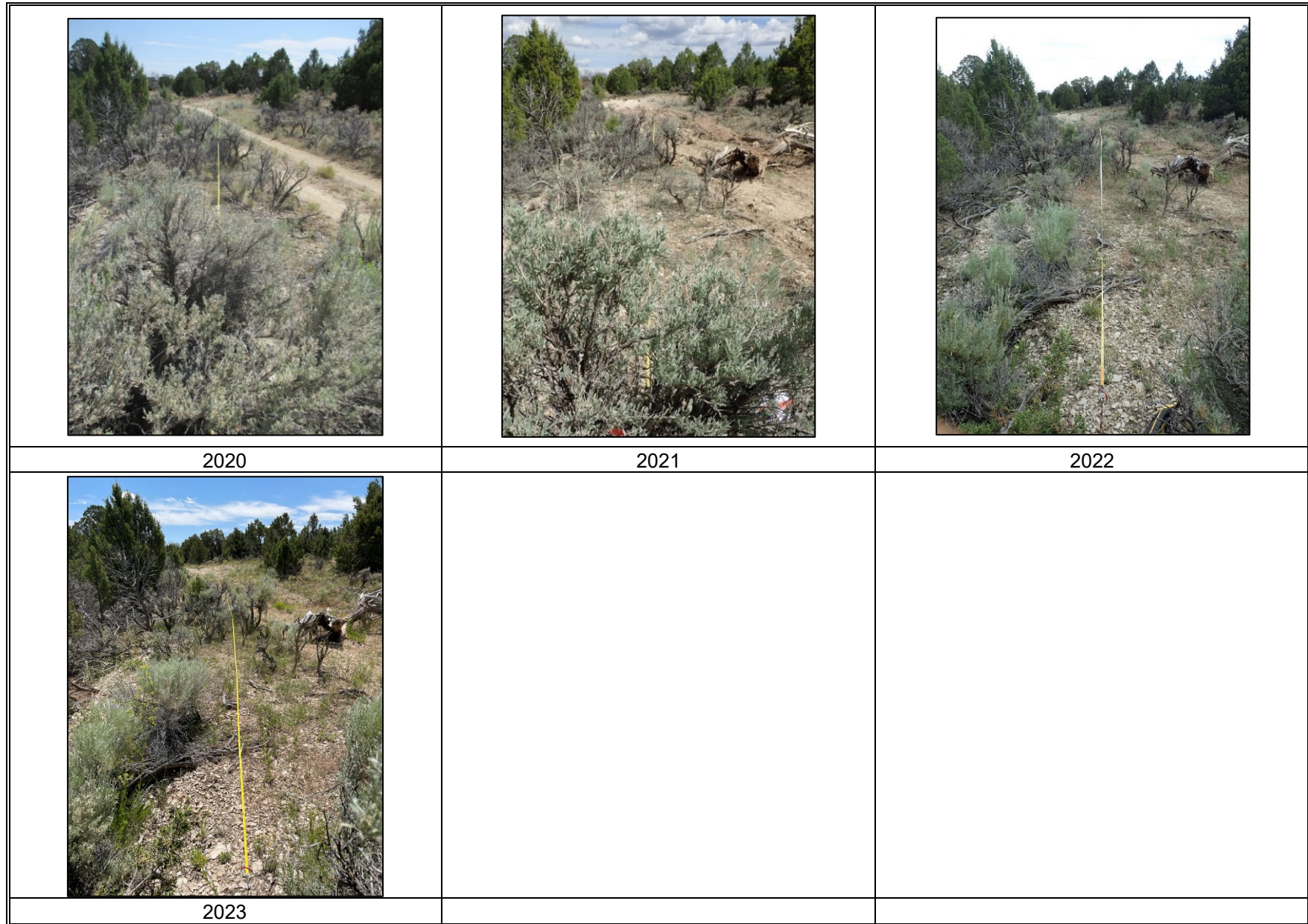


Figure 5. Monitoring Location 4, Bronco, Colorado, Site




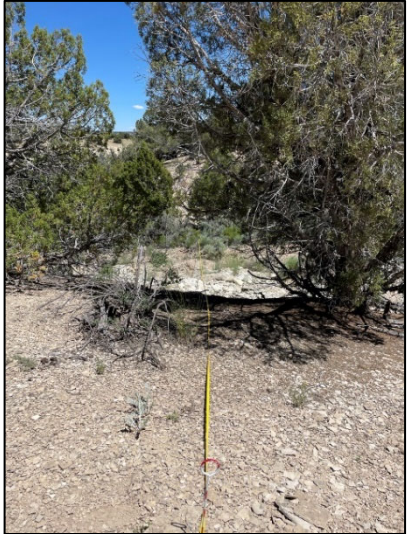
		
2020	2021	2022
		
2023		

Figure 6. Monitoring Location 5, Bronco, Colorado, Site

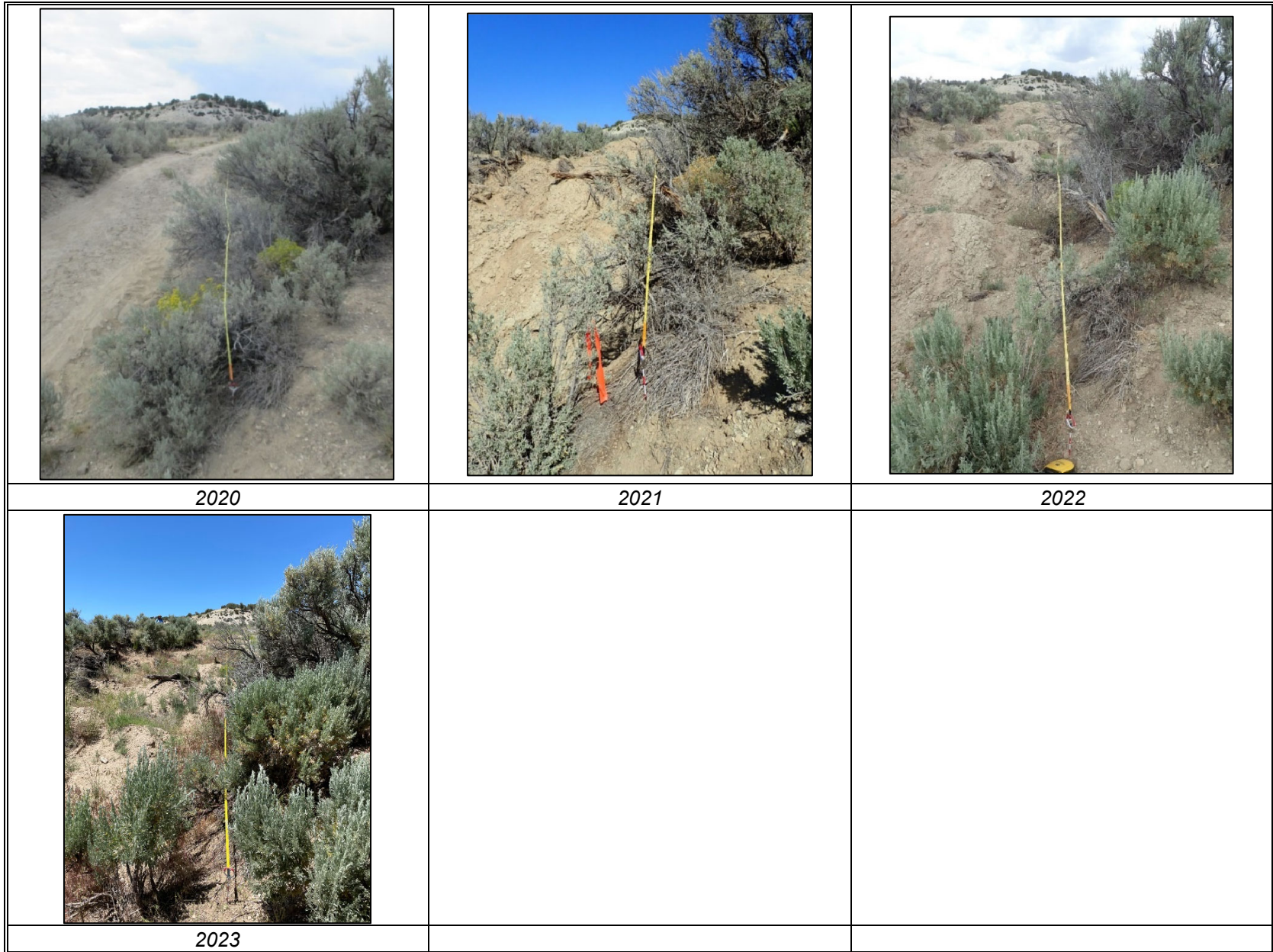
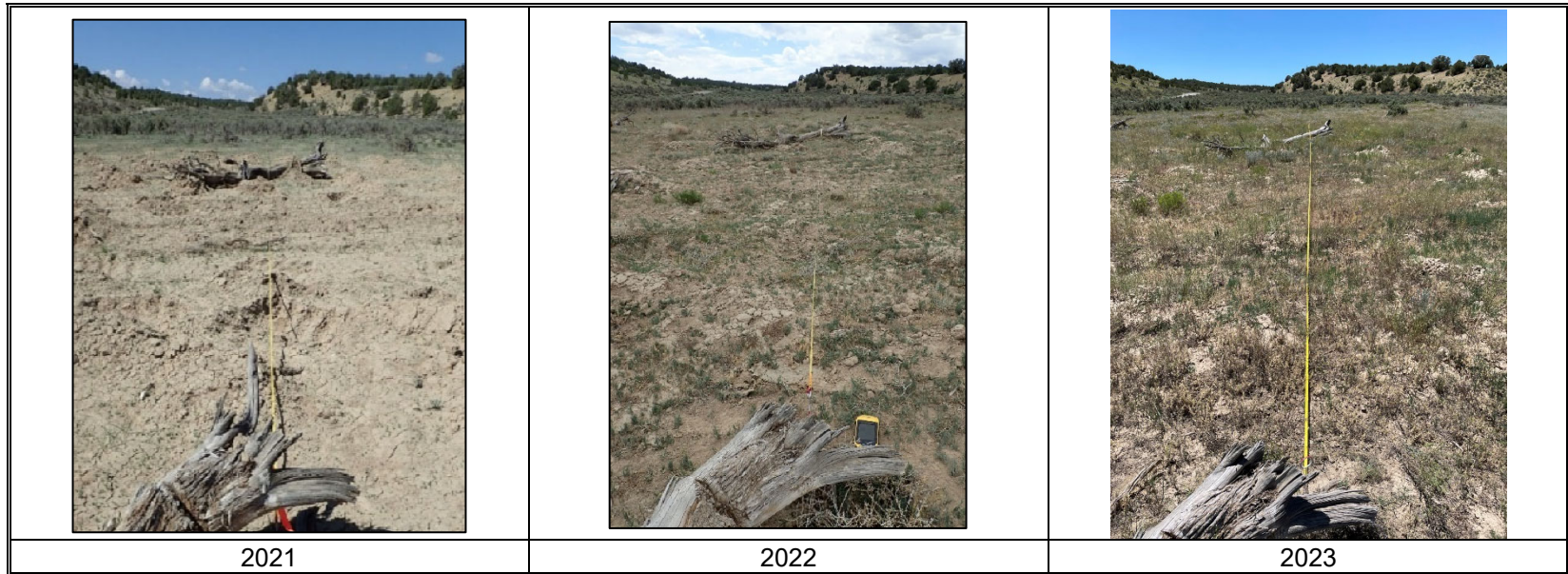


Figure 7. Monitoring Location 6, Bronco, Colorado, Site



Note: No photo monitoring location had been established in 2020

Figure 8. Monitoring Location 7, Bronco, Colorado, Site



Figure 9. Overview of Reclaimed Road, Bronco, Colorado, Site

Appendix A
Comprehensive Data

DPC Data (Predisturbance Monitoring Conducted August 19, 2020)

					Monitoring Locations						
					1	2	3	4	5	6	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable?	Relative Cover (%)						
<i>Achnatherum hymenoides</i>	Indian ricegrass	Grass	Native	D	3	3	0	10	0	4	3
<i>Agropyron cristatum</i>	Crested wheatgrass	Grass	Introduced	N	34	22	11	0	12	0	13
<i>Alyssum desertorum</i>	Desert madwort	Forb	Introduced	U	obs	obs	obs	0	0	0	<1
<i>Antennaria dimorpha</i>	Low pussytoes	Forb	Native	D	0	0	obs	0	0	0	<1
<i>Artemisia frigida</i>	Prairie sagewort	Shrub	Native	D	obs	0	obs	0	obs	0	<1
<i>Artemisia tridentata</i>	Wyoming big sagebrush	Shrub	Native	D	44	41	obs	19	9	39	25
<i>Astragalus bisulcatus</i>	Twogrooved milkvetch	Forb	Native	D	obs	obs	obs	obs	0	0	<1
<i>Bromus tectorum</i>	Cheatgrass	Grass	Introduced	U	0	0	0	0	0	25	4
<i>Castilleja linariifolia</i>	Wyoming Indian paintbrush	Forb	Native	D	0	0	0	obs	0	0	<1
<i>Cirsium barnebyi</i>	Barneby's thistle	Forb	Native	D	0	0	0	0	3	0	1
<i>Elymus elymoides</i>	Squirreltail	Grass	Native	D	obs	0	0	13	6	4	4
<i>Elymus trachycaulus</i>	Slender wheatgrass	Grass	Native	D	0	0	obs	3	3	obs	1
<i>Ericameria nauseosa</i>	Rubber rabbitbrush	Shrub	Native	D	9	13	obs	26	3	4	9
<i>Eriogonum ovalifolium</i>	Cushion buckwheat	Forb	Native	D	0	0	0	obs	obs	0	<1
<i>Erodium cicutarium</i>	Redstem stork's bill	Forb	Introduced	U	obs	obs	obs	0	0	0	<1
<i>Grindelia squarrosa</i>	Curlycup gumweed	Forb	Native	N	0	0	obs	0	12	11	4
<i>Gutierrezia sarothrae</i>	Broom snakeweed	Shrub	Native	N	6	16	22	3	0	0	8
<i>Hesperostipa comata</i>	Needle and thread	Grass	Native	D	obs	3	0	0	0	0	1
<i>Heterotheca villosa</i>	Hairy false goldenaster	Forb	Forb	D	0	0	obs	3	0	0	1
<i>Hymenopappus filifolius</i>	Fineleaf hymenopappus	Forb	Native	D	obs	obs	33	obs	0	0	6
<i>Juniperus osteosperma</i>	Utah juniper	Shrub	Native	D	obs	0	obs	obs	33	0	6
<i>Koeleria macrantha</i>	Prairie Junegrass	Grass	Native	D	0	0	0	obs	0	0	<1
<i>Krascheninnikovia lanata</i>	Winterfat	Shrub	Native	D	0	0	0	0	0	obs	<1
<i>Lupinus sp</i>	Lupine	Forb	Native	D	0	0	obs	6	0	0	1
<i>Machaeranthera canescens</i>	Hoary tansyaster	Forb	Native	D	0	0	0	0	9	0	2
<i>Pascopyrum smithii</i>	Western wheatgrass	Grass	Native	D	0	0	0	0	0	11	2
<i>Penstemon pachyphyllus</i>	Thickleaf beardtongue	Forb	Native	D	obs	obs	obs	0	0	0	<1
<i>Physaria acutifolia</i>	Sharpleaf twinpod	Forb	Native	D	0	obs	obs	0	3	0	1
<i>Phlox andicola</i>	Prairie phlox	Forb	Native	D	obs	obs	11	0	obs	0	2
<i>Phlox hoodii</i>	Spiny phlox	Forb	Native	D	0	0	obs	obs	obs	0	<1

DPC Data (Predisturbance Monitoring Conducted August 19, 2020) (continued)

					Monitoring Locations						
					1	2	3	4	5	6	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable?	Relative Cover (%)						
<i>Pinus edulis</i>	Twoneedle pinyon	Shrub	Native	D	0	0	obs	obs	0	0	<1
<i>Poa secunda</i>	Sandberg bluegrass	Grass	Native	D	3	0	obs	16	0	0	3
<i>Polygonum aviculare</i>	Prostrate knotweed	Forb	Introduced	U	0	obs	11	obs	0	0	2
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	Grass	Native	D	0	0	0	obs	obs	0	<1
<i>Purshia tridentata</i>	Antelope bitterbrush	Shrub	Native	D	obs	3	obs	0	6	0	2
<i>Rhus trilobata</i>	Skunkbush sumac	Shrub	Native	D	0	0	0	0	obs	0	<1
<i>Salsola tragus</i>	Prickly Russian thistle	Forb	Introduced	U	0	0	0	0	0	obs	<1
<i>Sphaeralcea coccinea</i>	Scarlet globemallow	Forb	Native	D	0	0	0	0	0	4	1
<i>Verbascum thapsus</i>	Common mullein	Forb	Introduced	U	0	0	11	0	0	0	2
Desirable species					59	63	44	97	76	64	67
Neutral species					41	38	33	3	24	11	25
Undesirable species					0	0	22	0	0	25	8
Grasses					41	28	11	42	21	43	31
Forbs					0	0	67	10	27	14	20
Shrubs					59	72	22	48	52	43	49
Slope (%)					1	1	3	3	20	15	7
Herbaceous height (cm)					23	20	13	27	18	16	20
Woody height (cm)					33	34	11	64	170	49	60
Azimuth					352	34	354	116	84	290	NA
					Absolute Cover (%)						
Total foliar cover					46	48	20	40	46	38	40
Bare ground					22	26	50	24	20	44	31
Basal					0	0	0	2	0	0	0
Rock					6	6	20	24	24	6	14
Lichen					4	0	0	0	0	0	1
Standing dead					2	0	0	2	0	2	1
Plant litter					20	20	10	10	10	10	13

Abbreviations:

AVG = average
cm = centimeters
D = desirable
N = neutral

NA = not applicable
obs = observed
U = undesirable

Revegetation Success Monitoring Conducted April 18–19, 2021

					Monitoring Locations							
					1	2	3	4	5	6	7	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable ?	Relative Cover (%)							
<i>Achnatherum hymenoides</i>	Indian ricegrass	Grass	Native	D	0	0	0	10	0	0	0	1
<i>Agropyron cristatum</i>	Crested wheatgrass	Grass	Introduced	N	50	0	100	10	0	0	0	23
<i>Alyssum desertorum</i>	Desert madwort	Forb	Introduced	U	0	0	0	0	0	0	0	*
<i>Amelanchier utahensis</i>	Service berry	Shrub	Native	D	0	0	0	0	6	0	0	1
<i>Artemisia frigida</i>	Prairie sagewort	Shrub	Native	D	obs	0	obs	0	obs	0	0	<1
<i>Artemisia tridentata</i>	Wyoming big sagebrush	Shrub	Native	D	0	0	0	20	0	100	0	17
<i>Astragalus bisulcatus</i>	Twogrooved milkvetch	Forb	Native	D	obs	obs	obs	obs	0	0	0	<1
<i>Bassia scoparia</i>	Burningbush	Forb	Introduced	U	0	0	0	0	0	0	22	3
<i>Bromus tectorum</i>	Cheatgrass	Grass	Introduced	U	0	0	0	0	0	0	22	3
<i>Castilleja linariifolia</i>	Wyoming Indian paintbrush	Forb	Native	D	0	0	0	obs	0	0	0	<2
<i>Ceratocephala testiculata</i>	Curveseed butterwort	Forb	Introduced	U	0	0	0	0	0	0	33	5
<i>Cirsium barnebyi</i>	Barneby's thistle	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Elymus elymoides</i>	Squirreltail	Grass	Native	D	obs	0	0	obs	obs	obs	0	<1
<i>Ericameria nauseosa</i>	Rubber rabbitbrush	Shrub	Native	D	0	0	0	10	0	0	0	1
<i>Eriogonum ovalifolium</i>	Cushion buckwheat	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Grindelia squarrosa</i>	Curlycup gumweed	Forb	Native	N	0	0	0	0	obs	0	0	<1
<i>Gutierrezia sarothrae</i>	Broom snakeweed	Shrub	Native	N	0	0	0	10	19	0	0	4
<i>Hesperostipa comata</i>	Needle and thread	Grass	Native	D	obs	0	0	0	0	0	0	<1
<i>Heterotheca villosa</i>	Hairy false goldenaster	Forb	Forb	D	0	0	obs	0	0	0	0	<1
<i>Hymenopappus filifolius</i>	Fineleaf hymenopappus	Forb	Native	D	0	0	obs	0	0	0	0	<1
<i>Juniperus osteosperma</i>	Utah juniper	Shrub	Native	D	obs	obs	0	obs	69	0	0	10
<i>Koeleria macrantha</i>	Prairie Junegrass	Grass	Native	D	0	0	0	obs	0	0	0	<1
<i>Krascheninnikovia lanata</i>	Winterfat	Shrub	Native	D	0	0	0	0	0	obs	obs	<1
<i>Lupinus sp</i>	Lupine	Forb	Native	D	0	0	0	10	0	0	0	1
<i>Machaeranthera canescens</i>	Hoary tansyaster	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Pascopyrum smithii</i>	Western wheatgrass	Grass	Native	D	50	100	0	10	6	0	22	27
<i>Physaria acutifolia</i>	Sharpleaf twinpod	Forb	Native	D	0	obs	obs	0	0	0	0	<1
<i>Phlox andicola</i>	Prairie phlox	Forb	Native	D	obs	obs	obs	0	obs	0	0	<1
<i>Phlox hoodii</i>	Spiny phlox	Forb	Native	D	0	0	obs	0	obs	0	0	<1

Revegetation Success Monitoring Conducted April 18–19, 2021 (continued)

					Monitoring Locations							
					1	2	3	4	5	6	7	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable ?	Relative Cover (%)							
<i>Pinus edulis</i>	Twoneedle pinyon	Shrub	Native	D	0	0	obs	obs	0	0	0	<1
<i>Poa secunda</i>	Sandberg bluegrass	Grass	Native	D	obs	0	obs	20	0	0	0	3
<i>Polygonum aviculare</i>	Prostrate knotweed	Forb	Introduced	U	0	0	0	0	0	0	0	*
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	Grass	Native	D	0	0	0	obs	obs	0	0	<1
<i>Purshia tridentata</i>	Antelope bitterbrush	Shrub	Native	D	obs	0	obs	0	obs	0	0	<1
<i>Rhus trilobata</i>	Skunkbush sumac	Shrub	Native	D	0	0	0	0	obs	0	0	<1
<i>Salsola tragus</i>	Prickly Russian thistle	Forb	Introduced	U	0	0	0	0	0	obs	obs	<1
<i>Sphaeralcea coccinea</i>	Scarlet globemallow	Forb	Native	D	0	0	0	0	0	obs	obs	<1
<i>Verbascum thapsus</i>	Common mullein	Forb	Introduced	U	0	0	obs	0	0	0	0	<1
Desirable Species					50	100	0	80	81	100	22	62
Neutral Species					50	0	100	20	19	0	0	27
Undesirable Species					0	0	0	0	0	0	78	11
Grasses					100	100	100	50	6	0	44	57
Forbs					0	0	0	10	0	0	56	9
Shrubs					0	0	0	40	94	100	0	33
Slope (%)					1	1	3	3	20	15	20	7
Herbaceous height (cm)					4	5	8	8	17	0	6	7
Woody height (cm)					0	0	0	75	162	99	6	49
Azimuth					352	34	354	116	84	290	220	NA
					Absolute Cover (%)							
Total foliar cover					4	2	2	18	32	14	18	13
Bare ground					48	70	34	36	18	44	70	46
Basal					0	0	0	0	0	0	0	0
Rock					22	18	42	20	34	8	2	21
Lichen					0	0	0	0	0	0	0	0
Standing dead					0	0	0	2	0	0	0	0
Plant Litter					26	10	22	24	16	34	10	20

Note:

*Indicates species in previous years.

Abbreviations: AVG = average, cm = centimeters, D = desirable, N = neutral, NA = not applicable, obs = observed, U = undesirable

Revegetation Success Monitoring Conducted June 29–30, 2022

					Monitoring Locations							
					1	2	3	4	5	6	7	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable?	Relative Cover (%)							
<i>Achnatherum hymenoides</i>	Indian ricegrass	Grass	Native	D	0	5	20	0	0	0	0	4
<i>Agropyron cristatum</i>	Crested wheatgrass	Grass	Introduced	N	8	0	20	0	0	0	0	4
<i>Alyssum desertorum</i>	Desert madwort	Forb	Introduced	U	23	14	20	4	0	11	11	12
<i>Amelanchier utahensis</i>	Service berry	Shrub	Native	D	0	0	0	0	obs	0	0	<1
<i>Antennaria dimorpha</i>	Low pussytoes	Forb	Native	D	0	0	obs	0	0	0	0	<1
<i>Artemisia cana</i>	Silver sagebrush	Shrub	Native	D	0	0	0	obs	0	0	0	<1
<i>Artemisia frigida</i>	Prairie sagewort	Shrub	Native	D	obs	0	obs	0	obs	0	0	<1
<i>Artemisia tridentata</i>	Wyoming big sagebrush	Shrub	Native	D	obs	obs	obs	0	25	11	0	5
<i>Astragalus bisulcatus</i>	Twogrooved milkvetch	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Astragalus wingatanus</i>	Fort Wingate milkvetch	Forb	Native	D	0	0	0	9	0	0	0	1
<i>Bassia scoparia</i>	Burningbush	Forb	Introduced	U	0	0	0	0	0	0	0	*
<i>Bromus arvensis</i>	Field brome	Grass	Introduced	U	0	0	0	9	0	0	0	1
<i>Bromus tectorum</i>	Cheatgrass	Grass	Introduced	U	0	0	0	4	0	0	11	2
<i>Ceratocephala testiculata</i>	Curvseed butterwort	Forb	Introduced	U	0	0	0	0	0	0	0	*
<i>Chrysothamnus viscidiflorus</i>	Yellow rabbitbrush	Shrub	Native	D	obs	obs	obs	0	obs	0	0	4
<i>Cirsium barnebyi</i>	Barneby's thistle	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Cryptantha flavoculata</i>	Roughseed cryptantha	Forb	Native	D	8	10	40	0	0	0	0	8
<i>Descurainia sophia</i>	herb sophia	Forb	Introduced	U	8	0	0	4	0	11	0	3
<i>Elymus elymoides</i>	Squirreltail	Grass	Native	D	obs	0	0	obs	obs	obs	0	<1
<i>Ericameria nauseosa</i>	Rubber rabbitbrush	Shrub	Native	D	0	0	0	9	0	0	0	1
<i>Eriogonum ovalifolium</i>	Cushion buckwheat	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Grindelia squarrosa</i>	Curlycup gumweed	Forb	Native	N	0	0	0	0	0	0	0	*
<i>Gutierrezia sarothrae</i>	Broom snakeweed	Shrub	Native	N	0	0	0	0	25	0	0	4
<i>Hesperostipa comata</i>	Needle and thread	Grass	Native	D	0	10	0	4	4	0	0	2
<i>Heterotheca villosa</i>	Hairy false goldenaster	Forb	Forb	D	0	0	0	0	0	0	0	*
<i>Hymenopappus filifolius</i>	Fineleaf hymenopappus	Forb	Native	D	0	0	obs	0	0	0	0	<1
<i>Juniperus osteosperma</i>	Utah juniper	Shrub	Native	D	0	0	0	0	39	0	0	6
<i>Koeleria macrantha</i>	Prairie Junegrass	Grass	Native	D	0	0	0	9	0	0	0	1

Revegetation Success Monitoring Conducted June 29-30, 2022 (continued)

					Monitoring Locations							
					1	2	3	4	5	6	7	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable?	Relative Cover (%)							
<i>Krascheninnikovia lanata</i>	Winterfat	Shrub	Native	D	0	0	0	0	0	0	obs	<1
<i>Lactuca serriola</i>	prickly lettuce	Forb	Introduced	N	0	0	0	4	0	33	0	5
<i>Linum lewisii</i>	Lewis flax	Forb	Native	D	23	0	0	4	0	0	0	4
<i>Lupinus sp</i>	Lupine	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Machaeranthera canescens</i>	Hoary tansyaster	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Machaeranthera grindelioides</i>	Rayless tansyaster	Forb	N	D	0	0	0	0	4	0	0	1
<i>Pascopyrum smithii</i>	Western wheatgrass	Grass	Native	D	8	14	0	4	0	0	11	5
<i>Physaria acutifolia</i>	Sharpleaf twinpod	Forb	Native	D	0	obs	obs	0	0	0	0	<1
<i>Phlox andicola</i>	Prairie phlox	Forb	Native	D	obs	obs	obs	0	obs	0	0	<1
<i>Phlox hoodii</i>	Spiny phlox	Forb	Native	D	0	0	obs	0	obs	0	0	<1
<i>Poa secunda</i>	Sandberg bluegrass	Grass	Native	D	0	0	0	9	0	0	0	1
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	Grass	Native	D	8	10	0	17	0	0	0	5
<i>Purshia tridentata</i>	Antelope bitterbrush	Shrub	Native	D	obs	0	obs	0	obs	0	0	<1
<i>Salsola tragus</i>	prickly Russian thistle	Forb	Introduced	U	15	38	0	0	0	33	61	21
<i>Sphaeralcea coccinea</i>	Scarlet globemallow	Forb	Native	D	0	0	0	0	0	obs	6	1
<i>Thinopyrum intermedium</i>	Intermediate wheatgrass	Grass	Introduced	D	0	0	0	9	4	0	0	2
<i>Verbascum thapsus</i>	Common mullein	Forb	Introduced	U	obs	obs	obs	0	0	0	0	0
Desirable Species					46	48	60	74	100	11	17	51
Neutral Species					8	0	20	4	0	33	0	9
Undesirable Species					46	52	20	22	0	56	83	40
Grasses					23	38	40	65	7	0	22	28
Forbs					77	62	60	26	4	89	78	56
Shrubs					0	0	0	9	89	11	0	16
Slope (%)					1	1	3	3	20	15	20	7
Herbaceous height (cm)					26	27	22	8	27	29	16	23
Woody height (cm)					0	0	0	40	222	91	15	59
Azimuth					352	34	354	116	84	290	220	NA

Revegetation Success Monitoring Conducted June 29-30, 2022 (continued)

					Monitoring Locations							
					1	2	3	4	5	6	7	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable?	Relative Cover (%)							
					Absolute Cover (%)							
Total foliar cover					24	40	12	44	48	18	32	31
Bare ground					30	34	16	18	20	60	40	31
Basal					0	0	0	0	0	0	0	0
Rock					30	18	48	20	22	10	0	21
Lichen					0	0	0	0	0	0	0	0
Standing dead					0	0	0	2	4	0	0	1
Plant litter					16	8	24	16	6	12	28	16

Note:

*Indicates species in previous years.

Abbreviations:

AVG = average
 cm = centimeters
 D = desirable
 N = neutral
 NA = not applicable
 obs = observed
 U = undesirable

Revegetation Success Monitoring Conducted June 27–28, 2023

					Monitoring Location							
Scientific Name	Common Name	Growth Form	Origin	Desirable?	1	2	3	4	5	6	7	AVG
					Relative Cover (%)							
<i>Achnatherum hymenoides</i>	Indian ricegrass	Grass	Native	D	0	6	17	0	0	9	0	4
<i>Agropyron cristatum</i>	Crested wheatgrass	Grass	Introduced	N	11	9	0	0	0	0	0	3
<i>Alyssum desertorum</i>	Desert madwort	Forb	Introduced	U	14	0	0	0	0	7	12	5
<i>Amelanchier utahensis</i>	Service berry	Shrub	Native	D	0	0	0	0	4	0	0	1
<i>Antennaria dimorpha</i>	Low pussytoes	Forb	Native	D	0	0	obs	0	0	0	0	<1
<i>Artemisia frigida</i>	Prairie sagewort	Shrub	Native	D	obs	0	obs	0	obs	0	0	<1
<i>Artemisia tridentata</i>	Wyoming big sagebrush	Shrub	Native	D	0	0	0	5	7	0	0	2
<i>Astragalus bisulcatus</i>	Twogrooved milkvetch	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Astragalus wingatanus</i>	Fort Wingate milkvetch	Forb	Native	D	0	0	0	14	4	0	0	2
<i>Bassia scoparia</i>	Burningbush	Forb	Introduced	U	0	0	0	0	0	0	obs	<1
<i>Bromus arvensis</i>	Field brome	Grass	Introduced	U	0	0	0	5	0	0	0	1
<i>Bromus tectorum</i>	Cheatgrass	Grass	Introduced	U	11	3	0	0	0	24	24	9
<i>Ceratocephala testiculata</i>	Curveseed butterwort	Forb	Introduced	U	0	0	0	0	0	0	2	<1
<i>Chorispora tenella</i>	Purple mustard	Forb	Introduced	U	3	0	0	0	4	0	0	1
<i>Chrysothamnus viscidiflorus</i>	Yellow rabbitbrush	Shrub	Native	D	0	3	0	0	19	2	0	3
<i>Cirsium barnebyi</i>	Barneby's thistle	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Cryptantha flavoculata</i>	Roughseed cryptantha	Forb	Native	D	0	0	17	0	0	0	0	2
<i>Delpinium sp.</i>	Larkspur	Forb	Native	D	0	0	0	5	0	0	0	1
<i>Descurainia pinnata</i>	Western tansymustard	Forb	Native	D	0	0	0	0	4	0	0	1
<i>Descurainia sophia</i>	Herb sophia	Forb	Introduced	U	0	0	0	0	0	0	0	*
<i>Elymus elymoides</i>	Squirreltail	Grass	Native	D	0	0	0	5	7	0	0	2
<i>Ericameria nauseosa</i>	Rubber rabbitbrush	Shrub	Native	D	0	0	0	5	4	0	0	1
<i>Eriogonum ovalifolium</i>	Cushion buckwheat	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Grindelia squarrosa</i>	Curlycup gumweed	Forb	Native	N	0	0	0	0	obs	0	0	<1
<i>Gutierrezia sarothrae</i>	Broom snakeweed	Shrub	Native	N	0	0	0	0	obs	0	0	<1
<i>Hesperostipa comata</i>	Needle and thread	Grass	Native	D	3	9	17	23	0	0	0	7
<i>Heterotheca villosa</i>	Hairy false goldenaster	Forb	Forb	D	0	0	0	0	0	0	0	*
<i>Hymenopappus filifolius</i>	Fineleaf hymenopappus	Forb	Native	D	0	0	0	obs	0	0	0	<1
<i>Ipomopsis congesta</i>	Ballhead ipomopsis	Forb	Native	D	0	0	0	0	0	2	0	<1

Revegetation Success Monitoring Conducted June 27-28, 2023 (continued)

		Monitoring Location			1	2	3	4	5	6	7	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable?	Relative Cover (%)							
<i>Juniperus osteosperma</i>	Utah juniper	Shrub	Native	D	0	0	0	0	33	0	0	5
<i>Koeleria macrantha</i>	Prairie Junegrass	Grass	Native	D	0	0	0	5	0	0	0	1
<i>Krascheninnikovia lanata</i>	Winterfat	Shrub	Native	D	0	0	0	0	0	0	2	<1
<i>Lactuca serriola</i>	prickly lettuce	Forb	Introduced	N	0	0	0	0	0	0	0	*
<i>Lapula occidentalis</i>	Flatspine Stickseed	Forb	Native	D	0	6	0	9	0	13	21	7
<i>Linum lewisii</i>	Lewis flax	Forb	Native	D	37	20	50	18	11	7	2	21
<i>Lupinus sp</i>	Lupine	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Machaeranthera canescens</i>	Hoary tansyaster	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Machaeranthera grindelioides</i>	Rayless tansyaster	Forb	Native	D	0	0	0	0	0	0	0	*
<i>Pascopyrum smithii</i>	Western wheatgrass	Grass	Native	D	14	11	0	0	0	0	14	6
<i>Physaria acutifolia</i>	Sharpleaf twinpod	Forb	Native	D	0	obs	obs	0	0	0	0	<1
<i>Phlox andicola</i>	Prairie phlox	Forb	Native	D	obs	obs	obs	0	obs	0	0	<1
<i>Phlox hoodii</i>	Spiny phlox	Forb	Native	D	0	0	obs	0	obs	0	0	<1
<i>Poa secunda</i>	Sandberg bluegrass	Grass	Native	D	0	0	0	0	obs	0	0	<1
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	Grass	Native	D	6	9	0	9	4	0	5	5
<i>Purshia tridentata</i>	Antelope bitterbrush	Shrub	Native	D	obs	0	obs	0	obs	0	0	<1
<i>Salsola tragus</i>	Prickly Russian thistle	Forb	Introduced	U	0	26	0	0	0	37	14	11
<i>Sisymbrium altissimum</i>	Tall tumbled mustard	Forb	Introduced	U	0	0	0	0	0	0	2	<1
<i>Sphaeralcea coccinea</i>	Scarlet globemallow	Forb	Native	D	0	0	0	0	0	obs	obs	<1
<i>Verbascum thapsus</i>	Common mullein	Forb	Introduced	U	obs	obs	obs	0	0	0	0	<1
Desirable Species					60	63	100	91	96	33	45	70
Neutral Species					14	9	0	0	4	0	0	4
Undesirable Species					26	29	0	5	0	67	50	25
Grasses					46	46	33	45	11	33	43	37
Forbs					51	51	67	41	19	65	50	49
Shrubs					0	3	0	9	63	2	0	11
Slope (%)					1	1	3	3	20	15	20	7
Herbaceous height (cm)					56	57	34	64	42	50	53	51
Woody height (cm)					39	0	21	47	190	58	34	56
Azimuth					352	10	354	116	84	290	220	NA

Revegetation Success Monitoring Conducted June 27-28, 2023 (continued)

Monitoring Location					1	2	3	4	5	6	7	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable?	Relative Cover (%)							
					Absolute Cover (%)							
Total foliar cover					60	52	10	38	48	62	62	47
Bare ground					8	20	38	20	6	16	16	18
Basal					0	0	0	0	2	0	2	1
Rock					14	10	34	18	32	4	0	16
Lichen					0	0	0	0	0	0	0	0
Standing dead					0	0	0	4	2	4	0	1
Plant litter					18	18	18	20	10	14	20	17

Note:

*Indicates species in previous years.

Abbreviations:

AVG = average
 cm = centimeters
 D = desirable
 N = neutral
 NA = not applicable
 obs = observed
 U = undesirable