APPENDIX F.
ALTON COAL TRACT LBA EIS REPORT OF RECONNAISSANCE SURVEYS: VEGETATION AND SPECIAL STATUS SPECIES, WILDLIFE AND SPECIAL STATUS SPECIES, SANDLOVING PENSTEMON, WET MEADOWS

Contents

Contents i
Attachments i
Preliminary Threatened And Endangered And Sensitive Species Analysis 1
Reconnaissance Surveys and Potential Species Occurrence Determinations 3
Reconnaissance Survey November 16-18, 2007 3
Wildlife Survey November 16-18, 2007 4
Methods 4
Results and Discussion 7
Summary of Wildlife Species Eliminated from Detailed Analysis 10
Vegetation Communities/Habitat Classification Survey November 16-18, 2007 12
Methods 12
Results 15
Special Status Plant Species Potential Occurrence Determination 16
Rare Plant Species Survey: Penstemon ammophilus May 27-30, 2008 21
Methods 21
Results and Discussion 21
Wet Meadows of the Alton Coal Tract: A Preliminary Assessment July 2, 2008 23
Methods 23
Sampling Design and Transect/Quadrat Placement 23
Cover, Frequency and Composition 23
Results and Discussion 23
Wet Meadows: East Pasture 23
Wet Meadows: West Pasture 25
Discussion 26
Hydrophytic Vegetation 26
Hydric Soils 27
Wetland Hydrology 28
Conclusions 28
References 29

Attachments

Attachment 1: Relevé Plot Data
Attachment 2: Vegetation Associations and Species List

This page intentionally blank

PRELIMINARY THREATENED AND ENDANGERED AND SENSITIVE SPECIES ANALYSIS

On June 7, 2007 personnel from the BLM Kanab Field Office met with personnel from SWCA's Salt Lake City office concerning the Alton Coal Tract LBA EIS. At this meeting BLM requested that SWCA compile a list of Threatened and Endangered and Sensitive (TES) plant and animal species that may be subject to impacts associated with the potential development of the Alton Coal Tract.

SWCA conducted a three-step process to determine which species may be impacted:

Step 1. Development of a comprehensive species list, inclusive of all potentially present species within the affected counties. SWCA personnel compiled a comprehensive list of all potentially impacted TES plant and animal species from the sources listed below. For plants, the comprehensive list was limited to Kane County since ground disturbing activities would be limited to this county and impacts would be expected to be limited to this area. Impacts to plants would not occur along the proposed transportation corridor. For animals, the comprehensive list included Kane, Garfield, and Iron counties. Though new ground disturbance would not be expected in Garfield and Iron counties, the comprehensive list pulls from these counties since impacts may occur from truck collisions with animals.

- **TES Plant Species**
  - Utah Department of Natural Resources, Conservation Data Center (CDC)
  - Inventory of Sensitive Species and Ecosystems in Utah, Endemic and Rare Plants of Utah: An Overview of Their Distribution and Status
  - Kanab Field Office RMP/EIS Final Analysis of the Management Situation (12/2005)
  - Utah Rare Plant Guide (http://www.utahrareplants.org/rpg_species.html; accessed 6/20/2007)
- **TES Animal Species**
  - Utah Department of Natural Resources, Conservation Data Center (CDC)
  - Utah State Listed Species by County (compiled using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System [BIOTICS])
  - County Lists of Utah's Federally Listed Threatened (T), Endangered (E), and Candidate (C) Species
  - Kanab Field Office RMP/EIS Final Analysis of the Management Situation

Step 2. Reduction of the comprehensive species list based on the probability of occurrence as determined through the analysis of SWReGAP data, elevation within the potentially affected area, and known distribution according to the CDC database.

- **TES Plant Species**

  SWCA researched each species on the comprehensive list to determine the probability of occurrence within the Alton Coal Tract LBA. Key factors in determining probability of occurrence were vegetation type (SWReGAP), elevation, and known distribution according to the CDC database. Species were sorted into three groups:

1. Known distribution shown on CDC or SWReGAP, recommend survey/further investigation;
2. Known distribution provided by CDC did not overlap with the project area, but habitat type may occur in the project area, recommend survey/further investigation; and
3. Not likely to occur; do not recommend survey

Additional information on each plant's bloom period (where readily available) was also obtained to provide detail relevant to surveying.

- **TES Animal Species**

  SWCA researched each species on the comprehensive list to determine the probability of occurrence within the Alton Coal Tract LBA and along the proposed transportation route and one alternate transportation route. Key factors in determining probability of occurrence were vegetation type (SWReGAP) and known distribution according to the CDC database. Species were sorted into three groups:

  1. Habitat shown on CDC, recommend survey/further investigation;
  2. Not shown on CDC but habitat may occur, recommend survey/further investigation; and
  3. Not likely to occur, do not recommend survey.

  Additional information on the survey period for each animal was also obtained.

Step 3. Further reduction of the comprehensive species list based on spatial analysis (GIS) modeling coupled with SWReGAP and CDC analyses.

- **TES Plant Species**

  SWCA used a GIS model to determine specific locations of potential occurrences of TES plant species within the Alton Coal Tract LBA. The GIS model included elevation, vegetation type, and species listed in groups 1 and 2 from Step 2.

- **TES Animal Species**

  SWCA used a GIS model to determine specific locations of potential occurrences of TES animal species within the Alton Coal Tract LBA. The GIS model included habitat type and the listed species in groups 1 and 2 from Step 2.

  SWCA used the same model to determine specific locations of potential occurrences of TES animal species along the proposed transportation route and one alternate route. The GIS model included habitat type and the listed species in groups 1, 2 and 3 from Step 2. The model was limited to a 200-foot buffer zone on either side of the roads making up the proposed transportation route and alternate route. Potential occurrences of TES animals for each transportation segment were provided in a memo to the BLM.

At the conclusion of the 3-step analysis process, SWCA presented to BLM a list of species for which surveys were recommended, which BLM further refined based upon personnel knowledge of the resources in the project area. The final list of recommendations was as follows:

Plants

- Paria breadroot
- Sandloving penstemon
- Ruth's sphaeromeria
- Charleston Mountain violet
- Slender (meager) camissonia
- Jones Cycladenia

Animals

- Bald Eagle
- Yellow-Billed Cuckoo
- Mexican Spotted Owl
- Southwestern Willow Flycatcher
- Utah Prairie Dog
- Allen's Big-Eared Bat
- Arizona Toad
- Big Free-Tailed Bat
- Burrowing Owl
- Ferruginous Hawk
- Fringed Myotis
- Greater Sage-Grouse
- Lewis's Woodpecker
- Long-Billed Curlew
- Northern Goshawk
- Spotted Bat
- Three-Toed Woodpecker
- Townsend's Big-Eared Bat
- Western Toad
- Black Swift
- Kit Fox
- Pygmy Rabbit
- Short-Eared Owl
- **Surveys recommended for proposed and alternate transportation routes:**
  - Pygmy Rabbit
  - Utah Prairie Dog
  - Kit Fox
  - Greater Sage Grouse

This list was then further refined through the Reconnaissance Surveys discussed below.

RECONNAISSANCE SURVEYS AND POTENTIAL SPECIES OCCURRENCE DETERMINATIONS

During fall 2007 and spring 2008 three reconnaissance level surveys were conducted on the Alton Coal Tract. These surveys were conducted to

- characterize vegetation communities on the tract
- determine presence/absence of certain wildlife and plant species on the tract, and
- make a preliminary determination of the presence of wet meadow wetlands on the tract.

Surveys were conducted November 16-18, 2007; May 27-30, 2008; and July 2, 2008. The methods, results, and conclusions of these field inventories are reported below by survey date in ascending chronological order.

RECONNAISSANCE SURVEY NOVEMBER 16-18, 2007

From November 16 to 18, 2007, three personnel from SWCA's Salt Lake City Office and one personnel from Mt. Nebo Consulting (surveyors listed in Attachment 1) conducted a reconnaissance-level survey of lands within the Alton Coal Tract LBA. The purpose of the survey was to: 1) provide data for use in alternatives development for the Alton Coal Tact LBA EIS; 2) provide data for Chapters 3 and 4 of the Alton Coal Tract LBA EIS; and 3) narrow the list of species for which species-specific surveys may need to be completed in support of the

Alton Coal Tract LBA EIS and provide documentation of this and target areas for species specific surveys during the appropriate survey period.

WILDLIFE SURVEY NOVEMBER 16-18, 2007

METHODS

Mexican Spotted Owl (MSO)

Using the 1997 and 2000 MSO habitat models (Spotskey and Willey 1997, 2000) two areas in the vicinity of the Alton Coal Tract LBA were identified as potentially suitable nesting habitat (Figure 1). These areas were assessed by recording the presence-absence of the five primary constituent elements (PCEs) identified in the MSO Recovery Plan (USFWS 1995) and other parameters on a standardized field form, to verify their suitability as MSO nesting habitat.

Southwestern Willow Flycatcher and Western Yellow-billed Cuckoo

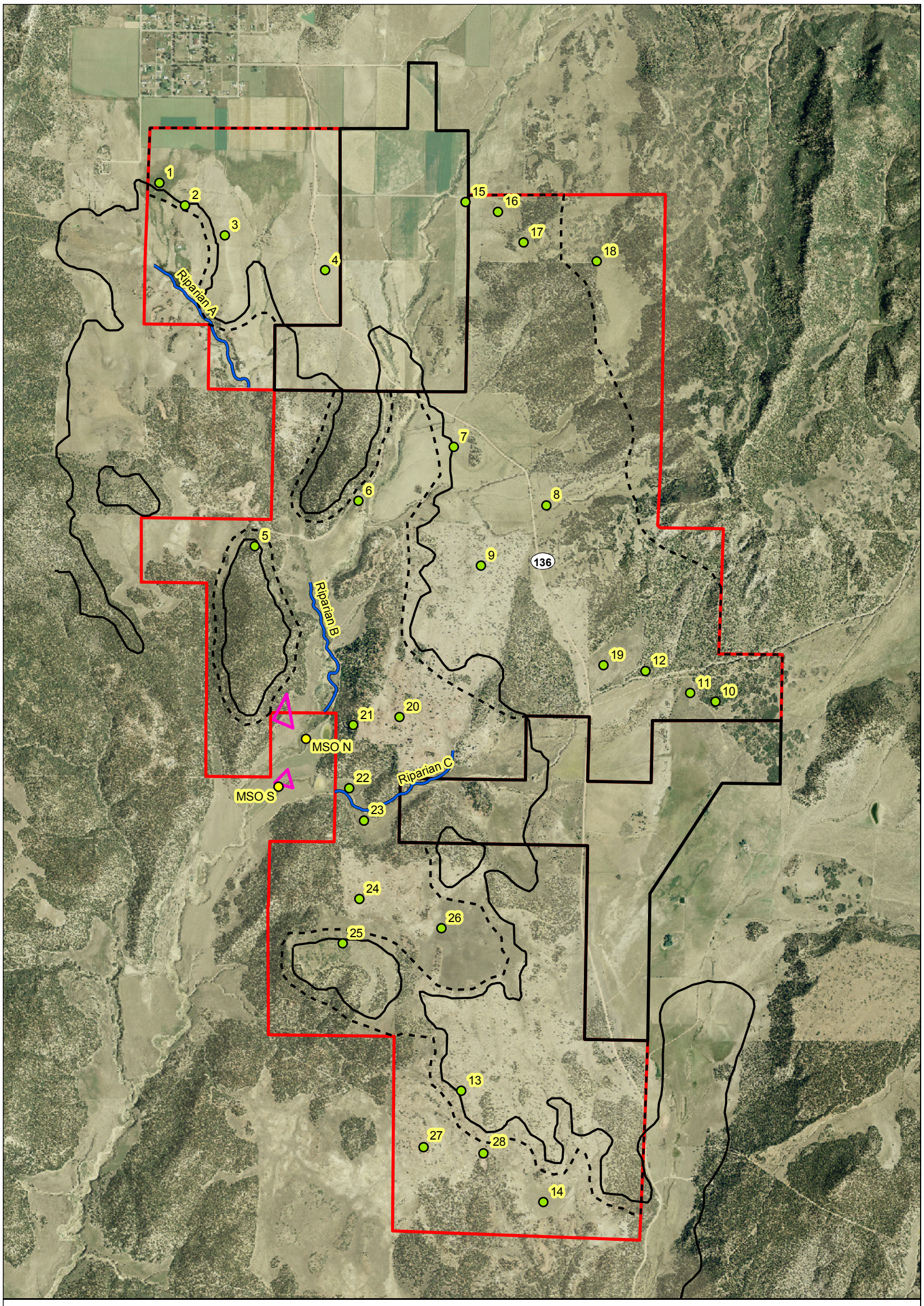
Three riparian areas were identified through SWReGAP as potentially suitable habitat for southwestern willow flycatchers (SWFL) and yellow-billed cuckoos (YBCU). These riparian areas were labeled as Riparian A, Riparian B, and Riparian C (see Figure 1). These three stretches were walked and assessed to verify their suitability as potential stopover and nesting habitat.

The surveyors focused on finding areas containing tamarisk and other species such as Fremont cottonwood *(Populus fremontii)* and black willow *(Salix gooddingii)*, which have the proper structure to be potentially suitable for use by nesting willow flycatchers. For the purposes of the study, potentially suitable habitat was defined as dense, woody, riparian vegetation greater than 3.0 m (9.8 feet) in height with greater than 75% canopy cover.

Pygmy Rabbit

Pygmy rabbits were listed as a potentially occurring species within the tract. Potentially suitable habitat was assessed during other wildlife and general vegetation surveys. According to *Surveying for Pygmy Rabbits* (Ulmschneider et al. 2004):

> The site characteristics of areas inhabited by pygmy rabbits in Utah vary considerably. Burrow habitat in southern, low elevation sites is often limited to the bottom of gentle drainages supporting Wyoming sagebrush amid a black sage, shadscale, and gray molly community of minimal height (28 cm). Understory condition is variable: many sites have grasses and forbs in excellent condition, but some of the most numerous pygmy rabbit populations discovered are in chronically grazed areas (sheep and cattle) being targeted for rehabilitation.



MSO Data Point
Vegetation Data Point
Riparian Data
Coal Line Boundary
LBA
Private
Pit Disturbance
MSO 1997 Model

0 0.25 0.5 1 Kilometers
0 0.2 0.4 0.8 Miles

N

Imagery taken from National Agricultural Imagery Program (NAIP) natural color aerial photography 1-meter resolution, 2006.

Projection: Transverse Mercator
Coordinate System: UTM
Datum: North American Datum of 1983 (NAD 83)

No warranty is made by the BLM for use of the data for purposes not intended by the BLM.

This product may not meet BLM standards for accuracy and content. Different data sources and input scales may cause some misalignment of data layers.

Figure 1. Alton Coal Tract wildlife and vegetation survey map.

This page intentionally blank

Therefore, areas of large dense sagebrush were of particular concern, and the fact that certain areas are grazed did not affect how the area was assessed as to the possibility of the presence of pygmy rabbits.

RESULTS AND DISCUSSION

Mexican Spotted Owl (MSO)

The two potentially suitable MSO habitat units, A-North and A-South (see Figure 1) were evaluated by recording and ranking the presence-absence of the five primary constituent elements (PCEs) identified in the MSO Recovery Plan (USFWS 2004). Both A-North and A-South received poor ratings and therefore are no longer considered potentially suitable habitat for MSO. It is therefore very unlikely that any MSO occur anywhere near the tract.

Southwestern Willow Flycatcher (SWFL) and Western Yellow-billed Cuckoo (YBCU)

The three riparian areas were walked and evaluated (see Figure 1). Riparian Area A did not contain any tamarisk, willow, or cottonwood trees. Riparian Area B had only sparse cottonwood trees along with relatively common Russian olive trees. Riparian Area C had only one cottonwood tree along the entire stretch. Therefore, all three areas Riparian A, B and C were found to be of no nesting or stopover value to SWFL or YBCU.

Pygmy Rabbit

During the vegetation surveys two different areas were found to be potentially suitable pygmy rabbit habitat (see Figure 1). These areas had relatively large patches of large sagebrush. Potential pygmy rabbit pellets were found and collected. It is possible that these pellets are young or small cottontails.

Table 1. Summary of SWFL, YBCU and MSO Potential to Occur in the LBA

Common Name	Status	Habitat Type	Potential On Tract	Field Surveys Recommended? EIS Analysis?
Mexican Spotted Owl (*Strix occidentalis lucida*)	T	This species utilizes cliff, canyon, riparian, conifer forest, and mixed forest habitats.	No Potential Habitat. Based on fall habitat surveys.	No Field Surveys. No EIS Analysis.
Southwestern Willow Flycatcher (*Empidonax traillii extimus*)	E	This species utilizes riparian, forested wetland, shrubland, and mixed woodland habitats.	No Potential Habitat. Based on fall habitat surveys.	No additional Field Surveys. No EIS Analysis.
Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)	C	This species utilizes riparian, forested wetland, scrub-shrub wetland, shrubland, and mixed woodland habitats.	No Potential Habitat. Based on fall habitat surveys.	No additional Field Surveys. No EIS Analysis.

Table 1. Summary of SWFL, YBCU and MSO Potential to Occur in the LBA

Common Name	Status	Habitat Type	Potential On Tract	Field Surveys Recommended? EIS Analysis?
Pygmy Rabbit (*Brachylagus idahoensis*)	SPC	This species utilizes big sagebrush and shrubland habitats.	Two Potential habitat areas	Additional Field Surveys Recommended. EIS Analysis: Yes.

Other Species

Other special status wildlife species with potential to occur in the tract are listed in Table 2.

Table 2. Other Special Status Wildlife Species with Potential to Occur in the LBA

Common Name	Status	Habitat Type	Potential On Tract	Field Surveys Recommended? EIS Analysis?
Bald Eagle (*Haliaeetus leucocephalus*)	Delisted 2008	This species utilizes riparian, riverine, forested wetland, coniferous forest, mixed forest, and woodland habitats.	Potential wintering habitat is present but no known nests	Raptor surveys completed in 2007 and again before project implementation. EIS Analysis: Yes
Allen's Big-eared Bat (*Idionycteris Phyllotis*)	SPC	This species utilizes cliff, canyon, and riparian habitats.	Potential habitat surrounding the tract but not within it.	No Field Surveys. EIS Analysis of Indirect Effects.
Arizona Toad (*Bufo Microscaphus*)	SPC	This species utilizes open water, riparian, shrubland, desert, and woodland habitats.	Potential Habitat is present	No Field Surveys. EIS Analysis: Yes
Big Free-tailed Bat (*Nyctinomops macrotis*)	SPC	This species utilizes cliff, canyon, and riparian habitats.	Potential habitat surrounding the tract but not within it.	No Field Surveys. EIS Analysis of Indirect Effects.
Burrowing Owl (*Athene cunicularia*)	SPC	This species utilizes grassland, shrubland, and desert habitats.	Likely to occur on the tract	Field surveys should occur where the ground will be disturbed. EIS Analysis: Yes

Table 2. Other Special Status Wildlife Species with Potential to Occur in the LBA

Common Name	Status	Habitat Type	Potential On Tract	Field Surveys Recommended? EIS Analysis?
Ferruginous Hawk (*Buteo regalis*)	SPC	This species utilizes riparian, cliff, desert, grassland, sagebrush, and shrubland habitats.	Likely to occur on or near the tract. Raptor nest surveys are needed	Raptor surveys completed in 2007 and again before project implementation. EIS Analysis: Yes
Fringed Myotis (*Myotis thysanodes*)	SPC	This species utilizes cliff, canyon, and riparian habitats.	Potential habitat surrounding the Tract but not within it.	No Field Surveys. EIS Analysis of Indirect Effects.
Greater Sage-grouse (*Centrocercus urophasianus*)	SPC	This species utilizes grassland, sagebrush, shrubland, and riparian habitats.	Individuals and a lek present on the Tract.	Field Surveys: Yes EIS Analysis: Yes
Lewis's Woodpecker (*Melanerpes lewis*)	SPC	This species utilizes coniferous forest, woodland, and shrubland habitats.	The CDC shows primary breeding habitat in and adjacent to the tract.	No Field Surveys. EIS Analysis: Yes
Long-billed Curlew (*Numenius americanus*)	SPC	This species utilizes grassland, wetland, riparian, and shrubland habitats.	Potential habitat	No Field Surveys. EIS Analysis: Yes
Northern Goshawk (*Accipiter gentilis*)	CS	This species utilizes coniferous forest, mixed forest, woodland, and riparian habitats.	Potential habitat surrounding the Tract but not within it.	No Field Surveys. EIS Analysis: Yes
Spotted Bat (*Euderma maculatum*)	SPC	This species utilizes cliff, canyon, and riparian habitats.	Potential habitat surrounding the Tract but not within it.	No Field Surveys. EIS Analysis of Indirect Effects.
Three-toed Woodpecker (*Picoides tridactylus*)	SPC	This species utilizes coniferous forest, mixed forest, woodland, shrubland, and riparian habitats.	Potential habitat surrounding the Tract but not within it.	No Field Surveys. EIS Analysis of Indirect Effects.
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	SPC	This species utilizes cliff, canyon, forested, woodland, and riparian habitats.	Potential habitat surrounding the Tract but not within it.	No Field Surveys. EIS Analysis of Indirect Effects.

Table 2. Other Special Status Wildlife Species with Potential to Occur in the LBA

Common Name	Status	Habitat Type	Potential On Tract	Field Surveys Recommended? EIS Analysis?
Western Toad (*Bufo boreas*)	SPC	This species utilizes open water, springs, wet meadows, riparian, coniferous forest, and woodland habitats.	Potential habitat	No Field Surveys. EIS Analysis of Indirect Effects.
Black Swift (*Cypseloides niger*)	SPC	This species utilizes waterfall, cliff, riparian, coniferous forest, mixed forest, and woodland habitats.	No Potential Habitat. Based on fall habitat surveys.	No Field Surveys. No EIS Analysis.
Kit Fox (*Vulpes macrotis)*	SPC	This species utilizes grassland, desert, shrubland, and savanna habitats.	Potential habitat, but not shown on CDC distribution map	No Field Surveys. EIS Analysis: Yes
Short-eared Owl (*Asio flammeus*)	SPC	This species utilizes sagebrush, grassland, shrubland, and savanna habitat.	Potential habitat, but not shown on CDC distribution map	No Field Surveys. EIS Analysis: Yes
Utah Prairie Dog (*Cynomys parvidens)*	Fed-T	This species inhabits open, grassy habitats and swales within sagebrush communities (Crocker-Bedford and Spillett 1981). It requires well-drained, deep soils suitable for burrowing, and moist herbage, particularly during drought.	Potential habitat not present on the tract. Populations known to occur along the coal haul transportation route adjacent to SR-20 and have high potential to occur along the coal haul transportation route adjacent to Highways 56 and 89.	Field Surveys: Yes EIS Analysis: Yes

SUMMARY OF WILDLIFE SPECIES ELIMINATED FROM DETAILED ANALYSIS

Based on the data gathered by the original preliminary analysis and supplemented by the results of the reconnaissance surveys, the following wildlife and special status species were eliminated from detailed analysis:

Table 3. Wildlife and Special Status Animal Species Eliminated from Detailed Analysis

Common Name ***Scientific Name***	**Status**	**Reason Eliminated**
Bonytail (*Gila elegans*)	Fed-E	No potential habitat in tract or coal haul transportation route
Bonneville Cutthroat trout *(Oncorhynchus clarkia Utah)*	CS	No potential habitat in tract or coal haul transportation route
Colorado pikeminnow (*Ptychocheilus lucius*)	Fed-E	No potential habitat in tract or coal haul transportation route
Desert Sucker *(Catostomus clarkia)*	SPC	No potential habitat in tract or coal haul transportation route
Humpback chub (*Gila cypha*)	Fed-E	No potential habitat in tract or coal haul transportation route
Razorback sucker (*Xyrauchen texanus*)	Fed-E	No potential habitat in tract or coal haul transportation route
Southwestern willow flycatcher (*Empidonax traillii extimus*)	Fed-E	Not likely to occur in tract or coal haul transportation route
Kanab ambersnail (*Oxyloma kanabense*)	Fed-E	Not likely to occur in tract or coal haul transportation route
Leatherside Chub *(Gila copei)*	SPC	No potential habitat in tract or coal haul transportation route
Mexican spotted owl (*Strix occidentalis*)	Fed-T	Not likely to occur in tract or coal haul transportation route
California Condor (*Gymnogyps californianus*)	Fed-Experimental	Not likely to occur in tract or coal haul transportation route
Coral pink sand dunes tiger beetle (*Cicindela limbata albissima*)	Fed-C	Not likely to occur in tract or coal haul transportation route
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	Fed-C	No potential habitat in tract or coal haul transportation route
Desert bighorn sheep (*Ovis canadensis nelsoni*)	UDWR	Not likely to occur in tract or coal haul transportation route
Dark kangaroo mouse (*Microdipodops megacephalus*)	SPC	Not likely to occur in tract or coal haul transportation route
American white pelican (*Pelecanus erythrorhynchos*)	SPC	No potential habitat in tract or coal haul transportation route
Common chuckwalla (*Sauromalus ater*)	SPC	Not likely to occur in tract or coal haul transportation route
Utah physa (*Physella utahensis*)	SPC	Not likely to occur in tract or coal haul transportation route
Virgin Spinedace *(Lepidomeda mollispinis)*	CS	No potential habitat in tract or coal haul transportation route

VEGETATION COMMUNITIES/HABITAT CLASSIFICATION SURVEY NOVEMBER 16-18, 2007

The tract was surveyed over a three day period (November 16–18, 2007), with the main areas of focus being those planned for known surface-disturbing activities.

METHODS

SWCA and Mt. Nebo Scientific ecologists surveyed and collected data on dominant species cover in the various vegetation communities within the tract (see Attachment 1, Relevé Plot Data). Vegetation community classification surveys were conducted by recording plant species present and their general percent cover within an approximate 10 meter radius of the data point. Data points were recorded in areas that typified the overall vegetation community (Figure 2).

The percent cover for each species was classified as rare (<5% cover), few (5%–25% cover), moderate (26%–50% cover), or common (>50% cover). As many data collection points as possible were established in each area of the tract to increase the reliability (for characterization of the affected environment and the analysis of impacts and for photo interpretation) of the data collected. Twenty-six vegetation data points were surveyed during fall 2007 field reconnaissance (see Attachment 1, Relevé Plot Data). Vegetation communities were ground-truthed and delineated on the aerial photograph while recording the data points with a handheld GPS unit as well as driving and walking through the tract.

The information collected was used to delineate the various vegetation communities within the tract. Vegetation data points were plotted on an aerial photo of the area and used to interpret patterns of vegetation cover, which were outlined and digitized onto a map using GIS. The results of the vegetation community delineation are shown in Figure 2.

For consistency, vegetation communities as identified by Mt. Nebo Scientific for other areas in the vicinity of the tract were used with minor modifications. These are sagebrush/grassland, meadows, perennial/annual grasses, pinyon-juniper/sagebrush, mountain brush, rabbitbrush, pinyon-juniper/mountain brush, and pinyon-juniper woodland (see Attachment 2, Vegetation Associations and Species List).

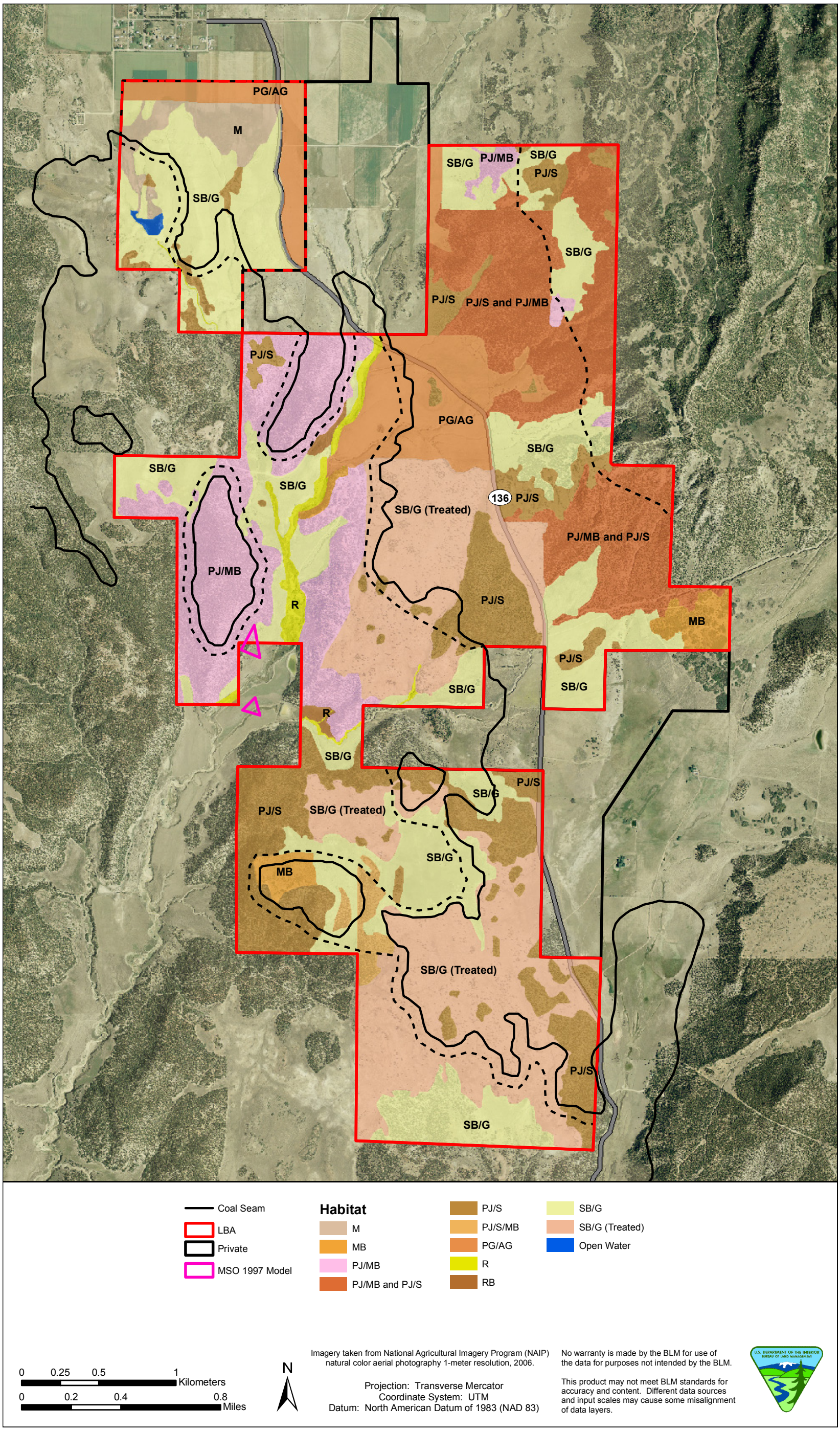


Figure 2. Alton Coal Tract vegetation (habitat) community map.

This page intentionally blank

RESULTS

Reconnaissance survey data coupled with aerial photo interpretation showed approximately 1,440 acres of pinyon-juniper habitat (including pinyon-juniper/sage and pinyon-juniper/mountain brush vegetation types), 275 acres of perennial/annual grasses, 10 acres of rabbitbrush habitat, 915 acres of sagebrush/grassland habitat, 755 acres of sagebrush/grassland (treated) habitat, 65 acres of meadow habitat, and 60 acres of mountain brush habitat. See Figure 2 for vegetation community delineation results. Table 3 lists the acreages of each of these habitats within the tract.

Table 3. Vegetation Communities and Approximate Acreages with the Alton Coal Tract

	Pinyon-juniper*	Sagebrush/ grassland	Sagebrush/ Grassland (Treated)**	Perennial/ Annual Grasses	Meadow	Mountain Brush	Rabbit-brush
Acres	1,440	915	755	275	65	60	10
% of Total (3,581)	40	25.5	21	7.6	1.8	1.7	0.3

* Pinyon-juniper habitat classification includes pinyon-juniper/sagebrush and pinyon-juniper/mountain brush vegetation communities.

** Sagebrush/Grassland (treated) habitat classification includes areas if sagebrush and grassland vegetation communities where pinyon and juniper trees have been cut or chained and the body of the tree chipped.

SPECIAL STATUS PLANT SPECIES POTENTIAL OCCURRENCE DETERMINATION

Potential for special status plant species identified during the preliminary threatened and endangered and sensitive species analysis was determined using the vegetation communities as delineated during the fall 2007 field reconnaissance visit. Using the known habitat preferences of these species, SWCA was able to determine areas of possible occurrence for these species within the tract.

Based on the *County Lists of Utah's Threatened, Endangered, and Candidate Species* (UDWR 2007), sensitive species lists as published in the BLM Kanab Field Office Draft Resource Management Plan (BLM 2007), the *Utah Rare Plant Guide* (UNPS 2007), and GIS analysis using SWReGAP vegetation data and elevation, the following special status or rare plant species may occur within the Alton Coal Tract LBA: Paria breadroot (*Pediomelum pariense*), sandloving penstemon (*Penstemon ammophilus*), Ruth's sphaeromeria (*Sphaeromeria ruthiae*), Charleston Mountain violet (*Viola charlestonensis*), Slender camissonia (*Camissonia exilis*), and Jones cycladenia (*Cycladenia humilis* var. *jonesii*). The habitat requirements for each of these species are outlined in Table 4 below (UNPS 2007).

Table 4. Habitat Requirements of Certain Special Status or Rare Vegetation Species With Possible Occurrence in the LBA

Species	Elevation Range	Flowering Season	Vegetation Associations	Soils and Geology Associations	Status	Additional surveys recommended?
Paria breadroot (*Pediomelum pariense*)	5,600 to 8,000 feet	June through July	Ponderosa pine and pinyon-juniper	Calcareous or sandy soils on Wasatch limestone	Utah Rare Plant (UNPS 2007)	No
Sandloving penstemon (*Penstemon ammophilus*)	5,900 to 7,200 feet	Late May through June	Ponderosa pine or mixed shrub communities	Blow sand derived from Navajo sandstone	BLM Sensitive Species	Yes
Ruth's sphaeromeria (*Sphaeromeria ruthiae*)	4,400 to 6,600 feet	September	Ponderosa pine, Douglas fir, oak, mountain mahogany, bigtooth maple, box elder, and sandstone crevice communities	Navajo and Kayenta sandstone, on cliffs and boulders	Utah Rare Plant (UNPS 2007)	No
Charleston Mountain violet (*Viola charlestonensis*)	6,500 to 9,500 feet	May through June	Ponderosa pine communities, limestone hills, slopes, and dry washes	Claron and Carmel Limestone	Utah Rare Plant (UNPS 2007)	No

Table 4. Habitat Requirements of Certain Special Status or Rare Vegetation Species With Possible Occurrence in the LBA

Species	Elevation Range	Flowering Season	Vegetation Associations	Soils and Geology Associations	Status	Additional surveys recommended?
Slender camissonia (*Camissonia exilis*)	5,000 to 6,900 feet	Late April to May	Sagebrush, galleta, and pinyon-juniper communities	Gypsiferous strata of Moenkopi, Entrada, Carmel, and other fine-textured substrates (Welsh et al. 2003)	BLM Sensitive Species	No
Jones cycladenia (*Cycladenia humilis* var. *jonesii*)	4,400 to 6,000 feet	Mid-May to June	Eriogonum-Ephedra cool desert shrub and juniper communities	Gypsiferous saline soils on Chinle, Cutler, and Summerville formations	Federally listed as threatened	No

To precisely determine areas of suitable habitat for these species within the Alton Coal Tract, data on surface geology (UGS 1999) and elevation were used in combination with vegetation community data as delineated through survey work. The main types of surface geology in the area are Tropic Shale (Kt) and Dakota formation (Kd), both of which are a mix of shale and sandstone. Other types of surface geology in the tract are Alluvium (Qa) and Mass Movement Deposits (Qms). Alluvium areas are mostly sand and other loose materials deposited in stream beds and washes, and Mass Movement Deposits include rock fall, talus, and colluvium (UGS 1999). Since there are no areas of limestone in the tract, Charleston Mountain violet and Paria breadroot are not likely to occur in the tract. There are also no Chinle, Cutler, or Summerville formations, which excludes Jones' Cycladenia. Finally, the lack of Navajo and Kayenta sandstone, and Moenkopi, Entrada, and Carmel formations excludes Ruth's sphaeromeria and slender camissonia from occurring in the tract. No surveys are recommended for these five species in the 2008 field season.

Possible areas of occurrence for the remaining species, sandloving penstemon, are shown in Figure 3. These potential habitat areas were identified by referencing surface geology information (UGS 1999) and vegetation covers as delineated using data acquired during the fall 2007 field surveys. Based on habitat requirements listed by the Utah Rare Plant Guide (UNPS 2007), sandloving penstemon has a relatively high likelihood of occurrence in Qa surface geology coupled with mountain brush, sagebrush/grass, or rabbitbrush ecology. Sandloving penstemon may also occur, although with lower likelihood, in Qa or Qms surface geology coupled with sagebrush/grassland (treated) or pinyon-juniper/mountain brush communities. Estimated areas of potential habitat for this species are shown in Table 5 and Figure 3.

Table 5. Acres of Potential Occurrence of Special Status or Rare Plant Species in the LBA (see also Figure 3).

	Acres of higher likelihood potential occurrence	Acres of lower likelihood potential occurrence
Sandloving penstemon	625.09	443.26

Surveys for sandloving penstemon are recommended in identified potential habitat during their flowering period (May and June) in the 2008 field season. Recommended areas of focus include locations where potential habitats overlap with proposed impact areas, although surrounding areas may also be surveyed as necessary.

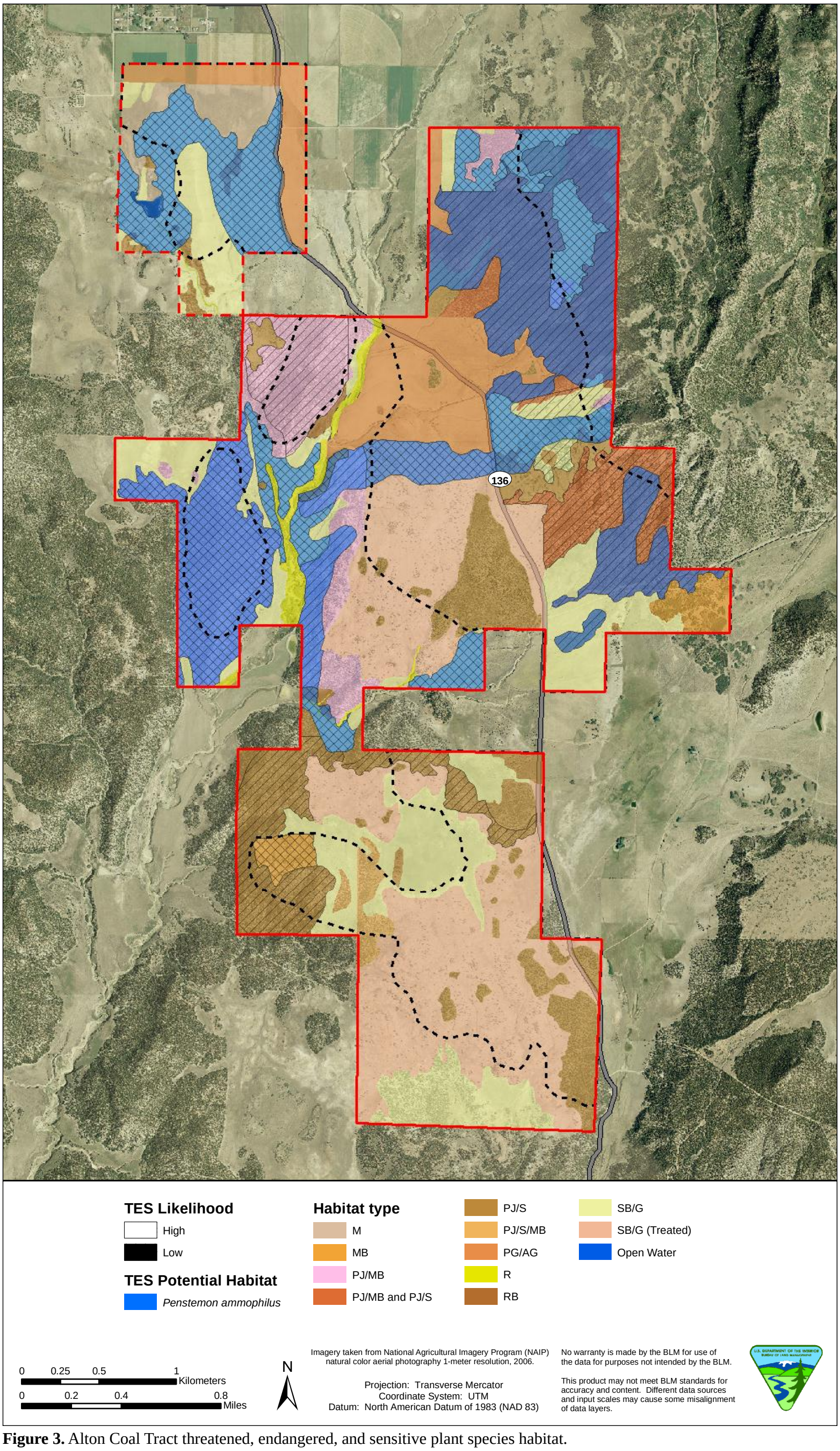


Figure 3. Alton Coal Tract threatened, endangered, and sensitive plant species habitat.

This page intentionally blank

RARE PLANT SPECIES SURVEY: PENSTEMON AMMOPHILUS *MAY 27-30, 2008*

Based on the recommendation from the habitat classification surveys and special status plant species potential occurrence determinations, a field survey was conducted to further assess the potential for sandloving penstemon to be present in the Alton Coal Tract.

METHODS

Prior to the field survey, known locations of sandloving penstemon were reviewed at the herbarium at Brigham Young University, Provo, Utah. All specimen locations were plotted on a field map. Notes about habitats, associated plant communities, elevation, phenology, geology, soil types and other applicable information were written in a field notebook. Based on the voucher specimens for this plant species, the most appropriate days believed to successfully locate sandloving penstemon in a field survey were chosen for the survey period.

Prior to surveying the Alton Coal Tract, several known locations of the plant were visited to review the specific habitats, identify the current phenology of the species and also to re-create a visual or "target" image for the surveyor. Once these locations, habitats and live plants were visited, the survey then focused on the areas within the Alton Coal Tract.

The field survey for sandloving penstemon was conducted from May 27 - May 30, 2008 by Mt. Nebo Scientific, Inc. Figure 4 identifies the survey area for the sandloving penstemon. These areas were accessed using a 4WD vehicle and an ATV on the roads and trails, then by walking the areas not accessible by the vehicles. Binoculars and spotting scopes were also utilized to assist in the search for suitable habitat for the plants.

RESULTS AND DISCUSSION

Although relatively close in proximity to known populations of the sandloving penstemon, this plant species was not found in the Alton Coal Tract study area shown in Figure 4, nor was the precise habitat of which this plant is currently thought to be limited to, found in the study area. Based on the research and subsequent field survey for the sandloving penstemon, it is believed that there is a very low probability that the species occurs within the Alton Coal Tract study area.

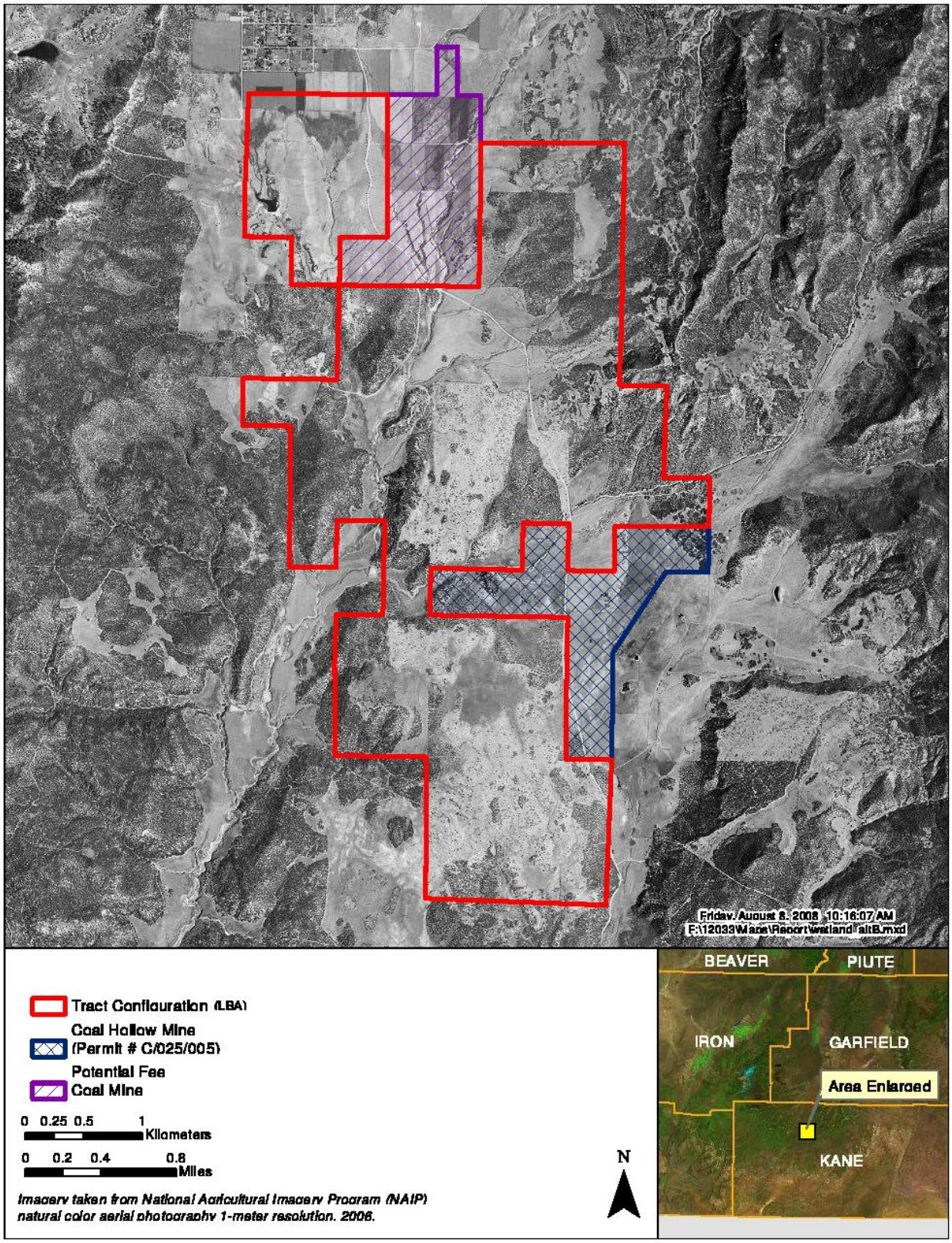


Figure 4. Survey area for sandloving penstemon.

WET MEADOWS OF THE ALTON COAL TRACT: A PRELIMINARY ASSESSMENT JULY 2, 2008

The scope of this study was to provide a preliminary assessment of some specific wet meadows currently used as pasture lands near the northern most boundary of the tract. The scope of the study was to provide a preliminary description of the pastures/meadows from a vegetation aspect with implications regarding their potential for being considered for future wetland studies. Soils and hydrology, two additional components required for wetland determinations, are only cursorily addressed in this study.

The study area was visited in November 2007, June 2008 and July 2008. On July 2, 2008, quantitative and qualitative data were recorded in the wet meadows near the northern boundary of the tract, just south of the Town of Alton, Utah (Figure 5).

METHODS

SAMPLING DESIGN AND TRANSECT/QUADRAT PLACEMENT

Transect lines for vegetation sampling were placed randomly within the boundaries of the meadow areas (see Figure 5). The transect placement technique was employed with the goal to adequately sample the meadows with a representative number of samples for each area. Once transects were established, quadrat locations for sampling were chosen using random numbers from the transect lines with the objective to record data without preconceived bias.

COVER, FREQUENCY AND COMPOSITION

Cover estimates were made using ocular methods with meter square quadrats. Species composition, cover by species, and relative frequencies were also assessed from the quadrats. Additional information was recorded on the raw data sheets notes such as: slope, exposure, grazing use, disturbance and/or other appropriate notes. Plant nomenclature follows Welsh et al. (2003).

RESULTS AND DISCUSSION

The sample areas were comprised of two wet meadows. They were sampled and have been reported separately and were called the “East Pasture" and "West Pasture" (see Figure 5).

WET MEADOWS: EAST PASTURE

The dominant plant species present in the sample quadrats in the East Pasture were wiregrass (*Juncus arcticus*), small-wing sedge (*Carex microptera*) and Missouri iris (*Iris missouriensis*). All species present in the sample quadrats along with their cover and frequency values are shown in Table 1. The total living cover for the East Pasture was estimated at 80.75% (see Table 2). The living understory cover composition was comprised of 85.48% grasses (or grass-like species) and 14.52% forbs (see Table 2). No woody species were present in the sample quadrats.

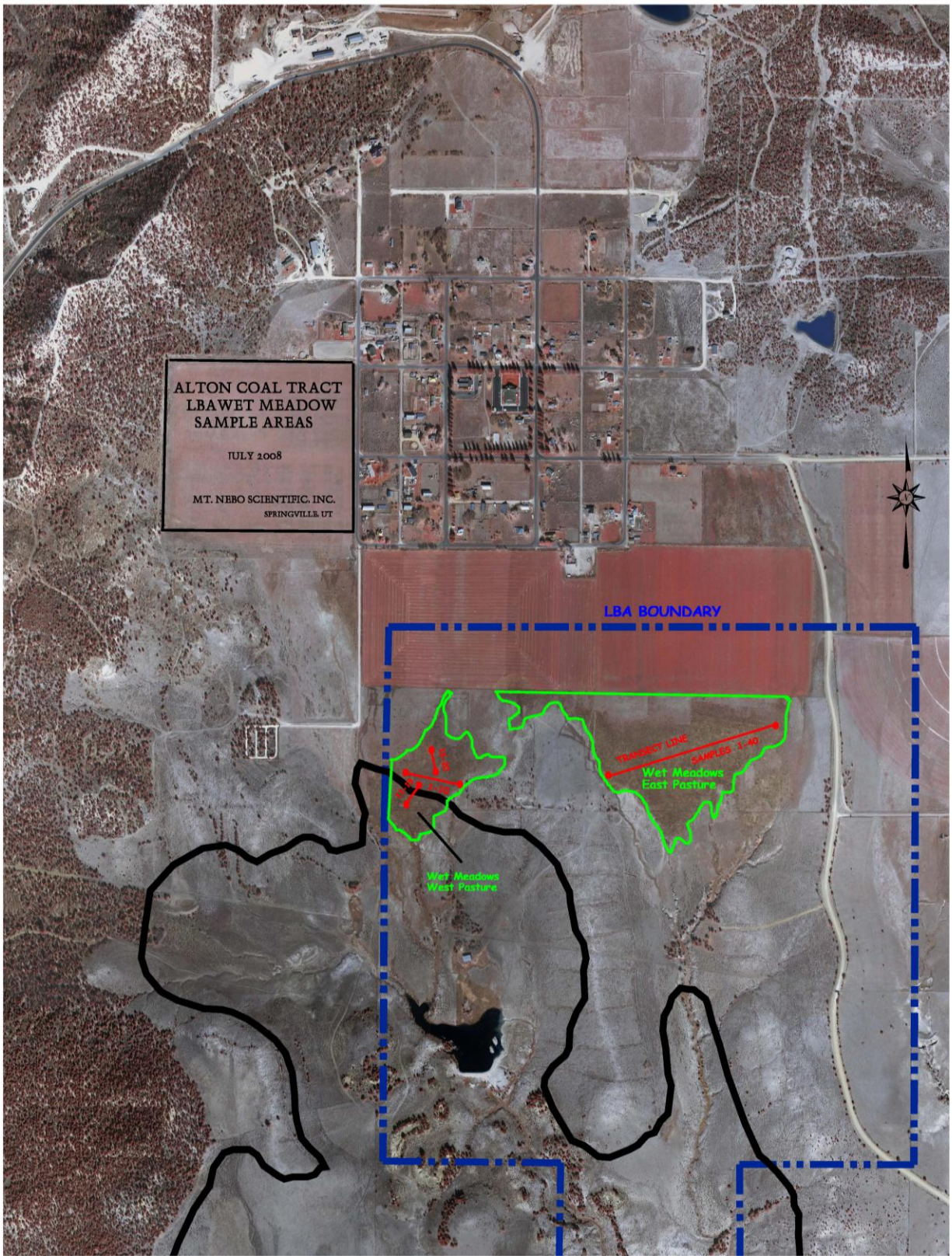


Figure 5. Wetland meadow sample areas.

Table 1. East Pasture Wet Meadow at the Alton Coal Tract. Total Cover, Standard Deviation and Frequency by Species (2008)

	Mean Percent	Standard Deviation	Percent Frequency
Trees and Shrubs			
Forbs			
Chenopodium sp.	0.13	0.78	2.50
Erigeron sp.	3.38	8.47	20.00
Iris missouriensis	7.13	11.88	32.50
Melilotus officinalis	0.25	1.56	2.50
Plantago major	0.25	1.09	5.00
Grasses			
Bromus inermis	3.13	6.39	22.50
Carex microptera	18.50	19.50	60.00
Juncus arcticus	47.50	26.76	90.00

Table 2. East Pasture Wet Meadow at the Alton Coal Tract. Total Cover, Standard Deviation and Sample Size (2008)

	Mean Percent	Standard Deviation	Percent Frequency
A. Total Cover			
Total Living Cover	80.75	10.34	40
Litter	16.20	9.33	40
Bareground	2.03	2.40	40
Rock	1.03	0.16	40
B. % Composition			
Shrubs	0.00	0.00	40
Forbs	14.52	18.08	40
Grasses	85.48	18.08	40

WET MEADOWS: WEST PASTURE

The dominant plant species for the West Pasture was primarily wiregrass (Table 3). Total living cover in this meadow was 78.00% (Table 4). The living cover was comprised almost exclusively of grass or grass-like species, which made up nearly 97% of the living cover by composition (Table 4). Like the East Pasture, no woody species were present in the sample quadrats.

Table 3. West Pasture Wet Meadow at the Alton Coal Tract LBA. Total Cover, Standard Deviation and Frequency by Species (2008)

	Mean Percent	Standard Deviation	Percent Frequency
Trees and Shrubs			
Forbs			
Cirsium sp.	0.75	1.79	15.00
Erigeron sp.	0.85	1.80	20.00
Melilotus officinalis	0.75	2.38	10.00
Grasses			
Bromus inermis	6.40	9.53	50.00
Elymus elymoides	0.25	1.09	5.00
Juncus arcticus	67.50	14.45	100.00
Poa pratensis	1.50	4.77	10.00

Table 4. West Pasture Wet Meadow at the Alton Coal Tract. Total Cover, Standard Deviation and Sample Size (2008)

	Mean Percent	Standard Deviation	Percent Frequency
A. Total Cover			
Total Living Cover	78.00	7.65	20
Litter	15.85	9.60	20
Bareground	5.10	6.63	20
Rock	1.05	0.22	20
B. % Composition			
Shrubs	0.00	0.00	20
Forbs	3.01	4.83	20
Grasses	96.99	4.83	20

DISCUSSION

HYDROPHYTIC VEGETATION

As mentioned, the scope of this report was to provide vegetation information regarding the wet meadows near the northern boundary of the Alton Coal Tract. Quantitative data from sampling the plant communities of the wet meadows can provide insight as to whether these areas may have the potential to be delineated as jurisdictional wetlands and if additional studies should be conducted in the future to make this determination. The U.S. Army Corps of Engineers (COE), the regulatory agency responsible for jurisdiction of wetlands under Section 404 of the Clean Water Act (33 U.S.C. 1344), has recently provided a manual that provides technical guidance

and procedures for identifying and delineating wetlands in the arid west region, of which the Alton Coal Tract is part (U.S. Army Corps of Engineers, 2006).

The COE manual mentioned above has a section regarding hydrophytic vegetation indicators for wetland delineations. This section describes two procedures that may be used to indicate the presence of hydrophytic vegetation, which is one step in determining if a given area would be considered wetland or jurisdictional wetland by definition. Both hydrophytic vegetation indicator procedures utilize quantitative data for their determinations. The first test is called the Dominance Test.

The Dominance Test is the basic hydrophytic vegetation indicator and "should be applied in every wetland determination in the arid west". This test is described by suggesting that the vegetation in a given community is "hydrophytic" if more that 50 percent of the dominant plant species across all strata are rated as:

1. OBL [Obligate Wetland: occurs almost always (estimated probability 99%) under natural condition in wetlands],
2. FACW [Facultative Wetland: usually occurs in wetlands (estimated probability 67%–99%), but occasionally found in non-wetlands], or
3. FAC [Facultative Wetland: Equally likely to occur in wetland or non-wetland (estimated probability 34%–66%)].

When the data from the East Pasture and West Pasture wet meadows were put through the Dominance Test, **both pastures would be considered to support hydrophytic vegetation** by the COE methods.

The second COE hydrophytic vegetation indicator procedure is called the Prevalence Test. This test can be employed on the vegetation in a community if it fails the Dominance Test described above, but meets those requirements for hydric soils and wetland hydrology in the wetland delineation process. The Prevalence Test considers all species in a plant community, however, the indicator categories assigned to the species (OBL, FACW, FAC, etc.) places a "weighted" value on them by using cover values of individual species. In other words, if a given plant species has more cover and is assigned OBL, FACW or FAC it is more likely that the community will be determined to be hydrophytic.

When the quantitative data of the East Pasture and West Pasture wet meadows are computed through the Prevalence Test, **both pastures would be considered as supporting hydrophytic vegetation**.

HYDRIC SOILS

As mentioned previously, the focus of this study was to be on vegetation analyses and *not* on soils or hydrology, two other important aspects for studies when delineating wetlands using COE protocols. Nonetheless, a few holes were dug in the pastures and the soils were examined for redox characteristics. These soil characteristics were present in the limited amount of sample holes observed. These holes were dug at random locations, but the sample number was not enough to be considered an adequate number of samples to determine if the meadows were dominated by hydric soils to be determined as jurisdictional by the COE.

WETLAND HYDROLOGY

This discipline is another crucial consideration necessary for wetland determinations and has not been studied in enough detail to make the determination in the scope of this report. However, when aerial photographs were examined (i.e., Figure 5) and when field observations were considered, it appears that the water supporting wet meadows in the East Pasture and West Pasture is a result of runoff irrigation from the fields directly north and adjacent to the pastures – not the result of water being supplied by natural means such as springs or seeps in the immediate area.

CONCLUSIONS

The quantitative data and the test procedures that determine the presence of hydrophytic vegetation suggests that the wet meadows of the East Pasture and West Pasture are that of wetlands – whether or not they are jurisdictional through the U.S. Army Corps of Engineers has not yet been determined. Cursory thoughts about soils and hydrology also suggest these areas could be considered wetlands. However, because the hydrologic regime may be artificially induced by present and historical irrigation practices, more study is probably warranted if a determination is to be made if the areas would be considered jurisdictional through the COE.

REFERENCES

Bureau of Land Management (BLM). 2007. Kanab Field Office Draft Resource Management Plan.

Crocker-Bedford, D. C. and J. J. Spillett. 1981. Habitat relationships of the Utah prairie dog. Publication No. 1981-0-677-202/4. U.S. Department of Agriculture, Forest Service, Intermountain Region, Ogden, Utah. 29 pp.

Utah Division of Wildlife Resources (UDWR). 2007. County Lists of Utah's Threatened, Endangered, and Candidate Species. Salt Lake City, Utah. Webpage: http://dwrcdc.nr.utah.gov/ucdc/ViewReports/te_cnty.pdf. Accessed November 2007.

Utah Native Plant Society (UNPS). 2003-2007. *Utah Rare Plant Guide*. Salt Lake City, UT: Utah Rare Plant Guide Home Page. http://www.utahrareplants.org. Accessed November 2007.

Utah Geological Survey (UGS). 1999. Interim Geologic Map of the Kanab 30' by 60' Quadrangle, Kane and Washington Counties, Utah, and Coconino and Mohave Counties, Arizona. Open-File Report 366. Salt Lake City, Utah.

Welsh, S. L., N. D. Atwood, S. Goodrich, and L. C. Higgins. 2003. *A Utah Flora*. Third edition. Brigham Young University Press. Provo, Utah.

Willey, D. W., and D. Spotskey. 1997. GIS habitat model for Mexican spotted owl habitat in Utah. Utah Division of Wildlife Resources. Unpublished Final Report. Salt Lake City, Utah.

———. 2000. Field test of a habitat model for Mexican spotted owl breeding habitat. Final Report; Arizona Heritage Program, Phoenix, Arizona.

Ulmschneider, H., D. Hays, H. Roberts, J. Rachlow, T. Forbes, J. Himes, E. Sequin, M. Haworth, T. Katzner, A. Lozlowski, R. Rauschder, and P. Lauridson, 2004. *Surveying for pygmy rabbits (*Brachylagus idahoensis*).*

U.S. Fish and Wildlife Service. 1995. *Recovery Plan for the Mexican Spotted Owl (*Strix occidentalis lucida*).*

U.S. Army Corps of Engineers. 2006. Interim regional supplement to the Corps of Engineers wetland delineation manual: arid west region. ERDC/EL TR-06-16, December 2006. U.S. Army Engineer Research and Development Center, Vicksburg, MS.

This page intentionally blank

Attachment 1: Relevé Plot Data

SWCA Surveyors:

Ben Gaddis, M.E.M.

Thomas Sharp, M.S.

Audrey McCulley, B.S.

Mt. Nebo Consulting Surveyors:

Patrick D Collins, Ph. D.

This page intentionally blank

Releve Plot Data Date	Releve ID	Plant Community	Surveyors	General Notes
11/17/2007	Veg 1	Wiregrass	PDC and AAM	Pasture, grazed, irrigation runoff area
11/17/2007	Veg 2	Black sagebrush/ grass	PDC and AAM	Could have been seeded because lots of AGCR, may not be as "natural" as other ARNO communities. Small scattered JUOS.
11/17/2007	Veg 3	Black sagebrush/ grass	PDC and AAM	Close to native condition as compared to veg 2.
11/17/2007	Veg 4	Pastureland	PDC and AAM	Previously was a sagebrush/grass community. Presently pasture, unirrigated and fenced.
11/17/2007	Veg 5	Pinyon/ juniper	PDC, AAM, BG, and TS	
11/17/2007	Veg 6	Rabbitbrush	PDC and AAM	Heavily grazed, previously s/g community
11/17/2007	Veg 7	Dry pastureland	PDC and AAM	Converted from s/g, scattered PJ, very heavily grazed. Fairly recently worked by tractor.
11/17/2007	Veg 8	Sagebrush/ grass	PDC and AAM	PJ cleared but not ARNO. Other side of road was cleared of ARNO.
11/17/2007	Veg 9	S/G, scattered PJ	PDC and AAM	Chipped PJ. To ehn.(?) sage grouse habitat.
11/17/2007	Veg 10	Oakbrush	PDC and AAM	Area adjacent to PJ removed with track hoe and grapple claw to increase sage grouse habitat. Piles of PJ.
11/17/2007	Ref 11	S/G sagebrush	PDC and AAM	
11/18/2007	Veg 12	PJ	PDC and AAM	Lots of bare ground
11/18/2007	Veg 13	Sagebrush/ grass	PDC and AAM	Lots of bare ground covered with chipped PJ, weeds, and a fair amount oak, used to be mostly PJ with sage but much of the PJ has been cleared.
11/17/2007	Veg A (15)	Pastureland	TS and BTG	Grazed grasses also part of cover. Grazed.
11/17/2007	Veg B (16)	Sagebrush/ grass	TS and BTG	Grazed grasses have moderate cover.
11/17/2007	Veg C (17)	Sage/ Gambel Oak/ Grass	TS and BTG	Grazed grasses have abundant cover. PJ near edge of plot.
11/17/2007	Veg D (18)	Black sagebrush/ grass	TS and BTG	Grasses have abundant cover. Less grazed than A, B, C.
11/17/2007	Veg E (19)	Black sagebrush/ grass	TS and BTG	PJ in surrounding area.
11/18/2007	Veg F (20)	S/G chipped	PDC and BTG	Previously this area was mostly PJ. Currently it is progressing toward a S/G community. Chipped to increase sage grouse habitat.
11/18/2007	Veg G (21)	P-J	PDC and BTG	Some soil pavement present (0.5"). Sparse understory. No forbs or grasses noted here.
11/18/2007	Veg H (22)	Rabbitbrush	PDC and BTG	
11/18/2007	Veg I (23)	ARNO / CHNA	PDC and BTG	ARNO and CHNA areas interspersed. Few forb species.
11/18/2007	Veg J (24)	S/G chipped	PDC and BTG	
11/18/2007	Veg K (25)	Gambel oak	PDC and BTG	Relatively small area with lots of ARNO.
11/18/2007	Veg L (26)	S/G (ARNO)	PDC and BTG	Very homogenous.

Releve Plot Data	**Releve ID**	**Plant Community**	**Surveyors**	***Achillea millefolium***	***Agropyrum cristatum***	***Artemisia nova***	***Artemisia tridentata***
Date				**ACMI**	**AGCR**	**ARNO**	**ARTR**
11/17/2007	Veg 1	Wiregrass	PDC and AAM				
11/17/2007	Veg 2	Black sagebrush/ grass	PDC and AAM			common	
11/17/2007	Veg 3	Black sagebrush/ grass	PDC and AAM			common	
11/17/2007	Veg 4	Pastureland	PDC and AAM		common	few	
11/17/2007	Veg 5	Pinyon/ juniper	PDC, AAM, BG, and TS			moderate	
11/17/2007	Veg 6	Rabbitbrush	PDC and AAM			rare	few
11/17/2007	Veg 7	Dry pastureland	PDC and AAM		moderate	few	
11/17/2007	Veg 8	Sagebrush/ grass	PDC and AAM		moderate	common	moderate
11/17/2007	Veg 9	S/G, scattered PJ	PDC and AAM		moderate	common	
11/17/2007	Veg 10	Oakbrush	PDC and AAM				moderate
11/17/2007	Ref 11	S/G sagebrush	PDC and AAM				
11/18/2007	Veg 12	PJ	PDC and AAM			moderate	
11/18/2007	Veg 13	Sagebrush/ grass	PDC and AAM			moderate	
11/17/2007	Veg A (15)	Pastureland	TS and BTG			few	
11/17/2007	Veg B (16)	Sagebrush/ grass	TS and BTG			few	
11/17/2007	Veg C (17)	Sage/ Gambel Oak/ Grass	TS and BTG			moderate	
11/17/2007	Veg D (18)	Black sagebrush/ grass	TS and BTG			common	
11/17/2007	Veg E (19)	Black sagebrush/ grass	TS and BTG			common	
11/18/2007	Veg F (20)	S/G chipped	PDC and BTG		few	moderate	moderate
11/18/2007	Veg G (21)	P-J	PDC and BTG			moderate	few
11/18/2007	Veg H (22)	Rabbitbrush	PDC and BTG				moderate
11/18/2007	Veg I (23)	ARNO / CHNA	PDC and BTG			common	
11/18/2007	Veg J (24)	S/G chipped	PDC and BTG	moderate		few	few
11/18/2007	Veg K (25)	Gambel oak	PDC and BTG		common	common	
11/18/2007	Veg L (26)	S/G (ARNO)	PDC and BTG			common	few

Releve Plot Data	**Releve ID**	**Plant Community**	**Surveyors**	***Artemisia tridentata* var. *vaseyana***	**Aster or composite sp.**	***Astragalus* sp.**	***Atriplex canescens***
Date				**ATRVA**	**ASTER**	**ASTRAGALUS**	**ATCA**
11/17/2007	Veg 1	Wiregrass	PDC and AAM				
11/17/2007	Veg 2	Black sagebrush/ grass	PDC and AAM				
11/17/2007	Veg 3	Black sagebrush/ grass	PDC and AAM				
11/17/2007	Veg 4	Pastureland	PDC and AAM				
11/17/2007	Veg 5	Pinyon/ juniper	PDC, AAM, BG, and TS				
11/17/2007	Veg 6	Rabbitbrush	PDC and AAM				rare
11/17/2007	Veg 7	Dry pastureland	PDC and AAM				
11/17/2007	Veg 8	Sagebrush/ grass	PDC and AAM				
11/17/2007	Veg 9	S/G, scattered PJ	PDC and AAM				
11/17/2007	Veg 10	Oakbrush	PDC and AAM				
11/17/2007	Ref 11	S/G sagebrush	PDC and AAM				
11/18/2007	Veg 12	PJ	PDC and AAM				
11/18/2007	Veg 13	Sagebrush/ grass	PDC and AAM		few	few	
11/17/2007	Veg A (15)	Pastureland	TS and BTG				
11/17/2007	Veg B (16)	Sagebrush/ grass	TS and BTG				
11/17/2007	Veg C (17)	Sage/ Gambel Oak/ Grass	TS and BTG				
11/17/2007	Veg D (18)	Black sagebrush/ grass	TS and BTG				
11/17/2007	Veg E (19)	Black sagebrush/ grass	TS and BTG				
11/18/2007	Veg F (20)	S/G chipped	PDC and BTG				
11/18/2007	Veg G (21)	P-J	PDC and BTG				
11/18/2007	Veg H (22)	Rabbitbrush	PDC and BTG				
11/18/2007	Veg I (23)	ARNO / CHNA	PDC and BTG				
11/18/2007	Veg J (24)	S/G chipped	PDC and BTG				
11/18/2007	Veg K (25)	Gambel oak	PDC and BTG	moderate			
11/18/2007	Veg L (26)	S/G (ARNO)	PDC and BTG				

Releve Plot Data				***Bromus carinatus***	***Bromus inermis***	***Bromus tectorum***	***Carex* sp.**	***Cercocarpus montanus***
Date	**Releve ID**	**Plant Community**	**Surveyors**	**BRCA**	**BRIN**	**BRTE**	**CAREX**	**CEMO**
11/17/2007	Veg 1	Wiregrass	PDC and AAM					
11/17/2007	Veg 2	Black sagebrush/ grass	PDC and AAM					
11/17/2007	Veg 3	Black sagebrush/ grass	PDC and AAM	common				
11/17/2007	Veg 4	Pastureland	PDC and AAM		few			
11/17/2007	Veg 5	Pinyon/ juniper	PDC, AAM, BG, and TS					common
11/17/2007	Veg 6	Rabbitbrush	PDC and AAM				few	
11/17/2007	Veg 7	Dry pastureland	PDC and AAM	few				
11/17/2007	Veg 8	Sagebrush/ grass	PDC and AAM	moderate				few
11/17/2007	Veg 9	S/G, scattered PJ	PDC and AAM					
11/17/2007	Veg 10	Oakbrush	PDC and AAM					
11/17/2007	Ref 11	S/G sagebrush	PDC and AAM			common		
11/18/2007	Veg 12	PJ	PDC and AAM					
11/18/2007	Veg 13	Sagebrush/ grass	PDC and AAM			few		
11/17/2007	Veg A (15)	Pastureland	TS and BTG					
11/17/2007	Veg B (16)	Sagebrush/ grass	TS and BTG					
11/17/2007	Veg C (17)	Sage/ Gambel Oak/ Grass	TS and BTG					
11/17/2007	Veg D (18)	Black sagebrush/ grass	TS and BTG					
11/17/2007	Veg E (19)	Black sagebrush/ grass	TS and BTG					
11/18/2007	Veg F (20)	S/G chipped	PDC and BTG	few		few		
11/18/2007	Veg G (21)	P-J	PDC and BTG					
11/18/2007	Veg H (22)	Rabbitbrush	PDC and BTG					
11/18/2007	Veg I (23)	ARNO / CHNA	PDC and BTG					
11/18/2007	Veg J (24)	S/G chipped	PDC and BTG					
11/18/2007	Veg K (25)	Gambel oak	PDC and BTG		moderate			few
11/18/2007	Veg L (26)	S/G (ARNO)	PDC and BTG			few		

Releve Plot Data	**Releve ID**	**Plant Community**	**Surveyors**	***Cirsium* sp.**	***Cirsium arvense***	***Chrysothamnus nauseosus***	***Dactylis glomerata***	***Echinocereus* sp.**
Date				**CIRSIUM**	**CIAR**	**CHNA**	**DAGL**	**ECHINOCACTUS**
11/17/2007	Veg 1	Wiregrass	PDC and AAM		rare			
11/17/2007	Veg 2	Black sagebrush/ grass	PDC and AAM					
11/17/2007	Veg 3	Black sagebrush/ grass	PDC and AAM			few		
11/17/2007	Veg 4	Pastureland	PDC and AAM	few			few	
11/17/2007	Veg 5	Pinyon/ juniper	PDC, AAM, BG, and TS					rare
11/17/2007	Veg 6	Rabbitbrush	PDC and AAM			common		
11/17/2007	Veg 7	Dry pastureland	PDC and AAM	few		few		
11/17/2007	Veg 8	Sagebrush/ grass	PDC and AAM					
11/17/2007	Veg 9	S/G, scattered PJ	PDC and AAM					
11/17/2007	Veg 10	Oakbrush	PDC and AAM					
11/17/2007	Ref 11	S/G sagebrush	PDC and AAM	rare		few		
11/18/2007	Veg 12	PJ	PDC and AAM					
11/18/2007	Veg 13	Sagebrush/ grass	PDC and AAM	moderate				
11/17/2007	Veg A (15)	Pastureland	TS and BTG			moderate		
11/17/2007	Veg B (16)	Sagebrush/ grass	TS and BTG			few		
11/17/2007	Veg C (17)	Sage/ Gambel Oak/ Grass	TS and BTG			few		
11/17/2007	Veg D (18)	Black sagebrush/ grass	TS and BTG					
11/17/2007	Veg E (19)	Black sagebrush/ grass	TS and BTG					
11/18/2007	Veg F (20)	S/G chipped	PDC and BTG	few		few		
11/18/2007	Veg G (21)	P-J	PDC and BTG					
11/18/2007	Veg H (22)	Rabbitbrush	PDC and BTG			common		
11/18/2007	Veg I (23)	ARNO / CHNA	PDC and BTG			common		
11/18/2007	Veg J (24)	S/G chipped	PDC and BTG	moderate				
11/18/2007	Veg K (25)	Gambel oak	PDC and BTG			moderate		
11/18/2007	Veg L (26)	S/G (ARNO)	PDC and BTG					

Releve Plot Data	**Releve ID**	**Plant Community**	**Surveyors**	***Elymus hispidus***	***Elymus smithii***	***Elymus trachycaulus***	***Elytrigia juncea***	**?**
Date				**ELHI**	**ELSM**	**ELTR**	**ELJU**	**ERCO**
11/17/2007	Veg 1	Wiregrass	PDC and AAM					
11/17/2007	Veg 2	Black sagebrush/ grass	PDC and AAM					
11/17/2007	Veg 3	Black sagebrush/ grass	PDC and AAM					
11/17/2007	Veg 4	Pastureland	PDC and AAM	moderate			moderate	
11/17/2007	Veg 5	Pinyon/ juniper	PDC, AAM, BG, and TS					
11/17/2007	Veg 6	Rabbitbrush	PDC and AAM			common		
11/17/2007	Veg 7	Dry pastureland	PDC and AAM			moderate	few	
11/17/2007	Veg 8	Sagebrush/ grass	PDC and AAM		moderate			
11/17/2007	Veg 9	S/G, scattered PJ	PDC and AAM			few	moderate	few
11/17/2007	Veg 10	Oakbrush	PDC and AAM					
11/17/2007	Ref 11	S/G sagebrush	PDC and AAM			common		
11/18/2007	Veg 12	PJ	PDC and AAM			few		
11/18/2007	Veg 13	Sagebrush/ grass	PDC and AAM					
11/17/2007	Veg A (15)	Pastureland	TS and BTG					
11/17/2007	Veg B (16)	Sagebrush/ grass	TS and BTG					
11/17/2007	Veg C (17)	Sage/ Gambel Oak/ Grass	TS and BTG					
11/17/2007	Veg D (18)	Black sagebrush/ grass	TS and BTG					
11/17/2007	Veg E (19)	Black sagebrush/ grass	TS and BTG					
11/18/2007	Veg F (20)	S/G chipped	PDC and BTG			few		
11/18/2007	Veg G (21)	P-J	PDC and BTG					
11/18/2007	Veg H (22)	Rabbitbrush	PDC and BTG					
11/18/2007	Veg I (23)	ARNO / CHNA	PDC and BTG			few		
11/18/2007	Veg J (24)	S/G chipped	PDC and BTG			few		
11/18/2007	Veg K (25)	Gambel oak	PDC and BTG					
11/18/2007	Veg L (26)	S/G (ARNO)	PDC and BTG					

Releve Plot Data	**Releve ID**	**Plant Community**	**Surveyors**	***Erigeron* sp.**	***Eriogonum* sp.**	***Festuca* sp.**	***Grindelia squarrosa***	***Gutierrezia sarothrae***
Date				**ERIGERON**	**ERIOGONUM**	**FESTUCA**	**GRSQ**	**GUSA**
11/17/2007	Veg 1	Wiregrass	PDC and AAM					
11/17/2007	Veg 2	Black sagebrush/ grass	PDC and AAM					few
11/17/2007	Veg 3	Black sagebrush/ grass	PDC and AAM					few
11/17/2007	Veg 4	Pastureland	PDC and AAM					rare
11/17/2007	Veg 5	Pinyon/ juniper	PDC, AAM, BG, and TS	few	rare	few		
11/17/2007	Veg 6	Rabbitbrush	PDC and AAM					
11/17/2007	Veg 7	Dry pastureland	PDC and AAM				rare	few
11/17/2007	Veg 8	Sagebrush/ grass	PDC and AAM					
11/17/2007	Veg 9	S/G, scattered PJ	PDC and AAM					few
11/17/2007	Veg 10	Oakbrush	PDC and AAM					
11/17/2007	Ref 11	S/G sagebrush	PDC and AAM					few
11/18/2007	Veg 12	PJ	PDC and AAM					few
11/18/2007	Veg 13	Sagebrush/ grass	PDC and AAM					
11/17/2007	Veg A (15)	Pastureland	TS and BTG					
11/17/2007	Veg B (16)	Sagebrush/ grass	TS and BTG					
11/17/2007	Veg C (17)	Sage/ Gambel Oak/ Grass	TS and BTG					
11/17/2007	Veg D (18)	Black sagebrush/ grass	TS and BTG					
11/17/2007	Veg E (19)	Black sagebrush/ grass	TS and BTG					
11/18/2007	Veg F (20)	S/G chipped	PDC and BTG					
11/18/2007	Veg G (21)	P-J	PDC and BTG					
11/18/2007	Veg H (22)	Rabbitbrush	PDC and BTG					
11/18/2007	Veg I (23)	ARNO / CHNA	PDC and BTG	few				
11/18/2007	Veg J (24)	S/G chipped	PDC and BTG					
11/18/2007	Veg K (25)	Gambel oak	PDC and BTG					
11/18/2007	Veg L (26)	S/G (ARNO)	PDC and BTG					

Releve Plot Data	**Releve ID**	**Plant Community**	**Surveyors**	***Hordeum jubatum***	***Juncus arcticus***	***Juniperus osteosperma***	***Juniperus scopulorum***
Date				**HOJU**	**JUAR**	**JUOS**	**JUSC**
11/17/2007	Veg 1	Wiregrass	PDC and AAM	moderate	common		
11/17/2007	Veg 2	Black sagebrush/ grass	PDC and AAM			few	
11/17/2007	Veg 3	Black sagebrush/ grass	PDC and AAM			few	
11/17/2007	Veg 4	Pastureland	PDC and AAM			rare	
11/17/2007	Veg 5	Pinyon/ juniper	PDC, AAM, BG, and TS			common	
11/17/2007	Veg 6	Rabbitbrush	PDC and AAM		moderate	few	
11/17/2007	Veg 7	Dry pastureland	PDC and AAM				
11/17/2007	Veg 8	Sagebrush/ grass	PDC and AAM			few	
11/17/2007	Veg 9	S/G, scattered PJ	PDC and AAM			few	
11/17/2007	Veg 10	Oakbrush	PDC and AAM			few	moderate
11/17/2007	Ref 11	S/G sagebrush	PDC and AAM		moderate		
11/18/2007	Veg 12	PJ	PDC and AAM			common	rare
11/18/2007	Veg 13	Sagebrush/ grass	PDC and AAM	few		few	
11/17/2007	Veg A (15)	Pastureland	TS and BTG				
11/17/2007	Veg B (16)	Sagebrush/ grass	TS and BTG				
11/17/2007	Veg C (17)	Sage/ Gambel Oak/ Grass	TS and BTG				
11/17/2007	Veg D (18)	Black sagebrush/ grass	TS and BTG			few	
11/17/2007	Veg E (19)	Black sagebrush/ grass	TS and BTG			few	
11/18/2007	Veg F (20)	S/G chipped	PDC and BTG			few	
11/18/2007	Veg G (21)	P-J	PDC and BTG			common	
11/18/2007	Veg H (22)	Rabbitbrush	PDC and BTG				
11/18/2007	Veg I (23)	ARNO / CHNA	PDC and BTG				
11/18/2007	Veg J (24)	S/G chipped	PDC and BTG			few	
11/18/2007	Veg K (25)	Gambel oak	PDC and BTG			few	
11/18/2007	Veg L (26)	S/G (ARNO)	PDC and BTG	few			

Releve Plot Data	**Releve ID**	**Plant Community**	**Surveyors**	***Mustard* sp.**	***Opuntia* sp.**	***Penstemon palmeri***	***Peraphyllum ramosissimum***
Date				**MUSTARD**	**OPUNTIA**	**PEPA**	**PERA**
11/17/2007	Veg 1	Wiregrass	PDC and AAM				
11/17/2007	Veg 2	Black sagebrush/ grass	PDC and AAM				
11/17/2007	Veg 3	Black sagebrush/ grass	PDC and AAM				
11/17/2007	Veg 4	Pastureland	PDC and AAM				
11/17/2007	Veg 5	Pinyon/ juniper	PDC, AAM, BG, and TS		moderate		rare
11/17/2007	Veg 6	Rabbitbrush	PDC and AAM			rare	
11/17/2007	Veg 7	Dry pastureland	PDC and AAM				
11/17/2007	Veg 8	Sagebrush/ grass	PDC and AAM				
11/17/2007	Veg 9	S/G, scattered PJ	PDC and AAM				
11/17/2007	Veg 10	Oakbrush	PDC and AAM				
11/17/2007	Ref 11	S/G sagebrush	PDC and AAM				
11/18/2007	Veg 12	PJ	PDC and AAM	rare	rare		rare
11/18/2007	Veg 13	Sagebrush/ grass	PDC and AAM			few	
11/17/2007	Veg A (15)	Pastureland	TS and BTG				
11/17/2007	Veg B (16)	Sagebrush/ grass	TS and BTG				
11/17/2007	Veg C (17)	Sage/ Gambel Oak/ Grass	TS and BTG				
11/17/2007	Veg D (18)	Black sagebrush/ grass	TS and BTG				
11/17/2007	Veg E (19)	Black sagebrush/ grass	TS and BTG				
11/18/2007	Veg F (20)	S/G chipped	PDC and BTG				
11/18/2007	Veg G (21)	P-J	PDC and BTG				
11/18/2007	Veg H (22)	Rabbitbrush	PDC and BTG				
11/18/2007	Veg I (23)	ARNO / CHNA	PDC and BTG				
11/18/2007	Veg J (24)	S/G chipped	PDC and BTG				
11/18/2007	Veg K (25)	Gambel oak	PDC and BTG		few		
11/18/2007	Veg L (26)	S/G (ARNO)	PDC and BTG				

Releve Plot Data	**Releve ID**	**Plant Community**	**Surveyors**	***Sanguisorba minor***	***Sissymbrium* sp.**	***Sissymbrium altissimum***	***Stipa hymenoides***
Date				**SAMI**	**SISSYMBRIUM**	**SIAL**	**STHY**
11/17/2007	Veg 1	Wiregrass	PDC and AAM				
11/17/2007	Veg 2	Black sagebrush/ grass	PDC and AAM				
11/17/2007	Veg 3	Black sagebrush/ grass	PDC and AAM				
11/17/2007	Veg 4	Pastureland	PDC and AAM				few
11/17/2007	Veg 5	Pinyon/ juniper	PDC, AAM, BG, and TS				
11/17/2007	Veg 6	Rabbitbrush	PDC and AAM				
11/17/2007	Veg 7	Dry pastureland	PDC and AAM				
11/17/2007	Veg 8	Sagebrush/ grass	PDC and AAM				
11/17/2007	Veg 9	S/G, scattered PJ	PDC and AAM				
11/17/2007	Veg 10	Oakbrush	PDC and AAM				
11/17/2007	Ref 11	S/G sagebrush	PDC and AAM				
11/18/2007	Veg 12	PJ	PDC and AAM				
11/18/2007	Veg 13	Sagebrush/ grass	PDC and AAM		moderate		
11/17/2007	Veg A (15)	Pastureland	TS and BTG				
11/17/2007	Veg B (16)	Sagebrush/ grass	TS and BTG				
11/17/2007	Veg C (17)	Sage/ Gambel Oak/ Grass	TS and BTG				
11/17/2007	Veg D (18)	Black sagebrush/ grass	TS and BTG				
11/17/2007	Veg E (19)	Black sagebrush/ grass	TS and BTG				
11/18/2007	Veg F (20)	S/G chipped	PDC and BTG			few	
11/18/2007	Veg G (21)	P-J	PDC and BTG				
11/18/2007	Veg H (22)	Rabbitbrush	PDC and BTG				
11/18/2007	Veg I (23)	ARNO / CHNA	PDC and BTG				
11/18/2007	Veg J (24)	S/G chipped	PDC and BTG	few			
11/18/2007	Veg K (25)	Gambel oak	PDC and BTG				
11/18/2007	Veg L (26)	S/G (ARNO)	PDC and BTG				

Releve Plot Data	**Releve ID**	**Plant Community**	**Surveyors**	***Symphorocarpus oreophilus***	***Trifolium* sp.**	***Triglochin maritima***	***Verbascum thapsis***	***Yucca* sp.**
Date				**SYOR**	**TRIFOLIUM**	**TRMA**	**VETH**	**YUCCA**
11/17/2007	Veg 1	Wiregrass	PDC and AAM			few		
11/17/2007	Veg 2	Black sagebrush/ grass	PDC and AAM					
11/17/2007	Veg 3	Black sagebrush/ grass	PDC and AAM					
11/17/2007	Veg 4	Pastureland	PDC and AAM					
11/17/2007	Veg 5	Pinyon/ juniper	PDC, AAM, BG, and TS	few				rare
11/17/2007	Veg 6	Rabbitbrush	PDC and AAM					
11/17/2007	Veg 7	Dry pastureland	PDC and AAM		rare			
11/17/2007	Veg 8	Sagebrush/ grass	PDC and AAM					
11/17/2007	Veg 9	S/G, scattered PJ	PDC and AAM					
11/17/2007	Veg 10	Oakbrush	PDC and AAM	moderate				
11/17/2007	Ref 11	S/G sagebrush	PDC and AAM					
11/18/2007	Veg 12	PJ	PDC and AAM	few				
11/18/2007	Veg 13	Sagebrush/ grass	PDC and AAM					
11/17/2007	Veg A (15)	Pastureland	TS and BTG					
11/17/2007	Veg B (16)	Sagebrush/ grass	TS and BTG					
11/17/2007	Veg C (17)	Sage/ Gambel Oak/ Grass	TS and BTG					
11/17/2007	Veg D (18)	Black sagebrush/ grass	TS and BTG					
11/17/2007	Veg E (19)	Black sagebrush/ grass	TS and BTG					
11/18/2007	Veg F (20)	S/G chipped	PDC and BTG					
11/18/2007	Veg G (21)	P-J	PDC and BTG					
11/18/2007	Veg H (22)	Rabbitbrush	PDC and BTG					
11/18/2007	Veg I (23)	ARNO / CHNA	PDC and BTG					
11/18/2007	Veg J (24)	S/G chipped	PDC and BTG				rare	
11/18/2007	Veg K (25)	Gambel oak	PDC and BTG	few				
11/18/2007	Veg L (26)	S/G (ARNO)	PDC and BTG					

This page intentionally blank

Attachment 2. Vegetation Associations and Species List

This page intentionally blank

VEGETATION SURVEY PROTOCOLS FOR ALTON COAL TRACT LBA

Habitat schemes as set by Mt. Nebo Scientific 2007

Sagebrush/Grass
Artemisia tridentata var. *tridentata*- big sagebrush
Artemisia nova- Black sagebrush
Koeleria micrantha- Junegrass
Poa secunda- Sandberg's bluegrass
Chrysothamnus depressus- longflower rabbitbrush
Gutierrezia sarothrae- Broom snakeweed
Eriogonum racemosum- redroot buckwheat
Gillia agreggata
Linum perenne- Flax
Bouteloua gracilis- Sideoats grama
Bromus tectorum- Cheatgrass
Elymus smithii- Western wheatgrass
Elymus trachycaulus- Slender wheatgrass
Hordeum jubatum- Foxtail barley
Poa pratensis- Kentucky bluegrass
Stipa hymenoides- Indian ricegrass

Meadows (Wet and dry)
Carex sp.-Sedges
Juncus arcticus- wiregrass
Gutierrezia sarothrae- Broom snakeweed
Achillea millefolium- yarrow
Aster ascendens- Pacific aster
Artemisia nova- Black sagebrush
Eriogonum racemosum- redroot buckwheat
Linum lewisii- Flax
Potentilla anserina
Bouteloua gracilis- Sideoats grama
Elymus elymoides- Squirreltail
Elymus smithii- Western wheatgrass
Hordeum jubatum- Foxtail barley
Koeleria micrantha- Junegrass
Muhlenbergia asperifolia- Scratchgrass
Poa pratensis- Kentucky bluegrass

Perennial/Annual Grasses
No quantitative vegetation surveys

Pinyon-Juniper/Sagebrush
Artemisia nova- Black sagebrush
Juniperus osteosperma- Utah juniper
Artemisia tridentata var. *tridentata*- big sagebrush
Phlox austromontana- Desert phlox
Pinus edulis- Pinyon pine
Amelanchier utahensis- Utah serviceberry
Gutierrezia sarothrae- Broom snakeweed

Mountain Brush
Quercus gambelii- Gambel oak
Cercocarpus montanus- Alderleaf mountain mahogany
Peraphyllum ramosissimum- Squaw-apple
Amelanchier utahensis- Utah serviceberry
Elymus smithii- Western wheatgrass
Symphorocarpus oreophilus- snowberry
Agropyron cristatum- Crested wheatgrass

Pinyon-Juniper/Mountain Brush ***Transition between pinyon-juniper and mountain brush***
Quercus gambelii- Gambel oak
Juniperus osteosperma- Utah juniper
Amelanchier utahensis- Utah serviceberry
Pinus edulis- Pinyon pine

Pinyon-Juniper Woodland
Juniperus osteosperma- Utah juniper
Pinus edulis- Pinyon pine
Phlox austromontana- Desert phlox