Alton Coal Development, LLC
463 North 100 West, Suite 1
Cedar City, Utah 84720
Phone (435) 867-5311 Fax (435) 867-1192

December 16, 2019

Steve Christensen
Coal Program Manager
Oil, Gas & Mining
1594 West North Temple, Suite 1210
Salt Lake City, UT 84114-5801

Re: **Coal Hollow Mine 2019 Annual Sage-grouse Report, Alton Coal Development, LLC, Coal Hollow Mine, Kane County, Utah, C/025/0005**

Dear Mr. Christensen:

Alton Coal Development, LLC (ACD) is submitting the attached "Greater Sage-grouse Population Monitoring and Habitat Improvement".

Changes to the MRP associated with this amendment have been uploaded to the DOGM's server for review. Upon approval, 2 (two) clean hard copies of the text and certified drawings for insertion into the MRP will be submitted. Please do not hesitate to contact me if you have any questions 435-691-1551

Very truly yours,

B. Kirk Nicholes

B. Kirk Nicholes
Environmental Specialist
Alton Coal Development

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: 2019 Annual Sage-grouse Report

Description. Include reason for application and timing required to implement:
Addition of soil information for North Private Lease prime farmland

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	12/16/2019	B Kirk Nicholes
Print Name	Position	Date	Signature (Right-click above choose certify then have notary sign below)

Subscribed and sworn to before me this 16th day of December, 2019

Notary Public: Megan Wagner, state of Utah, county of Iron

My commission Expires: Oct. 2, 2023
Commission Number: 708538
Address: 377 N. Main
City: Cedar City State: UT Zip: 84721

ss:

THE GREAT SEAL OF THE STATE OF UTAH 1896
MEGAN WAGNER
Notary Public - State of Utah
Comm. No. 708538
My Commission Expires on
Oct 2, 2023

For Office Use Only:	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: 2019 Annual Sage-grouse 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
☒ Add	☐ Replace	☐ Remove	Chapter 3, Appendix 3-6 (added to the end)
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	

Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	Received by Oil, Gas & Mining

Greater Sage-grouse Population Monitoring and Habitat Improvement

Alton - Sink Valley, Utah

2018-2019

Progress Report

For

Alton Coal Development, LLC

November 28, 2019

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

2018-2019

Steven L. Petersen, Ph.D., Consultant

Introduction and Background

The mining of coal, minerals and natural gas are important for providing most of Utah's current energy demand. According to John Baza, the director of the Utah Division of Oil, Gas and Mining (2019), "the mining of coal, minerals, oil and natural gas production play an important part in Utah's economy, and without these natural resources we would not enjoy the standard of living we do in our modern society". In 2017, approximately 70% of Utah's net electricity generation was produced from coal (USEIA 2019). In this same year, five coal companies produced 14.4 million short tons of coal, valued at an estimated $439 million https://www.ogm.utah.gov/coal/index.php).

Alton, Utah supports an active coal mine located 2.7 km south of town. This coal mine industry supports the local and regional economy, providing employment to neighboring communities and coal that is purchased by regional coal-based power plants. The pasturelands surrounding Alton are used to raise livestock (beef cattle) and grow alfalfa hay. Mule deer and pronghorn frequent the valley floor where they feed off native vegetation and agricultural production. Of significant importance to this area are the sagebrush habitats that sustain both obligate and facultative wildlife species. Of conservation significance is the local population of greater sage-grouse (*Centrocercus urophasianus*; hereafter sage-grouse). In an effort to promote healthy rangelands and ensure the sustainability of the local sage-grouse population and sagebrush habitats, management strategies are needed that facilitate sagebrush habitat conservation, rangeland improvement, and effective wildlife management (Petersen et al. 2016).

Objectives

The purpose of this report is to provide an assessment of the habitat conservation accomplishments from fall 2018 to fall 2019 within the Alton and Sink Valley region and to describe management strategies important in natural resource sustainability. Specifically, this report describes the conditions of the local sage-grouse population, characterizes habitat improvements implemented in the past year (including post-disturbance habitat reclamation and pinyon-juniper tree removal), and explains predator control (i.e. ravens and coyotes) efforts over the past year.

Following is a summary of the primary management efforts presented in this document.

1. During non-breeding months, ACD monitored sage-grouse in the Sink Valley area within important habitats that include:
    - the sagebrush field to the south of the mine
    - the bullhogged area further south and southwest of the mine
    - the conservation area to the east
    - the historic and new leks plus surrounding sagebrush habitats
2. Counted a maximum of 5 male birds attending the lekking areas during February, 2019.
3. Killed 2,629 pinyon pine and Utah juniper trees in primary habitats throughout the Alton/Sink Valley area.
4. Destroyed approximately 200 ravens, 15 coyotes, and 1 red fox. All three species are known to represents threats to sage-grouse nesting success, chick survival, and adult survival.

Table of Contents

Introduction and Background 2
Objectives 2
Table of Contents 4
1. Sage-grouse Population Monitoring 5
1.1 Employee Observations and Sage-grouse Population Monitoring 5
1.2 Ground-based Sage-grouse Surveys 6
1.3 GPS Collaring and Monitoring 10
1.4 Historic and Current Lek use in Alton/Sink Valley 10
2. Habitat Mitigation and Improvements 11
2.1 Reclamation 12
2.2 Juniper Mastication 12
3. Predator Control Activities 14
3.1 Raven Control 14
4. Participation and Involvement with Local Working Groups 15
References 16
Acknowledgements 17

1. Sage-grouse Population Monitoring

1.1 Employee Observations and Sage-grouse Population Monitoring

ACD employees are trained annually to identify sage-grouse and report any sighting to Kirk Nicholes, ACD Environmental Manager. Kirk records all information associated with the observation including the number of birds observed, the coordinate location of the observation, and the time of day the observation occurred (Table 1). Recorded observations are made when employees are fulfilling regular employment duties. No additional sage-grouse surveys are conducted by ACD employees.

These sightings are recorded to provide additional distribution information. They are not designed to provide sage-grouse density and distribution information within the mining area, only additional insight. It is recognized that variability in observations may be a result of heightened awareness (or lack) by employees rather than an increase in bird use activity or density.

During the 2018-19 season, only 1 sighting was recorded. The reason for the low number of sighting reports is likely that mining efforts have been concentrated in the North Lease area. The number of birds observed by employees in that area is low since birds do not typically frequent the North Lease region compared to Sink Valley and the south bullhog area.

Table 1. Observations of sage-grouse reported by ACD employees between November 2018 and October 2019 within the Alton/Sink Valley region and the North Lease mining area.

Obs ID	Date	Time of observation	Number of birds Observed	Location	State Plane Coordinates
1	July 1, 2019	8:00 am	1	Observed 1 bird north of the well in the upper CA (near road; observed by C. McDonald)	354071.8 E 1770210.4 N

1.2 Ground-based Sage-grouse Surveys

Monthly surveys are conducted by Dr. Steven Petersen to monitor the sage-grouse population within the Sink Valley and surrounding area. During this survey, the sighting location is recorded and the total number of birds per flock is reported. Generally, the search area is located in the general vicinity of the mining headquarters, the sagebrush flat located south of the mine, the new lek location, the bullhog region to the south, the well and conservation area. The specific location of all search areas are described in the following table and figure (Table 2, Figure 1).

Table 2. Sage-grouse observations are conducted throughout the mining area to monitor sage-grouse populations and identify distribution patterns in relation to mining activity. Areas surveyed are shown here.

Name	ID	Description
Sagebrush flat	SF	Sagebrush dominated field located south of the mine site. The dominant shrub is black sagebrush (*Artemisia nova*)
New lek	NL	The displaying area is positioned along the ridge crest, located at the hilltop south of the sagebrush flat.
South Mine Sagebrush Patch	SMSP	This area is surrounded by PJ woodland, and supports a springtime pond, located just south of the original spoils pile.
North Mine Sagebrush Patch	NMSP	Positioned north of the original spoils pile, this area is being invaded by young pinyon and juniper trees.
Original Lek	OL	Until 2010, this area supported the primary lek site for Sink Valley. The birds have since shifted strutting behaviors in the NL area. The OL was mined in 2012 and is currently existing as reseeded pasture, dominated by perennial grasses, forbs, and a few naturally recruiting sagebrush seedlings.
Wet meadow	WM	This site supports a grass/rush/sedge community which has served historically as a site for raising chicks. This area supports a natural spring, the well, and orchard.
East Sagebrush Patch	ESP	This site is located east of the mine and west of the conservation area. It is dominated by black sagebrush and surrounded by PJ.
Conservation Area	CA	Located east of the mine site along the upper bench. This includes some grassland but also disked sagebrush surrounded by oak and PJ woodland.
West Sagebrush Fields	WSF	Including all of the bullhog area located south of the new lek which connects to the sagebrush fields west of Sink Valley.

During breeding months, surveys are limited to non-nesting habitats to prevent hens flushing from nests or disturbing hens with chicks during the early brood-rearing period. Survey efforts in these months concentrate on lek counts and road surveys only.

A survey path that was previously established has made it possible to conduct relatively consistent and comparable monthly surveys. From these surveys, we can look for increasing or decreasing sage-grouse population patterns or trends within a given year and between years. The path courses through primary sage-grouse preferred habitats that include sagebrush (black and mountain big sagebrush), bullhogged areas, and post-mining reseedings. Each survey is conducted by slowly walking along looking for any sign of birds that includes fecal deposits, nest sites, feather piles, and flushed birds. Each time an individual bird or group of birds are observed, the coordinate position for that location is recorded (using GPS) along with the time of day.

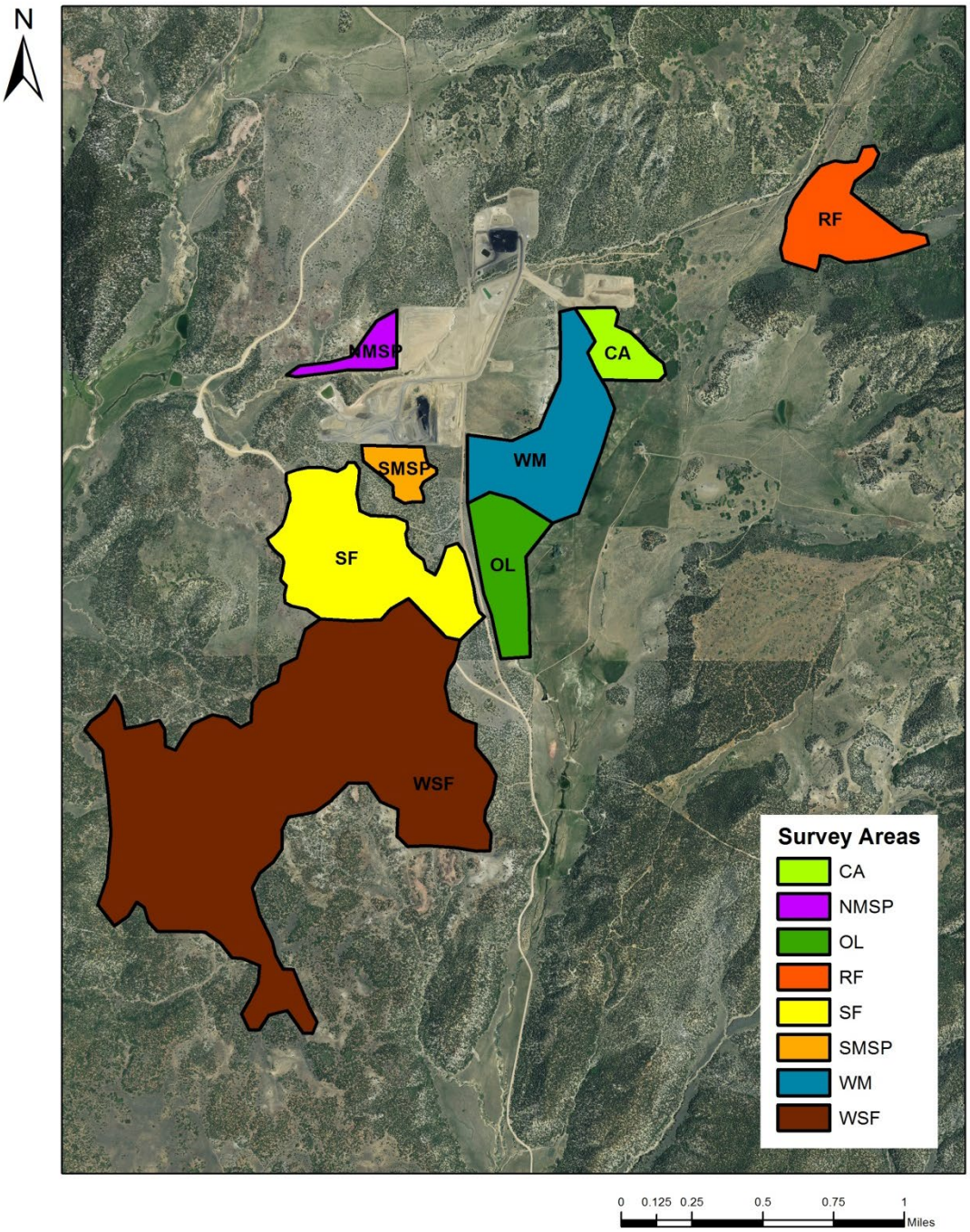

Figure 1. Location of survey areas for sage-grouse during the 2012-2019 monitoring seasons. CA = Conservation area, NMSP = North mine sagebrush patch, OL = Original lek, RL = Rabbitbrush field, SF = Sagebrush flat, SMSP = South mine sagebrush patch, WM = Wet meadow, and WSF = West sagebrush fields. Additional sites not shown above include the corridor (C) and the alfalfa fields (AF) east and south of the town Alton, respectively.

A summary of the results recorded for each monthly sage-grouse survey is provided in table 3. Historically, highest occurrence of sage-grouse occurred in the immediate sagebrush flat site. However, with extensive bullhogging south of that area, birds are now found nearly exclusively in these treated areas. Pinyon-juniper removal has been a valued method for increasing total sage-grouse non-breeding habitat (Frey et al. 2013).

Table 3. Observations from monthly surveys conducted by S.L. Petersen between December 2018 and November 2019.

Date	Time of observation	Number of birds	Location
December 15, 2018	8:55am	29	Flushed 29 birds in the south bullhog region (south of the new lek).
January 7, 2019	10:15-11:06am	11	Flushed 10 birds near the cattle guard sagebrush patch and 1 bird at the patch north of the SF and county road.
February 1, 2019	5:15-5:44pm	36	Flushed a single bird at the south bullhog, 18 at the sagebrush flat and 16 in the patch north of the county road and SF.
March 9, 2019	7:30-10:30am	39	Flushed 3 birds from the new lek area, 4 birds from the spoils pile area, and 32 from the north end of the south bullhog region.
April 26, 2019	7:00am	5	5 males lekking. No other surveys conducted to avoid disturbing lekking birds.
May 25 2019	8:25–12am	10	Flushed 7 birds in the south bullhog area and 2 birds from the patch north of the SF and county road. A hen aggressively defended territory in the upper conservation area. The chicks were not seen and the area avoided to disrupt brood rearing efforts.
June 22, 2019	7:34am	5	Flushed all 5 birds from the south bullhog area. A hen with 4 chicks was seen in the upper CA by Kevin Heaton the previous week.
August 10, 2019	6:55–8:10am	23 (32)	Flushed 23 birds in the south bullhog area (near the county road). Flushed 9 birds from the south bullhog, possibly birds that were a part of the original group.
September 19, 2019	7:33-7:52am	27	Flushed 11 birds from the sagebrush flat and 15 birds from the south bullhog area (3 groups of 7, 6, and 2 birds)
October 26, 2019	8:28–9:03am	41 (52)	Flushed 3 groups of birds from the south bullhog area (6, 24, and 17 birds). A flock of 11 birds flew overhead near the north of county road patch 20 min after the original group was observed (0.5 miles away). It is unlikely they were the same birds.

The Alton and Sink Valley area supports a viable population of sage-grouse with a diversity of habitat types that assist with all phases of the sage-grouse life cycle. The area just south of the county road supports a well-established and intact stand of black sagebrush that historically was the primary nesting habitat for sage-grouse in this area. Because this area has experienced

limited disturbance (ie. fire, mechanical treatment) for more than 15-20 years, the plant community is relative closed, with a maximum cover and density of sagebrush and limited forb and grass availability. While it provides excelling nesting and hiding cover, brood rearing hens are likely to go outside of that area to find insects and forbs for the chicks. The well site located south of the CA, dominated by wet meadow obligate and facultative species that include species of sedge, rush, and a diversity of forbs (*Iris missouriensis* Nutt.) and shrubs (i.e. *Rosa woodsia* Lindl.). Hens have been observed using this area consistently over the past decade for early to late brood rearing, likely due to high forb diversity, high insect availability, and no disturbance. The CA is dominated by black and mountain big sagebrush that was historically treated to reduce decadence and increase early seral sagebrush community structure.

Since 2015, the region south of the county road (WSF-SB) has been extensively cleared of Utah juniper (*Juniperus osteosperma* (Torr.) Little) and pinyon pine (*Pinus edulis* Engelm.). The primary method for clearing mature trees has been bullhogging by the Bureau of Land Management. This effort has greatly expanded suitable habitat for sage-grouse and promoted the reestablishment of sagebrush dominated plant communities. Sage-grouse are almost exclusively observed in this bullhogged area, utilizing areas where debris piles are found. Black sagebrush (*Artemisia nova* A. Nelson) and mountain big sagebrush (*Artemisia tridentata* Nutt. ssp. *vaseyana* (Rydb.) Beetle) are the predominant sagebrush species found in this area. There is also scattered rubber rabbitbrush (*Ericameria* nauseosa (Pall. ex Pursh) G.L. Nesom & Baird).

1.3 GPS Collaring and Monitoring

Sage-grouse are monitored with monthly surveys, however, significant effort has been made to use GPS technology to track sage-grouse during the breeding and winter time periods. In 2018 birds that carried transmitters died resulting in no data collected for most of the 2018 year. In spring 2019, sage-grouse trapping crews attempted to trap and collar birds in the Alton/Sink Valley area. However, no birds were caught resulting in no movement and distribution data for 2019.

1.4 Historic and Current Lek use in Alton/Sink Valley

Lekking grounds are located in the southern end of the Sink Valley area. Displaying males are most often observed at the New Lek location, found just south of the sagebrush flat (at the upper portion of the hillsides). Males have also been observed displaying in the bullhog area. In 2019, birds were observed on one sample date, observed at the New Lek location. A total of 5 male birds were observed strutting on April 26, 2019. The area was surveyed to identify all lekking males, however, this represents a single observation date and it is possible that more than 5 birds had been lekking in the area during the breeding season.

Lek counts are typically recorded annually by wildlife biologists to estimate bird populations for a particular area. These data are maintained by the UDWR to track population trends and

determine sage-grouse population health. During the past two years these counts were not provided to ACD. Figure 2 represents lek counts at the Sink Valley lek between 1991-2018, with data provided by the UDWR and ACD. Data from 1991 to 2016 were provided by the UDWR. Data from 2017-2018 are observations made by ACD employees since no data was made available from the UDWR. With the exception of 2019, lek counts suggest a general trend toward a sustainable sage-grouse population in this Sink Valley area. During 2005 and 2007, no males were observed at the lek. Similarly, in 2011 no males were counted at the historic lek (HL), however, it may have been that birds were displaying at NL and were not detected. Observations from 1991-2011 were of birds lekking at HL only.

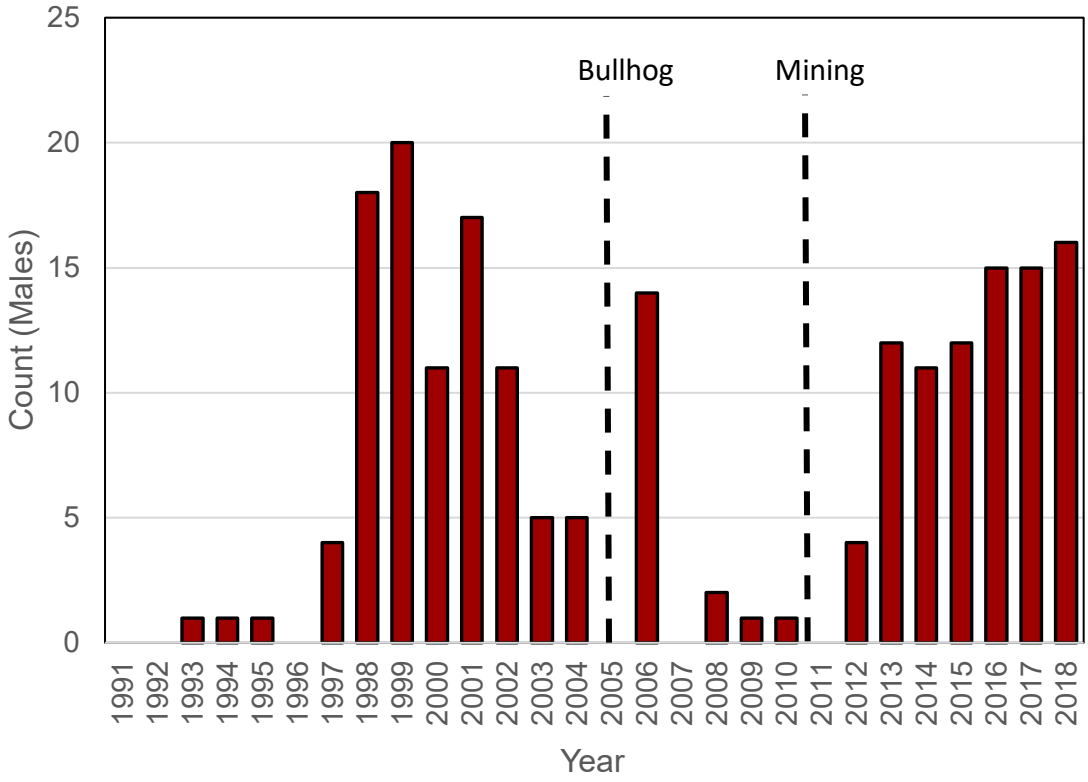

Figure 2. Male sage-grouse lek attendance at the Sink Valley lek, located south of Alton, Utah. All males were observed during morning hours strutting on the primary lek. Only 5 birds were observed in 2019 based on a single day survey on April 26, 2019.

2. Habitat Mitigation and Improvements

Effective habitat improvement methods have been shown to increase sage-grouse in disturbed or altered ecosystems (Dahlgren et al. 2006). ACD focuses significant attention on improving habitat for greater sage-grouse and other native wildlife species that occur within the Alton-Sink Valley region. In addition to facilitating suitable habitat for sage-grouse, these efforts also improve plant community structure, increase biodiversity, reduce erosion potential, improve

ecosystem resilience, and create aesthetically pleasing ecosystems. Extensive habitat improvement efforts have been made since mining began in 2010 and annual management plans focus on improving ecological health (BLM 2001).

2.1 Reclamation

Plant community reclamation projects are implement to improve habitat conditions and increase forage availability. These projects stabilize sites disturbed by mining activities, and in turn promote healthy rangeland vegetation. For nearly a decade, the Sink Valley region has experienced a significant reduction in pinyon-juniper woodlands through mining activities, and these sites have become reclaimed with an early seral perennial grass and forb plant community that will facilitate the establishment of a shrub dominated ecosystem. These reclaimed and improved areas are monitored annually to determine total plant cover, species composition, and frequency. These data are presented in reports that are available through ACD (see Bond Release by Patrick Collins).

2.2 Juniper Mastication

Pinyon-juniper woodland removal is a high priority in the Sink Valley area. Research has shown that woodland reduction improves sage-grouse habitat suitability and expands breeding potential and movement (Baruch-Mordo et al. 2013). This includes an increase in sage-grouse food for adults and chicks (Bates et al. 2017). In cooperation with the US BLM (Kanab field office) significant areas of woodlands were treated over the past 10 years. In most cases, entire woodland clearcutting has created open landscapes and reduced competition with sagebrush. Tree removal has consisted of tree cutting using chainsaws and tree mastication using bullhogging. Pinyon-juniper woodland removal provides an important ecological service by connecting intact sagebrush habitats and providing corridors for animal movement. This mechanical operation also creates conditions that increase food forb and insect availability for greater sage-grouse, mostly by releasing resources otherwise tied up woodlands for shrub, forb, and grass growth and development, particularly higher soil moisture content (Young et al. 2013, Bybee et al. 2016). Woodland mastication reduces runoff and erosion, increases plant community diversity and subsequently promotes ecological resilience (Cline et al. 2010).

The expansion of pinyon-juniper woodlands into new areas or its reinvasion in previously treated areas is an ongoing issue that requires consistent effort to prevent the reestablishment of phase I to phase III woodlands. To slow this expansion and infill of pinyon-juniper, seedlings and juvenile trees are removed. ACD sage-grouse consultant (Steve Petersen) removed 2,629 seedling and juvenile pinyon and juniper trees during 2019 using tree loppers throughout the Sink Valley area (Table 4). Tree ranged in size from 2” to 7’.

Table 4. Number of trees killed throughout the Sink Valley area from December 2018 to November 2019.

Location	Dec 18	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	**Total**
SF	41	27	0	0	0	154	21	0	25	67	4	0	**339**
SF-North side of road	27	50	0	0	0	46	47	0	21	0	0	0	**191**
SF-East Valley	22	76	49	0	0	0	13	0	32	3	33	0	**228**
NL	5	30	0	0	402	14	0	0	18	0	1	0	**470**
NL-West Bowl	43	102	0	0	0	118	24	0	37	17	28	0	**369**
WSF-SB	48	201	78	28	74	0	44	0	106	104	111	0	**794**
HL-West	0	0	0	0	0	0	0	0	0	0	0	0	**0**
CGP	27	100	8	0	0	22	20	0	17	0	0	0	**194**
CA-Upper	1	9	0	0	0	0	6	0	0	0	0	0	**16**
CA-Lower	0	0	0	0	0	0	6	0	0	0	0	0	**6**
NMSP	0	0	0	0	0	0	0	0	0	0	0	0	**0**
SMSP	0	10	0	0	0	12	0	0	0	0	0	0	**22**
Other	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**214**	**605**	**135**	**28**	**476**	**366**	**181**	**0**	**256**	**191**	**177**	**0**	**2629**

SF = sagebrush flat, NL = New Lek, WSF = west sagebrush flat, SB = South bowl, HL = Historic Lek, CA = Conservation Area, NMSP = North of Mine Spoil Area, SMSP = South of Mine Spoil Area.

3. Predator Control Activities

Sage-grouse are impacted by predators in the Alton/Sink Valley area. To reduce the threat of predation on sage-grouse, avian and mesoppredators are destroyed to increase sage-grouse nesting, brood rearing and adult survival. The primary predators removed included common ravens (*Corvus corax),* coyotes (*Canis latrans*), and red fox (*Vulpes vulpes*). Predator control activities were carried out by USDA APHIS Wildlife Services, a federal agency that provides an integrated wildlife damage management approach to help resolve wildlife conflicts and promote human-wildlife coexistence (APHIS 2019). ACD provides funding to Wildlife Services to cover the costs of materials and labor. A total of $7,500 was paid to cover the year's costs.

3.1 Raven Control

Raven control activities were coordinated by Teresa Wright, a raven control specialist with USDA Wildlife Services. Control efforts were focused on time periods when raven populations are high and during peak sage-grouse breeding periods. The primary method used to control ravens is by dispersing hard-boiled eggs treated with DRC-1339 3-chloro-p-toluidine hydrochloride, a restricted pesticide with acute toxicity in corvids including ravens, crows, blackbirds, starlings and magpies (US EPA 2015). When consumed, DRC-1339 is readily absorbed into the circulatory system where it is metabolized in the liver forming glucuronides and mercapturides. Uric acid posits build up in the kidney and blood vessels resulting in necrosis and circulatory impairment. The cause of death is from uremic poison and congestion of the major organs (https://ovocontrol.com/search-ovocontrol/bird-poisons/). In most cases, the target species dies as soon as 3 hours after consuming the bait. For application at in the Alton/Sink Valley area, the pesticide is injected into hard-boiled eggs rather than dispersed in granular form to reduce uptake by other susceptible species including non-target corvids, rock dove, Eurasian collared dove, ducks, geese, and pheasants.

Between January and June, 2019, 1200 treated eggs were dispersed throughout the target area (Figure 3). According to Teresa Wright, a wildlife control specialist with Wildlife Services, ravens cache eggs at a ratio of 1 kill for every 6 eggs distributed. Therefore, the total number of ravens killed was approximately 200 birds.

3.2 Mesopredator Control

Mesopredators that occur within the Sink Valley/Alton area include coyotes, red fox, raccoon, and skunk. Mesopredator control efforts were coordinated by Roger Nauer, USDA Wildlife Services trapper and mesopredator control specialist. To control mesopredators, Wildlife Services used foot snares, traps, and fixed-wing aircraft. Between October 1, 2018 and

September 30, 2019, Wildlife Services harvested 15 coyotes and 1 red fox by trapping and 1 coyote by fixed wing aircraft.

Figure 3. Hard-boiled eggs treated with the neurotoxin DRC-1339 were distributed eggs in the same general areas where raven densities and their risk to sage-grouse chicks are high. Areas where eggs are distributed are shown as blue polygons. 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.

4. Participation and Involvement with Local Working Groups

ACD participates as members of the Color Country Adaptive Resource Management (CCARM) organization. CCARM contributes meaningful input and suggestions for improving habitat conservation efforts within the Alton/Sink Valley area. This includes recommendations for sage-grouse population and habitat conservation planning. Feedback is considered in all aspects of

project planning and implementation. Maintaining this cooperation with CCARM has been instrumental in the success of this project.

References

APHIS. 2019. Wildlife Services mission statement and program overview. USDA Animal and Plant Health Inspection Service. https://www.aphis.usda.gov/aphis/home/ Last Accessed December 8, 2019.

Bates, J.D., K.W. Davies, A. Hulet, R.F. Miller, and B.A. Roundy. 2017. Sage grouse groceries: forb response to pinyon-juniper treatments. Rangeland Ecology and Management 70:106-115.

Boyd, C., S.L. Petersen, W. Gilgert, R. Rogers, S. Fulendorf, R. Larsen, D. Wolfe, K.C. Jensen, P. Gonzales, M. Nenneman, R. Danvir, D. Dahlgren, and T. Messmer. 2011. Looking toward a brighter future for lekking grouse. Rangelands 33:2-11.

Bybee, J., B.A. Roundy, K. Young, A. Hulet, D.B. Roundy, L. Crook, A. Aanderud, D.L. Eggett, and N.L. Cline. 2016. Vegetation response to piñon and juniper tree shredding. Rangeland Ecology & Management 69, 224–234.

Baruch-Mordo, S., J.E. Evans, J.P. Severson, D.E. Naugle, J.D. Maestas, J.M. Kiesecker, M.J. Falkowski, C.A. Hagen, and K.P. Reese. 2013. Saving sage-grouse from the trees: a proactive solution to reducing a key threat to a candidate species. Biological Conservation 167:233-241.

Cline, N.L., B.A. Roundy, F.B. Pierson, P. Kormos, and C.J. Williams. 2010. Hydrologic response to mechanical shredding in a juniper woodland. Rangeland Ecology and Management 63:467-477.

Dahlgren, D.K., R. Chi, and T.A.. Messmer. 2006. Greater sage-grouse response to sagebrush management in Utah. Wildlife Society Bulletin 34:975-985.

Frey, S.N., R. Curtis, and K. Heaton. 2013. Response of a small population of greater sage-grouse to tree removal: implications of limiting factors. Human-Wildlife Interactions 7:260-272.

Pellant, M., P.L. Shaver, D.A. Pyke, J.E. Herrick, F.E. Busby, G. Riegel, N. Lepak, E. Kachergis, B.A. 6 Newingham, and D. Toledo. 2018. Interpreting Indicators of Rangeland Health, Version 5. Tech 7 Ref 1734-6. U.S. Department of the Interior, Bureau of Land Management, National Operations 8 Center, Denver, CO.

Petersen, S.L., B.K. Nicholes, S.N. Frey, K.M Heaton, and D.L. Eggett. 2016. Response of greater sage-grouse to surface coal mining and habitat conservation in association with the mine. Journal of Human-Wildlife Interactions 10:205-216.

United State Environmental Protection Agency (EPA). 2015. Preregistration review for compound DRC-1339, Registration number 56228-10.

https://www3.epa.gov/pesticides/chem_search/ppls/056228-00010-20151020.pdf. Last accessed December 8, 2019.

United States Energy Information Administration (USEIA). 2018. Utah: State Profile and Energy Estimates. https://www.eia.gov/state/?sid=UT. Last accessed December 8, 2019.

Young, K.R., B.A. Roundy, and D.L. Eggett. 2013. Plant establishment in masticated Utah juniper woodlands. Rangeland Ecology and Management 66:597-607.

Acknowledgements

We would like to express our most sincere thanks to all of those who have assisted in helping sustain the sage-grouse population in the Alton-Sink Valley area. We appreciate Kirk Nicholes (ACD Environmental Scientists), Larry Johnson (ACD Project Manager), Kevin Heaton (USU Extension, habitat reclamation), Nicki Frey (SUU/USU Extension, sage-grouse collaring and monitoring), biologists from UDOGM, Teresa Wright (USDA WS, raven control), Roger Nauer (USDA WS, coyote control), biologists from the Utah DWR, and to the Color-Country Adaptive Resource Management group for support, contribution of resources, project feedback and input and financial contribution to this effort. The collaboration from these people has been critical in the successful work accomplished in the Alton/Sink Valley area that ensures a stable and successful sage-grouse population. With this help, this sage-grouse population has experienced long-term persistence within the mining area.