



Alton Coal Development, LLC

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C/025/0005
Received 12/16/15
Task ID #5055

December 16, 2015

Daron R. Haddock
Coal Program Manager
Oil, Gas & Mining
1594 West North Temple, Suite 1210
Salt Lake City, UT 84114-5801

Subject: **2015 Sage-grouse Population Monitoring and Habitat Improvement report**
Alton Coal Development, LLC, Coal Hollow Project, Kane County, Utah, C/025/0005

Dear Mr. Haddock,

Please find enclosed the "Greater Sage-grouse Population Monitoring and Habitat Improvement Alton – Sink Valley, Utah" for report year 2015. Alton Coal Development is submitting the enclosed report for inclusion into the MRP.

Upon acceptance two clean copies will be sent to be processed for inclusion into the MRP. Please do not hesitate to contact me if you have any questions 435-691-1551.

Sincerely

B. Kirk Nicholes
Environmental Specialist

APPLICATION FOR COAL PERMIT PROCESSING

Permit Change New Permit Renewal Exploration Bond Release Transfer

Permittee: Alton Coal Development, LLC

Mine: Coal Hollow Mine

Permit Number:

C/025/0005

Title: 2015 Annual Sage-grouse Progress Report

Description, Include reason for application and timing required to implement:

Instructions: If you answer yes to any of the first eight questions, this application may require Public Notice publication.

- Yes No 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: _____ increase decrease.
- Yes No 2. Is the application submitted as a result of a Division Order? DO# _____
- Yes No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
- Yes No 4. Does the application include operations in hydrologic basins other than as currently approved?
- Yes No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
- Yes No 6. Does the application require or include public notice publication?
- Yes No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
- Yes No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
- Yes No 9. Is the application submitted as a result of a Violation? NOV # _____
- Yes No 10. Is the application submitted as a result of other laws or regulations or policies?
Explain: _____

- Yes No 11. Does the application affect the surface landowner or change the post mining land use?
- Yes No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
- Yes No 13. Does the application require or include collection and reporting of any baseline information?
- Yes No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
- Yes No 15. Does the application require or include soil removal, storage or placement?
- Yes No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
- Yes No 17. Does the application require or include construction, modification, or removal of surface facilities?
- Yes No 18. Does the application require or include water monitoring, sediment or drainage control measures?
- Yes No 19. Does the application require or include certified designs, maps or calculation?
- Yes No 20. Does the application require or include subsidence control or monitoring?
- Yes No 21. Have reclamation costs for bonding been provided?
- Yes No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
- Yes No 23. Does the application affect permits issued by other agencies or permits issued to other entities?
- Yes No 24. Does the application include confidential information and is it clearly marked and separated in the plan?

Please attach three (3) review copies of the application. If the mine is on or adjacent to Forest Service land please submit four (4) copies, thank you. (These numbers include a copy for the Price Field Office)

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

B. Kirk Nicholes Environmental Specialist 12/16/2015

B. Kirk Nicholes
Signature (Right-click above choose certify then have notary sign below)

Subscribed and sworn to before me this 16 day of December, 2015

Notary Public Marty Nicholes, state of Utah.

My commission Expires: 9-11-2017

Commission Number: 670359

Address: 1670 E Millstone Cir

City: Endech State: UT Zip: 84721

} ss:
}
}



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Assigned Tracking Number:

Received by Oil, Gas & Mining

APPLICATION FOR COAL PERMIT PROCESSING

Detailed Schedule Of Changes to the Mining And Reclamation Plan

Permittee: Alton Coal Development, LLC
Mine: Coal Hollow Mine **Permit Number:** C/025/0005
Title: 2015 Annual Sage-grouse Progress Report

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
<input checked="" type="checkbox"/>	Add	<input type="checkbox"/>	MRP Vol. 2, Chapter 3, End of Appendix 3-6
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	Received by Oil, Gas & Mining
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Greater Sage-grouse Population Monitoring and Habitat Improvement

Alton - Sink Valley, Utah



Progress Report

For

Alton Coal Development, LLC

November 24, 2015

Prepared by
Steven L. Petersen, Ph.D.
Sage-grouse Population and Habitat Consultant

Greater Sage-grouse Population Monitoring and Habitat Improvement Alton – Sink Valley, Utah

Progress Report for Year 2014-2015

Steven L. Petersen, Ph.D., Consultant

Introduction and Background

In the Alton/Sink Valley area, greater sage-grouse (*Centrocercus urophasianus*) occupy areas that have a long and rich history of wildlife habitat use and human-related activity. In these areas, birds occupy sagebrush habitats that are shared with local residents for livestock grazing, farming, development, and hunting. In 2010, Alton Coal Development (ACD) initiated mining operations in Sink Valley, extracting and exporting coal for energy production in Delta, Utah.

Greater sage-grouse conservation in the Alton/Sink Valley area is a priority for ACD which focuses on maintaining healthy sage-grouse population structure and habitat in association with sustainable mining operations. Improvements to sage-grouse habitats have included reclamation of mine-related disturbances, improvement of sagebrush habitats by disking overly dense sagebrush stands, and removing pinyon-juniper trees to extend sagebrush communities and increase habitat use potential (Baruch-Mordo et al. 2013, Braun et al. 1977, Doherty et al. 2008).

A summary of sage-grouse population monitoring and habitat conservation for 2015 are listed. A more detailed description of each item is contained within the report.

1. Observed a minimum average of 40 birds each month during non-breeding months during 2015. This can be compared to 44 and 28 birds observed in 2013 and 2014, respectively.
2. ACD employees made 48 observations of birds within the immediate mining area, including inside mining pits and trenches.
3. DWR reported 12 strutting males in spring 2015. Petersen observed 14 strutting males on March 7th. These counts equal maximum counts reported since 2001.
4. Reclaimed spoils pile exhibited high perennial grass density (29.9 plants/m²), consisting predominantly of seeded perennial grasses (western and slender wheatgrass). This facilitates early succession of intended sagebrush dominated communities.
5. Analyzed wet meadow plant species composition, frequency, cover and density which demonstrate a similar structure that would be expected for this habitat type (located east of the mine).
6. Wildlife Services removed approximately 250 ravens and 16 coyotes.

7. Completed Sagebrush reduction treatments within the Conservation Area to improve potential nesting and brood rearing habitat.
8. Using a backpack sprayer, applied herbicide to reduce residual rabbitbrush and enhance sagebrush recover in an area that was initially treated in 2012 to improve habitat east of mine in Water Canyon.
9. Cleaned-up PJ slash piles within the 355 acre habitat mitigation area located west of the mine (Sagebrush Flat area).

Report Objectives

The purpose of this report is to present the accomplishments and sage-grouse conservation efforts that were completed during the 2014-2015 period. This includes results of the sage-grouse monitoring program, data collection and assessment of reclamation efforts, additional habitat improvements, and predator control.

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1. Sage-grouse Population Monitoring

1.1 Employee Observations and Sage-grouse Population Monitoring

Throughout the year, all casual (incidental) observations of sage-grouse by mine employees are reported to Kirk Nicholes (ACD Environmental Manager). Observations are reported from all mine employees regardless of work assignments or responsibilities. Examples of reports include birds observed on disturbed sites (scraped or piled soils), along roadsides, or drinking from ponded water within the mine pit (Figure 1). While sighting locations may suggest spatio-temporal seasonal variability in sage-grouse occurrence within the mine footprint, differences in observation may also be due to periodic heightened awareness by employees rather than an increase in bird use activity or density.

Each mine employee is trained to identify sage-grouse and to report any sighting to Kirk when the observation is made. When Kirk receives an employee sighting report, he identifies the coordinate location for that sighting and records this information in a logbook. The results of these sightings are used to assess population patterns and trends within the mining area (Table 1). For each employee report, Kirk maps the coordinate location for that sighting and the time the data was collected. This provides a record of sage-grouse population activity and habitat use within the Alton and Sink Valley areas directly associated with mining activities (Figure 2). To capture long-term employee observation patterns, Figure 3 represents all employee sightings over the past 3 years (2013-2015).

Comparing 2014 and 2015, employee observations have remained steady throughout the mining period (Figure 4). There are no detectable fluctuating patterns in mine site use between years and within each year.



Figure 1. Panoramic view of the disturbance created by mining activities. Sage-grouse are often observed within this mining footprint. Each bird observed by employees is reported to the Environmental Manager who records these to identify locations visited by birds and to determine trends of site use over time.

Table 1. Observations of sage-grouse reported by ACD employees between October 2013 and December 2014 within the Alton/Sink Valley region.

Obs ID	Date	Time of observation	Number of birds Observed	Location	State Plane Coordinates
1	Oct. 23, 2014	10:00 am	15	Observed near the cattle guard west of pit #23 on the county road (Larry J.)	853952 E 1763318 N
2	Oct. 28, 2014	8:30 am	4	Birds observed watering in a puddle in the bottom of Pit #10 (Dave S.)	853660 E 1768738 N
3	Oct. 29, 2014	8:35 am	5	Flyover Pit #21 going east to west (Robert H.)	850419 E 1768636 N
4	Oct. 31, 2014	8:15 am	8	Observed in Pit #9 near opening of high-wall trench (Larry J.)	852478 E 1768449 N
5	Oct. 31, 2014	9:45 am	26	Observed at Pond #3 (Larry J.)	853337 E 1765536 N
6	Nov. 4, 2014	7:30 am	6	Observed east of Pit #21 (Dave S.)	850343 E 1768646 N
7	Nov. 5, 2014	7:50 am	5	Observed at topsoil stockpile #4 along haul road (Davey J.)	8534603 E 1768728 N
8	Nov. 11, 2014	8:00 am	1	Observed along ramp into the high-wall trench (Davey J.)	852544 E 1768365 N
9	Nov. 17, 2014	8:40 am	5	Observed at the NE corner of Pit #10 (Kirk N. and Joe K.)	853939 E 1769081 N
10	Nov. 21, 2014	10:00 am	5	Observed at topsoil stockpile #4 (Dave S.)	854636 E 1768648 N
11	Nov. 25, 2014	9:45 am	8	Flyover from north side of spoils pile to the west (Scott C.)	853767 E 1766635 N
12	Dec. 5, 2014	9:45 am	4	Observed east of high-wall trench. One flew toward Sorensen's property (Larry J.)	852108 E 1769043 N
13	Dec. 5, 2014	8:20 am	28	Observed by repeater east of high-wall trench #1 (Clark A.)	851610 E 1769100 N
14	Dec. 5, 2014	11:08 am	17	Observed at the cattle guard on the county road in the sagebrush flat area (Larry J.)	853938 E 1763369 N
15	Dec. 8, 2014	9:00 am	10	Observed at the SE corner of Pit #10 (Dave S.)	852433 E 1769152 N
16	Dec. 11, 2014	8:00 am	1	Observed at the ramp going into the high-wall trench (Davey J.)	852452 E 1768368 N
17	Dec. 12, 2014	8:10 am	10	Observed south of high-wall trench #1 near the drill (Rod R.)	851776 E 1768639 N
18	Dec. 24, 2014	4:45 pm	5	Observed at the elbow on the way home	816664 E 1758415 N
19	Dec. 26, 2014	8:10 am	5	Observed south of high-all trench #1 (Brycn D.)	851768 E 1768804 N
20	Dec. 27, 2014	6:15 pm	1	Flushed while seeding (Kevin H.)	849782 E 1768063 N
21	Feb. 1, 2015	8:27 am	1	Male observed strutting on the new lek (Kirk N.)	851183 E 1764433 N
22	Feb. 7, 2015	9:30 am	8	Males observed on the new lek. Several hens also observed in the area (Devin)	849408 E 1765602 N
23	Feb. 10, 2015	4:00 pm	3	Observed at the elbow on the way home (Brycn D.)	816665 E 1758507 N

Table 1 (continued).

Obs ID	Date	Time of observation	# of birds Observed	Location	UTM Coordinates
25	Feb. 18, 2015	9:40 am	1	Observed at the cattle guard located on the north end of the sagebrush flat (Kirk N. and Joe K.)	853989 E 1763379 N
26	Feb. 18, 2015	9:42 am	5	Males strutting on the new lek (Kirk N. and Joe K.)	849304 E 1765626 N
27	Feb. 20, 2015	9:53 am	3	Observed while setting up a pump at pond #3 (Davey J.)	853267 E 1765499 N
28	Mar. 20, 2015	7:00 am	7	Observed on south side of Pit #20 (Adam A.)	849747 E 1768215 N
29	Apr. 28, 2015	12:03 pm	6	Observed while putting in an aerial panel at the southern end of property near Pond #4 (Kirk N. and Joe K.)	848666 E 1769392 N
30	Apr. 29, 2015	10:20 am	1	Female with cps transmitter observed north of topsoil stockpile #4 (Drew C.)	854616 E 1768839 N
31	May, 13, 2015	7:40 am	9	One hen with 8 chicks observed at south straw pile (Riley A.)	850043 E 1768139 N
32	May. 20, 2015	10:30 am	1	One hen observed at the Dave Bonfire site (Joe K.)	852258 E 1769324 N
33	June 1, 2015	4:30 pm	5	One hen and 4 chicks observed at church house SE of high-wall trench #1 (Clark A. and Cody M.)	850995 E 1769023 N
34	June 8, 2015	9:40 am	6	One hen and 5 chicks observed on hill coming out of Pond #3	853414 E 1765847 N
35	June 16, 2015	11:00 am	2	Flyby from topsoil stockpile #4 heading NE (Joe K.)	854687 E 1768751 N
36	June 16, 2015	2:00 pm	3	Hens observed flying toward Pond #3 (Robert H.)	853319 E 1765455 N
37	June 22, 2015	10:45 am	5	One hen and 4 chicks observed at Pugh's Palace (Larry J. and Joe K.)	852484 E 1769574 N
38	June 26, 2015	1:15 pm	5	One hen and 4 chicks observed at Pugh's Palace (Cody M.)	852391 E 1769575 N
39	June 27, 2015	1:30 pm	5	One hen and 4 chicks observed at Pugh's Palace (Cody M.)	852474 E 1769675 N
40	July 30, 2015	---	6	Observed at south side of spoils pile (Riley A.)	852501 E 1766485 N
41	July 31, 2015	10:14 am	3	One hen and 2 chicks at Pugh's Palace	852382 E 1769652 N
42	July 31, 2015	10:38 am	5	Flushed from SP-22 (Kirk N.)	852380 E 1769910 N
43	Aug. 7, 2015	10:47 am	5	Flushed from Dames Gate to'pond (Kirk N.)	850338 E 1769288 N
44	Aug. 10, 2015	7:58 am	5	Observed just north of Well (Riley A.)	853964 E 1770182 N
45	Aug. 20, 2015	11:17 am	6	Flushed at Dames gate (Erik P., Joe K., Keneen S., and Kirk N.)	850418 E 1769288 N
46	Aug 31, 2015	8:00 am	4	Observed at the well (possibly juveniles; Cody M.)	853580 E 1770166 N
47	Sept. 3, 2015	9:00 am	6	Observed at the well (Cody M.)	853591 E 177010 N
48	Sept. 28, 2015	10:20 pm	2	Observed in field south of spoils pile (Scott C.)	852478 E 1706585 N

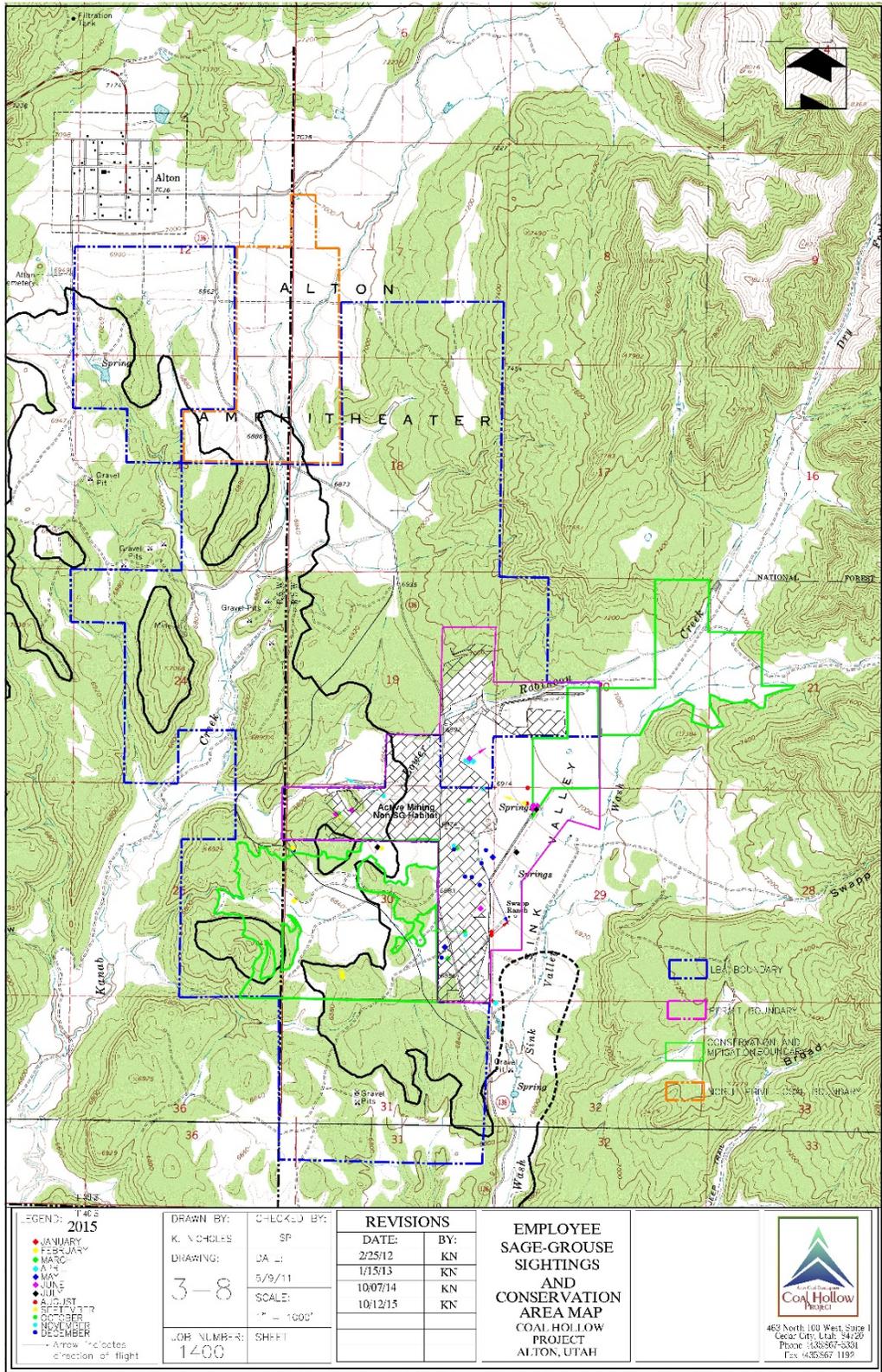


Figure 2. Location of sage-grouse observations made by ACD employees in 2015.

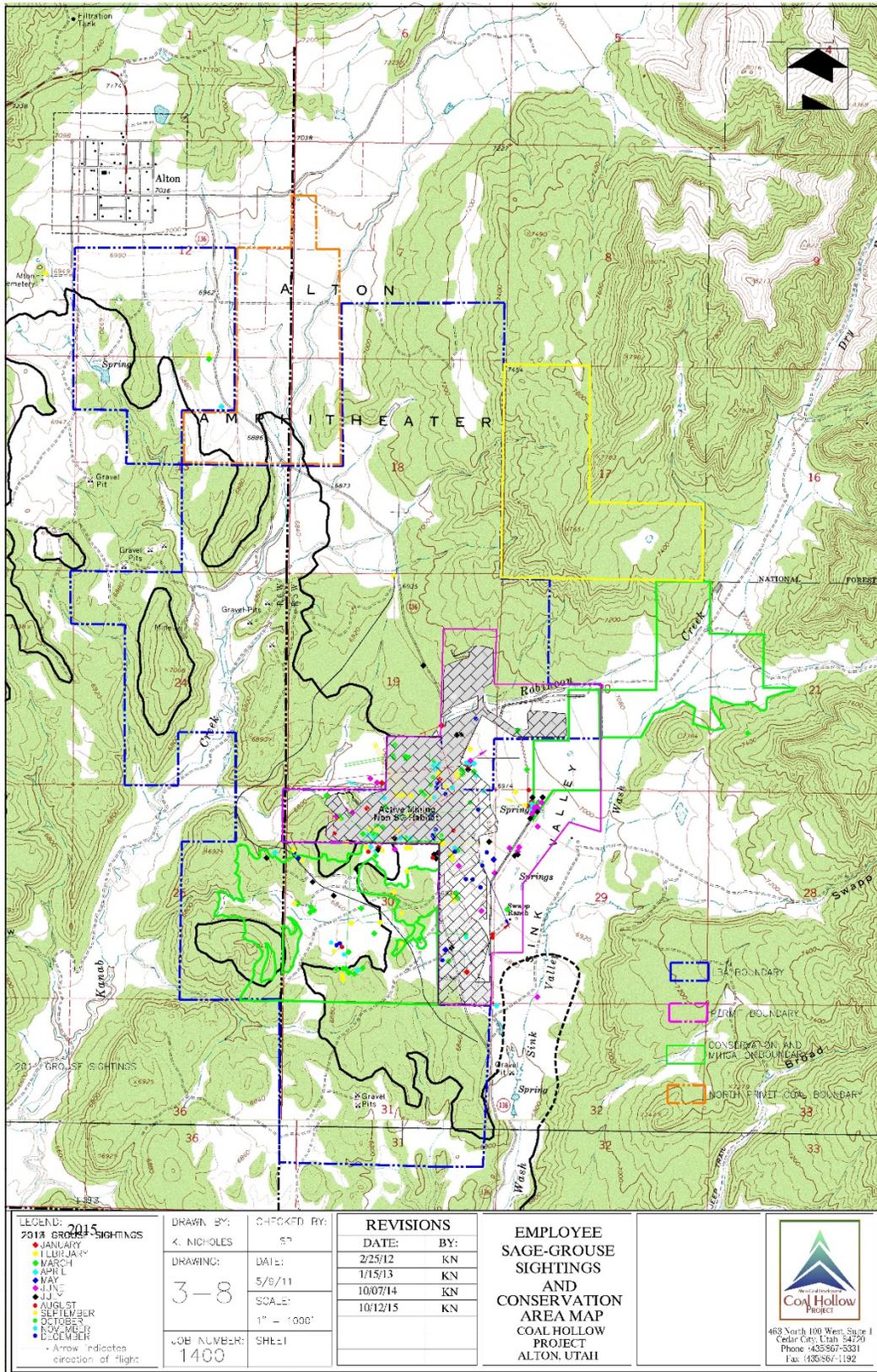


Figure 3. Combined employee sightings from 2013-2015.

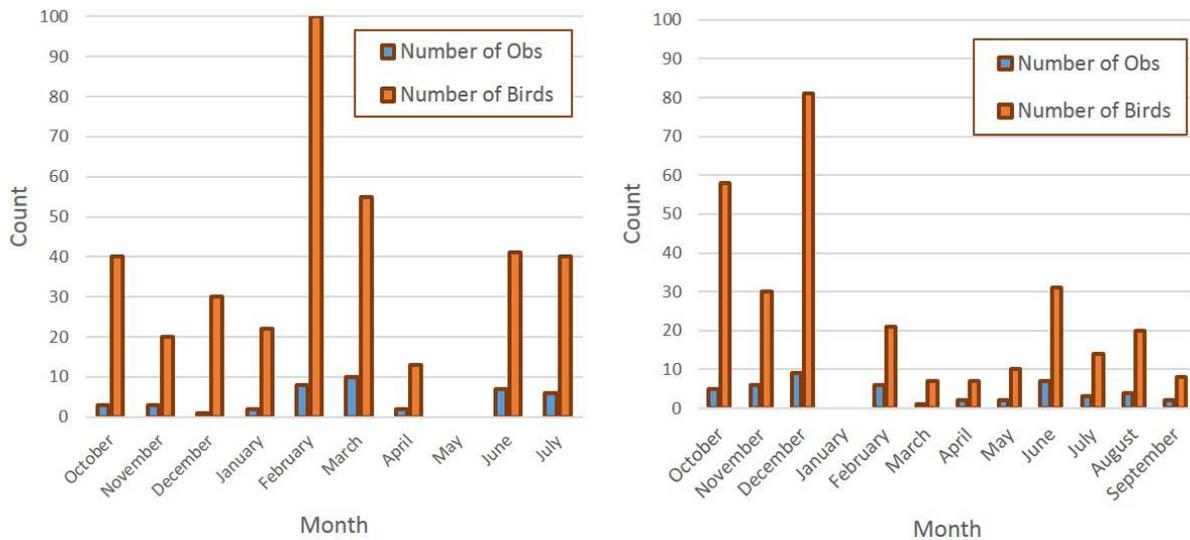


Figure 4. Employee sightings reported by month for 2014 (left) and 2015 (right). The “number of obs” reports how many times during each month employees reported bird observations. The “number of birds” reflects the total number of birds that were reported for those sightings. This number may include repeats that were seen from one day to the next. It is not a measure of bird densities for the mining area.

1.2 Sage-grouse Surveys

Each month during the non-breeding period, a survey was completed within sage-grouse habitats surrounding the mine site (conducted by Petersen). Habitats given priority were those dominated by sagebrush, primarily black and mountain big sagebrush (Figure 5). These surveys consisted of walking through each habitat along a pre-determined route (i.e. grid, transect) visually searching for any bird movement or flushes. Each time an individual bird or group of birds were observed, the coordinate position of the location where the bird was first sighted was obtained using GPS. Additionally, time of day and a decibel level (recorded during active mining periods) was also recorded. Dogs were not used to assist in locating birds. Sensitive habitats were not surveyed between March-June to avoid flushing hens from nests or disturbing hens with young chicks during early brood rearing.



Figure 5. Sage-grouse habitat on the east side of the mine (near the Conservation Area). Sage-grouse have been regularly observed in this area and closer to the active mine site located to the west.

During each survey, all areas where birds may be found were searched (Figure 6). These areas included 1) the sagebrush flat area 0.5 km south of the open coal pits (SF), 2) the new lekking area located at the top of the ridge at the south end of the sagebrush flat area, 3) the sagebrush patch located just south of the spoils pile (SMSP) and north of the spoils piles (NMSP), 4) the original lekking area (OL), 5) the wet meadow (WM) located in grass/rush/sedge community surrounding the well, 6) the sagebrush area immediately east of the open mine, 7) the conservation area east of the mine site (CA), and 8) Ford's Pasture located 10 miles south of Sink Valley.

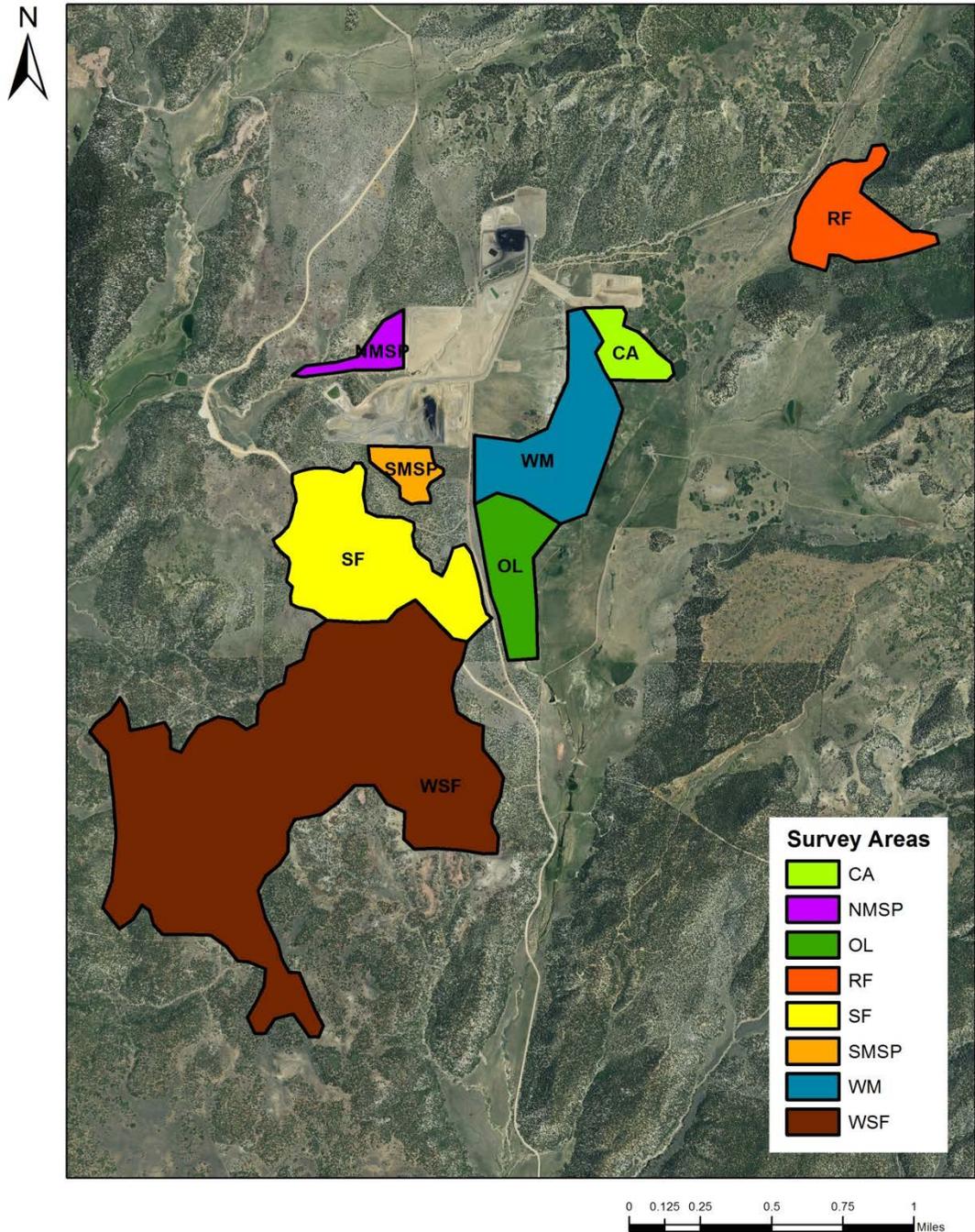


Figure 6. Location of survey areas for greater sage-grouse during the 2012-2014 monitoring seasons. CA = Conservation area, NMSP = North mine sagebrush patch, OL = Original lek, Rabbitbrush field, Sagebrush flat, SMSP = South mine sagebrush patch, WM = Wet meadow, and WSF = West sagebrush fields. Additional sites not shown above include the corridor (C) and the alfalfa fields (AF) south of Alton.

A summary of the results recorded for each monthly sage-grouse survey is provided in table 2. Figure 7 (map) shows the location for all sage-grouse sightings recorded during monthly surveys in the Alton/Sink Valley area (2014-2015) and displays bird observation locations by month. Of all sites observed, birds were most consistently found in the sagebrush flat area south of the mine (Figure 8) and in the region surrounding the conservation area (Figure 5). These sites are dominated by black sagebrush (*Artemisia nova* A. Nelson) and mountain big sagebrush (*Artemisia tridentata* Nutt. ssp. *vaseyana* (Rydb.) Beetle) with a diversity of associated perennial grasses and forbs. Detailed descriptions of plant community composition and structure in these areas can be found in vegetation reports prepared by Patrick Collins.

Sage-grouse are typically found in sagebrush dominated areas. While most adult habitat use has been detected within the sagebrush flat region, chicks and young juveniles have consistently been observed using habitat near the well on the east side of the mine (near the conservation area and in the lower sagebrush patch immediately adjacent to the active mining area east of the haul road).

On two different occasions, sage-grouse were observed in pinyon-juniper woodland areas. On several occasions sage-grouse would flush from sagebrush sites and then fly into woodland areas. In winter 2015, birds were observed in a pinyon juniper stand adjacent to the sagebrush flat, likely using this area for thermal cover and protection. Birds have been observed frequently in the bullhogged areas directly south of the new lek and west of the bullhog and southwest of the new lek.

Table 2. Observations from monthly surveys conducted by S.L. Petersen.

Date	Time of observation	Number of birds	Location
January 24, 2015	8 am-1 pm	23	Surveyed SF, MSP, HL, WM, CA, WSF, FP. Flushed 10 birds at the sagebrush flat on the first pass, 9 different birds in the same area further east. 5 birds in Fords Pasture, spotlighting.
March 7, 2015	7-9:18 am	46	Surveyed the historic lek (14 males). 26 birds observed at the SF (new lek) and 20 birds observed at FP (spotlight). 3 males strutting at FP during first light.
May 30, 2015	2:30-7:20 am	5	Surveyed Well, CA, Spoils Pile. Cursory survey, avoiding nesting habitat. Flushed 2 hens and 3 chicks near the well.
June 27, 2015	7-8:30 pm	12	Surveyed SF, MSP, HL, CA, and WM. Flushed 4 chicks with a hen near the well.
August 1, 2015	6:30–10 am	45	Spotlighted FP, observed no birds. Surveyed SF, MSP, HL, WM, NMSP, NL, and SB. Flushed 3 birds in SF and 8 in SB and 20 in the bowl at the west end of the bullhog area. Flushed 5 near the CA and 5 at the well.
September 7, 2015	7–11 am	43-56	Surveyed SF, NL, SB, MSP, SP, HL, WM, CA, NMSP, NL. Flushed 40 birds (or more) within the immediate SF region. Flushed 4 juveniles near the CA and adjacent to the mine area.
October 3, 2015	7–10 am	41	Surveyed SF, NL, SB, MSP, SP, HL, WM, CA, FP. Flushed 37 birds in the sagebrush flat area. Flushed 4 birds below the conservation area near the open mine pit and disturbance site.
October 31, 2015	8 am–1 pm	38	Surveyed SF, NL, SB, MSP, SP, HL, WM, CA, and FP. Flushed 25 birds from the sagebrush flat area. Flushed 6 birds from the area below the conservation area near the open mine pit. Flushed 7 birds from the MSP area.
November 28, 2015	11:30 pm – 1:30 am	13	Flushed from Ford’s Pastures using spotlight. Birds were in 6 groups ranging from 1-4 birds each.
	7-9 am	49	Surveyed SF, NL, SB, MSP, SP, HL, WM, CA, and FP. Flushed all 49 birds from SF. Flushed 29+ birds in NMSP which were likely the same birds flushed previously in the SF.

SF = sagebrush field located along the bypass haul road south of the mine, **MSP** = mine sagebrush patch located adjacent to (south) of the reclaimed area of pit #1, **HL** = historic lek located in Sink Valley, **FP** = Fords pasture located 10 miles south of the mine site, **SP** = Spoils Pile, **AF** = Alfalfa field, located immediately south of the town of Alton, **WSF** = West sagebrush fields located .5 to 1 mile west of SF, **C** = corridor between Alton and Hoyts Ranch, **WM** = wet meadow area located in close proximity to the well (pump) southwest of the conservation area, **CA** = conservation area, **NMSP** = North Mine Sagebrush Patch, **NL** = New lek located south of SF, **SB** = South Bullhog.

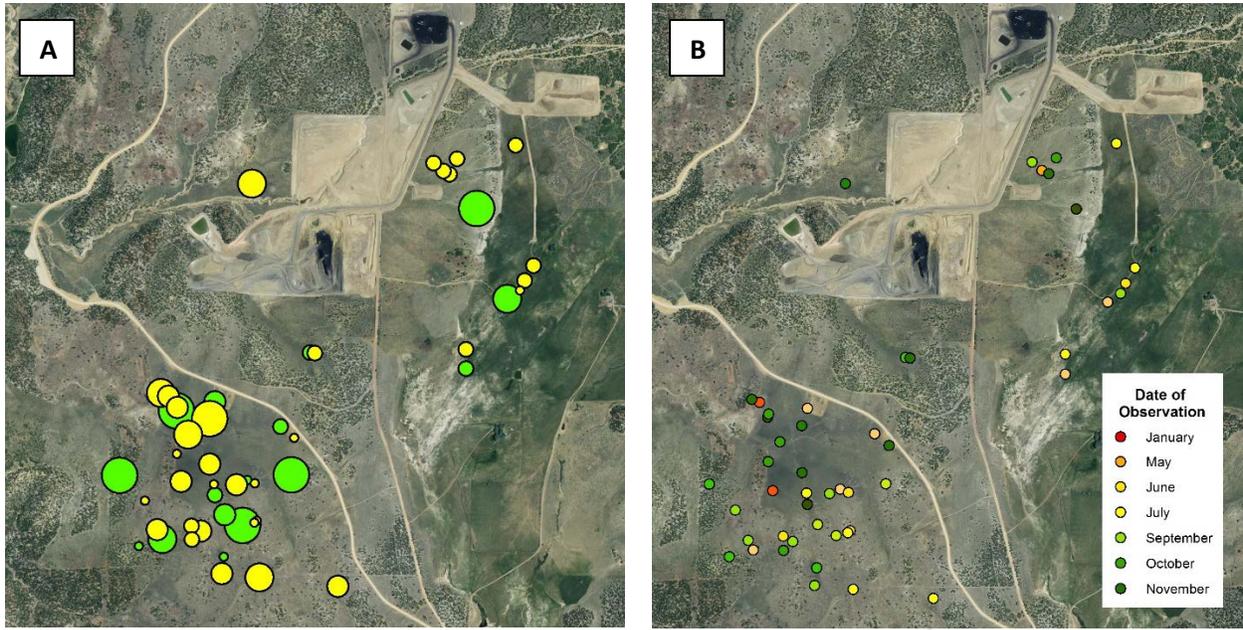


Figure 7. A) Location of greater sage-grouse during monthly field samples. Green points represent observations recorded in 2014 and yellow points are observations in 2015. The size of the dot is proportionate to the number of birds observed at that location (flock). B) Location of bird observations by month during non-breeding months for the 2014-15 survey period.



Figure 8. Sagebrush flat area, located southwest of the mine site. This area provides critical habitat for sage-grouse including lekking, nesting, brood rearing, and winter use.

1.3 GPS Collaring and Monitoring

During fall 2014, Dr. Nicki Frey obtained two GPS collars with funds provided ACD. One male and one hen were trapped and collared in the Alton area and saddled with a collar. Both birds have been monitored for over 1 year providing 3-4 point locations per day (approximately 1000 points each). This has made it possible to track bird movement in relation to mining over that time. Additionally, ACD assisted Dr. Frey and the BLM with trapping and collaring birds from the Sage Hen Hollow lek.

Results of the data collected from the Alton/Sink Valley GPS collared birds demonstrate similar movement patterns compared those recorded from the monthly surveys and employee sightings (Figure 9 and 10). According to Dr. Frey:

Kernel Density Estimates are those that depict the core area (50% "most dense" locations) and the general home range (95% of the locations). This analysis determined that more 75% percent of the location fell within the 50% core for each animal. You may also note that the brood rearing habitat appears to be directly to the east of the mining activity.

These data shown here are provided by Dr. Frey who will use these for publication in a peer-reviewed journal and should not be distributed or used for analysis without her consent.

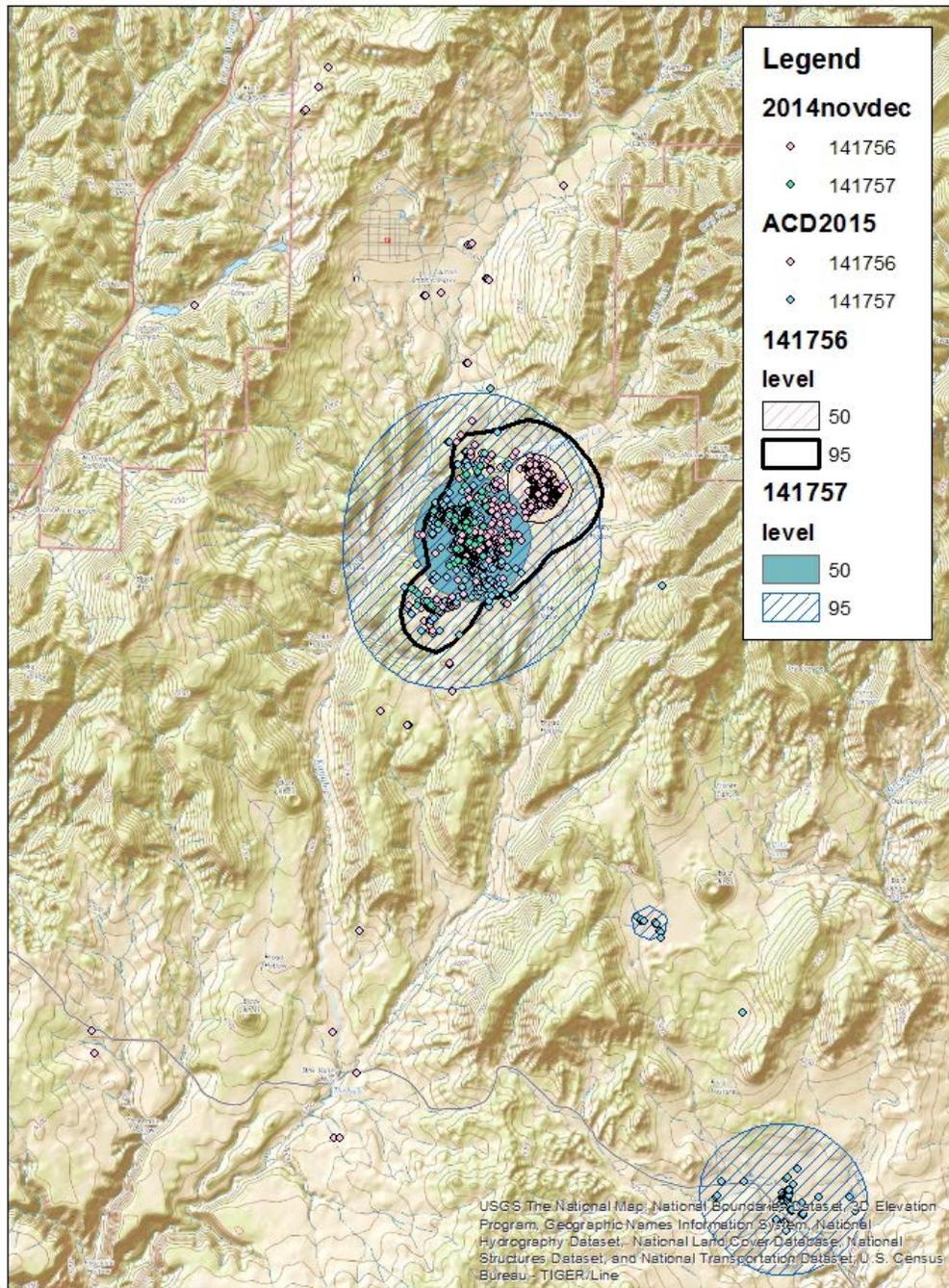


Figure 9. Coordinate locations for two sage-grouse trapped and monitored in the Alton / Sink Valley area and Fords Pasture to the south (southeast corner of the map). These data span over a 1 year time period collecting approximately 3 points per day. Data were collected, managed and owned by Dr. Nicki Frey (Utah State University Extension, Southern Utah University). These data should not be used or shared without her consent.

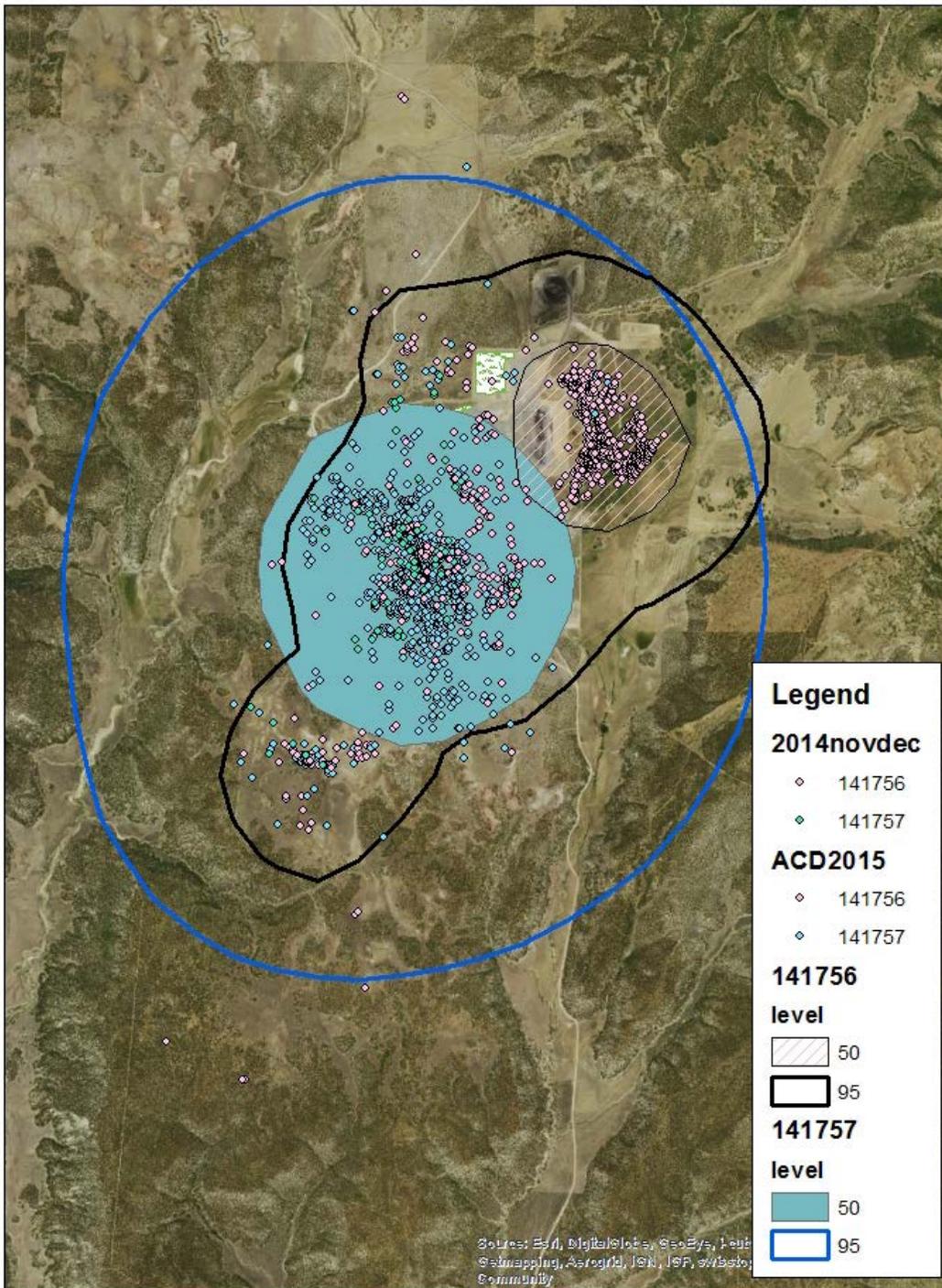


Figure 10. Coordinate locations for two sage-grouse trapped and monitored in the Alton / Sink Valley area span over a 1 year time period, representing approximately 3 points per day. This area shows kernel density estimates for sage-grouse habitat use. The area in blue is located around the sagebrush flat area and within the mine footprint directly. Clustering of points on the east side of the mine represent brood rearing habitat. These data were collected and are currently managed and owned by Dr. Nicki Frey (Utah State University Extension, Southern Utah University). These should not be shared or used without her consent.

1.4 Historic and Current Lek use in Alton/Sink Valley

Greater sage-grouse have been found in the Sink Valley and Alton areas of Kane County, Utah for many generations. This has consisted of breeding activity (at the Sink Valley lek), nesting and brood rearing (likely near Sink Valley but this has been poorly documented), and winter habitat use primarily in Sink Valley and the Alton area. The density of birds reported using the Sink Valley area has fluctuated widely during the time they have been observed. The most accurate estimates of bird densities in this region are from lek counts that were conducted annually by wildlife biologists with the Utah Division of Wildlife Resources (UDWR). Since 1991, lek counts have experienced significant declines in strutting males. Data suggest that there has been an oscillation in male lek attendance over the past 24 years which likely reflects variable sage-grouse occurrence and habitat use within this area (Figure 11).

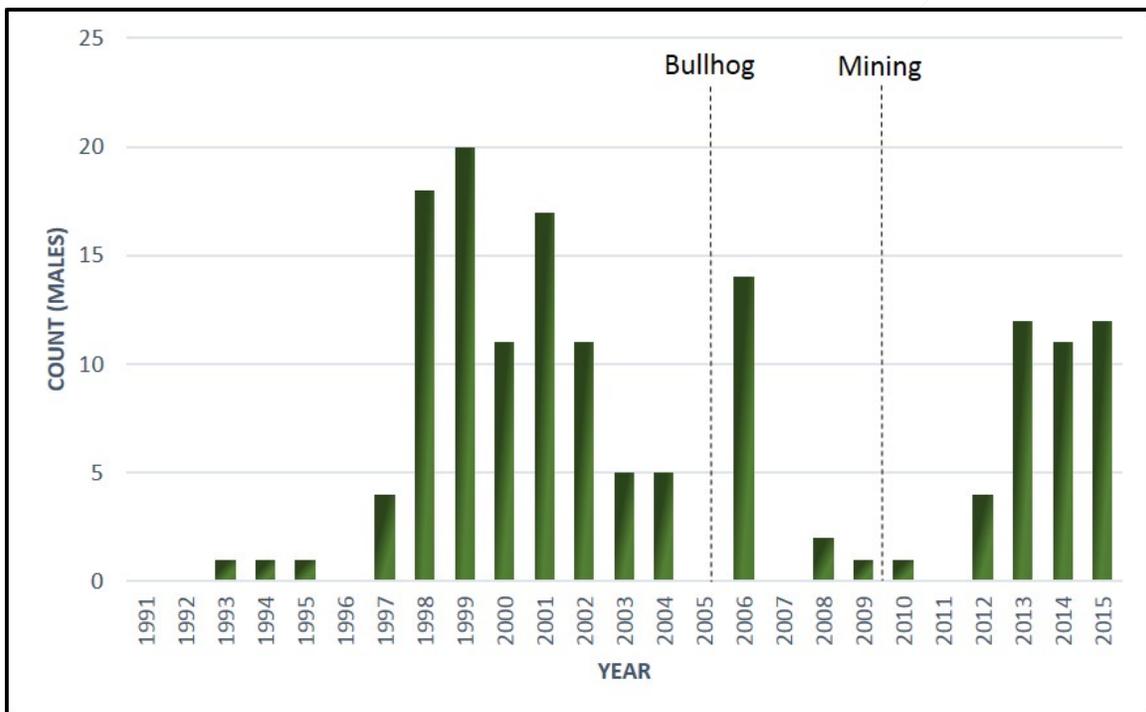


Figure 11. Male bird attendance at the Sink Valley lek, located south of Alton, Utah. Observations were made by Utah DWR employees observing during the spring breeding months (February – April). The 2005 and 2007 data are missing for this graph. Birds recorded from 2012-14 were located on the new lek. Previous observations were from the historic lek.

A detailed description of historic lek use patterns in Alton/Sink Valley is provided in the 2014 ACD annual report. Data from 2015 continue to show a similar trend in lek use. While the DWR reported a maximum of 12 birds at the lek in spring 2015 (March 7), Petersen found 14 males strutting on the lek during the breeding season. Snowpack remained deep at the new lek area

during the breeding season, causing birds to display on the top of the snow near the county road at the north end of the sagebrush flat. All birds including hens could be clearly seen displaying and mating on top of the snow. This was atypical for most years where birds are most often observed on the new lek hill site strutting on exposed soils.

To compare lek count results with nearby leks, Hoyts Ranch was reported to have had as many as 21 strutting males (April 16). On March 7, 3 males were observed strutting at the Fords Pasture (Figure 12). This was the first time birds have been observed strutting in that area for at least 10 years. This lek was historically active, reporting 12 males strutting at the lek in 1982. Since that date the lek became inactive for undetermined reasons. This strutting behavior reported this year in Fords Pasture represents the most southern lekking behavior for the species.

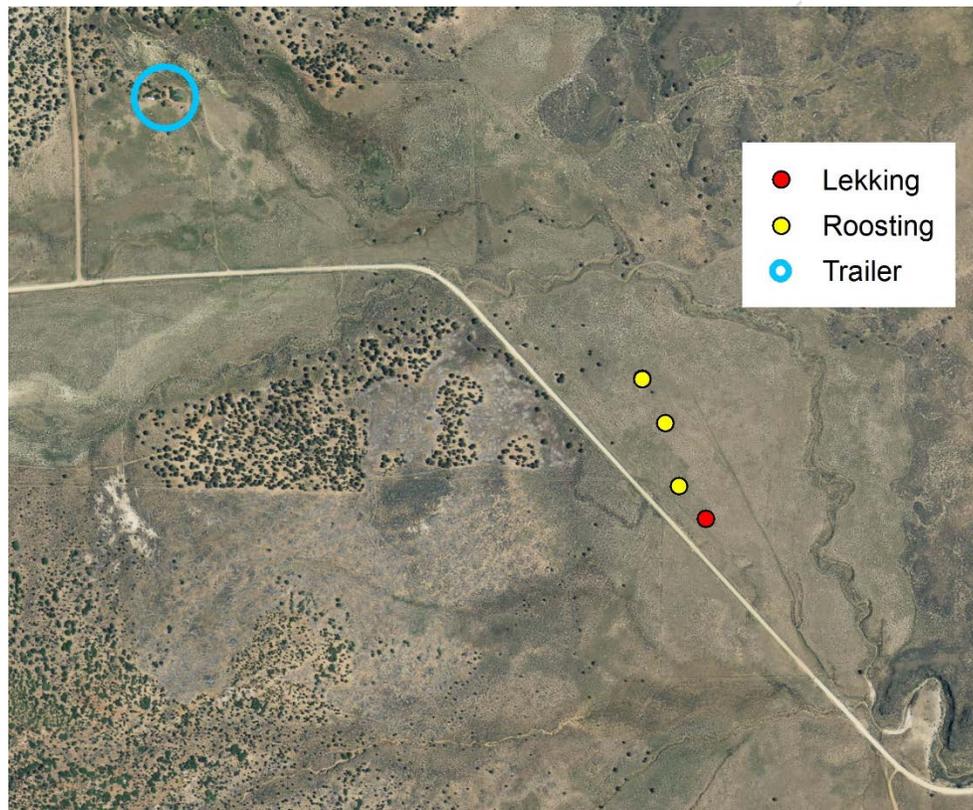


Figure 12. Fords Pasture area that supports fluctuating sage-grouse habitat use. Approximate location of lekking activity observed on March 7th and roost sites where birds were flushed during spotlight surveys. The blue circle represents the location of the trailer found in relatively close proximity to the sage-grouse use site (as a reference). The actual coordinate location of the lek was not recorded to avoid flushing displaying males.

1.5 Noise Detection and Sound Assessment

The influence of sound (noise pollution) on sage-grouse continues to be measured at each observation location when mining activity is active. Since October, mining was rested resulting in no detectable mining related noise. Decibels have been recorded using an Extech 407735 Sound Level Meter.

2. Habitat Mitigation and Improvements

2.1 Conservation Area Treatment

In Fall 2015, 27 acres of mountain big and basin big sagebrush located in the Conservation Area (Figure 13) were treated to reduce sagebrush cover and open sites for intercanopy plant establishment. Kevin Heaton was contracted to disk decadent sagebrush areas aiming for post-treatment target cover of 15% (low end of recommended sagebrush cover for nesting and brood rearing; Connelly et al., 2000). After disking this area, a seed mix consisting of perennial grasses and forbs was broadcast using a ATV mounted spreader. A description of the seed mix is provided in Chapter 3 of the MRP.



Figure 13. Area east of the mine site (Conservation Area) treated to reduce sagebrush in areas with high cover and shrub decadence.

2.2 Measurements of Spoil Pile Reclamation Response

During the fall (August 24th), vegetation surveys were completed on the spoils pile positioned on the west side of the mining area. Topsoil was spread across the site and then seeded in fall 2013. Seeds were broadcast using a seed mix consisting of both native and introduced perennial grass and forb species (Figure 14A).

Four transects, each 100m long, were randomly positioned within the sample area to measure plant density and plant canopy cover (Figure 14B). A total of 20-1x1m quadrats were placed at 5m intervals along each transect to collect plant density data. The total number of individual plants rooted within the plot was recorded by species. Along the same transect lines, plant canopy cover was measured using the point-intercept method. A pin was dropped at 0.5m intervals along the entire transect length, and the first feature contacted with the falling pin was recorded. The total number of observations by feature was divided by the total number of pin drops to produce total feature cover. Features recorded included plants by species, rock, large litter (i.e. branches), fine litter (i.e. needles, detached dead herbaceous plant parts), and bare ground.

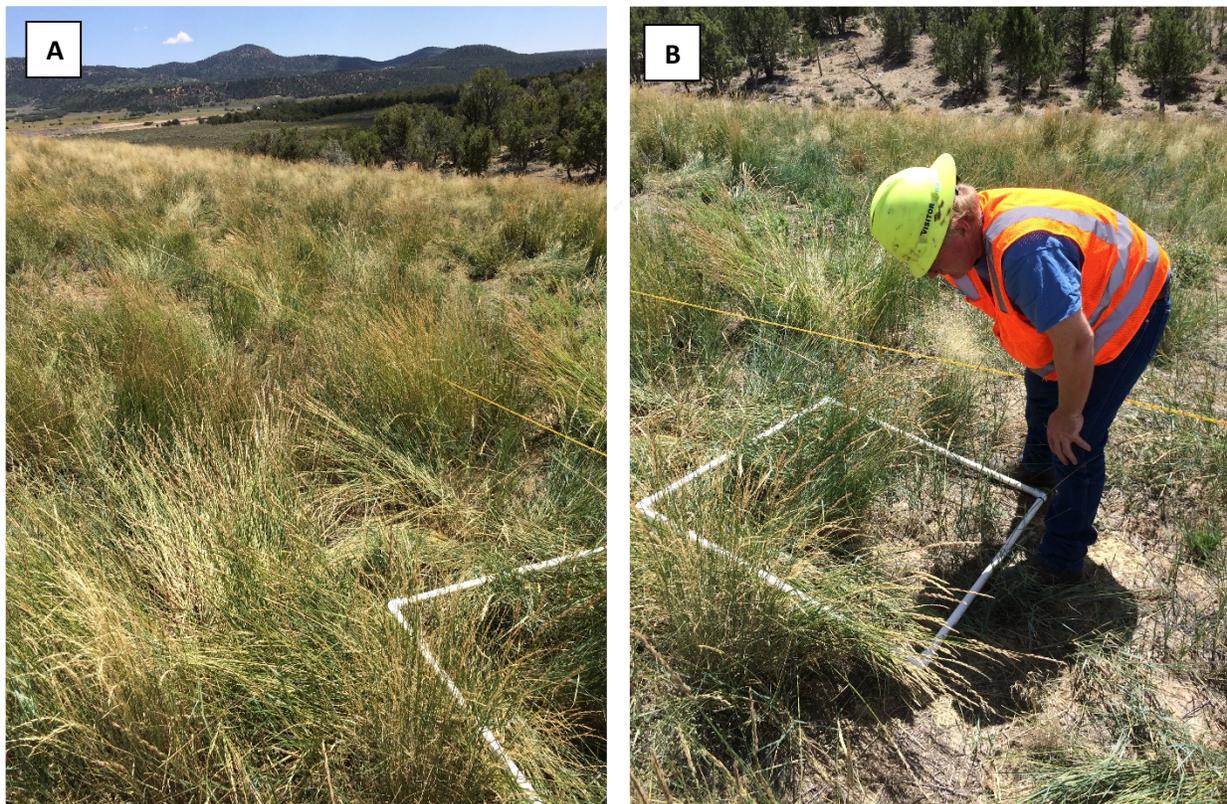


Figure 14. A) Vegetation growth and plant community establishment 2 years after seeding. B) Samples were collected to determine plant structure (density of plant species and percent cover). Photo with Kevin Heaton, USU Extension Specialist.

Species included in the reclaimed spoils pile reclamation area are provided in Appendix A, Table 2. Total plant density was highest for grasses and lowest for shrubs (Figure 15). By species, the most prevalent in the reclaimed plant community were western wheatgrass (ELSM) and slender wheatgrass (ELTR; Figure 16-19). Cheatgrass (BRTE) had high a density, however the variability in this species was also high across the spoils pile. Russian thistle, another invasive species, was also present in the community but with relatively low densities (0.6 ± 0.4) and cover (0.3 ± 0.2).

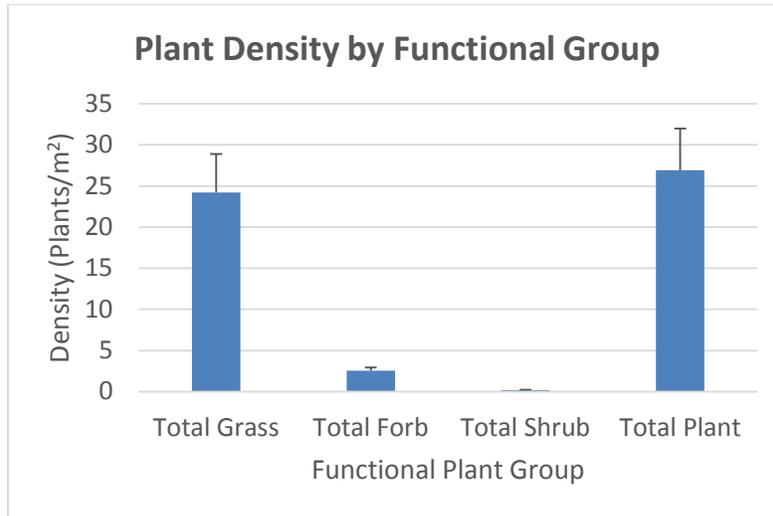


Figure 15. Density of plants established within the spoils pile reclamation area. Error bars represent the standard deviation of the data.

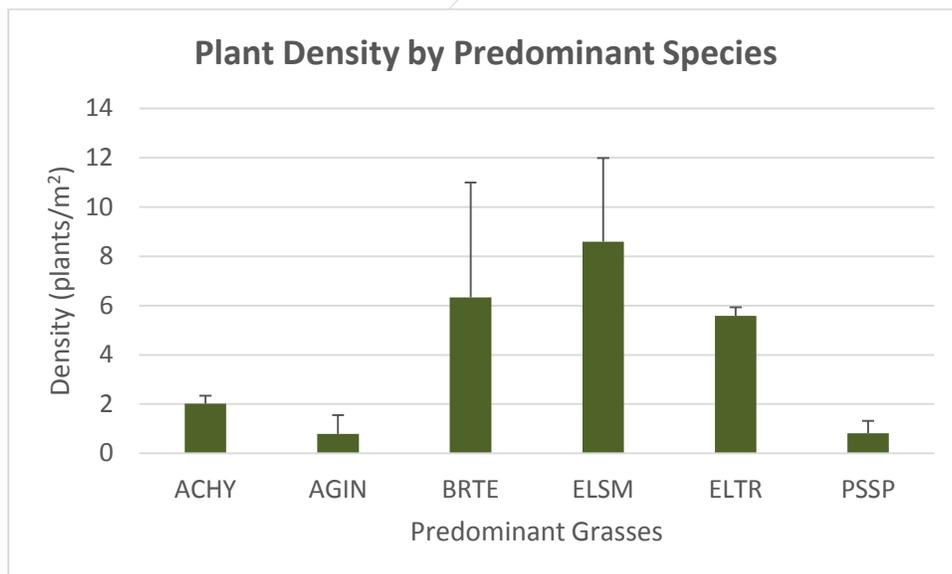


Figure 16. Plant species with the highest density of species sampled in the spoils pile reclamation area. Species include Indian ricegrass (ACHY), intermediate wheatgrass (AGIN), cheatgrass (BRTE), western wheatgrass (ELSM), slender wheatgrass (ELTR), and bluebunch wheatgrass (PSSP). Error bars represent the standard error (of the data).

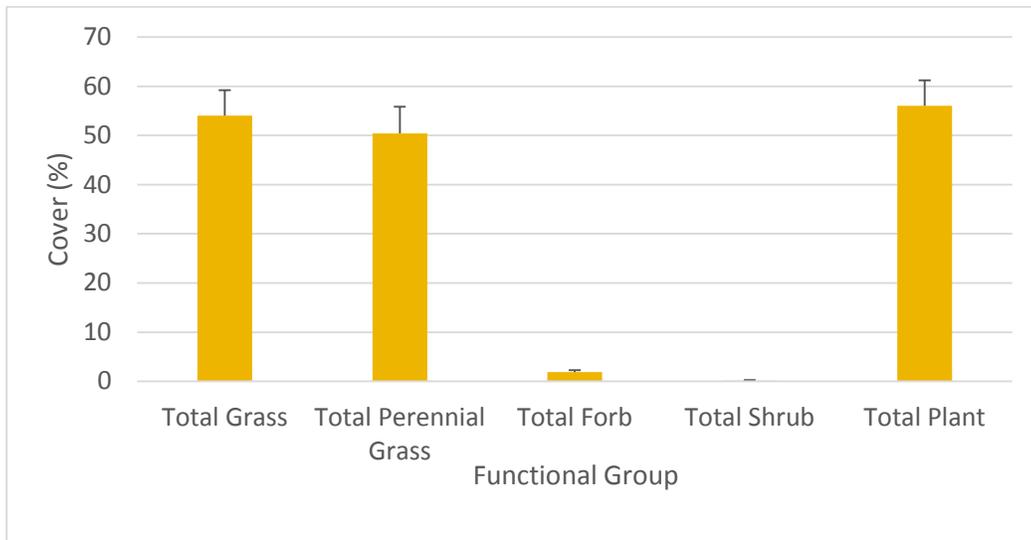


Figure 17. Percent canopy cover of plants sorted by functional group.

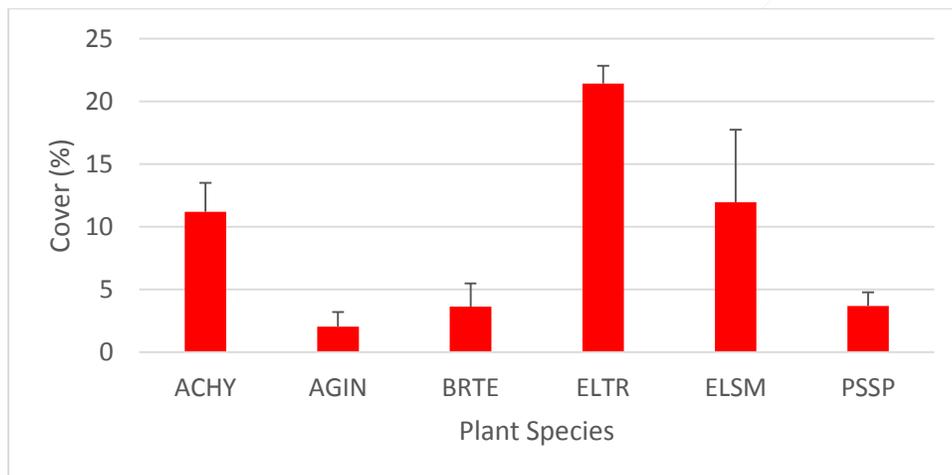


Figure 18. Percent canopy cover by predominant plant species based on those with highest values.

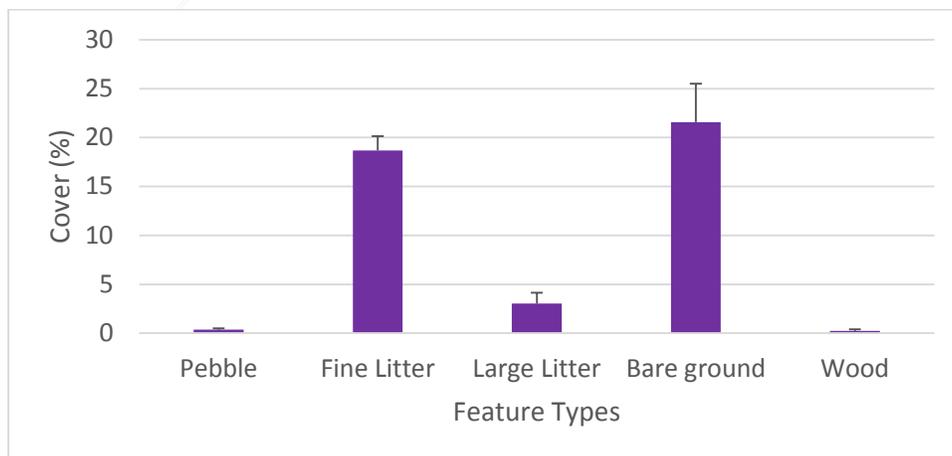


Figure 19. Percent canopy cover of surface features.

The succession of reclaimed plant communities begins with early seral species, which includes the establishment of desired perennial grasses. In the reclaimed area, desired perennial grasses had higher densities than invasive annual grasses (cheatgrass). Cheatgrass had relatively high densities, however, this was limited to only one of the four transects sampled (19.9 vs. 0.2, 0.15, and 5.2). Although native forb density was low compared to grasses, several desired native forb species did establish including daisies (*Astragalus* spp; 0.4 ± 0.1), showy goldeneye (0.3 ± 0.1), and globemallow (0.2 ± 0.2). Overtime, grasses should provide microsite conditions that facilitate higher native forb and shrub establishment, including sagebrush. This suggests that reclaimed areas have potential to be returned into sagebrush dominated plant communities. Although sagebrush was not recorded in the measured plots, it was observed establishing within the reclaimed area.

2.3 Wet Meadow Plant Community Structure

The density and cover of the wet meadow plant community, located near the well on the east side of the valley by the well, was measured on October 3rd. To measure density, 3-100 ft transects were placed across a random location within the wet meadow area. A total of 10 points were located along each transect. At each point, the point-centered quarter method was used to determine shrub density. A total of $3,308 \pm 739$ shrubs (all wild rose, *Rosa woodsii*) were measured using this method.

Plant canopy cover was assessed using an ocular estimate of cover by species within 1m² quadrats. Additionally, surface feature type (litter, bare ground) were also measured. Results of this survey characterizing plant cover by species are provided in Table 3. Total plant cover by functional group and surface feature are presented in Table 4.

Table 3. Results of the Wet Meadow area percent cover and frequency assessment by species.

	Mean	Std Error	Frequency
Shrubs			
Wild rose (<i>Rosa Woodsii</i>)	8.4	1.1	70
Forbs			
Western yarrow (<i>Acillia millefolium</i>)	2.0	0.4	43
Wild iris (<i>Iris missouriensis</i>)	8.2	1.1	77
Grasses			
Thickspike wheatgrass (<i>Elymus lanceolatus</i>)	3.0	2.0	70
Baltic rush (<i>Juncus arcticus</i>)	24.2	9.6	97
Kentucky bluegrass (<i>Poa pratensis</i>)	37.5	9.3	93
Sandbergs bluegrass (<i>Poa secunda</i>)	0.2	0.2	3

Table 4. Percent cover by functional group and surface feature classes.

Percent Cover	Mean	Std. Error
Total Living Plant	87.9	1.2
Total Shrub	7.9	1.5
Total Forb	15.0	4.0
Total Grass	65.0	2.3
Litter	9.7	0.6
Bare Ground	0.2	0.1

Results suggest that the wet meadow area supports vegetation species typical of landscapes with higher soil water availability than sagebrush or PJ woodlands. This is particularly evident with the predominance of wet meadow important perennial grasses/grass-likes (e.g. Baltic rush) and forbs (e.g. wild iris).

There has been concern shared that the lowering of the water table in response to mining will change the wet meadow hydrologic regime and plant community structure. A shift in plant community structure and composition was not evident based on this vegetation sampling within the wet meadow region. The results provided here are comparable to the reference area assessment conducted by Collins in 2007. Differences in data are more likely associated with differences in transect location.

3. Predator Control Activities

During the 2014-2015 periods, sage-grouse predators were removed to increase potential nesting and brood rearing success. The types of predators that were removed included common ravens (*Corvus corax*), American crows (*Corvus brachyrhynchos*), coyotes (*Canis latrans*), and red fox (*Vulpes vulpes*). All predator control activities were conducted by USDA Wildlife Services. Locations where eggs were distributed and coyotes trapped are displayed in Figure 14.

For a detailed description of sage-grouse predators and their potential impacts on sage-grouse populations, refer to the 2014 annual report.

3.1 Raven Control

Teresa Wright, a raven control specialist with USDA wildlife services, has been funded by ACD to control ravens within the Alton/Sink Valley area. Raven control occurred from December 1, 2014 through December 1, 2015. A total of 1500 poisoned eggs were distributed within target areas shown in Figure 14. Eggs were treated with DRC 1339, a chemical that is specific for

Corvids. According to Teresa, one raven is taken for every 6 eggs applied. Therefore, it is presumed that 250 ravens were killed throughout the year (Personal Communication Dec. 2015).

3.2 Mesopredator Control

Coyote control, also funded by ACD, was completed by Roger, also with USDA wildlife services. Coyote control occurred from December 1, 2014 through December 1, 2015 during which time a total of 16 coyotes were harvested. Animals were killed by either trapping using foot snares and traps, or by fixed-wing aircraft.



Figure 20. Blue polygons indicate areas where poison eggs were distributed by USDA Wildlife Services for raven control. This includes roadsides near critical habitat and the stock yard near Alton where birds congregate. The yellow polygon represents the location where coyote snares are set and trapped. Approximately 20 snares are set and checked every two days during the trapping season.

4. Participation and Involvement with Local Working Groups

ACD participates in the Color Country Adaptive Resource Management (CCARM) bi-monthly meetings, providing input and support on discussion and planning for sage-grouse conservation in the Alton/Sink Valley area. The members of CCARM provide highly valuable feedback that aids in conservation strategy development and habitat improvement planning. Maintaining this cooperation with CCARM has been instrumental in the success of this project.

Habitat use and sage-grouse movement patterns are currently being studied by Nicki Frey. ACD participated in trapping and collaring birds on three occasions during the spring and fall trapping season. As a result of this effort, 2 birds were harnessed with backpack style GPS devices in 2015 that are providing information on bird movement and habitat use within the region. In addition, ACD employees and consultants aided in trapping and collaring birds with Dr. Frey for the BLM in Sagehen Hollow further north in the Panguitch SGMA.

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Appendix A

Table 4. Density and cover of seeded or natural recruited plant species within the spoils pile located at the west end of the mine site.

Species	Average Density (plants/m ²)	Average Cover (%)
<i>Shrubs</i>		
Black sagebrush (<i>Artemisia nova</i>)	0.03 ± 0.25	0.00 ± 0.00
Rubber rabbitbrush (<i>Ericameria nauseosa</i>)	0.00 ± 0.00	0.13 ± 0.13
Antelope bitterbrush (<i>Purshia tridentata</i>)	0.10 ± 0.02	0.00 ± 0.00
Winterfat (<i>Kraschekennovia lanata</i>)	0.10 ± 0.03	0.00 ± 0.00
<i>Forbs</i>		
Silver sagebrush (<i>Artemisia ludoviciana</i>)	0.19 ± 0.06	0.13 ± 0.13
Daisy (<i>Astragalus</i> spp)	0.46 ± 0.20	0.38 ± 0.13
Lambsquarter (<i>Chenopodium album</i>)	0.60 ± 0.27	0.13 ± 0.13
Showy goldeneye (<i>Heliomeris multiflora</i>)	0.25 ± 0.11	0.13 ± 0.13
Prickly lettuce (<i>Lactuca serriola</i>)	0.15 ± 0.11	0.13 ± 0.13
Yellow sweetclover (<i>Melilotus officinalis</i>)	0.03 ± 0.02	0.38 ± 0.13
Palmer's penstemon (<i>Penstemon palmerii</i>)	0.01 ± 0.01	0.00 ± 0.00
Prostrate knotweed (<i>Polygonum aviculare</i>)	0.05 ± 0.04	0.00 ± 0.00
Russian thistle (<i>Salsola iberica</i>)	0.60 ± 0.42	0.25 ± 0.14
Scarlet globemallow (<i>Sphaeralcea coccinea</i>)	0.21 ± 0.03	0.38 ± 0.24
Dandelion (<i>Taraxicum officinale</i>)	0.01 ± 0.01	0.00 ± 0.00
Yellow salsify (<i>Tragopogon dubius</i>)	0.08 ± 0.03	0.00 ± 0.00
<i>Grasses</i>		
Indian ricegrass (<i>Achnathyrum hymenoides</i>)	2.00 ± 0.32	11.20 ± 2.30
Intermediate wheatgrass (<i>Agropyron intermedium</i>)	0.79 ± 0.77	2.02 ± 1.18
Meadow brome (<i>Bromus biebersteinii</i>)	0.01 ± 0.01	0.00 ± 0.00
Cheatgrass (<i>Bromus tectorum</i>)	6.34 ± 4.65	3.64 ± 1.85
Slender wheatgrass (<i>Elymus trachycaulus</i>)	5.59 ± 0.35	21.43 ± 1.42
Western wheatgrass (<i>Pascopyrum smithii</i>)	8.85 ± 3.41	11.97 ± 5.78
Kentucky bluegrass (<i>Poa pratensis</i>)	0.04 ± 0.02	0.13 ± 0.13
Sandberg's bluegrass (<i>Poa secunda</i>)	0.01 ± 0.01	0.00 ± 0.00
Bluebunch wheatgrass (<i>Pseudoroegneria spicata</i>)	0.80 ± 0.50	3.66 ± 1.11