

**2022
CCH-2 Vegetation Monitoring,
Bronco, Colorado, Site**

October 2022



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	Colorado Core Hole
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. 2 (CCH-2) well. Reclamation work included plugging and abandoning the CCH-2 well, 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 1966. The Bronco site is on land managed by the U.S. Bureau of Land Management (BLM) in NWNE, Section 14, T1S, R99W, 6th PM, in Rio Blanco County, Colorado (Figure 1). Before well abandonment and reclamation began, predisturbance vegetation monitoring was conducted in May 2021 to obtain data for revegetation success comparisons. The well was successfully abandoned in September 2021, and reclamation activities were completed in October 2021. The first revegetation success monitoring was completed in June 2022. 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 CCH-2 Abandonment, Rio Blanco County, Colorado* (DOE 2021) and took place September 24 through October 14, 2021. Monitoring methods follow the *Surface Reclamation Plan* (BLM 2007) and *BLM Core Terrestrial Indicators and Methods, Tech Note 440* (MacKinnon et al. 2011) and will be conducted annually until success criteria are reached. To demonstrate reclamation success, annual vegetation monitoring data (Appendix A) will be 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-2) are based on the capability of those sites in a herbaceous state.

3.0 Results

Three permanent monitoring locations were established for annual vegetation monitoring data collection. 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 4.

Table 1. Data Comparison of DPC, Success Criteria, and 2022 Monitoring Results

Metric	DPC	Success Criteria (80% similarity of DPC)	2022
Total foliar cover (% absolute cover)	25	25 ± 5	11
Bare ground (% absolute cover)	43	43 ± 6	53
Desirable foliar cover (% relative cover)	83	83 ± 17	74
Undesirable foliar cover (% relative cover)	0	0 ± 1	26
Forb foliar cover (% relative cover)	3	3 ± 1	17
Shrub foliar cover (% relative cover)	63	63 ± 13	9
Species Richness (No. of dominant species)	10	10 ± 2	7

Note: Bold values indicate that data are within success criteria.

4.0 Discussion

Data collected from the 2022 monitoring showed progression toward revegetation success criteria and much of the site is blending into the surrounding landscape (Figure 5). Mean values from all monitoring locations indicated that one of the seven success criteria was met. The increase in undesirable foliar cover is primarily attributed to desert madwort (*Alyssum desertorum*), a non-noxious annual weed, and cheatgrass (*Bromus tectorum*), a Colorado “List C” noxious weed². Currently, the presence of these species does not present a significant hinderance to achieving success criteria. Grazing by livestock and wildlife has been observed onsite. As of 2022, grazing does not appear to impede revegetation success, but it should continue to be monitored. Based on 2022 monitoring results, ecologists anticipate that vegetation establishment will continue and will reach success criteria within the next 1–5 years.

²List 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).

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), 2021. *Reclamation Plan for Project Bronco Well CCH-2 Abandonment, Rio Blanco County, Colorado*, LMS/S33467, Office of Legacy Management, April.

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.

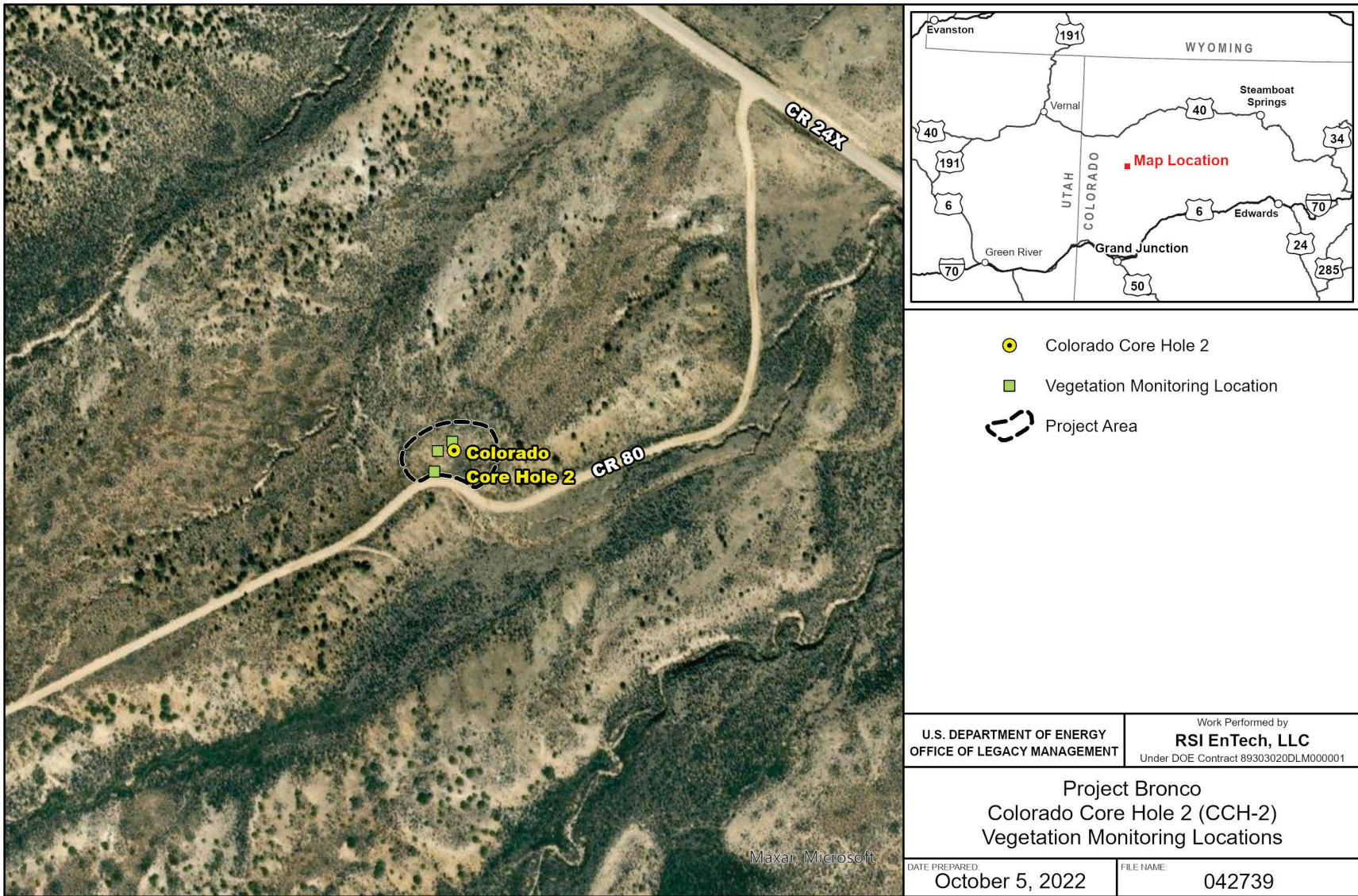


Figure 1. Vegetation Monitoring Locations at Bronco CCH-2

6.0 Photographs

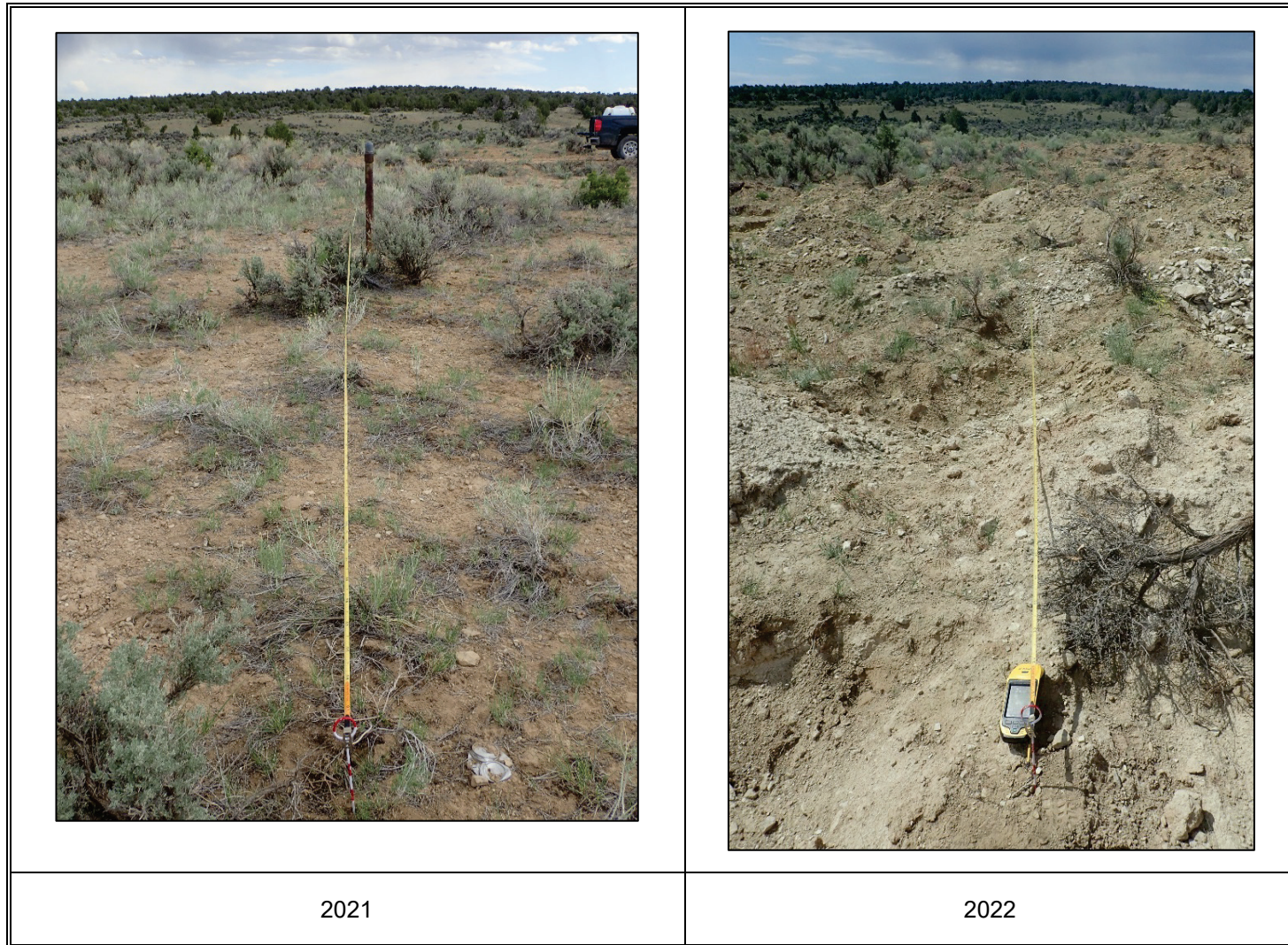


Figure 2. Monitoring Location 1

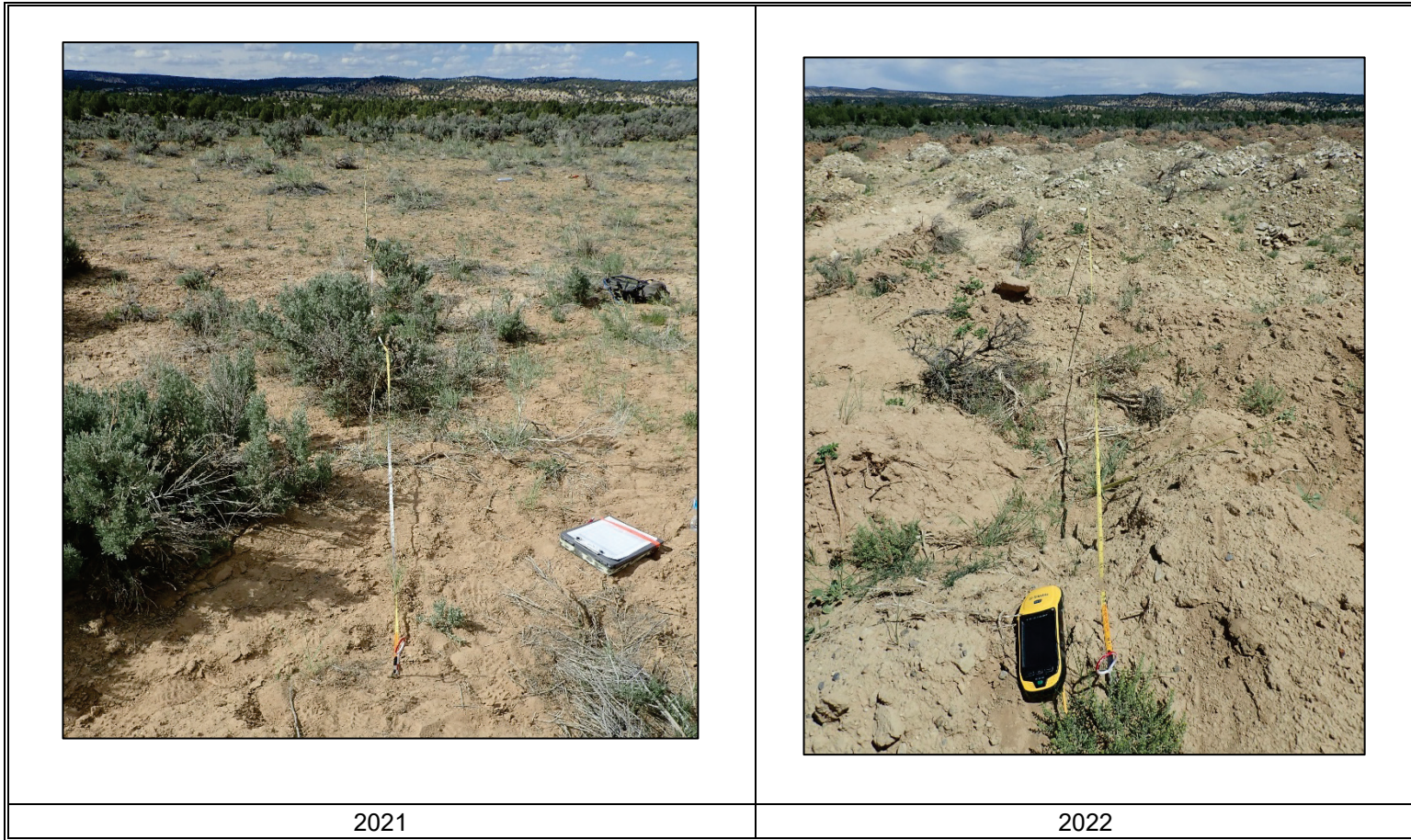


Figure 3. Monitoring Location 2



Figure 4. Monitoring Location 3



Figure 5. Overview of Reclaimed Well Pad, June 2022

Appendix A
Comprehensive Data

DPC Data (Predisturbance Monitoring Conducted May 19, 2021)

					Monitoring Locations			
					1	2	3	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable?	Relative Cover (%)			
<i>Achnatherum hymenoides</i>	Indian ricegrass	Grass	Native	D	0	10	8	6
<i>Agropyron cristatum</i>	Crested wheatgrass	Grass	Introduced	N	18	obs	0	6
<i>Artemisia frigida</i>	Prairie sagewort	Shrub	Native	D	obs	0	0	<1
<i>Artemisia tridentata</i>	Wyoming big sagebrush	Shrub	Native	D	24	30	8	20
<i>Astragalus wingatanus</i>	Fort Wingate milkvetch	Forb	Native	D	obs	obs	0	<1
<i>Bromus inermis</i>	Smooth brome	Grass	Introduced	N	obs	0	0	<1
<i>Castilleja linariifolia</i>	Wyoming Indian paintbrush	Forb	Native	D	obs	0	0	<1
<i>Cryptantha flavoculata</i>	Roughseed cryptantha	Forb	Native	D	obs	0	0	<1
<i>Delphinium nuttallianum</i>	Twolobe larkspur	Forb	Native	D	obs	0	0	<1
<i>Ericameria nauseosa</i>	Rubber rabbitbrush	Shrub	Native	D	35	20	38	31
<i>Eriogonum lonchophyllum</i>	Spearleaf buckwheat	Forb	Native	D	0	obs	0	<1
<i>Gutierrezia sarothrae</i>	Broom snakeweed	Shrub	Native	N	0	10	23	11
<i>Hesperostipa comata</i>	Needle and thread	Grass	Native	D	obs	10	8	6
<i>Juniperus osteosperma</i>	Utah juniper	Shrub	Native	D	obs	0	0	<1
<i>Koeleria macrantha</i>	Prairie Junegrass	Grass	Native	D	0	0	15	5
<i>Lomatium</i> sp.	Desert parsley	Forb	Native	D	0	obs	0	<1
<i>Machaeranthera grindelioides</i>	Rayless tansyaster	Forb	Native	D	0	10	0	3
<i>Pascopyrum smithii</i>	Western wheatgrass	Grass	Native	D	12	10	0	7
<i>Phlox longifolia</i>	Longleaf phlox	Forb	Native	D	0	0	obs	<1
<i>Poa secunda</i>	Sandberg bluegrass	Grass	Native	D	12	0	0	4
<i>Tetradymia canescens</i>	Spineless horsebrush	Shrub	Native	D	obs	0	0	<1
Desirable species					82	90	77	83
Neutral species					18	10	23	17
Undesirable species					0	0	0	0
Grasses					41	30	31	34
Forbs					0	10	0	3
Shrubs					59	60	69	63
Slope (%)					0-1	0-1	0-1	0-1

DPC Data (Predisturbance Monitoring Conducted May 19, 2021) (continued)

					Monitoring Locations			
					1	2	3	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable?	Relative Cover (%)			
Herbaceous height (cm)					10	11	10	10
Woody height (cm)					30	26	34	30
Azimuth					160	350	72	NA
					Absolute Cover (%)			
Total foliar cover					30	20	26	25
Bare ground					30	64	34	43
Basal					0	0	0	0
Rock					6	2	6	5
Lichen					0	2	8	3
Standing dead					0	0	0	0
Plant litter					34	12	26	24

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

Revegetation Success Monitoring Conducted June 29, 2022

					Monitoring Locations			
					1	2	3	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable?	Relative Cover (%)			
<i>Achnatherum hymenoides</i>	Indian ricegrass	Grass	Native	D	0	obs	0	<1
<i>Agropyron cristatum</i>	Crested wheatgrass	Grass	Introduced	N	0	0	0	*
<i>Alyssum desertorum</i>	Desert madwort	Forb	Introduced	U	0	14	25	13
<i>Aristida purpurea</i>	Purple threeawn	Grass	Native	D	0	obs	0	<1
<i>Artemisia frigida</i>	Prairie sagewort	Shrub	Native	D	obs	0	0	<1
<i>Artemisia tridentata</i>	Wyoming big sagebrush	Shrub	Native	D	0	0	13	4
<i>Astragalus wingatanus</i>	Fort Wingate milkvetch	Forb	Native	D	0	0	13	4
<i>Bromus inermis</i>	Smooth brome	Grass	Introduced	N	0	0	0	*
<i>Bromus tectorum</i>	Cheatgrass	Grass	Introduced	U	0	14	25	13
<i>Castilleja linariifolia</i>	Wyoming Indian paintbrush	Forb	Native	D	0	0	0	*
<i>Cryptantha flavoculata</i>	Roughseed cryptantha	Forb	Native	D	obs	0	0	<1
<i>Descurainia sophia</i>	Herb sophia	Forb	Introduced	U	obs	0	0	<1
<i>Elymus elymoides</i>	Squirreltail	Grass	Native	D	0	obs	0	<1
<i>Ericameria nauseosa</i>	Rubber rabbitbrush	Shrub	Native	D	0	14	0	5
<i>Eriogonum lonchophyllum</i>	Spearleaf buckwheat	Forb	Native	D	0	obs	0	<1
<i>Gutierrezia sarothrae</i>	Broom snakeweed	Shrub	Native	N	0	obs	obs	<1
<i>Hesperostipa comata</i>	Needle and thread	Grass	Native	D	obs	0	13	4
<i>Juniperus osteosperma</i>	Utah juniper	Shrub	Native	D	obs	0	0	<1
<i>Koeleria macrantha</i>	Prairie Junegrass	Grass	Native	D	0	0	obs	<1
<i>Lomatium sp.</i>	Desert parsley	Forb	Native	D	0	0	0	*
<i>Lactuca serriola</i>	Prickly lettuce	Forb	Introduced	N	obs	0	0	<1
<i>Machaeranthera grindelioides</i>	Rayless tansyaster	Forb	Native	D	0	obs	0	<1
<i>Melilotus officinalis</i>	Sweetclover	Forb	Introduced	U	obs	0	0	<1
<i>Mirabilis linearis</i>	Narrowleaf four o'clock	Forb	Native	D	0	obs	0	<1
<i>Pascopyrum smithii</i>	Western wheatgrass	Grass	Native	D	0	14	13	9
<i>Physaria acutifolia</i>	Sharpleaf twinpod	Forb	Native	D	0	obs	0	<1
<i>Phlox hoodii</i>	Spiny phlox	Forb	Native	D	0	obs	0	<1
<i>Phlox longifolia</i>	Longleaf phlox	Forb	Native	D	0	0	0	*

Revegetation Success Monitoring Conducted June 29, 2022 (continued)

					Monitoring Locations			
					1	2	3	AVG
Scientific Name	Common Name	Growth Form	Origin	Desirable?	Relative Cover (%)			
<i>Poa secunda</i>	Sandberg bluegrass	Grass	Native	D	0	0	obs	<1
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	Grass	Native	D	100	43	0	48
<i>Salsola tragus</i>	Prickly Russian thistle	Forb	Introduced	U	obs	0	0	<1
<i>Sphaeralcea coccinea</i>	Scarlet globemallow	Forb	Native	D	0	obs	0	<1
<i>Tetradymia canescens</i>	Spineless horsebrush	Shrub	Native	D	obs	0	0	<1
Desirable species					100	71	50	74
Neutral species					0	0	0	0
Undesirable species					<1	29	50	26
Grasses					100	71	50	74
Forbs					<1	14	38	17
Shrubs					<1	14	13	9
Slope (%)					0–1	0–1	0–1	0–1
Herbaceous height (cm)					10	11	10	10
Woody height (cm)					30	26	34	30
Azimuth					160	350	72	NA
					Absolute Cover (%)			
Total foliar cover					4	14	14	11
Bare ground					46	56	56	53
Basal					0	0	0	0
Rock					46	26	26	33
Lichen					0	0	0	0
Standing dead					2	0	0	1
Plant litter					2	4	4	3

Note:

*Indicates species in previous years.

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