COORS ENERGY COMPANY

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2022 ANNUAL HYDROLOGY & RECLAMATION REPORT

Prepared for:
COLORADO DIVISION OF RECLAMATION, MINING & SAFETY

PERMIT NO. C-1981-028

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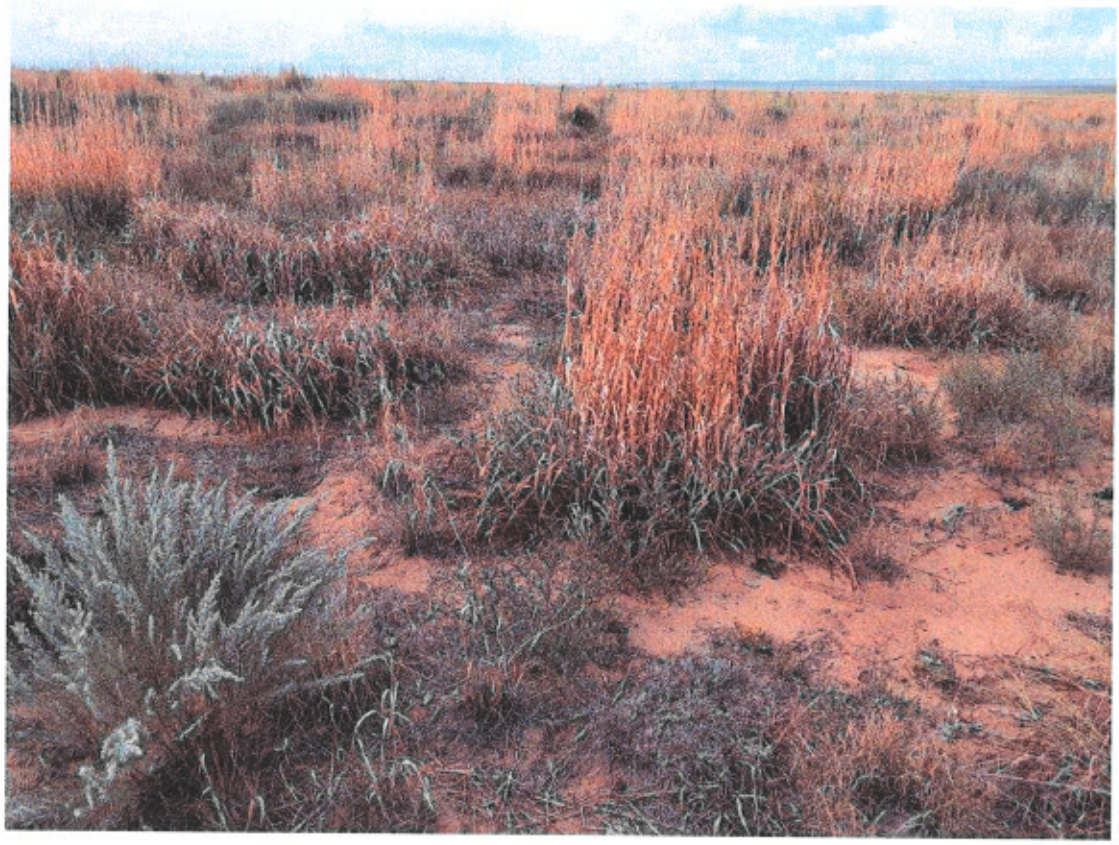
2022

AHR-2022

2022 Vegetation Monitoring Report
Reclamation Areas
25, 29, 30, 31, 32, 33, 34, 35, 43, and 44
Coors Energy Company Keenesburg Mine

Keenesburg, Colorado



November 2022

Prepared by:

Habitat Management
Environmental & Natural Resource Services

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EXECUTIVE SUMMARY

Quantitative vegetation monitoring of Reclamation Areas 25, 29, 30, 31, 32, 33, 34, 35, 43, and 44 at the Coors Energy Company (CEC) Keenesburg Mine was conducted in August 2022. Vegetation cover, herbaceous production, and species composition were evaluated. Comparisons were made between vegetation cover and herbaceous production means from the reclamation areas and predicted values calculated from the approved final revegetation success equations based on on-site precipitation from September 2021 to July 2022. The predictive equations for vegetation cover and herbaceous production were modified in Technical Revisions 43 and 46 to the Colorado Division of Reclamation Mining and Safety (DRMS) Mining and Reclamation Permit C-1981-028. The calculated final revegetation success vegetation cover standard value was 19.9%. The total herbaceous production standard was 11.0 g/m^2.

Reclamation Areas 29, 30, and 31 were evaluated based on the guidelines for Phase III bond release. Reclamation Area 30 has not yet received Phase II bond release but was reclaimed more than 10 years ago and is eligible for Phase III monitoring. All three areas met the Phase III vegetation cover, production, and diversity standards for the second year in a row and are now eligible for release.

Reclamation Areas 25, 34, 35, 43, and 44 were evaluated for Phase II bond release. Phase II areas are only subject to vegetation cover and diversity standards. None of these areas met the vegetation cover standard but all of them met the diversity standard.

Reclamation Areas 32 and 33 were evaluated using interim reclamation monitoring guidelines and were also compared to the Phase III bond release standards to measure their progress towards future release. Reclamation Areas 32 and 33 met both the production standards, Area 33 met the cover standard, but neither area met the species composition standard.

Quarterly inspections of the entire permitted area were conducted during 2022 to monitor for the presence and impacts of noxious weeds, pests, or disease to the revegetation. No pests or diseases were identified during these inspections. The primary noxious weed observed during these inspections was cheatgrass which is pervasive on the reclamation and is being aggressively treated by CEC.

1 INTRODUCTION

Coors Energy Company (CEC) operated the Keenesburg Mine for coal extraction from 1980 to 1988 under Colorado Division of Reclamation Mining and Safety (DRMS) Mining and Reclamation Permit C-1981-028. After mining, CEC completed reclamation activities including backfilling, grading, topsoiling, and revegetation in accordance with their approved DRMS reclamation plan in 2020. Vegetation monitoring of reclaimed areas is required by DRMS. This report presents the results of annual reclamation monitoring conducted on August 15 – 25, 2022 by Habitat Management, Inc. (Habitat Management). Quantitative information in this report characterizes the vegetative condition of Reclamation Areas 25, 29, 30, 31, 32, 33, 34, 35, 43, and 44. Vegetation sampling was performed in compliance with Colorado Mined Land Reclamation Board Surface Coal Mining Rules 2.04.10 and 4.15 and currently accepted methods for vegetation sampling.

The Keenesburg Mine is in Weld County, Colorado, approximately seven miles north of the town of Keenesburg and is accessed by Weld County Road 59. In 2002, the Keenesburg Mine assigned numerical designations to each reclamation area starting in the northeast corner of the permit area and continuing clockwise through the reclaimed areas. Newly reclaimed areas are assigned consecutive numbers as needed (Figure 1). Reclamation Areas monitored in 2022 are summarized in Table 1.

Table 1: Reclamation Areas Monitored in 2022

Reclamation Area	Acres	Seeding Date	Bond Release Status	Monitoring Guidelines	
				Cover	Production
25	12.6	2012	Phase I	Phase II	n/a
29*	8.8	2003 (2002*)	Phase II	Phase III	Phase III
30	9.7	2006	Phase I	Phase II/III	Phase III
31	11.9	2009	Phase II	Phase III	Phase III
32	5.5	2015	Phase II	Interim	Interim
33	12.5	2015	Phase II	Interim	Interim
34	6.9	2016	Phase I	Phase II	n/a
35	9.7	2019	Pending Phase I	Phase II	n/a
43	8.3	2019	Pending Phase I	Phase II	n/a
44	9.9	2019	Pending Phase I	Phase II	n/a

* Includes the previously separated Reclamation Area 23.

Reclamation Areas 29, 30, and 31 were monitored using the guidelines for Phase III bond release. Reclamation Areas 25, 34, 35, 43 and 44 were monitored using the guidelines for Phase II bond release. Reclamation Areas 32 and 33 were monitored using the guidelines for interim vegetation monitoring. All these Reclamation Areas were last monitored in 2021.

2 METHODS

The monitoring methods and revegetation standards used to evaluate these areas are those currently in effect under the Colorado Surface Coal Mining Reclamation Act (CRS 34-33-101) and the Keenesburg Mining and Reclamation Permit.

Figure 1: Keenesburg Mine Site Map

2.1 Sampling Design

Thirty sample points were located prior to going into the field using mapping software to create a square grid overlaid on each Reclamation Area being sampled. The sample points were located at the intersection of each square created by the grid. The grid size was adjusted to create the appropriate number of sample locations within each Reclamation Area. Sample numbers (1-30) were randomly assigned to each generated sample point along with a randomly generated azimuth (Figures 2 – 8). A minimum of 15 vegetation cover samples were collected in Reclamation Areas 25, 29, 30, 31, 34, 35, 43, and 44 with additional samples collected, if necessary, to meet sample adequacy for non-noxious vegetation cover in any area. Ten cover samples were collected in Reclamation Areas 32 and 33 per CEC's interim reclamation monitoring guidelines. The maximum of 30 herbaceous production samples were collected from Reclamation Areas 29, 30, and 31 and 15 production samples were collected in Reclamation Areas 32 and 33.

2.2 Sample Timing

Vegetation monitoring occurred on August 15 – 25, 2022 which was consistent with the timing of monitoring in previous years. Monitoring also coincided with maximum vegetation development of most plant species found in the reclaimed and adjacent native areas.

2.3 Vegetation Cover

Point-intercept methods were used to collect vegetation and ground cover, as well as species composition data. Each 25-meter transect represents a single sampling unit. Two data points were recorded at one-meter intervals along each transect, 0.5 m to each side of and at a right angle to the transect. A laser bar was used to determine intercepts, with the beam projected vertically to the ground surface. Each point-intercept represented an absolute cover value of 2%.

"First-hit" point-intercepts (the first item that the laser beam intercepts) were recorded as either: live vegetation (by plant species), litter, rock, or bare ground. Litter includes all dead plant material. Subsequent "hits" on vegetation (prior to interception of the ground) were also recorded. Vegetation cover was reported in absolute percentages from the point-intercept data using all 50 first-hit observations for each sample point. Additional interceptions were used to calculate relative cover of individual plant species and life forms. The quantitative cover data also provided the basis for calculation of species composition and relative importance.

2.4 Herbaceous Production

Herbaceous production was sampled using 0.5-square meter circular plots. For samples where cover data was also collected, the plots were located adjacent to the start point to the right of the transect. Additional production samples were collected with the plot centered on the sample point.

All herbaceous non-noxious growth within each plot's vertical projection was clipped, separated by growth form, and placed in labeled paper bags. Current year's herbaceous growth of shrubs was collected in the same manner, but no woody tissue was harvested. The bags containing the clipped material were returned to the Habitat Management office and dried at 30 degrees Celsius until weights stabilized to within 0.1 gram. Herbaceous production was reported in grams per square meter.

Figure 2: Sample Point Locations (Area 25)

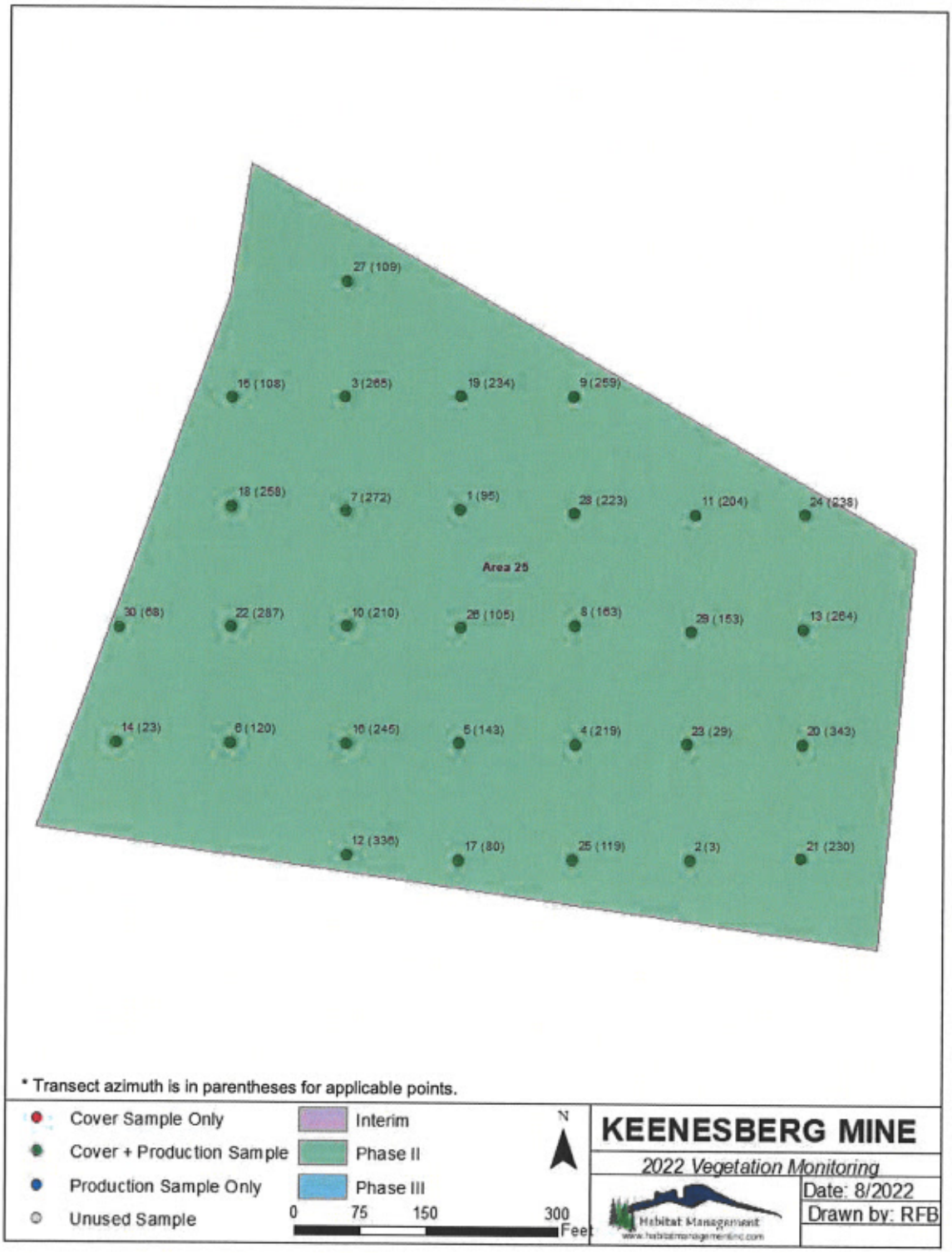


Figure 3: Sample Point Locations (Areas 29 & 30)

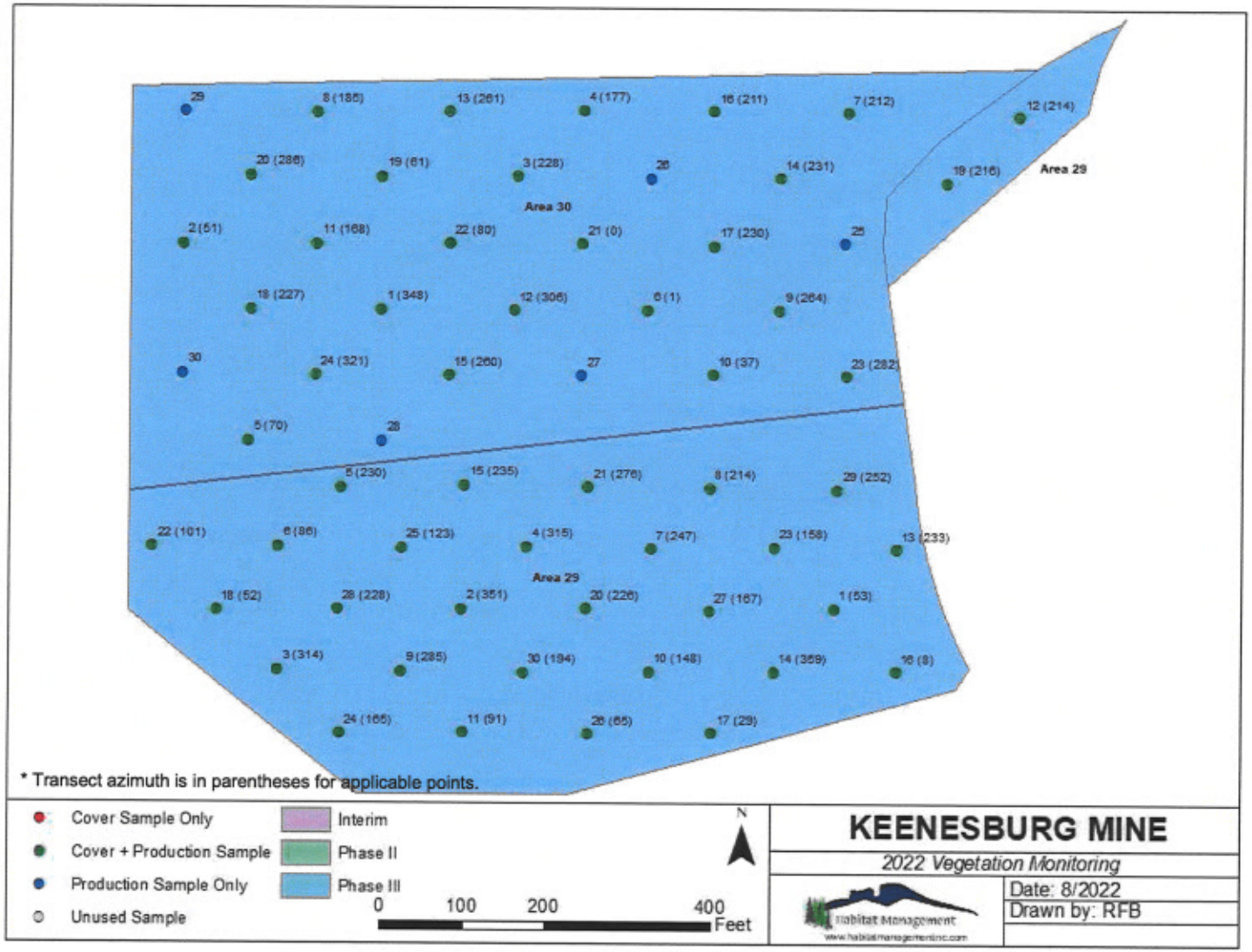


Figure 4: Sample Point Locations (Areas 31)

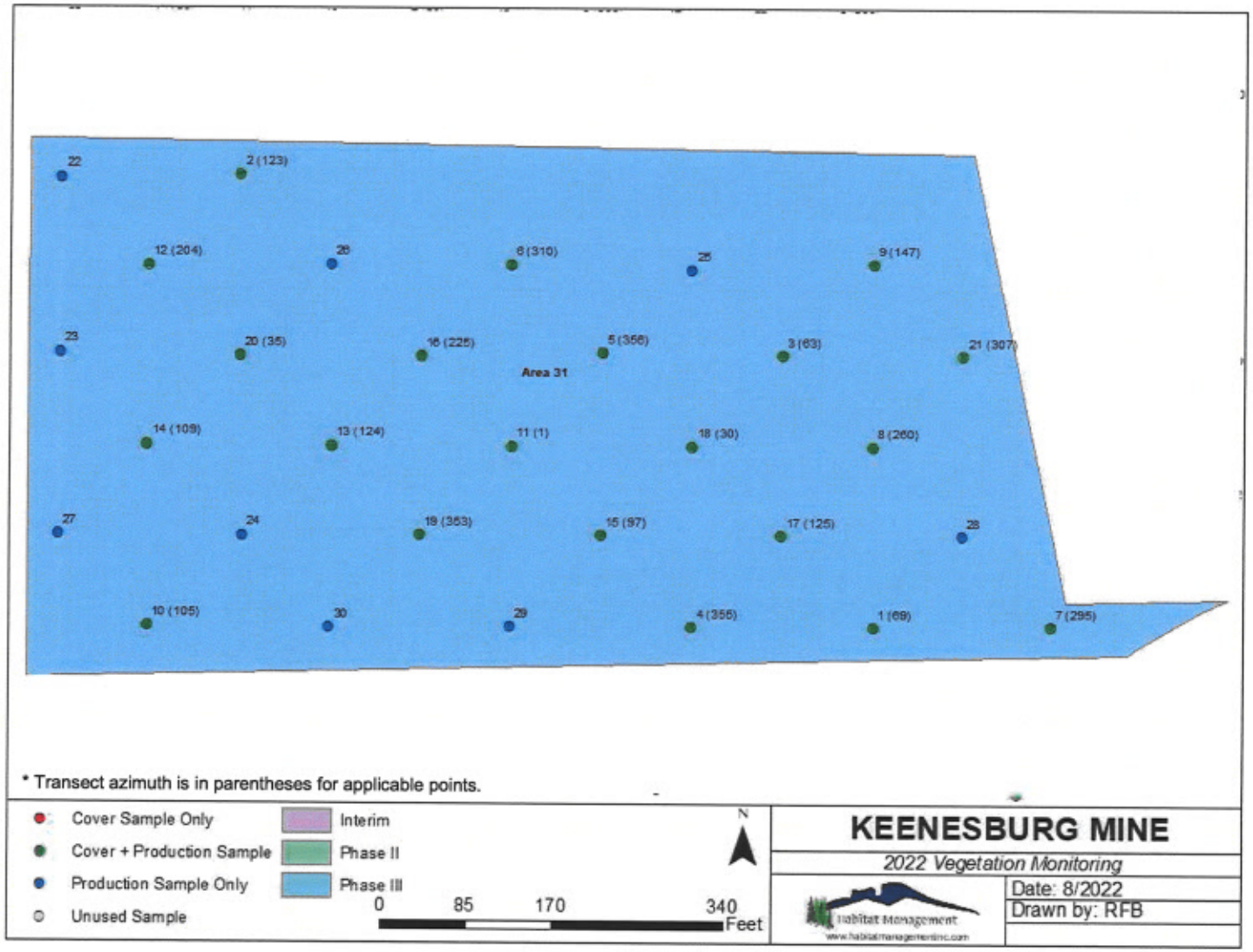


Figure 5: Sample Point Locations (Areas 32 & 35)

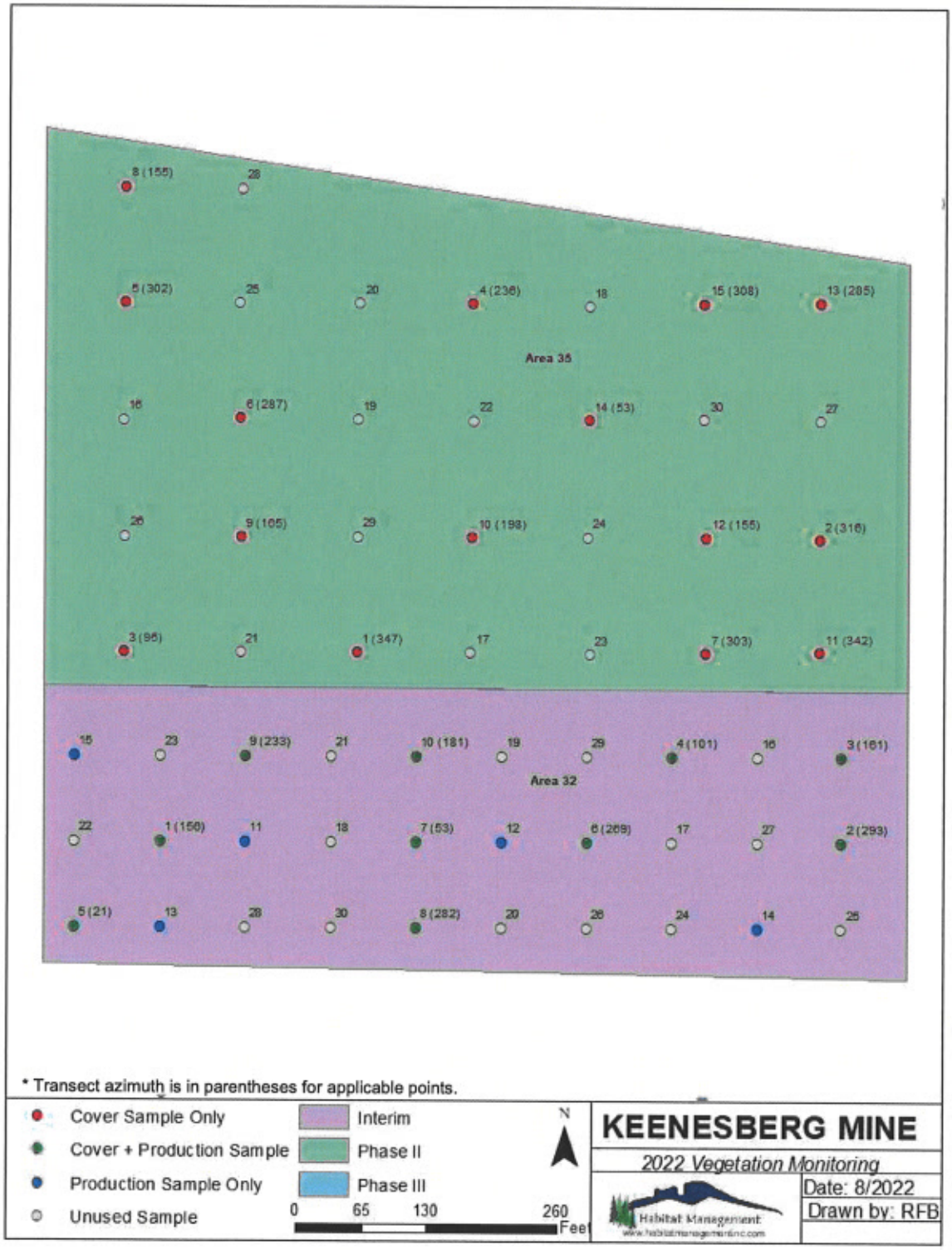


Figure 6: Sample Point Locations (Area 33)

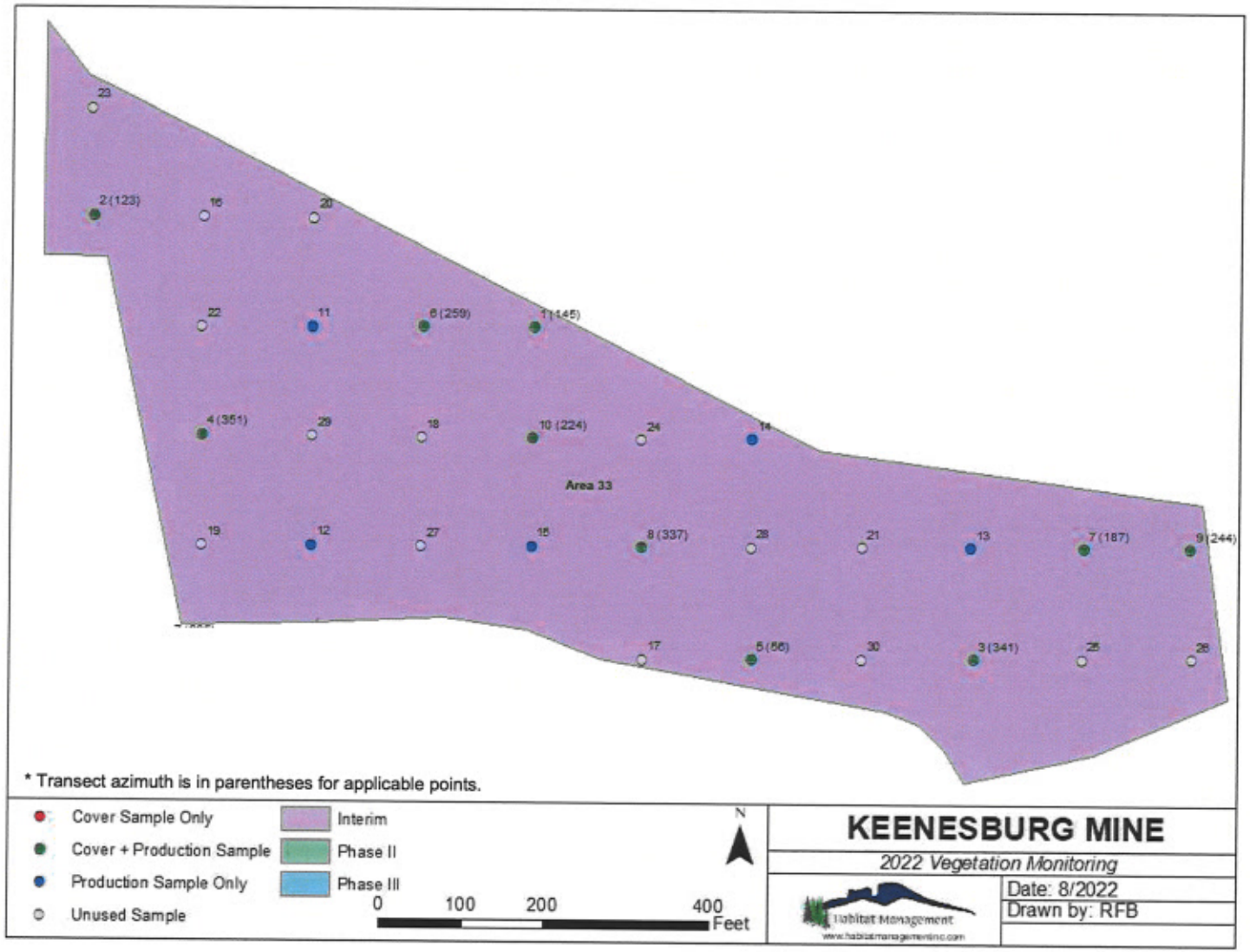


Figure 7: Sample Point Locations (Area 34)

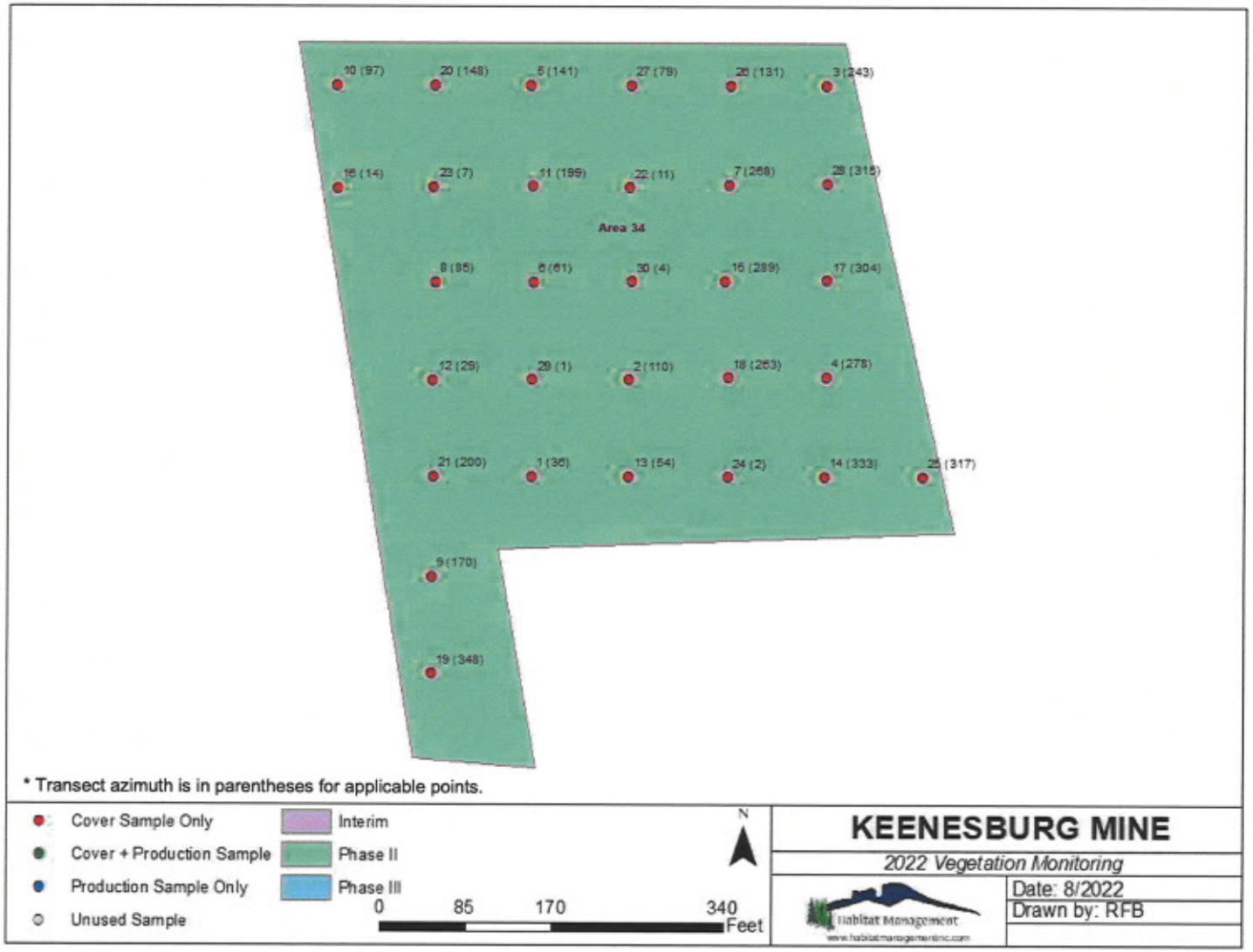
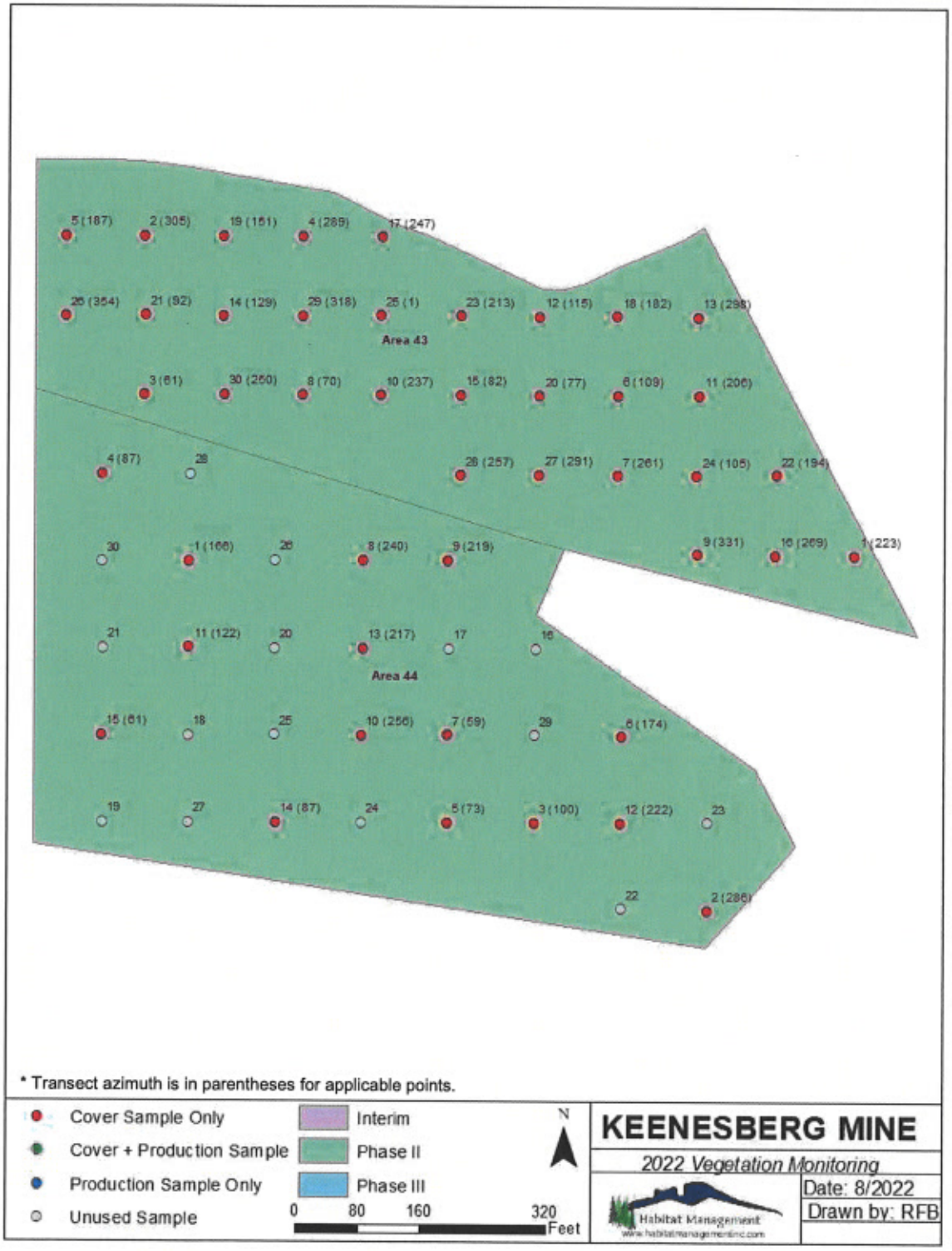


Figure 8: Sample Point Locations (Areas 43 & 44)



2.5 Species Composition

During cover sampling, all plant species occurring within one meter of either side of the cover sample transect were noted as present within each sample. These species are presented in the data tables for each Reclamation Area (Appendix A) as well as on the complete species list (Appendix C).

Species composition information for comparison to the final revegetation success criterion was derived from quantitative relative vegetation cover data. The total hits (first hits and subsequent hits) for each non-noxious species were used to calculate relative cover as a basis for evaluation of the importance of each encountered plant species and life form.

2.6 Photographs

A photograph was taken at the start point of each cover transect looking along the length of the transect. These photos are presented in Appendix E.

2.7 Species Identification and Nomenclature

Species that were not readily identified in the field were collected for later identification. Specimens were identified using floral keys including Weber and Wittmann (2001) and Wingate (1994). Nomenclature follows the NRCS Plants Database (2022).

3 RECLAMATION SUCCESS STANDARDS

The Keenesburg Mine Reclamation Permit includes a species composition standard and predictive equations to determine the success standards for vegetation cover and herbaceous production. The equations for both cover and production were revised in 2012 with a Technical Revision to the permit (TR43) and the cover standard was revised again in 2014 with a Minor Revision (MR46) to the permit. Both the vegetation cover and herbaceous production equations use the previous year's precipitation (September – July) to predict the success standard for any given year. These equations are as follows, where x is equal to the cumulative September – July precipitation:

$$\text{Vegetation Cover Standard} = -0.0127x^3+0.2115x^2+2.1772x$$

$$\text{Herbaceous Production Standard} = 0.4666x^{2.1405}$$

To meet the reclamation standard specified in the permit, data are subjected to hypothesis testing as described in the DRMS Regulations of the Colorado Mined Land Reclamation Board for Coal Mining (DRMS 2005). Per this guideline, Reclamation Areas meet the success standard if the dataset is not significantly different from 90% of the standard using a one-sample T-test with a one-tailed confidence interval of 90%. Noxious species cover or production is removed as well as annual vegetation cover or production in excess of 10% of the overall average for each Reclamation Area to derive the allowable vegetation cover or production value used for hypothesis testing per the DRMS Guideline Regarding Selected Coal Mine Bond Release Issues (DRMS 1995).

Species composition is considered an indicator of successful vegetation establishment and a diverse vegetation community. The species composition standard for the Keenesburg Mine was modified in 2020 with a Technical Revision to the permit (TR47). The revised standard requires that there be at least four perennial grass species, each of which comprise between 3% and 40%

relative cover. Any perennial grass species, native or introduced, that is not defined as a noxious species may be used in the calculation of species composition.

The Phase III bond release guidelines require that vegetation cover, herbaceous production, and species composition meet the standards for two years. Phase II bond release guidelines require vegetation cover to meet the standard and that four perennial grass species be present in the community to potentially meet the species composition standard in the future.

3.1 2022 Revegetation Success Standards

The following standards were calculated for vegetation cover and herbaceous production using the September 2021 through July 2022 precipitation (6.6 inches) in the permitted predictive equations.

1. Vegetation Cover Standard = 19.9% (90% Standard = 17.9%)
2. Herbaceous Production Standard = 11.0 g/m^2 (90% Standard = 9.9 g/m^2)

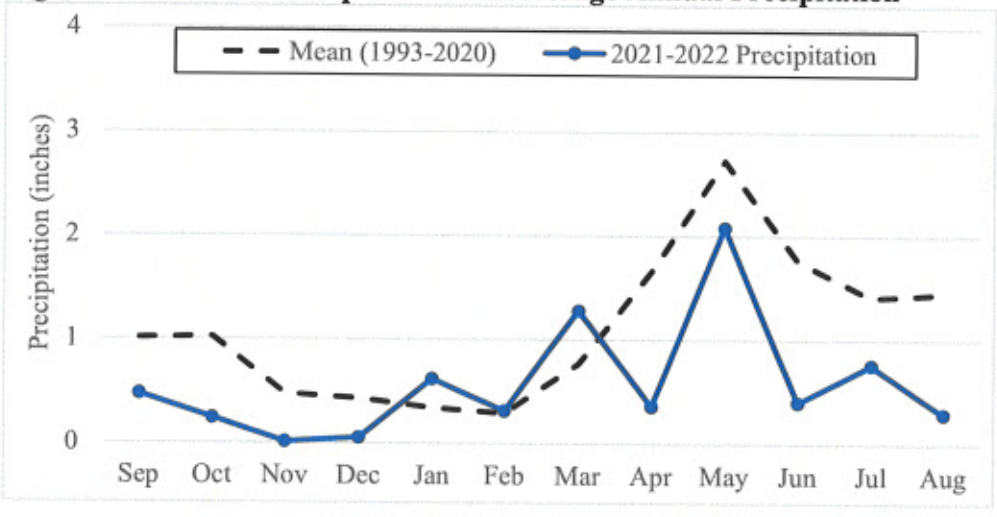
4 2021-2022 PRECIPITATION

The climate of the mine and surrounding area is typical of the region and characterized by cold winters and hot, dry summers. Average precipitation is generally lowest during the late fall and winter (October through March) and peaks in April through June (Figure 9).

The Keenesburg Mine Reclamation Permit specifies the use of onsite precipitation from September to July for calculating the vegetation cover and herbaceous production standards. CEC collected precipitation data at the mine from 1984 through August 2020 using a manual rain gauge checked daily by on-site personnel. In January 2021, a solar-powered NOAH IV Total Precipitation Measurement System was installed in the reclamation with a cellular connection to measure precipitation in the absence of on-site personnel.

Total cumulative precipitation for the period from September 2021 – July 2022 was 6.6 inches. This represents 55% of the average precipitation for the same period (1993-2020). The pattern and timing of the precipitation was generally consistent with the average (Figure 9). However, the September-December 2021 precipitation was only 26% of average and summer June-July 2022 was only 37% of average. All data from 1993 – 2022 are presented in Appendix D.

Figure 9: 2021-2022 Precipitation and Average Annual Precipitation



5 2022 PEST & DISEASE INSPECTIONS

Habitat Management was contracted to completed quarterly pest and disease inspections at the Keenesburg Mine in 2022. The first three inspections were completed on March 28th, June 3rd, August 31st, and the reports from each inspection are included in Appendix F. The 4th quarter inspection has not yet been completed as of this report; however, it will be completed before the end of the quarter.

6 RESULTS

Vegetation cover, species composition, and herbaceous production results for each Reclamation Area are summarized below. Results for Reclamation Areas monitored for Phase III bond release (Areas 29, 30, and 31) are presented first followed by those areas monitored for Phase II bond release (Areas 25, 34, 35, 43, and 44) and then those areas monitored for interim evaluation (Areas 32 and 33).

Complete vegetation cover and herbaceous production data for each Reclamation Area are presented in Appendix A and Appendix B, respectively. A complete species list for all Reclamation Areas is presented in Appendix C.

6.1 Phase III Reclamation Monitoring

Reclamation Areas 29, 30, and 31 were monitored for Phase III bond release.

6.1.1 Reclamation Area 29

Reclamation Area 29 is an 8.1-acre parcel that was formerly part of the B Pit mining area. This area was graded to blend into the undisturbed area to the west and the reclaimed mining and operational areas to the east resulting in a gentle, east-facing slope. Final revegetation seeding with the DRMS-approved permanent seed mixture took place in 2003. Per approval from DRMS, Reclamation Area 23 was combined with Reclamation Area 29 in 2019. Reclamation Area 23 is a 0.7-acre parcel, formerly part of the B Pit mining area, which was graded to blend into the reclaimed mining and operational areas to the east resulting in an almost flat, east-facing slope. Final revegetation seeding with the DRMS-approved permanent seed mixture took place in November 2002. The total area included in the Reclamation Area 29 sampling was 8.8 acres.

Total vegetation cover averaged 44.5% (Table 2) which was a substantial increase from the 38.3% cover observed in 2021. Non-noxious vegetation cover was 43.9% up from 35.9% observed in 2021. However, allowable vegetation cover was only 18.9% down from 29.1% in 2021 due to an average excess annual cover of 25.1%. Area 29 met sample adequacy for non-noxious cover with 15 samples; however, due to an error in the formula used in the field a total of 30 samples were collected.

Total non-noxious herbaceous production averaged 100.8 g/m^2 in 2022 (Table 2) which is a substantial increase from the 70.4 g/m^2 production observed in 2021. Annual species accounted for 71.7% of the relative production so the average allowable herbaceous production was only 45.7 g/m^2 down from 53.8 g/m^2 in 2021.

Seventeen species contributed to the cover data and another 13 species were encountered along the transects (Table 3). Of the 30 species recorded, 24 were native or desirable. There were 12 grasses, 16 forbs, and two woody species including 17 perennial species and 13 annual species.

Table 2: Reclamation Area 29 Summary Statistics

Summary Statistics	Mean	SE
Absolute Cover Statistics (%)		
Total Ground Cover	81.8	1.7
Total Vegetation Cover	44.5	2.3
Non-Noxious Vegetation Cover	43.9	2.4
Allowable Vegetation Cover	18.9	2.4
Grass Cover	14.3	1.5
Forb Cover	29.7	2.8
Woody Cover	0.4	0.2
Perennial Cover	14.5	1.5
Annual Cover	30.0	2.8
Non-Noxious Relative Cover Statistics (%)		
Grass Cover	33.8	3.7
Forb Cover	65.2	3.6
Woody Cover	1.0	0.5
Perennial Cover	35.7	3.6
Annual Cover	64.3	3.6
Herbaceous Production Statistics (g/m^2)		
Total Production	100.8	11.4
Allowable Production	45.7	10.0
Perennial Production	28.6	6.0
Annual Production	72.3	12.2

Table 3: Reclamation Area 29 Species Composition

Life Form	Cover Data	Present
Graminoids		
Perennial	7	10
Annual	1	2
Native	7	11
Introduced	1	1
Cool Season	1	1
Warm Season	6	9
Total	***8***	***12***
Forbs		
Perennial	2	5
Annual	5	11
Native	4	11
Introduced	3	5
Total	***7***	***16***
Woody Species		
Perennial	2	2
Total Species	**17**	**30**

The only species observed on all 30 transects was Russian thistle (*Salsola tragus*) which contributed 60.0% of the overall relative cover. Cheatgrass (*Bromus tectorum*) which contributed 57.0% of the overall relative cover in 2020, and 6.6% in 2021, only contributed 1.2% in 2022. With cheatgrass removed, four perennial grass species contributed more than 3% of the relative cover including (in decreasing order): sand dropseed (*Sporobolus cryptandrus*), prairie sandreed (*Calamovilfa longifolia*), sand bluestem (*Andropogon hallii*), and blue grama (*Bouteloua gracilis*). One other forb species, common sunflower (*Helianthus annuus*), also contributed more than 3% of the relative cover.

Both the allowable vegetation cover and the allowable herbaceous production passed the technical standard when subjected to hypothesis testing (Table 4). Additionally, four perennial grass species contributed greater than 3% and less than 40% of the non-noxious relative cover. Thus, the Phase III bond release success criteria were met.

Table 4: Reclamation Area 29 Success Criteria

Reclamation Success Criteria	Reclamation Area	Technical Standard	90% Technical Standard	Pass?
Allowable Cover (%)	18.9	19.9	17.9	Yes
Allowable Production (g/m^2)	45.7	11.0	9.9	Yes
Species Composition (perennial grass)	4	4		Yes

6.1.2 Reclamation Area 30

Reclamation Area 30 is a 9.7-acre parcel that was formerly part of the B Pit mining area. This area was graded to blend into the undisturbed area to the west and the reclaimed mining and operational areas to the east resulting in a gentle, east-facing slope. Final revegetation seeding with the DRMS-approved permanent seed mixture took place in November 2006. This Reclamation Area has previously received Phase I bond release but has not received Phase II release.

Total vegetation cover averaged 33.0% (Table 5) which was a slight decrease from the 36.8% cover observed in 2021. However, non-noxious vegetation cover was 31.5% up from 30.5% observed in 2021. Allowable vegetation cover was only 18.7% down from 27.5% in 2021 due to an average excess annual cover of 12.9%. Area 30 met sample adequacy for non-noxious cover with 20 samples; however, due to an error in the formula used in the field a total of 24 samples were collected.

Total non-noxious herbaceous production averaged 59.2 g/m^2 (Table 5) which is a slight increase from the 50.5 g/m^2 production in 2021. Annual species accounted for 33.5% of the relative production. Thus, the average allowable herbaceous production was only 33.2 g/m^2.

Sixteen species contributed to the cover data and another 13 species were encountered along the transects (Table 6). Of the 29 species recorded, 23 were native or desirable. There were 13 grasses, 13 forbs, and three woody species including 16 perennial species and 13 annual species.

Table 5: Reclamation Area 30 Summary Statistics

Summary Statistics	Mean	SE
Absolute Cover Statistics (%)		
Total Ground Cover	82.5	1.6
Total Vegetation Cover	33.0	2.3
Non-Noxious Vegetation Cover	31.5	2.2
Allowable Vegetation Cover	18.7	2.2
Grass Cover	17.3	1.3
Forb Cover	15.8	2.4
Woody Cover	0.0	0.0
Perennial Cover	15.5	1.3
Annual Cover	17.5	2.5
Non-Noxious Relative Cover Statistics (%)		
Grass Cover	57.4	4.6
Forb Cover	42.6	4.6
Woody Cover	0.0	0.0
Perennial Cover	56.8	4.6
Annual Cover	43.2	4.6
Herbaceous Production Statistics (g/m^2)		
Total Production	59.2	5.7
Allowable Production	33.2	5.3
Perennial Production	25.7	3.3
Annual Production	33.5	6.3

Table 6: Reclamation Area 30 Species Composition

Life Form	Cover Data	Present
Graminoids		
Perennial	8	10
Annual	3	3
Native	10	12
Introduced	1	1
Cool Season	1	3
Warm Season	7	7
Total	***11***	***13***
Forbs		
Perennial	1	3
Annual	4	10
Native	3	8
Introduced	2	5
Total	***5***	***13***
Woody Species		
Perennial	0	3
Total Species	**16**	**29**

Sand dropseed, Russian thistle, and Canadian horseweed (*Conyza canadensis*) were present along all 24 transects. Sand bluestem contributed to the cover on 22 transects while sand dropseed and Russian thistle each contributed to the cover on 21 of them. Together these three species contributed 81.3% of the overall relative cover. Cheatgrass only contributed 4.1% of the relative cover down from 16.6% in 2021 and 48.1% in 2020. With cheatgrass removed, six species contributed more than 3% of the relative cover including (in decreasing order): Russian thistle, sand bluestem, sand dropseed, redroot amaranth (*Amaranthus retroflexus*), prairie sandreed, and blue grama.

Both the allowable vegetation cover and the allowable herbaceous production passed the technical standard when subjected to hypothesis testing (Table 7). Additionally, four perennial grass species contributed greater than 3% and less than 40% of the non-noxious relative cover. With these results, both the Phase II and Phase III bond release success criteria were met.

Table 7: Reclamation Area 30 Success Criteria

Reclamation Success Criteria	Reclamation Area	Technical Standard	90% Technical Standard	Pass?
Allowable Cover (%)	18.7	19.9	17.9	Yes
Allowable Production (g/m^2)	33.2	11.0	9.9	Yes
Species Composition (perennial grass)	4	4		Yes

6.1.3 Reclamation Area 31

Reclamation Area 31 is an 11.9-acre parcel that was also part of the B Pit mining area. This area was graded to blend into the undisturbed area to the west and the reclaimed mining and operational areas to the east resulting in a gentle, east-facing slope. Final revegetation seeding with the DRMS-approved permanent seed mixture took place in the fall of 2009.

Total vegetation cover averaged 27.4% (Table 8) which was a decrease from the 38.0% cover observed in 2021, but there was no noxious species cover unlike previous years. There was substantial annual cover, so allowable vegetation cover was 22.6%. Area 31 met sample adequacy for non-noxious cover with the minimum 15 samples; however, due to an error in the formula used in the field a total of 21 samples were collected.

Total non-noxious herbaceous production averaged 46.3 g/m^2 (Table 8) which was substantially less than the 63.3 g/m^2 production observed in 2021. Annual species accounted for 34.7% of the relative production. Thus, the average allowable herbaceous production was only 34.9 g/m^2.

Fourteen species contributed to the cover data and 16 more species were encountered along the transects (Table 9). Of the 30 species recorded, 24 were native or desirable. There were 13 grasses, 14 forbs, and three woody species including 17 perennial species and 13 annual species.

Prairie sandreed was present on all 21 transects and contributed to the cover on 20 transects, comprising 47.1% of the total relative cover. Cheatgrass was present on eight transects and did not contribute to the cover data. A total of seven species contributed more than 3% of the relative cover including (in decreasing order): prairie sandreed, Russian thistle, sand dropseed, sand bluestem, redroot amaranth, blue grama, and alkali sacaton (*Sporobolus airoides*).

Table 8: Reclamation Area 31 Summary Statistics

Summary Statistics	Mean	SE
Absolute Cover Statistics (%)		
Total Ground Cover	74.8	2.4
Total Vegetation Cover	27.4	1.3
Non-Noxious Vegetation Cover	27.4	1.3
Allowable Vegetation Cover	22.6	1.3
Grass Cover	19.3	1.5
Forb Cover	7.9	1.2
Woody Cover	0.2	0.1
Perennial Cover	19.8	1.5
Annual Cover	7.6	1.2
Non-Noxious Relative Cover Statistics (%)		
Grass Cover	70.8	4.3
Forb Cover	28.7	4.3
Woody Cover	0.5	0.4
Perennial Cover	72.5	4.2
Annual Cover	27.5	4.2
Herbaceous Production Statistics (g/m^2)		
Total Production	46.3	6.1
Allowable Production	34.9	6.1
Perennial Production	30.3	4.7
Annual Production	16.1	5.0

Table 9: Reclamation Area 31 Species Composition

Life Form	Cover Data	Present
Graminoids		
Perennial	7	10
Annual	1	3
Native	8	12
Introduced	0	1
Cool Season	0	3
Warm Season	7	7
Total	***8***	***13***
Forbs		
Perennial	2	4
Annual	3	10
Native	4	9
Introduced	1	5
Total	***5***	***14***
Woody Species		
Perennial	1	3
Total Species	**14**	**30**

Both the allowable vegetation cover and the allowable herbaceous production passed the technical standard when subjected to hypothesis testing (Table 10). Additionally, four perennial grass species contributed greater than 3% and less than 40% of the non-noxious relative cover. Thus, the Phase III bond release success criteria were met.

Table 10: Reclamation Area 31 Success Criteria

Reclamation Success Criteria	Reclamation Area	Technical Standard	90% Technical Standard	Pass?
Allowable Cover (%)	22.6	19.9	17.9	Yes
Allowable Production (g/m^2)	34.9	11.0	9.9	Yes
Species Composition (perennial grass)	4	4		Yes

6.2 Phase II Monitoring

Reclamation Areas 25, 34, 35, 43, and 44 were monitored for Phase II bond release.

6.2.1 Reclamation Area 25

Reclamation Area 25 is a 12.6-acre parcel east of the long-term spoil area. This area was graded to blend into the reclaimed areas resulting in a gentle, southwest-facing slope. Revegetation seeding with the DRMS-approved permanent seed mixture took place in 1995, but it was repeated in 2002 and 2012 due to insufficient vegetation cover.

Total vegetation cover averaged 38.6% (Table 11) which was a decrease from the 45.9% cover observed in 2021 with no noxious species hit during cover sampling. However, substantial excess annual cover was recorded, and the allowable cover used for hypothesis testing was only 11.6%. Reclamation Area 25 met sample adequacy for non-noxious cover with the minimum 15 samples; however, due to an error in the formula used in the field the maximum number of 30 samples were collected.

Table 11: Reclamation Area 25 Summary Statistics

Summary Statistics	Mean	SE
Absolute Cover Statistics (%)		
Total Ground Cover	80.3	1.2
Total Vegetation Cover	38.6	1.6
Non-Noxious Vegetation Cover	38.6	1.6
Allowable Vegetation Cover	11.6	1.5
Grass Cover	6.9	1.1
Forb Cover	31.5	1.9
Woody Cover	0.1	0.1
Perennial Cover	7.4	1.1
Annual Cover	31.2	1.9
Non-Noxious Relative Cover Statistics (%)		
Grass Cover	19.6	3.4
Forb Cover	80.1	3.4
Woody Cover	0.3	0.2
Perennial Cover	20.7	3.4
Annual Cover	79.3	3.4

Fifteen species contributed to the cover data and 18 more species were encountered along the transects (Table 12). Of the 33 species recorded, 27 were native or desirable. There were 16 grasses, 15 forbs, and two woody species including 23 perennial species and 10 annual species.

Table 12: Reclamation Area 25 Species Composition

Life Form	Cover Data	Present
Graminoids		
Perennial	8	14
Annual	0	2
Native	8	15
Introduced	0	1
Cool Season	2	5
Warm Season	6	9
Total	***8***	***16***
Forbs		
Perennial	2	7
Annual	4	8
Native	3	10
Introduced	3	5
Total	***6***	***15***
Woody Species		
Perennial	1	2
Total Species	**15**	**33**

The only species observed along all 30 transects were Russian thistle and prairie sandreed which comprised 76.9% and 13.6% of the relative cover, respectively. No other species contributed more than 3% of the relative cover.

Allowable vegetation cover did not pass the technical standard when subjected to hypothesis testing (Table 13). Fourteen perennial grasses were observed along the transects which meets the Phase II bond release species composition standard. No production data were collected in the area in 2022.

Table 13: Reclamation Area 25 Success Criteria

Reclamation Success Criteria	Reclamation Area	Technical Standard	90% Technical Standard	Pass?
Allowable Cover (%)	11.6	19.9	17.9	No
Allowable Production (g/m^2)	n/a	n/a	n/a	n/a
Species Composition (perennial grass)	14	4		Yes

6.2.2 Reclamation Area 34

Reclamation Area 34 is a 6.9-acre parcel that was formerly part of Topsand Piles A and B. This area was graded to blend into the reclaimed mining and operational areas to the south resulting in an almost flat area. Final revegetation seeding with the DRMS-approved permanent seed mixture took place in October 2016.

Total vegetation cover averaged 29.4% up from 33.3% in 2021 with no noxious species hit during cover sampling (Table 14). Annual species contributed a substantial amount of the relative cover resulting in an allowable vegetation cover of only 11.4%, down from 20.6% in 2021. Area 34 met sample adequacy for non-noxious cover with the 18 samples; however, due to an error in the formula used in the field the maximum number of 30 samples were collected.

Twenty species contributed to the cover data and 14 other species were encountered along the transects (Table 15). Of the 34 species recorded, 30 were native or desirable. There were 17 grasses, 14 forbs, and three woody species including 24 perennial species and 10 annual species.

The only species observed on all 30 transects were Russian thistle and common sunflower which combined to comprise 67.5% of the relative cover. Prairie sandreed and sand dropseed each contributed about 10% of the relative cover and the other 11.3% came from 16 species each contributing less than 2%. Cheatgrass was only observed on one transect and did not contribute to the cover data.

The allowable vegetation cover did not pass the technical standard when subjected to hypothesis testing (Table 16). However, 16 perennial grasses were observed along the transects which does meet the Phase II bond release species composition standard.

Table 14: Reclamation Area 34 Summary Statistics

Summary Statistics	Mean	SE
Absolute Cover Statistics (%)		
Total Ground Cover	64.4	2.7
Total Vegetation Cover	29.4	1.8
Non-Noxious Vegetation Cover	29.4	1.8
Allowable Vegetation Cover	11.4	1.7
Grass Cover	7.7	1.0
Forb Cover	21.6	2.2
Woody Cover	0.1	0.1
Perennial Cover	8.2	1.1
Annual Cover	21.2	2.2
Non-Noxious Relative Cover Statistics (%)		
Grass Cover	30.9	4.5
Forb Cover	68.9	4.6
Woody Cover	0.2	0.2
Perennial Cover	32.5	4.7
Annual Cover	67.5	4.7

Table 15: Reclamation Area 34 Species Composition

Life Form	Cover Data	Present
Graminoids		
Perennial	11	16
Annual	0	1
Native	11	16
Introduced	0	1
Cool Season	4	6
Warm Season	7	10
Total	***11***	***17***
Forbs		
Perennial	2	5
Annual	6	9
Native	7	11
Introduced	1	3
Total	***8***	***14***
Woody Species		
Perennial	1	3
Total Species	**20**	**34**

Table 16: Reclamation Area 34 Success Criteria

Reclamation Success Criteria	Reclamation Area	Technical Standard	90% Technical Standard	Pass?
Allowable Cover (%)	11.4	19.9	17.9	No
Allowable Production (g/m^2)	n/a	n/a	n/a	n/a
Species Composition (perennial grass)	16	4		Yes

6.2.3 Reclamation Area 35

Reclamation Area 35 is a 9.7-acre parcel that was formerly part of the B Pit mining area. This area was graded to blend into the undisturbed area to the west and the reclaimed mining and operational areas to the east resulting in a gentle, east-facing slope. Revegetation seeding with the DRMS-approved permanent seed mixture took place in 2020. This area was included in a 2021 Phase I bond release application that is under review by DRMS.

Total and non-noxious vegetation cover averaged 27.5% (Table 17). Substantial excess annual cover was recorded; thus, the allowable cover used for hypothesis testing was only 7.7%. Only the minimum 15 samples were collected due to the obvious lack of sufficient cover to meet the Phase II standards.

Only eight species contributed to the cover data and six other species were encountered along the transects (Table 18). Of the 14 species recorded, 10 were native or desirable. There were five grasses and nine forbs including seven perennial species and seven annual species.

Table 17: Reclamation Area 35 Summary Statistics

Summary Statistics	Mean	SE
Absolute Cover Statistics (%)		
Total Ground Cover	52.7	3.4
Total Vegetation Cover	27.5	2.2
Non-Noxious Vegetation Cover	27.5	2.2
Allowable Vegetation Cover	7.7	2.0
Grass Cover	4.5	0.8
Forb Cover	22.9	1.9
Woody Cover	0.0	0.0
Perennial Cover	4.5	0.8
Annual Cover	22.9	1.9
Non-Noxious Relative Cover Statistics (%)		
Grass Cover	16.3	2.5
Forb Cover	83.7	2.5
Woody Cover	7.0	1.2
Perennial Cover	16.3	2.5
Annual Cover	83.7	2.5

Table 18: Reclamation Area 35 Species Composition

Life Form	Cover Data	Present
Graminoids		
Perennial	2	4
Annual	0	1
Native	2	5
Introduced	0	0
Cool Season	1	3
Warm Season	1	1
Total	***2***	***5***
Forbs		
Perennial	0	3
Annual	6	6
Native	2	5
Introduced	4	4
Total	***6***	***9***
Woody Species		
Perennial	0	0
Total Species	**8**	**14**

There were three dominant species observed along at least 14 of the 15 transects: Russian thistle, common sunflower and Indian ricegrass (*Achnatherum hymenoides*). These species comprised 61.0%, 15.5%, and 11.3%, respectively, of the relative cover. An additional 5.6% was contributed by sand dropseed and 5.2% by slender Russian thistle (*Salsola collina*). The remaining cover was three species each contributing less than 1% of the relative cover.

Allowable vegetation cover did not pass the technical standard when subjected to hypothesis testing (Table 19). However, four perennial grasses were observed along the transects which meets the Phase II bond release species composition standard. No production data were collected in the area in 2022.

Table 19: Reclamation Area 35 Success Criteria

Reclamation Success Criteria	Reclamation Area	Technical Standard	90% Technical Standard	Pass?
Allowable Cover (%)	7.7	19.9	17.9	No
Allowable Production (g/m^2)	n/a	n/a	n/a	n/a
Species Composition (perennial grass)	4	4		Yes

6.2.4 Reclamation Area 43

Reclamation Area 43 is an 8.3-acre parcel that was formerly the northernmost part of the B Pit mining area. This area was monitored as part of Reclamation Area 44 in 2021 but was split off when the boundaries were adjusted in the spring of 2022. This area was graded to blend into the undisturbed area to the west and the reclaimed mining and operational areas to the east resulting in a gentle, east-facing slope. Revegetation seeding with the DRMS-approved permanent seed mixture took place in 2019. This area was included in a 2021 Phase I bond release application that is under review by DRMS.

Total vegetation cover averaged 18.6% (Table 20) and non-noxious vegetation cover was 18.5%. Substantial excess annual cover was recorded; thus, the allowable cover used for hypothesis testing was only 13.2%. Area 43 met sample adequacy for non-noxious cover with 24 samples; however, due to an error in the formula used in the field the maximum of 30 samples were collected.

Table 20: Reclamation Area 43 Summary Statistics

Summary Statistics	Mean	SE
Absolute Cover Statistics (%)		
Total Ground Cover	70.8	2.1
Total Vegetation Cover	18.6	1.3
Non-Noxious Vegetation Cover	18.5	1.3
Allowable Vegetation Cover	13.2	1.2
Grass Cover	8.9	0.9
Forb Cover	9.7	1.2
Woody Cover	0.0	0.0
Perennial Cover	11.3	1.0
Annual Cover	7.3	1.1
Non-Noxious Relative Cover Statistics (%)		
Grass Cover	51.4	4.8
Forb Cover	48.6	4.8
Woody Cover	0.0	0.0
Perennial Cover	64.7	4.7
Annual Cover	35.3	4.7

Eight species contributed to the cover data and 23 more species were encountered along the transects (Table 21). Of the 31 species recorded, 24 were native or desirable. There were 11 grasses, 18 forbs, and two woody species including 16 perennial species and 15 annual species.

Table 21: Reclamation Area 43 Species Composition

Life Form	Cover Data	Present
Graminoids		
Perennial	1	8
Annual	1	3
Native	1	9
Introduced	1	2
Cool Season	0	3
Warm Season	1	5
Total	***2***	***11***
Forbs		
Perennial	2	6
Annual	4	12
Native	4	13
Introduced	2	5
Total	***6***	***18***
Woody Species		
Perennial	0	2
Total Species	**8**	**31**

The only species observed on all 30 transects were sand dropseed and common sunflower which contributed 47.2% and 31.9% of the overall relative cover, respectively. Other species contributing more than 3% of the relative cover were cuman ragweed (*Ambrosia psilostachya*) with 12.8% and Russian thistle with 4.6%.

Allowable vegetation cover did not pass the technical standard when subjected to hypothesis testing (Table 22). Eight perennial grasses were observed along the transects which meets the Phase II bond release species composition standard. No production data were collected in the area in 2022.

Table 22: Reclamation Area 43 Success Criteria

Reclamation Success Criteria	Reclamation Area	Technical Standard	90% Technical Standard	Pass?
Allowable Cover (%)	13.2	19.9	17.9	No
Allowable Production (g/m^2)	n/a	n/a	n/a	n/a
Species Composition (perennial grass)	8	4		Yes

6.2.5 Reclamation Area 44

Reclamation Area 44 is a 10-acre parcel that was formerly part of the B Pit mining area. The area monitored as Reclamation Area 44 in 2021 included this area along with what is now Area 43 and part of Area 37. Adjustments were made to the Reclamation Area boundaries in the spring of

2022 due to re-seeding of some areas. Reclamation Area 44 was graded to blend into the undisturbed area to the west and the reclaimed mining and operational areas to the east resulting in a gentle, east-facing slope. Revegetation seeding with the DRMS-approved permanent seed mixture took place in 2019. This area was included in a 2021 Phase I bond release application that is under review by DRMS.

Total vegetation cover averaged 19.6% (Table 23) with no noxious species included in the cover data. Substantial excess annual cover was recorded; thus, the allowable cover used for hypothesis testing was only 6.0%. Only the minimum 15 samples were collected due to the obvious lack of sufficient cover to meet the Phase II standards.

Ten species contributed to the cover data and 17 more species were encountered along the transects (Table 24). Of the 27 species recorded, 19 were native or desirable. There were eight grasses, 18 forbs, and one woody species including nine perennial species and 18 annual species.

There were three dominant species observed along all 15 transects. Russian thistle contributed 71.4% of the relative cover, sand dropseed contributed 9.5%, and Indian ricegrass contributed 3.5%. Common sunflower contributed 9.5% of the overall relative cover but was only observed on seven of the 15 transects.

Allowable vegetation cover did not pass the technical standard when subjected to hypothesis testing (Table 25). Four perennial grasses were observed along the transects which meets the Phase II bond release species composition standard. No production data were collected in the area in 2022.

Table 23: Reclamation Area 44 Summary Statistics

Summary Statistics	Mean	SE
Absolute Cover Statistics (%)		
Total Ground Cover	57.1	4.8
Total Vegetation Cover	19.6	2.3
Non-Noxious Vegetation Cover	19.6	2.3
Allowable Vegetation Cover	6.0	2.0
Grass Cover	2.8	0.8
Forb Cover	16.8	2.6
Woody Cover	0.0	0.0
Perennial Cover	2.8	0.8
Annual Cover	16.8	2.6
Non-Noxious Relative Cover Statistics (%)		
Grass Cover	18.2	5.6
Forb Cover	81.8	5.6
Woody Cover	0.0	0.0
Perennial Cover	18.1	6.0
Annual Cover	81.9	6.0

Table 24: Reclamation Area 44 Species Composition

Life Form	Cover Data	Present
Graminoids		
Perennial	3	5
Annual	1	3
Native	4	7
Introduced	0	1
Cool Season	2	3
Warm Season	1	2
Total	***4***	***8***
Forbs		
Perennial	1	3
Annual	5	15
Native	2	11
Introduced	4	7
Total	***6***	***18***
Woody Species		
Perennial	0	1
Total Species	**10**	**27**

Table 25: Reclamation Area 44 Success Criteria

Reclamation Success Criteria	Reclamation Area	Technical Standard	90% Technical Standard	Pass?
Allowable Cover (%)	6.0	19.9	17.9	No
Allowable Production (g/m^2)	n/a	n/a	n/a	n/a
Species Composition (perennial grass)	5	4		Yes

6.3 Interim Monitoring

Reclamation Areas 32 and 33 were monitored under the interim evaluation guidelines. The interim monitoring guidelines call for the collection of 10 cover samples and 15 production samples which were not a statistically adequate sample sizes for hypothesis testing. However, to evaluate the progress of reclamation establishment on these sites, the data were compared to the Phase III standards anyway.

6.3.1 Reclamation Area 32

Reclamation Area 32 is a 5.5-acre parcel that was formerly part of the B Pit mining area. This area was graded to blend into the undisturbed area to the west and the reclaimed mining and operational areas to the east resulting in a gentle, east-facing slope. Final revegetation seeding with the DRMS-approved permanent seed mixture took place in November 2015.

Total vegetation cover averaged 20.2% (Table 26) which was a substantial decrease from the 45.6% cover observed in 2021. Non-noxious vegetation cover was 19.6% down from 43.4% in 2021. Excess annual cover was only 1.8% more that the allowable 10% to be used in final

hypothesis testing. Thus, the average allowable vegetation cover was 17.8% down from 36.1% in 2021.

Total non-noxious herbaceous production averaged 35.6 g/m^2 (Table 26) down from 67.5 g/m^2 in 2021. Annual species accounted for 26.4% of the relative production. Thus, the average allowable herbaceous production was only 29.8 g/m^2.

Table 26: Reclamation Area 32 Summary Statistics

Summary Statistics	Mean	SE
Absolute Cover Statistics (%)		
Total Ground Cover	80.4	3.6
Total Vegetation Cover	20.2	2.1
Non-Noxious Vegetation Cover	19.6	2.2
Allowable Vegetation Cover	17.8	2.2
Grass Cover	16.2	2.9
Forb Cover	4.0	1.4
Woody Cover	0.0	0.0
Perennial Cover	15.8	3.0
Annual Cover	4.4	1.4
Non-Noxious Relative Cover Statistics (%)		
Grass Cover	75.8	9.6
Forb Cover	24.2	9.6
Woody Cover	0.0	0.0
Perennial Cover	76.4	9.7
Annual Cover	23.6	9.7
Herbaceous Production Statistics (g/m^2)		
Total Production	35.6	4.1
Allowable Production	29.8	4.1
Perennial Production	26.2	2.9
Annual Production	9.4	4.6

Seven species contributed to the cover data and 11 other species were encountered along the transects (Table 27). Of the 18 species recorded, 15 were native or desirable. There were 11 grasses, six forbs, and one woody species including 11 perennial species and seven annual species.

The only species contributing to cover in all 10 transects were prairie sandreed and blue grama which contributed 59.5% and 19.0%, respectively, of the overall relative cover. Russian thistle also contributed 16.4% of the relative cover even though it was only observed on nine transects. Cheatgrass was observed on seven transects but contributed only 2.6% of the total relative cover down from 4.7% in 2021.

Sample adequacy would have required 25 cover samples and 30 production samples. While the allowable herbaceous production calculated from the samples collected exceeded the technical standard, the allowable cover did not (Table 28). However, given the sample mean and standard deviation, the allowable cover would have passed hypothesis testing if there had been an adequate sample size. Only one perennial grass species contributed greater than 3% and less than

40% of the non-noxious relative cover and a second species contributed more than 40% of the relative cover.

Table 27: Reclamation Area 32 Species Composition

Life Form	Cover Data	Present
Graminoids		
Perennial	4	9
Annual	1	2
Native	4	10
Introduced	1	1
Cool Season	0	2
Warm Season	4	7
Total	***5***	***11***
Forbs		
Perennial	1	1
Annual	1	5
Native	1	4
Introduced	1	2
Total	***2***	***6***
Woody Species		
Perennial	0	1
Total Species	**7**	**18**

Table 28: Reclamation Area 32 Success Criteria

Reclamation Success Criteria	Reclamation Area	Technical Standard	90% Technical Standard	Pass?
Allowable Cover (%)	17.8	19.9	17.9	No
Allowable Production (g/m^2)	29.8	11.0	9.9	Yes
Species Composition (perennial grass)	1	4		No

6.3.2 Reclamation Area 33

Reclamation Area 33 is a 12.5-acre parcel that was formerly part of the Long-Term Spoil Area. This area was graded to blend into the reclaimed mining and operational areas to the west resulting in an almost flat, east-facing slope. Final revegetation seeding with the DRMS-approved permanent seed mixture took place in November 2015.

Total vegetation cover averaged 20.0% (Table 29) down from 53.6% in 2021. Area 33 was the only area with no noxious or excess annual cover; thus, the total vegetation cover was used for hypothesis testing.

Total non-noxious herbaceous production averaged 20.4 g/m^2 (Table 29) down from 88.0 g/m^2 in 2021. Annual species accounted for only 2.0% of the relative production; thus, the average allowable herbaceous production was the same as the total production.

Table 29: Reclamation Area 33 Summary Statistics

Summary Statistics	Mean	SE
Absolute Cover Statistics (%)		
Total Ground Cover	89.2	2.9
Total Vegetation Cover	20.0	1.9
Non-Noxious Vegetation Cover	20.0	1.9
Allowable Vegetation Cover	20.0	1.9
Grass Cover	20.0	1.9
Forb Cover	0.0	0.0
Woody Cover	0.0	0.0
Perennial Cover	20.0	1.9
Annual Cover	0.0	0.0
Non-Noxious Relative Cover Statistics (%)		
Grass Cover	100.0	0.0
Forb Cover	0.0	0.0
Woody Cover	4.5	1.0
Perennial Cover	100.0	0.0
Annual Cover	0.0	0.0
Herbaceous Production Statistics (g/m^2)		
Total Production	20.4	2.1
Allowable Production	20.4	2.1
Perennial Production	19.9	2.2
Annual Production	0.4	0.2

Seven species contributed to the cover data and 10 other species were encountered along the transects (Table 30). Of the 17 species recorded, 13 were native or desirable. There were 12 grasses and five forbs including 12 perennial species and five annual species.

The only species contributing to cover in all 10 transects were prairie sandreed and blue grama which contributed 66.1% and 21.7%, respectively, of the overall relative cover. Sand dropseed contributed 3.5% of the relative cover and was present on eight transects. Cheatgrass was only observed on six transects and did not contribute to the cover data. This was a substantial improvement from 2021 when it contributed 24.1% of the total relative cover and was present on all 10 transects.

Sample adequacy would have required 18 cover samples and 30 production samples. Both the allowable cover and allowable herbaceous production calculated from the samples collected exceeded the technical standard (Table 31). Only two perennial grass species contributed greater than 3% and less than 40% of the non-noxious relative cover and a third species contributed more than 40% of the relative cover.

Table 30: Reclamation Area 33 Species Composition

Life Form	Cover Data	Present
Graminoids		
Perennial	7	10
Annual	0	2
Native	7	11
Introduced	0	1
Cool Season	2	3
Warm Season	5	7
Total	***7***	***12***
Forbs		
Perennial	0	2
Annual	0	3
Native	0	2
Introduced	0	3
Total	***0***	***5***
Woody Species		
Perennial	0	0
Total Species	**7**	**17**

Table 31: Reclamation Area 33 Success Criteria

Reclamation Success Criteria	Reclamation Area	Technical Standard	90% Technical Standard	Pass?
Allowable Cover (%)	20.0	19.9	17.9	Yes
Allowable Production (g/m^2)	20.4	11.0	9.9	Yes
Species Composition (perennial grass)	2	4		No

7 DISCUSSION

Reclamation Areas 25, 29, 30, 31, 32, 33, and 34 have been monitored every year since at least 2018. Reclamation Areas 35, 43, and 44 were monitored for the first time in 2022.

7.1 Vegetation Cover

Based on the results of the quantitative sampling, five of the 10 Reclamation Areas had allowable vegetation cover that passed the success standard (Table 32). This included all the Phase III and interim monitoring areas. The Phase II Reclamation Areas (25, 34, 35, 43, and 44) all would have passed using the total non-noxious cover if there had not been excess annual cover. Most of the Phase II areas (Reclamation Areas 34, 35, 43, and 44) are recently reclaimed and would be expected to have more annual cover. Typically, it takes several years for the perennial vegetation to establish and begin to displace the early seral annual species. Reclamation Area 25, while older reclamation, was treated with a pre-emergent herbicide in 2020 to control the cheatgrass. This treatment effectively treated the cheatgrass, but this left substantial bare areas for the invasion of other annual species. It may take a few years for the perennial grasses to fill in.

Table 32: Vegetation Cover Success Standard Comparison

	Phase III Monitoring			Phase II Monitoring					Interim Monitoring	
Vegetation Cover	**Area 29**	**Area 30**	**Area 31**	**Area 25**	**Area 34**	**Area 35**	**Area 43**	**Area 44**	**Area 32**	**Area 33**
Average Vegetation Cover	44.5	33.0	27.4	38.6	29.4	27.5	18.6	19.6	20.2	20.0
Average Non-Noxious Cover	43.9	31.5	27.4	38.6	29.4	27.5	18.5	19.6	19.6	20.0
Average Allowable Cover	18.9	18.7	22.6	11.6	11.4	7.7	13.2	6.0	17.8	20.0
N	30	24	21	30	30	15	30	15	10	10
Nmin (non-noxious)	15	20	8	9	18	17	24	38	25	18
Stdev Allowable Cover	13.1	10.8	6.0	8.1	9.2	7.9	6.8	7.9	7.1	6.1
Standard	19.9									
90% of Standard	17.9									
T (one-tail, α=0.9)	1.311	1.319	1.325	1.311	1.311	1.345	1.311	1.345	1.383	1.383
Standard Passed?	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**	**No**	**No**	**No***	**Yes***

* Only sampled to the minimum sample size

Desirable vegetation cover decreased from 2021 to 2022 in all Phase III and interim monitoring areas after a substantial increase from 2020 to 2021 (Figure 10). However, in most areas (all except Area 33) the 2022 desirable cover was still greater than it was in 2020. In Area 33 as well as the two Phase II monitoring areas (Figure 11), the 2022 desirable cover was lower than it has been since before 2018.

Figure 10: Absolute Cover by Life Form 2018 – 2022 – Phase III & Interim Areas

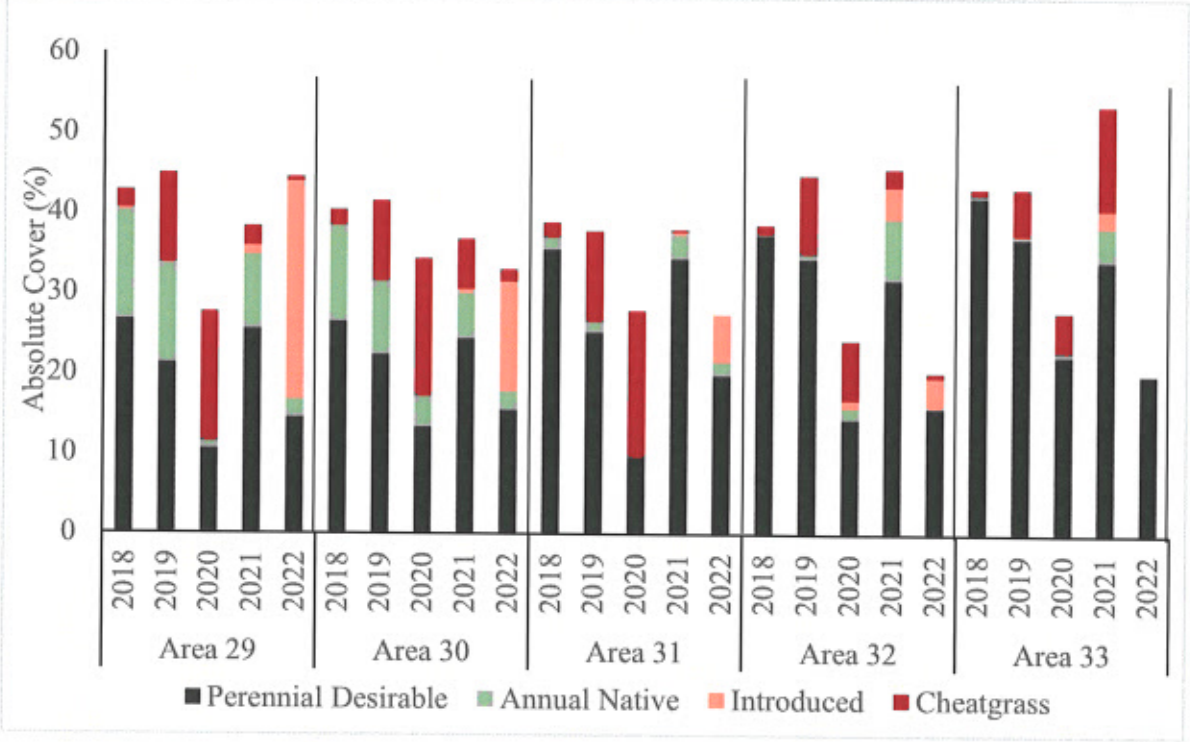
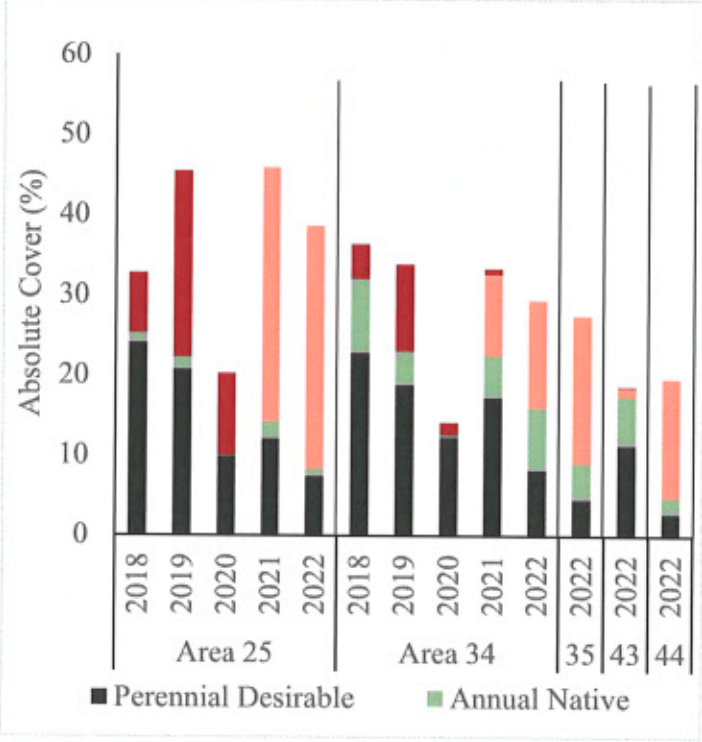


Figure 11: Absolute Cover by Life Form 2018 – 2022 – Phase II Areas



The 11 months preceding vegetation monitoring (September – July) were the second driest since CEC started collecting precipitation data in 1993 and the driest since 2002. The past three years have all been at least 30% drier than average. The reduced precipitation has also reduced the cover standard; thus, the more developed Reclamation Areas have still been able to pass the standard. The drought has particularly impacted the areas only seeded in 2019 or 2020 (Areas 35, 43, and 44) because this was only the second or third growing season for these areas. While the vegetation cover was expected to be lower in the newer reclamation, the prolonged drought when they were first establishing may impact their development in the future.

7.2 Herbaceous Production

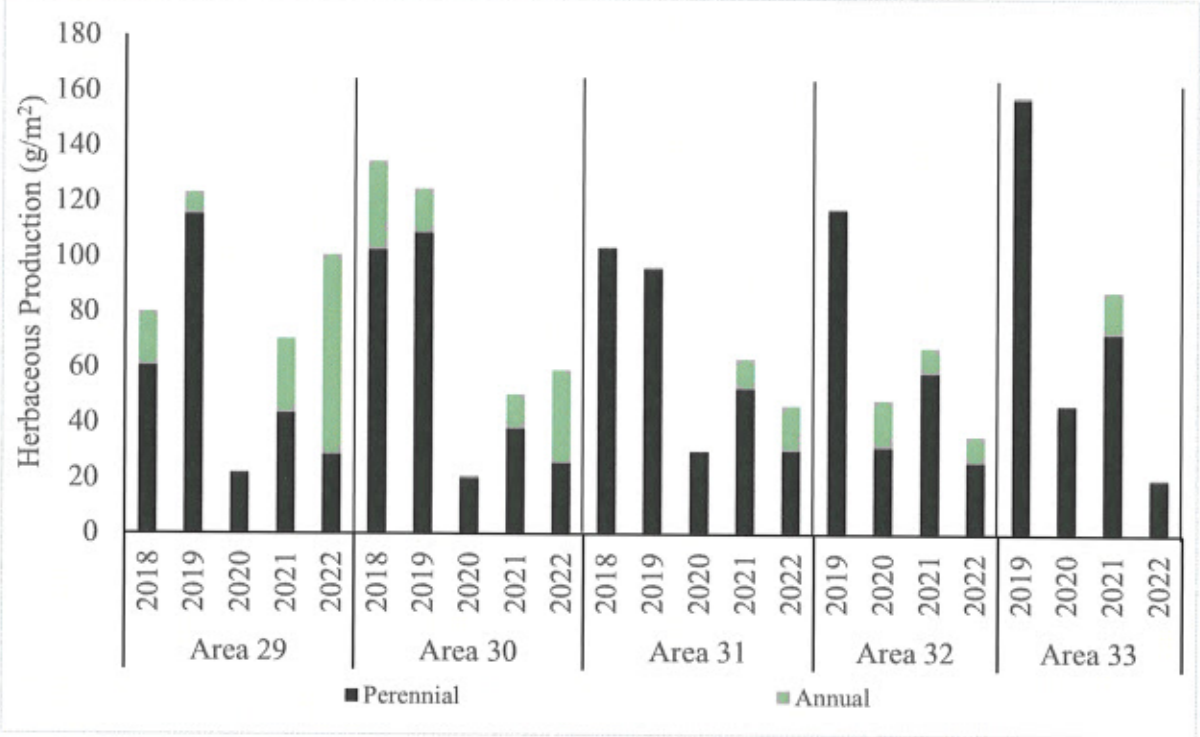
Based on the results of the herbaceous production sampling, all Reclamation Areas passed the calculated production success standard (Table 33). Overall, non-noxious herbaceous production increased from 2021 to 2022 in Areas 29 and 30 and decreased in all other areas (Figure 12). When excess annual production was removed, allowable herbaceous production decreased in all areas. However, continued drought conditions resulted in a reduced production standard as well.

Table 33: Herbaceous Production Success Standard Comparison

	Phase III Monitoring			Interim Monitoring	
Herbaceous Production	**Area 29**	**Area 30**	**Area 31**	**Area 32**	**Area 33**
Average Total Production	100.8	59.2	46.3	35.6	20.4
Average Allowable Production	45.7	33.2	34.9	29.8	20.4
N	30	30	30	15	15
Nmin (non-noxious)	65	48	88	72	60
Stdev Allowable Production	54.8	29.3	33.2	22.5	11.7
Standard	11.0				
90% of Standard	9.9				
T (one-tail, α=0.9)	1.311	1.311	1.311	1.345	1.345
Standard Passed?	**Yes**	**Yes**	**Yes**	**Yes***	**Yes***

* Only sampled to the minimum sample size

Figure 12: Non-Noxious Herbaceous Production by Life Form 2018 – 2022



7.3 Species Composition

The Phase III species composition bond release standard requires that four perennial grass species each contribute a minimum of 3% and a maximum of 40% of the relative non-noxious vegetation cover. All the reclamation areas monitored for Phase III release met this standard. The species composition standard for Phase II bond release is that a sufficient number of species be present to meet the future Phase III bond release cover requirements. All five of the reclamation

areas monitored for Phase II release exhibited at least four perennial grasses in the data. The two areas monitored using the interim monitoring methods each exhibited at least nine perennial grass species, but neither one has yet met the Phase III standard.

8 SUMMARY

Quantitative monitoring revealed that Reclamation Areas 29, 30, and 31 all met the revegetation success standards for Phase III bond release (Table 34). This was the second year that these areas have met the standard, so they are eligible for release. Reclamation Area 30 also met the standard for Phase II bond release. Reclamation Areas 25, 34, 35, 43, and 44 were monitored under the Phase II bond release guidelines, but none of the areas met the vegetation cover standard. They did all meet the Phase II species composition standard. Both Reclamation Areas 32 and 33 were monitored under the interim monitoring program and both met the herbaceous production standards. Area 33 also met the vegetation cover standard but neither area met the species composition standards. All Phase II and interim reclamation areas will require additional sampling in 2023.

Table 34: Success Standard Summary

	Phase III Monitoring			**Phase II Monitoring**					**Interim Monitoring**	
Reclamation Standard	**Area 29**	**Area 30**	**Area 31**	**Area 25**	**Area 34**	**Area 35**	**Area 43**	**Area 44**	**Area 32**	**Area 33**
Vegetation Cover	Yes	Yes	Yes	No	No	No	No	No	No*	Yes*
Herbaceous Production	Yes	Yes	Yes	n/a	n/a	n/a	n/a	n/a	Yes*	Yes*
Species Composition	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Eligible for Release	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**	**No**	**No**	**n/a**	**n/a**

* Only sampled to the minimum sample size

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Appendix A: Vegetation Cover Data

Reclamation Area 25 Vegetation Cover Data

Scientific Name	Common Name	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18	
		1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Grass: Annual Native																																					
Munroa squarrosa	false buffalograss							p						p																							
Subtotal								p						p																							
Grass: Annual Introduced																																					
Bromus tectorum	cheatgrass	p												p																		p					
Subtotal		p												p																		p					
Grass: Perennial Desirable (Cool)																																					
Achnatherum hymenoides	Indian ricegrass	p		p						p						p	1			p						p		p				p					
Bromus inermis	smooth brome																							p													
Elymus trachycaulus	slender wheatgrass																							1													
Pascopyrum smithii	western wheatgrass							p																													
Thinopyrum intermedium	intermediate wheatgrass																													p							
Subtotal		p		p				p		p						p	1			p				1		p		p		p		p					
Grass: Perennial Desirable (Warm)																																					
Andropogon hallii	sand bluestem	p		p				p				p		p		1		1				p				2				1						4	
Aristida purpurea	purple threeawn																	p																			
Bouteloua curtipendula	sideoats grama																																				
Bouteloua gracilis	blue grama			p												p		p																			
Calamovilfa longifolia	prairie sandreed	p		p		4		3		2		p		1		2	1	p		6		2		2		5		4		13	1	4		1		2	
Panicum virgatum	switchgrass																	p						1													
Schizachyrium scoparium	little bluestem																																				
Sorghastrum nutans	Indiangrass																													p							
Sporobolus cryptandrus	sand dropseed	p		1				p		p		p				2	1	p		p				p				p		p				2		p	
Subtotal		p		1		4		3		2		p		1		5	2	1		6		2		3		7		4		14	1	4		3		6	
Total Grass Cover		0	0	1	0	4	0	3	0	2	0	0	0	1	0	5	3	1	0	6	0	2	0	4	0	7	0	4	0	14	1	4	0	3	0	6	0
Forbs: Annual & Biennial Native																																					
Amaranthus retroflexus	redroot amaranth									p		p																p				p				p	
Argemone polyanthemos	crested pricklypoppy			p				p								p						p								p		p					
Croton texensis	Texas croton							p																													
Helianthus annuus	common sunflower	p		p				1		p		p				p		p				1				4										p	
Subtotal		p		p				1		p		p				p		p				1				4		p		p		p				p	
Forbs: Annual & Biennial Introduced																																					
Ambrosia artemisiifolia	annual ragweed																																				
Bassia scoparia	burningbush	p				p		p		p				p				p				p				p				p							
Lactuca serriola	prickly lettuce			p				1												p						p											
Salsola tragus	prickly Russian thistle	16	1	18		11		13		17	1	12		10		9		20		7		16		21		16		12	1	2		14		19		11	1
Subtotal		16	1	18		11		14		17	1	12		10		9		20		7		16		21		16		12	1	2		14		19		11	1

Reclamation Area 25 Vegetation Cover Data (continued)

Scientific Name	Common Name	1 1st	1 2nd	2 1st	2 2nd	3 1st	3 2nd	4 1st	4 2nd	5 1st	5 2nd	6 1st	6 2nd	7 1st	7 2nd	8 1st	8 2nd	9 1st	9 2nd	10 1st	10 2nd	11 1st	11 2nd	12 1st	12 2nd	13 1st	13 2nd	14 1st	14 2nd	15 1st	15 2nd	16 1st	16 2nd	17 1st	17 2nd	18 1st	18 2nd
Forbs: Perennial Native																																					
Ambrosia psilostachya	Cuman ragweed	p														p						p				p											
Asclepias speciosa	showy milkweed																																				
Mentzelia nuda	bractless blazingstar																																				
Physalis hispida	prairie groundcherry																																				
Physalis hispida	prairie groundcherry																											p									
Rumex venosus	veiny dock	4																																			
Subtotal		4														p						p				p		p									
Forbs: Perennial Introduced																																					
Convolvulus arvensis	field bindweed																							p													
Subtotal																								p													
Total Forb Cover		**20**	**1**	**18**	**0**	**11**	**0**	**15**	**0**	**17**	**1**	**12**	**0**	**10**	**0**	**9**	**0**	**20**	**0**	**7**	**0**	**17**	**0**	**21**	**0**	**20**	**0**	**12**	**1**	**2**	**0**	**14**	**0**	**19**	**0**	**11**	**1**
Subshrubs/Shrubs/Succulents: Perennial Native																																					
Artemisia filifolia	sand sagebrush			1				1																													
Opuntia phaeacantha	tulip pricklypear			p						p																				p							
Subtotal				1				1		p																				p							
Total Shrub Cover		**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Rock																																					
Litter		23		15		25		17		22		30		24		26		20		26		18		20		17		28		30		21		15		20	
Bare Ground		7		15		10		14		9		8		15		10		9		11		13		5		6		6		4		11		13		13	
Total Hits		50	1	50	0	50	0	50	0	50	1	50	0	50	0	50	3	50	0	50	0	50	0	50	0	50	0	50	1	50	1	50	0	50	0	50	1
Total Vegetation Cover		**40**	**2**	**40**	**0**	**30**	**0**	**38**	**0**	**38**	**2**	**24**	**0**	**22**	**0**	**28**	**6**	**42**	**0**	**26**	**0**	**38**	**0**	**50**	**0**	**54**	**0**	**32**	**2**	**32**	**2**	**36**	**0**	**44**	**0**	**34**	**2**
Non-Noxious Vegetation Cover		**40**	**2**	**40**	**0**	**30**	**0**	**38**	**0**	**38**	**2**	**24**	**0**	**22**	**0**	**28**	**6**	**42**	**0**	**26**	**0**	**38**	**0**	**50**	**0**	**54**	**0**	**32**	**2**	**32**	**2**	**36**	**0**	**44**	**0**	**34**	**2**
Total Ground Cover		**86**		**70**		**80**		**72**		**82**		**84**		**70**		**80**		**82**		**78**		**74**		**90**		**88**		**88**		**92**		**78**		**74**		**74**	
Allowable Vegetation Cover		**12.7**		**12.7**		**2.7**		**10.7**		**10.7**		**0.0**		**0.0**		**0.7**		**14.7**		**0.0**		**10.7**		**22.7**		**26.7**		**4.7**		**4.7**		**8.7**		**16.7**		**6.7**	

Non-Noxious Annual Cover	31.2
Excess Annual Cover	27.3

Reclamation Area 25 Vegetation Cover Data (continued)

Scientific Name	Common Name	19 1st	19 2nd	20 1st	20 2nd	21 1st	21 2nd	22 1st	22 2nd	23 1st	23 2nd	24 1st	24 2nd	25 1st	25 2nd	26 1st	26 2nd	27 1st	27 2nd	28 1st	28 2nd	29 1st	29 2nd	30 1st	30 2nd	Total Hits 1st	Total Hits All	Average Absolute Cover (%)	Average Relative Cover (%)	Non-Noxious Relative Cover (%)
Grass: Annual Native																														
Munroa squarrosa	false buffalograss																									0	0	0.0	0.0	0.0
Subtotal																										0	0	0.0	0.0	0.0
Grass: Annual Introduced																														
Bromus tectorum	cheatgrass	p												p	p					p	p					0	0	0.0	0.0	0.0
Subtotal		p												p	p					p	p					0	0	0.0	0.0	0.0
Grass: Perennial Desirable (Cool)																														
Achnatherum hymenoides	Indian ricegrass			p						p		p		1						p		p				1	2	0.1	0.3	0.3
Bromus inermis	smooth brome																									0	0	0.0	0.0	0.0
Elymus trachycaulus	slender wheatgrass																									1	1	0.1	0.2	0.2
Pascopyrum smithii	western wheatgrass																									0	0	0.0	0.0	0.0
Thinopyrum intermedium	intermediate wheatgrass																									0	0	0.0	0.0	0.0
Subtotal				p						p		p		1						p		p				2	3	0.1	0.5	0.5
Grass: Perennial Desirable (Warm)																														
Andropogon hallii	sand bluestem					4				1										p		1		p		15	15	1.0	2.5	2.5
Aristida purpurea	purple threeawn																									0	0	0.0	0.0	0.0
Bouteloua curtipendula	sideoats grama					p				p												p				0	0	0.0	0.0	0.0
Bouteloua gracilis	blue grama			2		2				p						1										5	5	0.3	0.8	0.8
Calamovilfa longifolia	prairie sandreed	p		p		p		6	1	7	1	1		p		2	2	p		p		5	1	2		74	81	4.9	13.6	13.6
Panicum virgatum	switchgrass																					p				1	1	0.1	0.2	0.2
Schizachyrium scoparium	little bluestem																					p				0	0	0.0	0.0	0.0
Sorghastrum nutans	Indiangrass																									2	2	0.1	0.3	0.3
Sporobolus cryptandrus	sand dropseed			1				p				p				p		p		1				p		5	6	0.3	1.0	1.0
Subtotal		p		3		6		6	1	8	1	1		p		3	2	p		1		6	1	2		102	110	6.8	18.5	18.5
Total Grass Cover		**0**	**0**	**3**	**0**	**6**	**0**	**6**	**1**	**8**	**1**	**1**	**0**	**1**	**0**	**3**	**2**	**0**	**0**	**1**	**0**	**6**	**1**	**2**	**0**	**104**	**113**	**6.9**	**19.0**	**19.0**
Forbs: Annual & Biennial Native																														
Amaranthus retroflexus	redroot amaranth							p		p				p								p				0	0	0.0	0.0	0.0
Argemone polyanthemos	crested pricklypoppy					p				p												p				0	0	0.0	0.0	0.0
Croton texensis	Texas croton																									0	0	0.0	0.0	0.0
Helianthus annuus	common sunflower	p		p		p				p		3		p				3		p		2		p		14	14	0.9	2.4	2.4
Subtotal		p		p		p		p		p		3		p				3		p		2		p		14	14	0.9	2.4	2.4
Forbs: Annual & Biennial Introduced																														
Ambrosia artemisiifolia	annual ragweed																					p				0	0	0.0	0.0	0.0
Bassia scoparia	burningbush	p		p		1								p		1		p		p		p				2	2	0.1	0.3	0.3
Lactuca serriola	prickly lettuce					p												p								1	1	0.1	0.2	0.2
Salsola tragus	prickly Russian thistle	22		23		17		12	2	17		13		19		15		18		27		10		14		451	457	30.1	76.9	76.9
Subtotal		22		23		18		12	2	17		13		19		16		18		27		10		14		454	460	30.3	77.4	77.4

Reclamation Area 25 Vegetation Cover Data (continued)

Scientific Name	Common Name	19 1st	19 2nd	20 1st	20 2nd	21 1st	21 2nd	22 1st	22 2nd	23 1st	23 2nd	24 1st	24 2nd	25 1st	25 2nd	26 1st	26 2nd	27 1st	27 2nd	28 1st	28 2nd	29 1st	29 2nd	30 1st	30 2nd	Total Hits 1st	Total Hits All	Average Absolute Cover (%)	Average Relative Cover (%)	Non-Noxious Relative Cover (%)
Forbs: Perennial Native																														
Ambrosia psilostachya	Cuman ragweed					p																p				0	0	0.0	0.0	0.0
Asclepias speciosa	showy milkweed													p												0	0	0.0	0.0	0.0
Mentzelia nuda	bractless blazingstar																					p				0	0	0.0	0.0	0.0
Physalis hispida	prairie groundcherry					p																1				1	1	0.1	0.2	0.2
Physalis hispida	prairie groundcherry																									0	0	0.0	0.0	0.0
Rumex venosus	veiny dock																			p						4	4	0.3	0.7	0.7
Subtotal						p								p						p		1				5	5	0.3	0.8	0.8
Forbs: Perennial Introduced																														
Convolvulus arvensis	field bindweed																									0	0	0.0	0.0	0.0
Subtotal																										0	0	0.0	0.0	0.0
Total Forb Cover		22	0	23	0	18	0	12	2	17	0	16	0	19	0	16	0	21	0	27	0	13	0	14	0	473	479	31.5	80.6	80.6
Subshrubs/Shrubs/Succulents: Perennial Native																														
Artemisia filifolia	sand sagebrush																									2	2	0.1	0.3	0.3
Opuntia phaeacantha	tulip pricklypear																	p				p				0	0	0.0	0.0	0.0
Subtotal																		p				p				2	2	0.1	0.3	0.3
Total Shrub Cover		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0.1	0.3	0.3
Rock																										0	0	0.0		
Litter		15		18		18		21		17		24		18		27		14		13		20		23		625	625	41.7		
Bare Ground		13		6		8		11		8		9		12		4		15		9		11		11		296	296	19.7		
Total Hits		50	0	50	0	50	0	50	3	50	1	50	0	50	0	50	2	50	0	50	0	50	1	50	0	1500	1515	100.0		
Total Vegetation Cover		44	0	52	0	48	0	36	6	50	2	34	0	40	0	38	4	42	0	56	0	38	2	32	0			38.6	100.0	100.0
Non-Noxious Vegetation Cover		44	0	52	0	48	0	36	6	50	2	34	0	40	0	38	4	42	0	56	0	38	2	32	0			38.6		
Total Ground Cover		74		88		84		78		84		82		76		92		70		82		78		78				80.3		
Allowable Vegetation Cover		16.7		24.7		20.7		8.7		22.7		6.7		12.7		10.7		14.7		28.7		10.7		4.7				11.6		

Non-Noxious Annual Cover	31.2
Excess Annual Cover	27.3

Reclamation Area 29 Vegetation Cover Data

Scientific Name	Common Name	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Grass: Annual Native																																					
Vulpia octoflora	sixweeks fescue									p				p						p		p															
Subtotal										p				p						p		p															
Grass: Annual Introduced																																					
Bromus tectorum	cheatgrass	p		p		p		p		1				p				p		1		p		1		p		p		p		1		p			
Subtotal		p		p		p		p		1				p				p		1		p		1		p		p		p		1		p			
Grass: Perennial Desirable (Cool)																																					
Pascopyrum smithii	western wheatgrass					p										p																					
Subtotal						p										p																					
Grass: Perennial Desirable (Warm)																																					
Andropogon hallii	sand bluestem	1		6		9				p				4	1					3		p		7		2		3		p		p				p	
Bouteloua curtipendula	sideoats grama					p																								p		p		p			
Bouteloua gracilis	blue grama	p		6	1	p	1	1	1	p	1	3		2		p		2		2		p				1		p		1		1		1		1	
Calamovilfa longifolia	prairie sandreed	3		p		12				1				3				1	1	p		2				1		9		p		p					
Panicum virgatum	switchgrass	5								p				p								1				1				2		2					
Schizachyrium scoparium	little bluestem																					p						p									
Sorghastrum nutans	Indiangrass					p												1																			
Sporobolus airoides	alkali sacaton									p								p																			
Sporobolus cryptandrus	sand dropseed			p		1		4	1	p		3		1		8	1			2				3	2	p		2		1		2		3		2	1
Subtotal		9		12	1	22	1	5	2	1	1	6		10	1	8	1	4	1	7		3		10	2	5		14		4		5		5		3	1
Total Grass Cover		**9**	**0**	**12**	**1**	**22**	**1**	**5**	**2**	**2**	**1**	**6**	**0**	**10**	**1**	**8**	**1**	**4**	**1**	**8**	**0**	**3**	**0**	**11**	**2**	**5**	**0**	**14**	**0**	**4**	**0**	**6**	**0**	**5**	**0**	**3**	**1**
Forbs: Annual & Biennial Native																																					
Amaranthus retroflexus	redroot amaranth									p		p				p		p		p	1	p		p				p				p	1	2		p	
Argemone polyanthemos	crested pricklypoppy																									p						p		p			
Chenopodium leptophyllum	narrowleaf goosefoot													p																							
Chenopodium sp.	goosefoot																																				
Conyza canadensis	Canadian horseweed	p		p				p		p		p		p		p		p				p				p		p		p		p				p	
Helianthus annuus	common sunflower	p		2		p		2		1		3		1		p	1	1		1		p				1		1		2		1		2		1	
Subtotal		p		2		p		2		1		3		1		p	1	1		1	1	p		p		1		1		2		1	1	4		1	
Forbs: Annual & Biennial Introduced																																					
Ambrosia artemisiifolia	annual ragweed																									p											
Bassia scoparia	burningbush																							2				p						p			
Lactuca serriola	prickly lettuce	p		p				p				p		p		1		p		p						p				p		p		p		p	
Salsola tragus	prickly Russian thistle	7		17	1	4		20		13		17		8		14	2	35	2	4		18		6		13		5		30	1	11		13		16	
Tragopogon dubius	yellow salsify																									p											
Subtotal		7		17	1	4		20		13		17		8		15	2	35	2	4		18		8		13		5		30	1	11		13		16	

Reclamation Area 29 Vegetation Cover Data (continued)

Scientific Name	Common Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2
Forbs: Perennial Native																			
Ambrosia psilostachya	Cuman ragweed	p									p	p		p					
Physalis hispida	prairie groundcherry													p					
Mentzelia nuda	bractless blazingstar														p				
Physalis hispida	prairie groundcherry																		
Symphyotrichum falcatum	white prairie aster																		
Subtotal		p									p	p		p	p				
Total Forb Cover		7 0	19 1	4 0	22 0	14 0	20 0	9 0	15 3	36 2	5 1	18 0	8 0	14 0	6 0	32 1	12 1	17 0	17 0
Subshrubs/Shrubs/Succulents: Perennial Native																			
Artemisia filifolia	sand sagebrush									p		2				p		p	2
Opuntia phaeacantha	tulip pricklypear	p	p					1						p			p		
Subtotal		p	p					1		p		2		p		p	p	p	2
Total Shrub Cover		0 0	0 0	0 0	0 0	0 0	0 0	1 0	0 0	0 0	0 0	2 0	0 0	0 0	0 0	0 0	0 0	0 0	2 0
Rock							1		1										
Litter		27	12	20	13	18	12	19	17	7	22	20	27	23	27	11	24	14	20
Bare Ground		7	7	4	10	16	11	11	9	3	15	7	4	8	3	3	8	14	8
Total Hits		50 0	50 2	50 1	50 2	50 1	50 0	50 1	50 4	50 3	50 1	50 0	50 2	50 0	50 0	50 1	50 1	50 0	50 1
Total Vegetation Cover		32 0	62 4	52 2	54 4	32 2	52 0	40 2	46 8	80 6	26 2	46 0	38 4	38 0	40 0	72 2	36 2	44 0	44 2
Non-Noxious Vegetation Cover		32 0	62 4	52 2	54 4	30 2	52 0	40 2	46 8	80 6	24 2	46 0	36 4	38 0	40 0	72 2	34 2	44 0	44 2
Total Ground Cover		86	86	92	80	68	78	78	82	94	70	86	92	84	94	94	84	72	84
Allowable Vegetation Cover		6.9	36.9	26.9	28.9	4.9	26.9	14.9	20.9	54.9	0.0	20.9	10.9	12.9	14.9	46.9	8.9	18.9	18.9

Non-Noxious Annual Cover	29.5
Excess Annual Cover	25.1

Reclamation Area 29 Vegetation Cover Data (continued)

Scientific Name	Common Name	19		20		21		22		23		24		25		26		27		28		29		30		Total Hits		Absolute Cover (%)	Relative Cover (%)	Relative Cover (%)
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1st	All			
Grass: Annual Native																														
Vulpia octoflora	sixweeks fescue																									0	0	0.0	0.0	0.0
Subtotal																										0	0	0.0	0.0	0.0
Grass: Annual Introduced																														
Bromus tectorum	cheatgrass	2				1								p								1				8	8	0.5	1.2	1.2
Subtotal		2				1								p								1				8	8	0.5	1.2	1.2
Grass: Perennial Desirable (Cool)																														
Pascopyrum smithii	western wheatgrass											1														1	1	0.1	0.1	0.1
Subtotal												1														1	1	0.1	0.1	0.1
Grass: Perennial Desirable (Warm)																														
Andropogon hallii	sand bluestem	p		1	1	1		p		2		4		2		2				3		1				51	53	3.4	7.6	7.7
Bouteloua curtipendula	sideoats grama																									0	0	0.0	0.0	0.0
Bouteloua gracilis	blue grama	p		p		p		p		p		p		1		p		1		1		p		4		28	32	1.9	4.6	4.7
Calamovilfa longifolia	prairie sandreed			6				5		5		1						3		p						53	54	3.5	7.8	7.9
Panicum virgatum	switchgrass	1				1				2								2								17	17	1.1	2.5	2.5
Schizachyrium scoparium	little bluestem			p																		p				0	0	0.0	0.0	0.0
Sorghastrum nutans	Indiangrass													p												1	1	0.1	0.1	0.1
Sporobolus airoides	alkali sacaton																	p								0	0	0.0	0.0	0.0
Sporobolus cryptandrus	sand dropseed	9		2		3		3				p		p		1		1		4	1	p		1		56	62	3.7	8.9	9.1
Subtotal		10		9	1	5		8		9		5		3		3		7		8	1	1		5		206	219	13.7	31.6	32.0
Total Grass Cover		**12**	**0**	**9**	**1**	**6**	**0**	**8**	**0**	**9**	**0**	**6**	**0**	**3**	**0**	**3**	**0**	**7**	**0**	**8**	**1**	**2**	**0**	**5**	**0**	**215**	**228**	**14.3**	**32.9**	**33.3**
Forbs: Annual & Biennial Native																														
Amaranthus retroflexus	redroot amaranth	p				p	1	p				1				p		p				p		1		4	7	0.3	1.0	1.0
Argemone polyanthemos	crested pricklypoppy																									0	0	0.0	0.0	0.0
Chenopodium leptophyllum	narrowleaf goosefoot																									0	0	0.0	0.0	0.0
Chenopodium sp.	goosefoot																			p						0	0	0.0	0.0	0.0
Conyza canadensis	Canadian horseweed	p		p		p				p		p		p				p		p				p		0	0	0.0	0.0	0.0
Helianthus annuus	common sunflower			p		2		p				1		2		p		2		2		1		p		29	30	1.9	4.3	4.4
Subtotal		p		p		2	1	p		p		2		2		p		2		2		1		1		33	37	2.2	5.3	5.4
Forbs: Annual & Biennial Introduced																														
Ambrosia artemisiifolia	annual ragweed																									0	0	0.0	0.0	0.0
Bassia scoparia	burningbush	p																								2	2	0.1	0.3	0.3
Lactuca serriola	prickly lettuce			1		p		1		1				1		p		p		p		p				5	5	0.3	0.7	0.7
Salsola tragus	prickly Russian thistle	6		12		21		16	1	4		22		16		8	1	12		10	1	11		13		402	411	26.8	59.3	60.0
Tragopogon dubius	yellow salsify																									0	0	0.0	0.0	0.0
Subtotal		6		13		21		17	1	5		22		17		8	1	12		10	1	11		13		409	418	27.3	60.3	61.0

Reclamation Area 29 Vegetation Cover Data (continued)

Scientific Name	Common Name	19 1	19 2	20 1	20 2	21 1	21 2	22 1	22 2	23 1	23 2	24 1	24 2	25 1	25 2	26 1	26 2	27 1	27 2	28 1	28 2	29 1	29 2	30 1	30 2	Total Hits 1st	Total Hits All	Absolute Cover (%)	Relative Cover (%)	Relative Cover (%)
Forbs: Perennial Native																														
Ambrosia psilostachya	Cuman ragweed																					p				0	0	0.0	0.0	0.0
Physalis hispida	prairie groundcherry									1								1								2	2	0.1	0.3	0.3
Mentzelia nuda	bractless blazingstar																			p						0	0	0.0	0.0	0.0
Physalis hispida	prairie groundcherry															2										2	2	0.1	0.3	0.3
Symphyotrichum falcatum	white prairie aster																									0	0	0.0	0.0	0.0
Subtotal										1						2		1		p		p				4	4	0.3	0.6	0.6
Total Forb Cover		**6**	**0**	**13**	**0**	**23**	**1**	**17**	**1**	**6**	**0**	**24**	**0**	**19**	**0**	**10**	**1**	**15**	**0**	**12**	**1**	**12**	**0**	**14**	**0**	**446**	**459**	**29.7**	**66.2**	**67.0**
Subshrubs/Shrubs/Succulents: Perennial Native																														
Artemisia filifolia	sand sagebrush																					1				5	5	0.3	0.7	0.7
Opuntia phaeacantha	tulip pricklypear									p				p				p				p				1	1	0.1	0.1	0.1
Subtotal										p				p				p				1				6	6	0.4	0.9	0.9
Total Shrub Cover		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**6**	**6**	**0.4**	**0.9**	**0.9**
Rock																										2	2	0.1		
Litter		28		24		11		12		23		17		20		20		10		22		23		15		558	558	37.2		
Bare Ground		4		4		10		13		12		3		8		17		18		8		12		16		273	273	18.2		
Total Hits		50	0	50	1	50	1	50	1	50	0	50	0	50	0	50	1	50	0	50	2	50	0	50	0	1500	1526	100.0		
Total Vegetation Cover		**36**	**0**	**44**	**2**	**58**	**2**	**50**	**2**	**30**	**0**	**60**	**0**	**44**	**0**	**26**	**2**	**44**	**0**	**40**	**4**	**30**	**0**	**38**	**0**			**44.5**	**100.0**	**101.2**
Non-Noxious Vegetation Cover		**32**	**0**	**44**	**2**	**56**	**2**	**50**	**2**	**30**	**0**	**60**	**0**	**44**	**0**	**26**	**2**	**44**	**0**	**40**	**4**	**28**	**0**	**38**	**0**			**43.9**		
Total Ground Cover		**92**		**92**		**80**		**74**		**76**		**94**		**84**		**66**		**64**		**84**		**76**		**68**				**81.8**		
Allowable Vegetation Cover		**6.9**		**18.9**		**30.9**		**24.9**		**4.9**		**34.9**		**18.9**		**0.9**		**18.9**		**14.9**		**2.9**		**12.9**				**18.9**		

Non-Noxious Annual Cover	29.5
Excess Annual Cover	25.1

Reclamation Area 30 Vegetation Cover Data

Scientific Name	Common Name	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Grass: Annual Native																																					
Munroa squarrosa	false buffalograss	p				2						p						p				p		p				p				p				p	
Vulpia octoflora	sixweeks fescue					p																		p										1		p	
Subtotal		p				2						p						p				p		p				p				p		1		p	
Grass: Annual Introduced																																					
Bromus tectorum	cheatgrass	p		p		1		3		1				3		p		3		p		p				1		p		p		2				p	
Subtotal		p		p		1		3		1				3		p		3		p		p				1		p		p		2				p	
Grass: Perennial Desirable (Cool)																																					
Achnatherum hymenoides	Indian ricegrass																					1															
Agropyron cristatum	crested wheatgrass							p																													
Pascopyrum smithii	western wheatgrass																			p																	
Subtotal								p												p		1															
Grass: Perennial Desirable (Warm)																																					
Andropogon hallii	sand bluestem	5		4		2	1	4	1	2	1	3	1	6		4	3	2	3	4		11		3		2		10	4					5	1	5	1
Bouteloua curtipendula	sideoats grama			p												p				p	1	p		p		1		p						p		p	
Bouteloua gracilis	blue grama	p		p				p				p				p		2		1				1		p						1		p		3	
Calamovilfa longifolia	prairie sandreed					1						1		1				p		p		2		1				1						p		1	
Panicum virgatum	switchgrass	p										p										p		p				p						1		1	
Schizachyrium scoparium	little bluestem	p								1		p				p		p								p										p	
Sporobolus cryptandrus	sand dropseed	6		4		3	1	3	1	1		3	2	p		3		4	4	6		p		p		2	1	1		2		2		2		1	
Subtotal		11		8		6	2	7	2	4	1	7	3	7		7	3	8	7	11	1	13		5		5	1	12	4	2		3		8	1	11	1
Total Grass Cover		**11**	**0**	**8**	**0**	**9**	**2**	**10**	**2**	**5**	**1**	**7**	**3**	**10**	**0**	**7**	**3**	**11**	**7**	**11**	**1**	**14**	**0**	**5**	**0**	**6**	**1**	**12**	**4**	**2**	**0**	**5**	**0**	**9**	**1**	**11**	**1**
Forbs: Annual & Biennial Native																																					
Amaranthus retroflexus	redroot amaranth			p		3		1		p		p		p		2		p		p		1		p		6		2				1		1		p	
Argemone polyanthemos	crested pricklypoppy																																			p	
Conyza canadensis	Canadian horseweed	p		p		p		p		p		p		p		1		p		p		p		p		p		p		p				p		p	
Croton texensis	Texas croton																																				
Helianthus annuus	common sunflower			p				p		p																p		p				p				p	
Subtotal		p		p		3		1		p		p		p		3		p		p		1		p		6		2		p		1		1		p	
Forbs: Annual & Biennial Introduced																																					
Amaranthus blitoides	mat amaranth											p												1													
Ambrosia artemisiifolia	annual ragweed															p																					
Bassia scoparia	burningbush																																				
Lactuca serriola	prickly lettuce									p		p								p									p							
Salsola tragus	prickly Russian thistle	12		3		3	1	p		18		2		7		4		10	1	15		5		7		2		p		19		4		3		5	
Subtotal		12		3		3	1	p		18		2		7		4		10	1	15		5		8		2		p		19		4		3		5	

Reclamation Area 30 Vegetation Cover Data (continued)

Scientific Name	Common Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2
Forbs: Perennial Native																			
Ambrosia psilostachya	Cuman ragweed	p	2			p						p							p
Lygodesmia juncea	rush skeletonplant							p											
Physalis hispida	prairie groundcherry	p																	
Subtotal		p	2			p		p				p							p
Total Forb Cover		12 0	5 0	6 1	1 0	18 0	2 0	7 0	7 0	10 1	15 0	6 0	8 0	8 0	2 0	19 0	5 0	4 0	5 0
Subshrubs/Shrubs/Succulents: Perennial Native																			
Artemisia filifolia	sand sagebrush							p					p		p				
Yucca glauca	soapweed yucca							p											
Opuntia phaeacantha	tulip pricklypear	p	p		p			p	p	p		p	p	p		p			
Subtotal		p	p		p			p	p	p		p	p	p	p	p			
Total Shrub Cover		0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Rock																			
Litter		22	28	21	34	21	35	27	28	20	17	22	26	21	23	19	28	19	22
Bare Ground		5	9	14	5	6	6	6	8	9	7	8	11	15	13	10	12	18	12
Total Hits		50 0	50 0	50 3	50 2	50 1	50 3	50 0	50 3	50 8	50 1	50 0	50 0	50 1	50 4	50 0	50 0	50 1	50 1
Total Vegetation Cover		46 0	26 0	30 6	22 4	46 2	18 6	34 0	28 6	42 16	52 2	40 0	26 0	28 2	28 8	42 0	20 0	26 2	32 2
Non-Noxious Vegetation Cover		46 0	26 0	28 6	16 4	44 2	18 6	28 0	28 6	36 16	52 2	40 0	26 0	26 2	28 8	42 0	16 0	26 2	32 2
Total Ground Cover		90	82	72	90	88	88	88	84	82	86	84	78	70	74	80	76	64	76
Allowable Vegetation Cover		33.2	13.2	15.2	3.2	31.2	5.2	15.2	15.2	23.2	39.2	27.2	13.2	13.2	15.2	29.2	3.2	13.2	19.2

Non-Noxious Annual Cover	16.0
Excess Annual Cover	12.9

Reclamation Area 30 Vegetation Cover Data (continued)

Scientific Name	Common Name	19		20		21		22		23		24		Total Hits		Average Absolute Cover (%)	Average Relative Cover (%)	Non-Noxious Relative Cover (%)
		1	2	1	2	1	2	1	2	1	2	1	2	1st	All			
Grass: Annual Native																		
Munroa squarrosa	false buffalograss	1				p		1						4	4	0.3	0.9	1.0
Vulpia octoflora	sixweeks fescue											p		1	1	0.1	0.2	0.2
Subtotal		1				p		1				p		5	5	0.4	1.1	1.2
Grass: Annual Introduced																		
Bromus tectorum	cheatgrass	p		p		p		p		4				18	18	1.5	4.1	
Subtotal		p		p		p		p		4				18	18	1.5	4.1	
Grass: Perennial Desirable (Cool)																		
Achnatherum hymenoides	Indian ricegrass													1	1	0.1	0.2	0.2
Agropyron cristatum	crested wheatgrass													0	0	0.0	0.0	0.0
Pascopyrum smithii	western wheatgrass													0	0	0.0	0.0	0.0
Subtotal														1	1	0.1	0.2	0.2
Grass: Perennial Desirable (Warm)																		
Andropogon hallii	sand bluestem	6	1	3	3	2		4	1	1		4	2	92	115	7.7	26.2	27.3
Bouteloua curtipendula	sideoats grama	p						p						1	2	0.1	0.5	0.5
Bouteloua gracilis	blue grama	1	1	1		p				p		1	1	11	13	0.9	3.0	3.1
Calamovilfa longifolia	prairie sandreed	4	2			p		p						12	14	1.0	3.2	3.3
Panicum virgatum	switchgrass							1						3	3	0.3	0.7	0.7
Schizachyrium scoparium	little bluestem													1	1	0.1	0.2	0.2
Sporobolus cryptandrus	sand dropseed	3		2		5	2	5	1	4	1	1		63	76	5.3	17.3	18.1
Subtotal		14	4	6	3	7	2	10	2	5	1	6	3	183	224	15.3	51.0	53.2
Total Grass Cover		**15**	**4**	**6**	**3**	**7**	**2**	**11**	**2**	**9**	**1**	**6**	**3**	**207**	**248**	**17.3**	**56.5**	**58.9**
Forbs: Annual & Biennial Native																		
Amaranthus retroflexus	redroot amaranth	p		3		p		p		p				20	20	1.7	4.6	4.8
Argemone polyanthemos	crested pricklypoppy			p										0	0	0.0	0.0	0.0
Conyza canadensis	Canadian horseweed	p		1		p		p		p		p		2	2	0.2	0.5	0.5
Croton texensis	Texas croton			p										0	0	0.0	0.0	0.0
Helianthus annuus	common sunflower			p		p		p		p		p		0	0	0.0	0.0	0.0
Subtotal		p		4		p		p		p		p		22	22	1.8	5.0	5.2
Forbs: Annual & Biennial Introduced																		
Amaranthus blitoides	mat amaranth													1	1	0.1	0.2	0.2
Ambrosia artemisiifolia	annual ragweed													0	0	0.0	0.0	0.0
Bassia scoparia	burningbush									p				0	0	0.0	0.0	0.0
Lactuca serriola	prickly lettuce									p		p		0	0	0.0	0.0	0.0
Salsola tragus	prickly Russian thistle	3		p		2		4		20		16		164	166	13.7	37.8	39.4
Subtotal		3		p		2		4		20		16		165	167	13.8	38.0	39.7

Reclamation Area 30 Vegetation Cover Data (continued)

Scientific Name	Common Name	19 1	19 2	20 1	20 2	21 1	21 2	22 1	22 2	23 1	23 2	24 1	24 2	Total Hits 1st	Total Hits All	Average Absolute Cover (%)	Average Relative Cover (%)	Non-Noxious Relative Cover (%)
Forbs: Perennial Native																		
Ambrosia psilostachya	Cuman ragweed													2	2	0.2	0.5	0.5
Lygodesmia juncea	rush skeletonplant													0	0	0.0	0.0	0.0
Physalis hispida	prairie groundcherry													0	0	0.0	0.0	0.0
Subtotal														2	2	0.2	0.5	0.5
Total Forb Cover		3	0	4	0	2	0	4	0	20	0	16	0	189	191	15.8	43.5	45.4
Subshrubs/Shrubs/Succulents: Perennial Native																		
Artemisia filifolia	sand sagebrush													0	0	0.0	0.0	0.0
Yucca glauca	soapweed yucca													0	0	0.0	0.0	0.0
Opuntia phaeacantha	tulip pricklypear	p				p		p		p				0	0	0.0	0.0	0.0
Subtotal		p				p		p		p				0	0	0.0	0.0	0.0
Total Shrub Cover		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Rock														0	0	0.0		
Litter		28		28		36		31		17		21		594	594	49.5		
Bare Ground		4		12		5		4		4		7		210	210	17.5		
Total Hits		50	4	50	3	50	2	50	2	50	1	50	3	1200	1243	100.0		
Total Vegetation Cover		36	8	20	6	18	4	30	4	58	2	44	6			33.0	100.0	100.0
Non-Noxious Vegetation Cover		36	8	20	6	18	4	30	4	50	2	44	6			31.5		
Total Ground Cover		92		76		90		92		92		86				82.5		
Allowable Vegetation Cover		23.2		7.2		5.2		17.2		37.2		31.2				18.7		

Non-Noxious Annual Cover	16.0
Excess Annual Cover	12.9

Reclamation Area 31 Vegetation Cover Data

Scientific Name	Common Name	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Grass: Annual Native																																					
Munroa squarrosa	false buffalograss			p																		p				p						p				p	
Vulpia octoflora	sixweeks fescue																															1					
Subtotal				p																		p				p						1				p	
Grass: Annual Introduced																																					
Bromus tectorum	cheatgrass	p		p				p										p								p				p						p	
Subtotal		p		p				p										p								p				p						p	
Grass: Perennial Desirable (Cool)																																					
Achnatherum hymenoides	Indian ricegrass							p																						p							
Agropyron cristatum	crested wheatgrass																	p																			
Hesperostipa comata	needle and thread																			p																	
Subtotal								p										p		p										p							
Grass: Perennial Desirable (Warm)																																					
Andropogon hallii	sand bluestem	p		1				1		1				1		p		1		2		2		2		p		1		3		1		p		2	
Bouteloua curtipendula	sideoats grama					p																1		p				p				p					
Bouteloua gracilis	blue grama	p				p		p		p				p		p		1		p		p		1		p		1				1		1		2	
Calamovilfa longifolia	prairie sandreed	10		4		9		4		3		p		11		3		4		11		7		10		6		9		6		8		5		4	
Panicum virgatum	switchgrass																					1		p						1							p
Sporobolus airoides	alkali sacaton			p								3												2										1			
Sporobolus cryptandrus	sand dropseed	p		1		p		2		3		p		3		4		p		p		2		p		p		p		5	1	2		1		p	
Subtotal		10		6		9		7		7		3		15		7		6		13		13		15		6		11		15	1	12		8		8	
Total Grass Cover		**10**	**0**	**6**	**0**	**9**	**0**	**7**	**0**	**7**	**0**	**3**	**0**	**15**	**0**	**7**	**0**	**6**	**0**	**13**	**0**	**13**	**0**	**15**	**0**	**6**	**0**	**11**	**0**	**15**	**1**	**13**	**0**	**8**	**0**	**8**	**0**
Forbs: Annual & Biennial Native																																					
Amaranthus retroflexus	redroot amaranth	p		2				1		p		6		p		1		p		2		p		p		p				p		p		p		p	
Chenopodium leptophyllum	narrowleaf goosefoot									p														p													
Conyza canadensis	Canadian horseweed			p								p		p						p				p		p											
Helianthus annuus	common sunflower			p				p		2		p						p						2		p		p				p				p	
Machaeranthera canescens	hoary tansyaster					p																															
Subtotal		p		2		p		1		2		6		p		1		p		2		p		2		p		p		p		p		p		p	
Forbs: Annual & Biennial Introduced																																					
Ambrosia artemisiifolia	annual ragweed			p																																	
Bassia scoparia	burningbush	p				p												p																		p	
Lactuca serriola	prickly lettuce			p						p		p								p				p		p				p						p	
Melilotus officinalis	sweetclover																																			p	
Salsola tragus	prickly Russian thistle	3		2		6		6		5		6		4		6		4				2				2				3		1		4		2	
Subtotal		3		2		6		6		5		6		4		6		4		p		2		p		2				3		1		4		2	

Reclamation Area 31 Vegetation Cover Data (continued)

Scientific Name	Common Name	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Forbs: Perennial Native																																					
Ambrosia psilostachya	Cuman ragweed			p								p						p						1		1										p	
Asclepias speciosa	showy milkweed													p																							
Mirabilis hirsuta	hairy four o'clock																																				
Physalis hispida	prairie groundcherry	p						p		1				p																						1	
Subtotal		p		p				p		1		p		p				p						1		1										1	
Total Forb Cover		3	0	4	0	6	0	7	0	8	0	12	0	4	0	7	0	4	0	2	0	2	0	3	0	3	0	0	0	3	0	1	0	4	0	3	0
Subshrubs/Shrubs/Succulents: Perennial Native																																					
Artemisia filifolia	sand sagebrush					1								1										p								p					
Yucca glauca	soapweed yucca											p																									
Opuntia phaeacantha	tulip pricklypear			p		p		p				p						p		p		p				p						p		p			
Subtotal				p		1		p				p		1				p		p		p		p		p						p		p			
Total Shrub Cover		0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rock																																					
Litter		18		15		26		18		17		17		21		22		31		29		25		25		33		35		18		26		30		23	
Bare Ground		19		25		8		18		18		18		9		14		9		6		10		7		8		4		14		10		8		16	
Total Hits		50	0	50	0	50	0	50	0	50	0	50	0	50	0	50	0	50	0	50	0	50	0	50	0	50	0	50	0	50	1	50	0	50	0	50	0
Total Vegetation Cover		26	0	20	0	32	0	28	0	30	0	30	0	40	0	28	0	20	0	30	0	30	0	36	0	18	0	22	0	36	2	28	0	24	0	22	0
Non-Noxious Vegetation Cover		26	0	20	0	32	0	28	0	30	0	30	0	40	0	28	0	20	0	30	0	30	0	36	0	18	0	22	0	36	2	28	0	24	0	22	0
Total Ground Cover		62		50		84		64		64		64		82		72		82		88		80		86		84		92		72		80		84		68	
Allowable Vegetation Cover		21.1		15.1		27.1		23.1		25.1		25.1		35.1		23.1		15.1		25.1		25.1		31.1		13.1		17.1		31.1		23.1		19.1		17.1	

Non-Noxious Annual Cover	7.6
Excess Annual Cover	4.9

Reclamation Area 31 Vegetation Cover Data

Scientific Name	Common Name	19 1	19 2	20 1	20 2	21 1	21 2	Total Hits 1st	Total Hits All	Absolute Cover (%)	Relative Cover (%)	Relative Cover (%)
Grass: Annual Native												
Munroa squarrosa	false buffalograss	p		p				0	0	0.0	0.0	0.0
Vulpia octoflora	sixweeks fescue							1	1	0.1	0.3	0.3
Subtotal		p		p				1	1	0.1	0.3	0.3
Grass: Annual Introduced												
Bromus tectorum	cheatgrass					p		0	0	0.0	0.0	0.0
Subtotal						p		0	0	0.0	0.0	0.0
Grass: Perennial Desirable (Cool)												
Achnatherum hymenoides	Indian ricegrass							0	0	0.0	0.0	0.0
Agropyron cristatum	crested wheatgrass							0	0	0.0	0.0	0.0
Hesperostipa comata	needle and thread							0	0	0.0	0.0	0.0
Subtotal								0	0	0.0	0.0	0.0
Grass: Perennial Desirable (Warm)												
Andropogon hallii	sand bluestem	p		3		p		21	21	2.0	7.3	7.3
Bouteloua curtipendula	sideoats grama							1	1	0.1	0.3	0.3
Bouteloua gracilis	blue grama	1		p		1		9	9	0.9	3.1	3.1
Calamovilfa longifolia	prairie sandreed	8		6		8		136	136	13.0	47.1	47.1
Panicum virgatum	switchgrass					p		2	2	0.2	0.7	0.7
Sporobolus airoides	alkali sacaton	3						9	9	0.9	3.1	3.1
Sporobolus cryptandrus	sand dropseed			1				24	25	2.3	8.7	8.7
Subtotal		12		10		9		202	203	19.2	70.2	70.2
Total Grass Cover		**12**	**0**	**10**	**0**	**9**	**0**	**203**	**204**	**19.3**	**70.6**	**70.6**
Forbs: Annual & Biennial Native												
Amaranthus retroflexus	redroot amaranth	p		1				13	13	1.2	4.5	4.5
Chenopodium leptophyllum	narrowleaf goosefoot							0	0	0.0	0.0	0.0
Conyza canadensis	Canadian horseweed	p						0	0	0.0	0.0	0.0
Helianthus annuus	common sunflower	p		p				4	4	0.4	1.4	1.4
Machaeranthera canescens	hoary tansyaster							0	0	0.0	0.0	0.0
Subtotal		p		1				17	17	1.6	5.9	5.9
Forbs: Annual & Biennial Introduced												
Ambrosia artemisiifolia	annual ragweed							0	0	0.0	0.0	0.0
Bassia scoparia	burningbush					p		0	0	0.0	0.0	0.0
Lactuca serriola	prickly lettuce			p				0	0	0.0	0.0	0.0
Melilotus officinalis	sweetclover							0	0	0.0	0.0	0.0
Salsola tragus	prickly Russian thistle	3		3		p		62	62	5.9	21.5	21.5
Subtotal		3		3		p		62	62	5.9	21.5	21.5

Reclamation Area 31 Vegetation Cover Data (continued)

Scientific Name	Common Name	19 1	19 2	20 1	20 2	21 1	21 2	Total Hits 1st	Total Hits All	Absolute Cover (%)	Relative Cover (%)	Relative Cover (%)
Forbs: Perennial Native												
Ambrosia psilostachya	Cuman ragweed			p		p		2	2	0.2	0.7	0.7
Asclepias speciosa	showy milkweed							0	0	0.0	0.0	0.0
Mirabilis hirsuta	hairy four o'clock	p						0	0	0.0	0.0	0.0
Physalis hispida	prairie groundcherry							2	2	0.2	0.7	0.7
Subtotal		p		p		p		4	4	0.4	1.4	1.4
Total Forb Cover		**3**	**0**	**4**	**0**	**0**	**0**	**83**	**83**	**7.9**	**28.7**	**28.7**
Subshrubs/Shrubs/Succulents: Perennial Native												
Artemisia filifolia	sand sagebrush							2	2	0.2	0.7	0.7
Yucca glauca	soapweed yucca	p						0	0	0.0	0.0	0.0
Opuntia phaeacantha	tulip pricklypear			p		p		0	0	0.0	0.0	0.0
Subtotal		p		p		p		2	2	0.2	0.7	0.7
Total Shrub Cover		**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0.2**	**0.7**	**0.7**
Rock								0	0	0.0		
Litter		18		18		32		497	497	47.3		
Bare Ground		17		18		9		265	265	25.2		
Total Hits		50	0	50	0	50	0	1050	1051	100.0		
Total Vegetation Cover		**30**	**0**	**28**	**0**	**18**	**0**			**27.4**	**100.0**	**100.0**
Non-Noxious Vegetation Cover		**30**	**0**	**28**	**0**	**18**	**0**			**27.4**		
Total Ground Cover		**66**		**64**		**82**				**74.8**		
Allowable Vegetation Cover		**25.1**		**23.1**		**13.1**				**22.6**		

Non-Noxious Annual Cover	7.6
Excess Annual Cover	4.9

Reclamation Area 32 Vegetation Cover Data

Scientific Name	Common Name	1	2	3	4	5	6	7	8	9	10	Total Hits	Absolute Cover (%)	Relative Cover (%)	Relative Cover (%)
		1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1st All			
Grass: Annual Native															
Munroa squarrosa	false buffalograss	p				p		p	p			0 0	0.0	0.0	0.0
Subtotal		p				p		p	p			0 0	0.0	0.0	0.0
Grass: Annual Introduced															
Bromus tectorum	cheatgrass		p	p	1		1	p		1	p	3 3	0.6	2.6	
Subtotal			p	p	1		1	p		1	p	3 3	0.6	2.6	
Grass: Perennial Desirable (Cool)															
Achnatherum hymenoides	Indian ricegrass				p						p	0 0	0.0	0.0	0.0
Pascopyrum smithii	western wheatgrass			p		p					p	0 0	0.0	0.0	0.0
Subtotal				p	p	p					p	0 0	0.0	0.0	0.0
Grass: Perennial Desirable (Warm)															
Bouteloua curtipendula	sideoats grama	p			p	p	p					0 0	0.0	0.0	0.0
Bouteloua gracilis	blue grama	4 1	1	p	1	2	p	6	2	p 1	3 1	19 22	3.8	19.0	19.5
Calamovilfa longifolia	prairie sandreed	9 1	1	1	7	9 2	3 1	4	8 3	5 3	10 2	57 69	11.4	59.5	61.1
Panicum virgatum	switchgrass	p				p		p		p		0 0	0.0	0.0	0.0
Schizachyrium scoparium	little bluestem								1			1 1	0.2	0.9	0.9
Sorghastrum nutans	Indiangrass	p	p	p						p	p	0 0	0.0	0.0	0.0
Sporobolus cryptandrus	sand dropseed	p			p	1	p		p	p	p	1 1	0.2	0.9	0.9
Subtotal		13 2	2	1	8	12 2	3 1	10	11 3	5 4	13 3	78 93	15.6	80.2	82.3
Total Grass Cover		13 2	2 0	1 0	9 0	12 2	4 1	10 0	11 3	6 4	13 3	81 96	16.2	82.8	85.0
Forbs: Annual & Biennial Native															
Amaranthus retroflexus	redroot amaranth	p				p	p	p	p	p	p	0 0	0.0	0.0	0.0
Conyza canadensis	Canadian horseweed					p						0 0	0.0	0.0	0.0
Helianthus annuus	common sunflower			p	p					p	p	0 0	0.0	0.0	0.0
Subtotal		p		p	p	p	p	p	p	p	p	0 0	0.0	0.0	0.0
Forbs: Annual & Biennial Introduced															
Lactuca serriola	prickly lettuce							p				0 0	0.0	0.0	0.0
Salsola tragus	prickly Russian thistle		4	7	3	p	2	1	1	p	1	19 19	3.8	16.4	16.8
Subtotal			4	7	3	p	2	1	1	p	1	19 19	3.8	16.4	16.8
Forbs: Perennial Native															
Ambrosia psilostachya	Cuman ragweed										1	1 1	0.2	0.9	0.9
Subtotal											1	1 1	0.2	0.9	0.9
Total Forb Cover		0 0	4 0	7 0	3 0	0 0	2 0	1 0	1 0	0 0	2 0	20 20	4.0	17.2	17.7
Subshrubs/Shrubs/Succulents: Perennial Native															
Opuntia phaeacantha	tulip prickypear		p									0 0	0.0	0.0	0.0
Subtotal			p									0 0	0.0	0.0	0.0
Total Shrub Cover		0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0.0	0.0	0.0
Rock												0 0	0.0		
Litter		35	28	26	29	31	24	30	33	38	27	301 301	60.2		
Bare Ground		2	16	16	9	7	20	9	5	6	8	98 98	19.6		
Total Hits		50 2	50 0	50 0	50 0	50 2	50 1	50 0	50 3	50 4	50 3	500 515	100.0		
Total Vegetation Cover		26 4	12 0	16 0	24 0	24 4	12 2	22 0	24 6	12 8	30 6		20.2	100.0	100.0
Non-Noxious Vegetation Cover		26 4	12 0	16 0	22 0	24 4	10 2	22 0	24 6	10 8	30 6		19.6		
Total Ground Cover		96	68	68	82	86	60	82	90	88	84		80.4		
Allowable Vegetation Cover		24.2	10.2	14.2	20.2	22.2	8.2	20.2	22.2	8.2	28.2		17.8		

Non-Noxious Annual Cover	3.8
Excess Annual Cover	1.8

Reclamation Area 33 Vegetation Cover Data

Scientific Name	Common Name	1	2	3	4	5	6	7	8	9	10	Total Hits	Absolute Cover (%)	Relative Cover (%)	Relative Cover (%)
		1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1∝ All			
Grass: Annual Native															
Munroa squarrosa	false buffalograss									p		0 0	0.0	0.0	0.0
Subtotal										p		0 0	0.0	0.0	0.0
Grass: Annual Introduced															
Bromus tectorum	cheatgrass			p		p	p	p		p	p	0 0	0.0	0.0	0.0
Subtotal				p		p	p	p		p	p	0 0	0.0	0.0	0.0
Grass: Perennial Desirable (Cool)															
Achnatherum hymenoides	Indian ricegrass									1		1 1	0.2	0.9	0.9
Agropyron cristatum	crested wheatgrass	p									p	0 0	0.0	0.0	0.0
Pascopyrum smithii	western wheatgrass									3		3 3	0.6	2.6	2.6
Subtotal		p								4	p	4 4	0.8	3.5	3.5
Grass: Perennial Desirable (Warm)															
Andropogon hallii	sand bluestem									p		0 0	0.0	0.0	0.0
Bouteloua gracilis	blue grama	p	3	1	2 1	2	2 1	p	8	1	4	23 25	4.6	21.7	21.7
Calamovilfa longifolia	prairie sandreed	15 4	8 1	5	4	3 2	7	6 2	6 1	7 1	4	65 76	13.0	66.1	66.1
Panicum virgatum	switchgrass		p		2	1		p	p		p	3 3	0.6	2.6	2.6
Schizachyrium scoparium	little bluestem								p			0 0	0.0	0.0	0.0
Sorghastrum nutans	Indiangrass			p	1	1	p		p		1	3 3	0.6	2.6	2.6
Sporobolus cryptandrus	sand dropseed	p		p		1	1 1	p	p	p	p 1	2 4	0.4	3.5	3.5
Subtotal		15 4	11 1	6	9 1	8 2	10 2	6 2	14 1	8 1	9 1	96 111	19.2	96.5	96.5
Total Grass Cover		**15 4**	**11 1**	**6 0**	**9 1**	**8 2**	**10 2**	**6 2**	**14 1**	**12 1**	**9 1**	**100 115**	**20.0**	**100.0**	**100.0**
Forbs: Annual & Biennial Native															
Helianthus annuus	common sunflower									p		0 0	0.0	0.0	0.0
Subtotal										p		0 0	0.0	0.0	0.0
Forbs: Annual & Biennial Introduced															
Bassia scoparia	burningbush	p										0 0	0.0	0.0	0.0
Salsola tragus	prickly Russian thistle	p	p							p		0 0	0.0	0.0	0.0
Subtotal		p	p							p		0 0	0.0	0.0	0.0
Forbs: Perennial Native															
Physalis hispida	prairie groundcherry										p	0 0	0.0	0.0	0.0
Subtotal											p	0 0	0.0	0.0	0.0
Forbs: Perennial Introduced															
Convolvulus arvensis	field bindweed			p								0 0	0.0	0.0	0.0
Subtotal				p								0 0	0.0	0.0	0.0
Total Forb Cover		**0 0**	**0 0**	**0 0**	**0 0**	**0 0**	**0 0**	**0 0**	**0 0**	**0 0**	**0 0**	**0 0**	**0.0**	**0.0**	**0.0**
Rock												0 0	0.0		
Litter		32	36	42	36	26	34	41	33	27	39	346 346	69.2		
Bare Ground		3	3	2	5	16	6	3	3	11	2	54 54	10.8		
Total Hits		50 4	50 1	50 0	50 1	50 2	50 2	50 2	50 1	50 1	50 1	500 515	100.0		
Total Vegetation Cover		**30 8**	**22 2**	**12 0**	**18 2**	**16 4**	**20 4**	**12 4**	**28 2**	**24 2**	**18 2**		**20.0**	**100.0**	**100.0**
Non-Noxious Vegetation Cover		**30 8**	**22 2**	**12 0**	**18 2**	**16 4**	**20 4**	**12 4**	**28 2**	**24 2**	**18 2**		**20.0**		
Total Ground Cover		**94**	**94**	**96**	**90**	**68**	**88**	**94**	**94**	**78**	**96**		**89.2**		
Allowable Vegetation Cover		**30.0**	**22.0**	**12.0**	**18.0**	**16.0**	**20.0**	**12.0**	**28.0**	**24.0**	**18.0**		**20.0**		

Non-Noxious Annual Cover	0.0
Excess Annual Cover	0.0

Reclamation Area 34 Vegetation Cover Data

Scientific Name	Common Name	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Grass: Annual Introduced																																					
Bromus tectorum	cheatgrass	p																																			
Subtotal		p																																			
Grass: Perennial Desirable (Cool)																																					
Achnatherum hymenoides	Indian ricegrass			1		p																		p						p							
Agropyron cristatum	crested wheatgrass																			1																		
Cyperus schweinitzii	Schweinitz's flatsedge					p				p		p		p																								
Hesperostipa comata	needle and thread																															1						
Pascopyrum smithii	western wheatgrass																																					
Thinopyrum intermedium	intermediate wheatgrass																	p																			
Subtotal				1		p				p		p		p				p		1				p						p		1					
Grass: Perennial Desirable (Warm)																																					
Andropogon hallii	sand bluestem	p		p						1				p				2		p				p	1	1											
Aristida purpurea	purple threeawn																							p													
Bouteloua curtipendula	sideoats grama					p								p		p				1																	
Bouteloua dactyloides	buffalograss																																				
Bouteloua gracilis	blue grama	1		p		p		1		1		1		p		1		p		p		1		p		p		p		p	1	p		p		p	
Calamovilfa longifolia	prairie sandreed	1	1			2				1		p		p				9	1	p								1				p		4			
Panicum virgatum	switchgrass					p																															
Schizachyrium scoparium	little bluestem			2						p								p		p				p		p											
Sorghastrum nutans	Indiangrass			p														1																			
Sporobolus cryptandrus	sand dropseed	2		3		p		1	1	2		4		p		2				p		3	1	4		2		1		1		6		p		2	1
Subtotal		4	1	5		2		2	1	5		5		p		3		12	1	1		4	1	4	1	3		2		1	1	6		4		2	1
Total Grass Cover		**4**	**1**	**6**	**0**	**2**	**0**	**2**	**1**	**5**	**0**	**5**	**0**	**0**	**0**	**3**	**0**	**12**	**1**	**2**	**0**	**4**	**1**	**4**	**1**	**3**	**0**	**2**	**0**	**1**	**1**	**7**	**0**	**4**	**0**	**2**	**1**
Forbs: Annual & Biennial Native																																					
Ambrosia acanthicarpa	flatspine bur ragweed											p		3								p								1				p			
Argemone polyanthemos	crested pricklypoppy							p																		p											
Croton texensis	Texas croton			p								p		p		1						p				p				p				p		p	
Dysphania graveolens	fetid goosefoot													1		p				p								p		1				3			
Helianthus annuus	common sunflower	p		3	1	1		3		1		9		4		9		p		2		11		6		1		2		2		2		4		6	
Machaeranthera sp.	tansyaster			p						p																p		p								1	
Subtotal		p		3	1	1		3		1		9		8		10		p		2		11		6		1		2		4		2		7		7	
Forbs: Annual & Biennial Introduced																																					
Lactuca serriola	prickly lettuce																					p															
Onopordum acanthium	Scotch cottonthistle											p																									
Salsola tragus	prickly Russian thistle	6		7	1	4	1	7		4		4		3		7	1	p		9		7	1	4		10		20	1	13		6		4		p 9	
Subtotal		6		7	1	4	1	7		4		4		3		7	1	p		9		7	1	4		10		20	1	13		6		4		9	

Reclamation Area 34 Vegetation Cover Data (continued)

Scientific Name	Common Name	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Forbs: Perennial Native																																			
Ambrosia psilostachya	Cuman ragweed	p												p										p		p									
Psoralidium tenuiflorum	slimflower scurfpea																													p					
Physalis hispida	prairie groundcherry																									p						1			
Symphyotrichum falcatum	white prairie aster																															p		2	
Rumex venosus	veiny dock																																		
Subtotal		p												p										p		p				p			1		2
Total Forb Cover		6	0	10	2	5	1	10	0	5	0	13	0	11	0	17	1	0	0	11	0	18	1	10	0	11	0	22	1	17	0	8	0	12	0	18	0
Subshrubs/Shrubs/Succulents: Perennial Native																																			
Artemisia filifolia	sand sagebrush																																		
Yucca glauca	soapweed yucca																															p			
Opuntia phaeacantha	tulip pricklypear	p														p		p														p			
Subtotal		p														p		p														p			
Total Shrub Cover		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rock																																			
Litter		27		17		15		23		16		15		9		14		36		8		16		24		21		9		10		19		8		11	
Bare Ground		13		17		28		15		24		17		30		16		2		29		12		12		15		17		22		16		26		19	
Total Hits		50	1	50	2	50	1	50	1	50	0	50	0	50	0	50	1	50	1	50	0	50	2	50	1	50	0	50	1	50	1	50	0	50	0	50	1
Total Vegetation Cover		20	2	32	4	14	2	24	2	20	0	36	0	22	0	40	2	24	2	26	0	44	4	28	2	28	0	48	2	36	2	30	0	32	0	40	2
Non-Noxious Vegetation Cover		20	2	32	4	14	2	24	2	20	0	36	0	22	0	40	2	24	2	26	0	44	4	28	2	28	0	48	2	36	2	30	0	32	0	40	2
Total Ground Cover		74		66		44		70		52		66		40		68		96		42		76		76		70		66		56		68		48		62	
Allowable Vegetation Cover		1.7		13.7		0.0		5.7		1.7		17.7		3.7		21.7		5.7		7.7		25.7		9.7		9.7		29.7		17.7		11.7		13.7		21.7	

Non-Noxious Annual Cover	21.2
Excess Annual Cover	18.3