ASTER CANYON CONSULTING, INC.

2007 JONAH FIELD WILDLIFE INVENTORY AND MONITORING

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1.0 EXECUTIVE SUMMARY

Aster Canyon Consulting, Inc. has prepared this 2007 Jonah Field Wildlife Inventory and Monitoring Report in compliance with criteria set forth by the Bureau of Land Management (BLM) and the Jonah Interagency Mitigation Office (JIO) as described in the Wildlife Monitoring Protection Plan (WMPP; JIO 2007). The purpose of this inventory is to replace previous monitoring conducted in the area, to compare trends of observations and data collected over time, and to identify existing needs for mitigation and protection measures as described in the BLM Jonah Field Record of Decision (ROD; BLM 2006) and make recommendations for new ones.

Data presented in this report were collected between April 15 and August 15, 2007. Existing criteria discussed in the WMPP are for: threatened, endangered, proposed, and candidate species (TEPC), species of greatest conservation need (SGCN), and BLM Wyoming Sensitive Species (WSS). Species inventoried include: Bald eagle, Western burrowing owl, other raptors, Mountain Plover, Greater sage-grouse, landbirds (i.e. Sage thrasher, Sage sparrow, and Brewer's sparrow), pygmy rabbit, and pronghorn antelope. Other species not specifically referred to in the WMPP but on the TEPC, WSS, or SGCN lists are addressed in the document under general wildlife. This report evaluates trends on the Jonah Infill Drilling Project Area (JIDPA) over time from 1997-2007 and identifies protection and mitigation projects. This report is presented by species, and provides an introduction, methods, results, and mitigation and protection measures for each.

Inventory results suggest the following:

- Only 4 Ferruginous hawk nests were active, with 1 nest successfully fledging young. This nest was at an alternative nesting structure, suggesting the importance of these structures.
- Common raven production has continued to increase since 2001. Monitoring and management of raven populations on the JIDPA may help reduce predation to sensitive species.
- No Bald eagles were found nesting or hunting on the JIDPA because of lack of habitat, this is consistent with records since 2005.
- Western burrowing owls were very active within the JIDPA, and appear to prefer the loose aerated soils of pipelines and reclaimed areas. Nesting burrowing owl presence within the JIDPA has increased since 2005 with 19 active nests found in 2007.

- A total of 14 Mountain plovers were found in the JIDPA 3-mile buffer in breeding grounds surveyed since 1997. Some habitat that was suitable in past years is no longer good breeding habitat for Mountain plovers.
- Twenty-four bird species were recorded during point transect surveys. Some species (Brewer's sparrow) seem to be negatively affected by disturbance in the JIDPA while other species (Horned lark) benefit. Transect surveys will need to be continued to determine trends.
- Two Greater sage-grouse nests were recorded in 2007. The northern leks near Blue Rim yielded more birds than other areas. Birds were seen on 296 accounts, but double counting likely occurred. Trends cannot be determined due to 2007 being the first year of inventory efforts.
- Pygmy rabbits and their burrows were found in the major drainages as modeled, and in rock outcrops. Pygmy rabbit data cannot be directly compared to previous year's data due to differences in survey techniques.
- White-tailed prairie dog town boundaries did not change greatly from the 2005 TRC survey. These towns provide important resources for other sensitive species in the area.
- Pronghorn antelope were found throughout the JIDPA, with numbers reducing on transect lines as more animals moved to waterholes throughout the summer.
- Sensitive species recorded in the JIDPA during general wildlife observations include: 3 Redhead ducks, 20 Loggerhead shrikes, and 4 Northern pintails. Several species never before recorded in the JIDPA were found including the Rufous hummingbird and Willow flycatcher.

The principle protection measure underway on the Jonah Field for most wildlife species is the avoidance of sensitive/critical habitats, specifically, raptor nests, Mountain plover breeding habitat, and sage-grouse leks. The principle mitigation measure underway is the allocation of $24.5 million dollars to the JIO for distribution and management of off-site mitigation. Current JIO projects underway are outlined in this document. One of the recommended on-site mitigation measures includes placement of artificial nest structures and burrows for the Ferruginous hawk and Western burrowing owl. In addition, on-site efforts to restore early successional stage sage-steppe habitat through interim reclamation, and continual monitoring of wildlife species to identify long-term trends is a significant step towards sustaining the wildlife populations within the JIDPA.

2.0 INTRODUCTION

The Jonah Field, located in Sublette County, Wyoming, is currently a major source of natural gas production in the United States. The sagebrush-dominated ecosystems located in the area are critically important to many of Wyoming's wildlife species. The natural resource value of Wyoming's wildlife and open spaces provide the state with sustainable revenue through hunting, fishing, and tourism (Holloran 2005). Accordingly, the Bureau of Land Management (BLM) has initiated wildlife monitoring and inventory studies recommended under the Environmental Impact Statement (EIS), written in compliance with the National Environmental Policy Act of 1969 (NEPA). These studies were instituted in 1996 with Anderson Environmental Consultants, Inc. (AEC). TRC Mariah Associates, Inc. (TRC) conducted the inventories from 1997 through 2005, and Aster Canyon Consulting, Inc. (Aster Canyon) inventoried during 2007. Funding was not allocated for the project for 2006, thus no data was collected for that year. An effort was made to collect data from all contractors that have or currently are conducting work in the area to provide an analysis as comprehensive as possible. Data provided by other contractors are documented where included.

Picture depicting a Sage thrasher perched on sagebrush with an insect in its mouth.

In order to provide "real time" reporting for exception request assistance, preliminary reports were compiled and delivered to Operators, JIO and the BLM in April and June, 2007. These reports outlined inventory efforts for Greater sage-grouse, raptors, and Mountain plover. This annual report was prepared by Aster Canyon for the Jonah Field Operators, BLM and JIO in accordance with the ROD (BLM 2006). Page ii includes a report distribution list.

Study Area

Aster Canyon's 2007 Jonah Field Wildlife Inventory and Monitoring study area includes the Jonah Infill Drilling Project Area (JIDPA) and a surrounding 3-mile buffer. The JIDPA encompasses approximately 30,500 acres of Township 28 and 29 North, Range 107 through 109 West and is located approximately 32 miles southeast of Pinedale and 28 miles northwest of Farson in Sublette County, Wyoming (BLM 2006). The area consists of shrub-steppe habitat, which is dominated by Wyoming big sagebrush (*Artemisia tridentata* var. *wyomingensis*) and includes other species of sagebrush (*Artemisia spp.*), rabbitbrush (*Chrysothamnus spp.*), saltbush (*Atriplex spp.*), and a variety of forbs and grasses. It is considered a semi-arid, cold desert climate with rolling hills interspersed with scattered buttes and rock outcrops. It is intersected by numerous ephemeral washes and playas but lacks any permanent water bodies. Total precipitation averages 8.0 inches per year, and elevation ranges from 7,000 - 7,400 feet (BLM 2006). Figure 1 depicts the study areas surveyed in 1997-2005 by TRC and 2007 by Aster Canyon.

Picture showing a Jonah Field natural gas producing location and a oak mat wellpad in the foreground.

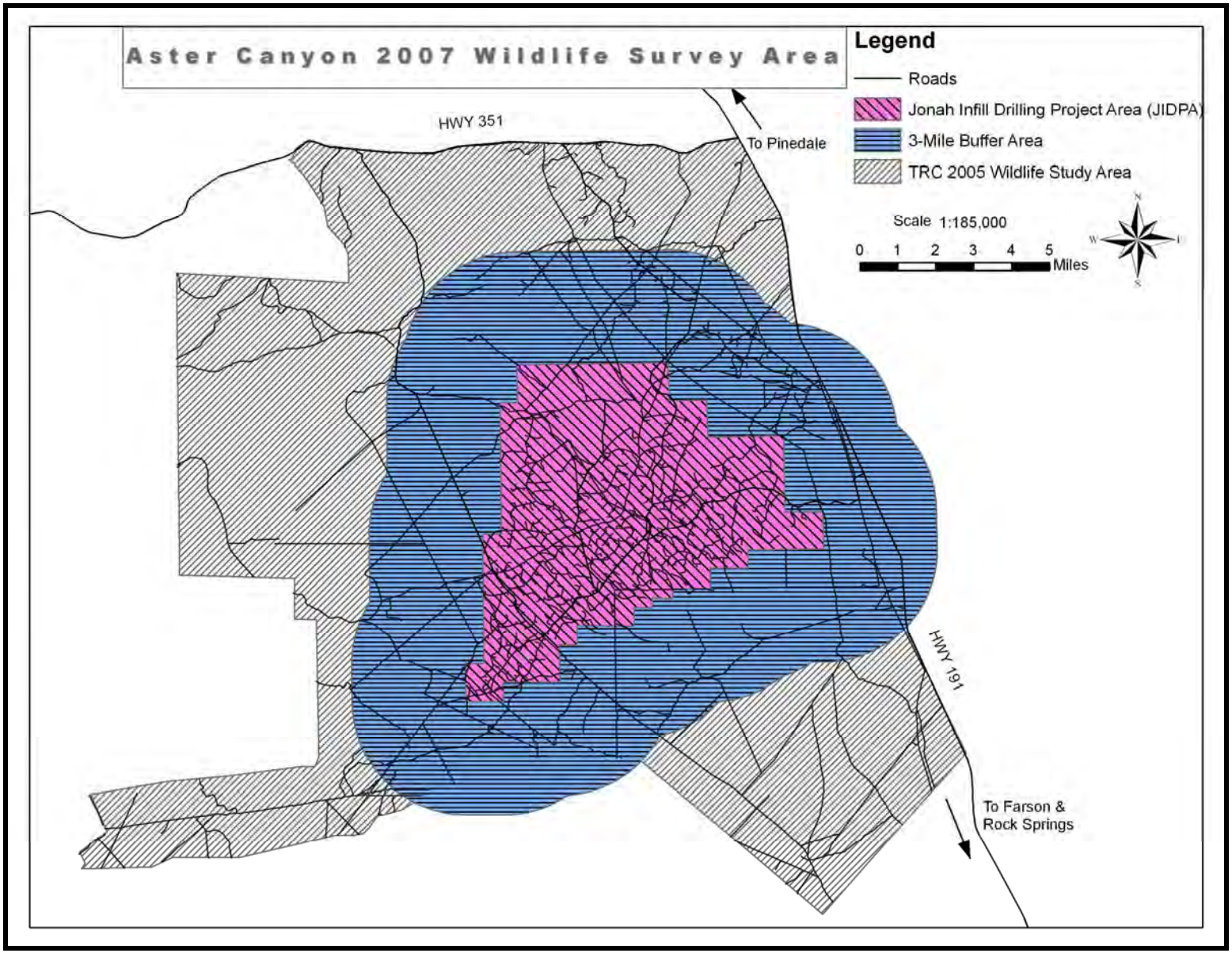

Figure 1. Map of study area showing TRC study area versus Aster Canyon study area, which includes the JIDPA and a surrounding 3-mile buffer.

2.1 Purpose and Objectives

The main purpose of the 2007 Jonah Wildlife Inventory was to identify wildlife and resources being utilized in the area in order to make recommendations to land managers and operators for continued and/or new mitigation and protection measures. Aster Canyon's inventories of the study area were an effort to determine disturbance effects on wildlife resources by obtaining information in a way that assured monitoring efforts would not result in added disturbance or stresses to wildlife. The inventory was initiated in order to predict cumulative impacts over time (1997-2007) using pre-existing data and Geographic Information System (GIS). This information will assist land managers in determining appropriate mitigation and protection measures, address recommendations for responses to environmental change and provide suggestions for continued monitoring, as well as providing the data necessary to validate and revise EIS wildlife models and projections.

Picture above depicts habitat within the buffer of the study area.

2.2 Datum and General Information

Specific methods and techniques employed follow those presented in the WMPP, while revisions were discussed and made in accordance with the BLM Pinedale Field Office and JIO. All GIS locations are projected in NAD83 UTM Zone 12 North. GPS units used during survey efforts included Garmin e-trex legend and Trimble Geo XT 2005. The latter was used for locating specific raptor nests in rock outcrops where signals tend to display low accuracy and during prairie dog mapping efforts. Details of previous information and data was provided by TRC, BLM Pinedale Field Office, and the JIO. TRC provided their 2005 report from the Jonah Field and the 2006 Pinedale Anticline monitoring projects, including all GIS layers and data tables.

2.3 Threatened, Endangered, Proposed, Candidate, BLM Wyoming Sensitive Species, and Species of Greatest Conservation Need

There are several species on the threatened, endangered, proposed, and candidate (TEPC) species list generated by the U.S. Fish and Wildlife Service, the BLM Wyoming Sensitive Species (WSS) list, and the Species of Greatest Conservation Need (SGCN) list generated by the WGFD. A compiled list is shown in Table 1. See Appendix A for a complete list of agencies, ranking codes, and acronym definitions. The included species are discussed in the WMPP (JIO 2007) and include: the black-footed ferret in which surveys were not required in 2007; the Bald eagle, Ferruginous hawk, and Golden eagle in which surveys were conducted in conjunction with raptor nest searches; the Mountain plover in which surveys were conducted following 2002 USFWS guidelines (USFWS 2002); the Western burrowing owl in which surveys were conducted in conjunction with raptor nest searches; the pygmy rabbit in which general techniques were described by Ulmschneider, 2004 and Oles, 2005; landbird surveys which follow the Rocky Mountain Bird Observatory (RMBO) protocol; and white-tailed prairie dog surveys following criteria described in *Proceedings of the Symposium on the Management of Prairie Dog Complexes for the Reintroduction of the Black-footed Ferret* with amendments (Biggins, 1993) . Efforts to inventory species that occur on the list but are not known to occur within the study area because of specific habitat requirements were limited to incidental observations.

Table 1. Sensitive species list of species found on or in the vicinity of the Jonah Field, Pinedale, Sublette Co., Wyoming.

Common Name	Scientific Name	Habitat Preference	Other Designation and Ranking
Mammals			
Long-eared myotis	*Myotis evotis*	Conifer and deciduous forests, caves, and mines	G5/S1B, S1?N, NSS2
Whitetail prairie dog	*Cynomys leucurus*	Basin-prairie shrub, grasslands	G4/S2S3,NSS3 (Petitioned 7/11/2002)
Idaho pocket gopher	*Thomomys idahoensis*	Shallow stony soils	G4/S2?, NSS3, IUCN-LR (nt)
Pygmy rabbit	*Brachylagus idahoensis*	Basin-prairie and riparian shrub	G4/S2, NSS3, IUCN-LR (nt)
Birds			
White-faced ibis	*Plegadis chihi*	Marshes, wet meadows	G5/S1B, SZN, FSR2, NSS3
Trumpeter swan	*Cygnus buccinator*	Lakes, ponds, rivers	G4/S1B, S2N, FSR2, FSR4, NSS2
Northern goshawk	*Accipiter gentilis*	Conifer and deciduous forests	G5/S23B, S4N, FSR2, FSR4, NSS2
Ferruginous hawk	*Buteo regalis*	Basin-prairie shrub, grassland, rock outcrops	G4/S3B, S4N, FSR2, FSR4, NSS4
Peregrine falcon	*Falco peregrinus*	Tall cliffs	G4/T3/S1B, S2N, FSR2, NSS3 (Removed from federal endangered list 8/25/1999)
Greater sage-grouse	*Centrocercus urophasianus*	Basin-prairie shrub, mountain-foothill shrub	G5/S3 (Petitioned 6/8/2002; removed from consideration for listing 1/07/2005), NSS2
Mountain plover	*Charadrius montanus*	Cushionplant communities; low sparse vegetation	G2/S2B, SZN (Proposed listing withdrawn 9/2003), NSS4
Long-billed curlew	*Numenius americanus*	Grasslands, plains, foothills, wet meadows	G5/S3B, SZN, FSR2, NSS3
Yellow-billed cuckoo	*Coccyzus americanus*	Open woodlands, streamside willow and alder groves	G5/S2B, SZN, FSR2, NSS2 (Petitioned 7/25/2001)
Burrowing owl	*Athene cunicularia*	Grasslands, basin-prairie shrub	G4/S3B, SZN, FSR2, NSS4
Loggerhead shrike	*Lanius ludovicianus*	Basin-prairie shrub, mountain-foothill shrub	G5/S4B, SZN, FSR2
Sage Thrasher	*Oreoscoptes montanus*	Basin-prairie shrub, mountain-foothill shrub	G5/S3B, SZN, PIF Priority, NSS4
Brewer's sparrow	*Spizella breweri*	Basin-prairie shrub	G5/S3B, SZN, PIF Priority, NSS4
Sage sparrow	*Amphispiza billineata*	Basin-prairie shrub, mountain-foothill shrub	G5/S3B, SZN, PIF Priority, NSS4
Northern pintail	*Anas acuta*	ponds and marshes	NSS3
Redhead duck	*Aythya americana*	lakes, marshes, prairie pothole ponds	NSS3

Table 1. Sensitive species list of species found on or in the vicinity of the Jonah Field, Pinedale, Sublette Co., Wyoming.

Fish			
Roundtail chub	*Gila robusta*	Colorado River drainage, mostly large rivers, also streams and lakes	G2G3/S2?, NSS1
Leatherside chub	*Gila copei*	Bear, Snake, and Green River drainages, clear cool streams and pools	G3G4/S2, NSS1
Amphibians			
Northern leopard frog	*Rana pipiens*	Beaver ponds, permanent water in plains and foothills	G5/S3, FSR2, TBNG, NSS4
Boreal toad (Northern Rocky Mountain population)	*Bufo boreas boreas*	Pond margins, wet meadows, riparian areas	G4T4/S2, NSS2, FSR2, FSR4, NSS4
Spotted frog	*Rana pretiosa*	Ponds, sloughs, small streams	G4/S2S3, FSR2, FSR4, NSS4

2.4 Overall Monitoring and Protection Measures

Picture representing male Greater sage-grouse.

This section summarizes the role of the Jonah Interagency Mitigation and Reclamation Office, as well as suggestions, recommendations, and summaries of current monitoring and protection measures for mitigation of future disturbance activities. The central wildlife resources include those of sensitive or crucial habitats such as raptor nests, Greater sage-grouse leks, and drainages. Rock outcrops in the area also appear to be important habitat for a variety of species. Significant amounts of wildlife sign are found in these areas, including that of pygmy rabbits, and cavity nesting species, such as the American kestrel and Rock wren. These areas also serve as important perching and hunting sites for all raptors. Thus, building of facilities should be avoided or designed to minimize disturbances to wildlife in critical habitat areas.

Aster Canyon recommends that maintaining vital habitat such as drainages, waterholes, and rock outcrops is important for the persistence of many sensitive species in the area. Likewise, it should be recognized that a mosaic landscape that maintains a community of various plants with different structures and ages provides

more opportunities for wildlife use. It is further suggested that the study area be expanded to include habitats surveyed in previous years to adequately collect data for appropriate trend analysis. This would also allow for the inclusion of other habitats to determine if species that are selecting new sites away from disturbance activities are affecting species already using those areas through the competition for resources.

Table 2 outlines wildlife stipulations for all surface disturbance activities in the JIDPA as illustrated in the EIS (BLM 2007). It describes the affected areas and their applied restrictions, the time frame of those restrictions, and the restricted area boundaries.

Table 2. Standard protection measures for all surface-disturbing activities in the JIDPA by the species affected areas, the applied restrictions and time frame, and the boundary area for the specified restriction (BLM 2007).

Affected Areas	**Applied Restrictions**	**Restriction Time Frame**	**Restricted Area Boundaries**
Greater sage-grouse leks	No surface occupancy	Year-round	Within 0.25 mile of occupied lek boundary
Greater sage-grouse leks	No surface-disturbing activity	March 1–May 15	Within 0.25 mile of occupied lek boundary
Greater sage-grouse nesting habitat	No surface-disturbing activity	March 15–July 15	Up to 2-mile radius of active lek or within suitable Nesting Habitat
Winter Greater sage-grouse habitat	No surface-disturbing activity	November 15-March 14	Within identified winter habitat
Greater sage-grouse leks/strutting grounds	Surface occupancy or use restricted or prohibited	March 1-May 15 (8pm to 8 am)	Within 0.25 mile of lek/strutting ground boundary
Mountain plover	No surface-disturbing activity until 2 surveys (no earlier than 4/20 and 5/4) show no nesting activity; activity must begin within 72 hrs of survey	April 10-July 10	Within potential mountain plover habitat
Bald eagle nest	No surface occupancy	Year-round	Within 0.5 mile of active nest
Bald eagle nest	No surface-disturbing activity	February 1-August 15	Within 1 mile radius
Bald eagle winter use areas	No surface-disturbing activity; disruptive activities restricted	November 15-April 30	Within 1 mile radius
Ferruginous hawk nest	No surface occupancy	Year-round	Within 1,000 feet of active nest
Ferruginous hawk nest	No surface-disturbing activity	February 1-July 31	Within 1 mile radius
Other raptors	No surface occupancy	Year-round	Within 825 feet of active nest
Other raptors	No surface-disturbing activity	Year-round	Within 0.5 mile radius
Riparian areas	No surface occupancy	Year-round	Within 500 feet

As stated in the ROD, intensive surface-disturbance practices on the Jonah Field will likely have significant impacts on natural resource values, including wildlife displacement and/or local extirpation of local populations. Therefore, mitigation is encouraged and expected to maintain these resources and help protect wildlife. The JIO was formed to provide overall on-site and off-site management of field monitoring and mitigation activities and is tasked with managing $24.5 million dollars donated by EnCana Oil and Gas (USA) Inc. Interested organizations submit project proposals semi-annually to the JIO, and the proposed projects must meet criteria described in the JIDPA EIS. The purpose of the JIO is to maintain, preserve and enhance sagebrush-steppe habitat for native wildlife (JIO 2006). The JIO and BLM jointly authored the WMPP for the 2007 inventory and monitoring project. Table 3 portrays the 2006 approved mitigation projects and Table 4 portrays the 2007 approved mitigation projects.

Table 3. Jonah Interagency Mitigation and Reclamation Office approved project proposals from July 2006 (JIO 2006).

Project Name	Contact	Amount Requested	Description of Project	Evaluation Results	Amount Approved
Lander Trail Well Wildlife and Stockwater Development	Square Top Grazing Assn.	$19,500	Improvement of existing well and conversion to solar. New storage tank with fencing for watering area for wildlife and offsite livestock	Approved with minor modifications	$19,500
Muddy Creek Water Well	Square Top Grazing Assn.	$11,500	Repair and improve existing well; replace windmill with generator, overflow pit and fencing for wildlife watering.	Approved with minor modifications	$11,500
Square Top Water Well #1	Square Top Grazing Assn.	$25,500	Drill new well; equip with solar pump and storage and stock watering tank, water overflow pit with fencing for wildlife watering.	Approved with minor modifications	$25,500
Sand Draw Water Well #1, 2, & 3	Rendezvous Ranch	$76,500	Drill 3 new water wells, with solar pumping system, storage and stock water tanks, and drinking facilities for wildlife.	Approved with minor modifications	$76,500
Sand Draw water well #4	Rendezvous Ranch	$25,700	Drill new water well with solar pump, storage and stock tank and drinking facilities for wildlife	Approved with minor modifications	$25,700
Jonah Raptor Nest Platform Project	BLM – Pinedale Field Office	$5,025	Construction and placement of nesting platforms for ferruginous hawks.	Partially approved - for platforms outside the JIDPA boundary	$2,153
Habitat Improvement Pilot Project	EnCana & Wyoming. Board of State Land Commissioners	$868,685.25	Treatment of 5 acre test plots using Lawson Aerator, snow fence construction to add moisture for increased reclamation success, test of weed control methods, and repair of dam on Juel Reservoir.	Partially approved with modifications – disapproved past work; approved future work with input from JIO, max contribution of $499K	$499,000

Table 4. Jonah Interagency Mitigation and Reclamation Office approved project proposals from March 2007 (JIO 2007).

Project Name	Contact	Amount Requested	Amount Approved	Approval Status	Description of Project
Tibbals Reservoir & Vegetative Enhancement	Cotton Bousman	$115,200	$115,200	Approved	Project to enhance sage-grouse brood rearing habitat. Off-site fenced livestock water/reservoir to provide sanctuary to sage-grouse. Approximately 10 acres around reservoir will be fenced and seeded with forbs. Vegetative enhancements to improve habitat for wildlife, specifically sage-grouse and pronghorn.
Cottonwood Ranch Bench Corral Conservation Project	Freddie Botur, Luke Lynch, Steve Laster, Scott Yates	$1,173,650	$978,650	Approved with Contingencies	Conservation easement on 1110 acres of pristine wildlife habitat. Water efficiency project will allow improved grazing management on 25,000 acres. Funding for intensive grazing management on a large scale (25,000 acres) that will address BMP's for sagebrush obligates.
MJ Ranch Sagebrush Conservation & Mitigation Project	Mark & Renee Jones, Luke Lynch, Kerry Olson, Glenn Pauley	$1,920,000	$1,309,000	Approved with Contingencies	Conservation easement on 2052 acres to preserve wildlife habitat. Potential for a forage reserve and/or habitat plan, indirectly benefiting 80,000 acres.
Elk Mountain/Red Canyon Prescribed Burn	BLM KFO, Gavin Lovell	$90,000	$90,000	Approved	Improvement of upland plant communities for wildlife, including sage-grouse with prescribed burning of 20,000 acres (approximately half black) in a mosaic pattern in the Elk Mountain area. Approval of the Proposed Action is the most environmentally accepTable method of stimulating regeneration of desired plant communities (aspen, mountain shrubs and grasses).
SUBTOTAL -Wildlife		**$4,383,357**	**$2,492,850**		
Wardell Buffalo Trap	Sam Drucker, Dave Vlcek & David Crowley	$40,000	$40,000	Approved	Establishment of a drainage system to protect the Wardell Buffalo Trap site for preservation of an important archaeological site.
Stud Horse Butte Livestock Mitigation	Donald Rogers	$147,200	$73,200	Approved w/ modifications	Project mitigates livestock impacts and supports reclamation success. 2 water sources to be developed in north end of stud horse butte to attract livestock away from infill. Develop water in Chalk Butte to temporarily reduce time cattle are in stud horse butte thus reducing livestock/gas development conflicts.
SUBTOTAL -Other		**$624,581**	**$113,200**		
A Project to Mitigate Direct Impacts to Wildlife & Grazing in the Immediate Area South of the Jonah Field	Steve Reynolds & Project Team	$181,000	$181,000	Approved	Provide wildlife drinking water by drilling 2 new wells and upgrading 2 wells south of Jonah. Repair/extend wildlife approved fencing between two allotments to reduce livestock drift from Jonah. Fence will also allow for grazing rotation which may improve habitat values.
SUBTOTAL -Both		**$181,000**	**$181,000**		
TOTAL FUNDING REQUESTED		**$5,188,937**	**$2,787,050**		

Mitigation and protection measure projects approved by the JIO appear to be providing protection and habitat for wildlife species in the area. The 2006 approved mitigation proposal list indicates several projects approved for repairs and improvement at water well sites. Several of the 2007 approved mitigation proposals further aim to enhance areas for wildlife and livestock by attracting these species off the JIDPA to accomplish reclamation goals. For example, the Stud Horse Butte Livestock Mitigation Project relieves direct impacts and supports reclamation success by developing off-site water wells. These mitigation projects are also intended to provide water for animals in an otherwise semi-arid high elevation desert climate and reduce conflict between animals and disturbance activities.

The Tibbals Reservoir and Vegetative Enhancement Project provide another off-site water location. However, the purpose of this project is to provide a sanctuary for Greater sage-grouse. Fencing of the reservoir has the potential to decrease predation, especially by ground predators, to increase survival of the young during brood rearing. It further aims to enhance brood rearing habitat by seeding the area with forbs to provide forage.

The objective of the habitat improvement pilot project is to test plots with aeration and snow fence construction. This is intended to add moisture for increased reclamation success, potentially creating better forage for wildlife species. Aster Canyon recommends using rock piles in place of snow fence construction, as the rock piles create habitat for small mammals and perches for raptors and other bird species. Additionally, rock piles would limit obstruction to larger wildlife such as pronghorn antelope, for which snow fences might be a concern.

Conservation easement projects preserve valuable wildlife habitat by protecting different types of habitat. These projects often protect important archaeology and have the potential to create natural sanctuaries for wildlife. These areas often provide habitat for sagebrush obligate species, and protect riparian corridors for all wildlife.

Many bird species tend to nest in riparian areas, as well as on the ground of tall rims. Productivity of raptors appears to have decreased within the study area due to disturbance activities and an increase in predation. Thus, the Jonah Raptor Nest Platform Project consists of construction and placement of nesting platforms for Ferruginous hawks. The ANS site located in the study area this year was used by a pair of

Ferruginous hawks and their breeding attempt was successful. Aster Canyon agrees that ANS sites are beneficial for raptors in the area and has recommended construction of additional ANS sites in the monitoring and protection measures for raptors (3.3). Locations should be carefully placed as not to disturb other sensitive wildlife such as the Mountain plover. Thus, Aster Canyon has made some suggestions to consider for such placement areas.

Finally protection measures for TECP, WSS, and SGCN not identified previously are often identified during field reviews by the BLM and Operator on-site meetings for Applications for Permits to Drill (APD), Right of Way (ROW) applications and in Sundry Notices. When these protection measures are identified surveys by BLM approved consulting biologists are usually required. Protocols for these species are coordinated with BLM biologists at the time of the survey request.

Picture of wild horses in the buffer area of the Jonah Field study area.

3.0 RAPTORS

Raptors are birds that comprise the hawks, eagles, owls, and falcons. They are important to ecosystems not only for their intrinsic value, but they also help to control rodent populations. Presented below are the methods, results, and monitoring and protection measures for the nesting raptors within the study area. The Bald eagle is included in this section but is not discussed in detail since it does not typically occur in the vicinity of the study area. Some of the raptors, such as the Ferruginous hawk appear to be sensitive to disturbance activities, while others, such as the Western burrowing owl appear to be benefiting from the activities. The different effects are due to the specific requirements of each species.

3.1 Raptor Methods

Though the Jonah field area has been surveyed since 1996 for nesting raptors with changing boundaries the methods of recording raptor nests has not changed and are defined below. As per the 2007 WMPP, the study area includes the Jonah Infill Drilling Project Area (JIDPA) and a 3-mile buffer surrounding the area. Refer to Figure 1 to compare previous years study area to the current study area boundaries.

Surveys were conducted according to the Raptor Survey Procedures and Data Standards outlined by the Bureau of Land Management (BLM 2004) to determine productivity and activity of known nests. Surveys for new nests were conducted by searching potential raptor habitat such as rock outcrops, cliffs, ridges, knolls, and washes on foot. Measures were taken to reduce the disturbance effects of the surveys on nesting birds (TRC 2005). These measures include:

- Scanning for nests from afar, when feasible, with binoculars and/or spotting scope to determine activity and status.
- When nests were approached, it was done so in an obvious manner to alert birds to the presence of the observer.
- Number of visits to nests was minimized to avoid repeated disturbance while still collecting the necessary data.
- Surveys of nests were conducted quickly to minimize disturbance to birds.
- Attempts were made to avoid active nests during extreme weather conditions.

Aster Canyon biologists Molly Tranel, Nikki Mann, Melanie Purcell, Jamie Coble, Jacey Roche, Renan Yanish, and Rebecca Fogerty conducted raptor nest searches on foot and by truck. Data was recorded on the standardized form as seen in Appendix B. Any raptors observed hunting or perching away from a nest site were recorded and reported as part of the general wildlife observations on the field.

A large majority of new nests and active nests were photographed to illustrate location and current condition. Some of the previously recorded nests were re-photographed to demonstrate current nest condition. Several of the new nests found do not have photographs due to camera malfunction. New nests were assigned a nest name consisting of the bird species (two letters), the next consecutive nest number for that species (TRC 2005 Master List), followed by the letter "N" to depict that the nest was new this year (for example, a new American kestrel nest was named AK351N). Several new nests were also found by Aster Canyon biologists during other surveys. The nests that were assigned with "N" should have this depiction dropped in future years since the nest will no longer be considered new.

Raptor surveys were initiated on April 18 and concluded on August 15, 2007. Biologists spent a total of 82 field days on the project. All known raptor nests located within the 3-mile buffer were visited once to determine nest condition and activity status. Nests that were identified as inactive since the 2004 survey (TRC 2005) and nests given a status of remnants or poor condition in 2007 were not checked again. Nests given a status of fair, good, or excellent condition, and nests in which the activity status was unknown were checked a total of three times, in April, May and June. Monitoring efforts were continued on active nests until productivity could be determined.

Techniques implemented in past surveys and addressed in 2007 include Ferruginous hawk territory mapping and Common raven nesting surveys. Although Common ravens are not considered raptors, they were included as part of the raptor nest survey because they often use nests historically occupied by raptors, and information on nesting ravens has been collected since 2001. Nesting boundaries of Ferruginous hawks is difficult to determine and territories determined in previous years are approximations, therefore, we did not attempt to determine the nesting or foraging territories in this survey. Raven nesting and productivity was treated the same as raptor nests, and all nests recorded in previous years were surveyed as well as all new nests incidentally observed.

3.2 Raptor Results

Results presented in this section indicate that raptors are using the study area for hunting grounds, but nesting activities appear to be limited within the vicinity. However, the different study areas described by TRC and Aster Canyon's inventory designs make it difficult to directly compare trends between 1997-2005 efforts and 2007 efforts. No Bald eagles were recorded nesting or hunting within the study area due to the lack of nesting and hunting habitat preferred by the species. Golden eagles were documented hunting the study area but no nests were found.

Monitored nests within the study area are illustrated in Table 5. Productivity results are further discussed under each species. Unknown species nests are not specifically addressed. The unknown nests were located in large draws with sagebrush approximately 2 meters high, and had a bottom platform of approximately ¼ inch diameter sage sticks and a similar stick covering. Loggerhead shrike activity in the area made observers suspect that the nests belong to this species, although further investigation may be needed. For more detail on all raptor nest locations, activity, productivity, and field notes please see Appendix B.

Table 5. Number of raptor nests from 1997-2005, 2007, and total, and their status in terms of activity and number of young discovered. * indicates number of young unknown because unable to count.

Species	Number of 1997-2005 nest locations	Number of new nest locations (2007)	Total Number of nests	Number of Inactive nests	Number of Active nests	Number with unknown status	Total Number of Discovered Young
American kestrel	8	22	30	14	4	12	3
Ferruginous hawk	83	18	101	95	4	2	3
Prairie falcon	4	0	4	3	1	0	*
Short-eared owl	2	0	2	2	0	0	0
Western burrowing owl	20	21	41	22	16	3	19
Common raven	10	11	21	10	11	0	*
Unknown species	1	2	3	3	0	0	0

American kestrel

Four American kestrel nests were found to be active in 2007. Activity was determined by presence of birds and new nesting material. Productivity among kestrel nests was difficult to determine as many of the cavities used for nesting were deep, and observers were unable to see into the back of the nests. However, it was determined that one nest contained one chick while the other contained two chicks. On future nest

surveys, a peeper-probe (Sandpiper Technologies 2006) or similar device may assist in determining the productivity for otherwise inaccessible cavities.

Four Rock wren nests were originally classified as American kestrel and later changed. Rock wrens build cavity nests in the same habitat as the American kestrel and use similar nest material. The noticeable difference is that Rock wren nests have small stones or flint chips paving the entrance of the nest (Harrison 1979). However, because of the similarity in nest construction and location, American kestrels may use the Rock wren nests or cavities in the future.

Ferruginous hawk

Ferruginous hawk nests were determined to be active by presence of birds, fresh mutes, and new nest building material. Four of the 18 newly discovered Ferruginous hawk nests of 2007 were deemed active. Many of the new nests were only remnants and could only have been seen while on foot. Packrat middens made out of large sage sticks were often used as an indicator of where to look for remnant nests. The packrats appear to use much of the abandoned nest material in their middens, and scouting of nearby ridges or rock outcrops often reveals some remnants at the actual nest location.

The only successfully productive nest was FH128, an Alternative Nest Structure (ANS), which had 3 chicks. Nests FH101 and FH1 were both at the stage where adults were incubating eggs when the nests were predated. No fragments of eggshells remained on the nests suggesting that the predator must have been big enough to swallow the eggs whole or carry them off. Nest FH14 exhibited extensive building early in the season, with 2 being built on at the one location, however, only one soaring adult was sighted and no eggs were laid. Late in the season, between the second and third surveys (June), a nest approximately 0.3 miles northwest of FH14 was rebuilt and nest lining added. This atypical activity, so late in the season, led the observers to suggest that a lone male may have been building in attempts to attract a mate.

Prairie falcon

Picture depicts a Prairie falcon on a fresh kill at the corner of windmill road and lumen road.

Four previously recorded Prairie falcon nests were monitored during the nesting season, none of which were new in 2007. One of the Prairie falcon nests fell outside the study area, but was recorded and monitored because it was active with two adults persisting in the area. Productivity remains unknown at this time because the observers could not see into the sheltered cliff ledge to check if eggs or juveniles were present. The other three Prairie falcon nests were inactive.

Short-eared owl

Two Short-eared owl nests were investigated, however, activity was undetermined because the nests were not located and no short-eared owls were observed in the area. The draws where the Short-eared owl nests were reported were search but no indication of the species was found.

Common raven

A total of 21 Common raven nests were monitored during the 2007 survey efforts and 11 of these were newly discovered during incidental observations. The ravens appeared to mainly be using man-made structures such as windmills and the stairs to condensate tanks. No other birds were observed using these structures. There were more active than inactive raven nests and most juveniles had fledged before the third survey. Productivity among Common raven nests was considered to be quite high because general juvenile raven observations were prevalent throughout the study area. However, actual productivity is lacking since nest monitoring was limited to previous nest locations and new nest locations, both of which were incidental observations of Common raven nest locations.

Productivity and General Raptor Observations

A summary of nesting attempts and productivity by individual raptor species within the study area are illustrated in Table 6. The table represents data collected from 2001 to 2007 with no data collected in 2006. It is important to note that the data collected by TRC from 2001-2005 was a much larger study area covering a more diverse geographic range. For detailed information on each nest see data sheets in Appendix B. The map in Figure 2 depicts raptor observations recorded throughout the JIDPA and 3-mile buffer area. These are incidental observations documented outside of formal nesting surveys. Table 7 provides the number of sightings for species such as the Golden eagle, Northern harrier, Osprey, Prairie falcon, and Red-tailed hawk. Presence of these birds on the field suggests that they are using the area, even if they are not nesting in the study area itself.

Picture of Golden eagle during “take-off” after perching at rock outcrop.

Table 6. Raptor nest productivity documented by species from years 2007 through 2001. Data was not collected for 2006. Study area for 2005-2001 differed from that of 2007.

Species/Parameter	2007	2005	2004	2003	2002	2001
American Kestrel						
Total Number of Nesting Attempts	16	10	9	7	6	2
Total Number of Recorded Fledged in the JWSA (2001-2005), and in the 2007 study area	n/a	9-10+	20+	UNK	UNK	UNK
Number of Nesting Attempts with Known Outcome	2	3	5	0	0	0
Number of Fledglings/Nest with Known Outcome	1.5+	3.0-3.3+	4.0+	n/a	n/a	n/a
Number of Productive Nesting Attempts (% Nest Attempts Productive)	2 (100%)	3 (100%)	5 (100%)	0 (n/a)	0 (n/a)	0 (n/a)
Number of Fledglings/ Productive Nest	1.5+	3.0-3.3+	4.0+	n/a	n/a	n/a
Ferruginous Hawk						
Total Number of Nesting Attempts	4	11	10	3	1	0
Total Number of Recorded Fledged in the JWSA (2001-2005), and in the 2007 study area	n/a	6+	1	3	0	0
Number of Nesting Attempts with Known Outcome	4	11	10	3	1	n/a
Number of Fledglings/Nest with Known Outcome	0.75	.5+	0.1	1	0	n/a
Number of Productive Nesting Attempts (% Nest Attempts Productive)	1(25%)	3(27%)	1 (10%)	2 (67%)	0(0%)	n/a (n/a)
Number of Fledglings/ Productive Nest	3	2.0+	1	1.5	n/a	n/a
Prairie Falcon						
Total Number of Nesting Attempts	1	7	3	2	1	1
Total Number of Recorded Fledged in the JWSA (2001-2005), and in the 2007 study area	n/a	12.0-14.0	7+	10.0-11.0	5.0-6.0	2+
Number of Nesting Attempts with Known Outcome	Unknown	7	2	2	1	1

Table 6. Raptor nest productivity documented by species from years 2007 through 2001. Data was not collected for 2006. Study area for 2005-2001 differed from that of 2007.

Species/Parameter	2007	2005	2004	2003	2002	2001
Number of Fledglings/Nest with Known Outcome	Unknown	1.7-2.0	3.5+	5.0-5.5	5.0-6.0	2.0+
Number of Productive Nesting Attempts (% Nest Attempts Productive)	Unknown	4 (57%)	2(100%)	2 (100%)	1 (100%)	1 (100%)
Number of Fledglings/ Productive Nest	Unknown	3.0-3.5	3.5+	5.0-5.5	5.0-6.0	2.0+
Short-eared Owl						
Total Number of Nesting Attempts	0	2	1	1	0	0
Total Number of Recorded Fledged in the JWSA (2001-2005), and in the 2007 study area	n/a	n/a	n/a	3	0	0
Number of Nesting Attempts with Known Outcome	0	0	0	1	0	0
Number of Fledglings/Nest with Known Outcome	n/a	n/a	n/a	3	n/a	n/a
Number of Productive Nesting Attempts (% Nest Attempts Productive)	n/a (n/a)	n/a (n/a)	n/a (n/a)	1 (100%)	n/a (n/a)	n/a (n/a)
Number of Fledglings/ Productive Nest	n/a	n/a	n/a	3	n/a	n/a
Western burrowing owl						
Total Number of Nesting Attempts	19	9	1	2	3	3
Total Number of Recorded Fledged in the JWSA (2001-2005), and in the 2007 study area	19+	23+	UNK	UNK	1+	2+
Number of Nesting Attempts with Known Outcome	13	7	0	0	1	2
Number of Fledglings/Nest with Known Outcome	1.5+	3.3+	n/a	n/a	1.0+	1.0+
Number of Productive Nesting Attempts (% Nest Attempts Productive)	7 (54%)	6 (86%)	0 (n/a)	0 (n/a)	1 (100%)	2 (100%)
Number of Fledglings/ Productive Nest	2.7+	3.8+	n/a	n/a	1.0+	1.0+

Table 6. Raptor nest productivity documented by species from years 2007 through 2001. Data was not collected for 2006. Study area for 2005-2001 differed from that of 2007.

Species/Parameter	2007	2005	2004	2003	2002	2001
Common Raven						
Total Number of Nesting Attempts	11	12	10	9	4	8
Total Number of Recorded Fledged in the JWSA (2001-2005), and in the 2007 study area	n/a	23+	20+	18+	2	2+
Number of Nesting Attempts with Known Outcome	10	9	8	8	4	2
Number of Fledglings/Nest with Known Outcome	3.6+	2.6+	2.5+	2.3+	0.5	1.0+
Number of Productive Nesting Attempts (% Nest Attempts Productive)	9(90%)	7 (78%)	7 (88%)	6 (75%)	1 (25%)	1 (50%)
Number of Fledglings/ Productive Nest	3.6+	3.3+	2.9+	3.0+	2	2.0+

Table 7. Total number of raptor sightings made outside nesting surveys within the study area.

Species	Number Observed
American kestrel	8
Ferruginous hawk	12
Golden eagle	11
Northern harrier	11
Osprey	2
Prairie falcon	2
Red-tailed hawks	11
Unknown buteo	1

3.3 Raptor Monitoring and Protection Measures

A review of currently implemented and other suggested monitoring and protection measures for raptors are presented in this section. Protection measures already in place dictate that wellpads, access roads, and other facilities are not to be located within 825 ft of an active raptor nest, within 1000 ft of an active Ferruginous hawk nest, or within 2640 ft of any Bald eagle nest (BLM 2006). Seasonal restrictions apply for surface-disturbance activities near active raptor sites and are to be avoided within 0.5 mile of all active raptor nests, 1.0 mile of all active Ferruginous hawk nests (February 1 – July 31), within 1.0 mile of all active Bald eagle nests (February 1 – August 15), and within 1.0 mile of active Bald eagle communal winter roosts and winter forage areas (November 1 – April 1; BLM 2006).

Additional protection measures implemented include the requirement for operator coordination with BLM, USFWS, and WGFD for all mitigation activities related to raptor or other sensitive species and their habitats and the need to obtain permits for relocation, removal, and establishment of raptor nests. Facilities and sites are to be selected and designed to avoid disturbance to known active nest sites (BLM 2006). Raptor nest surveys are to be conducted within a 1.0 mile radius of proposed surface activities between February 1 and July 31, and the above protection measures and seasonal restrictions discussed are to be applied. Finally, the Jonah field Operators are to notify officials immediately if a raptor nesting location is found on a project facility in order to coordinate erection of an ANS in the area (BLM 2006). Further recommendations suggested for future monitoring and protection measures are outlined below under individual raptor species.

American kestrel

The American kestrel is not considered a species of concern in Wyoming and appears to be fairly adaptable to human disturbances. It has been documented that kestrels are attracted to human-modified habitats and are often found near areas of human activity (Smallwood *et al.*, 2002). Continued monitoring is recommended and retaining nesting habitat and changes in survey technique could provide more information. For more accurate information on productivity, a Peeper video probe system (Sandpiper Technologies 2006) or similar device for seeing into small, dark cavities could be used. Rock outcrops should particularly be avoided during disturbance activities since this species is a cavity nester and seeks out these areas.

Ferruginous hawk

Picture of a Ferruginous hawk (dark morph) captured in flight.

Ferruginous hawks build and repair multiple nests each breeding season as part of their courtship behavior (Bechard *et al*. 1995). This species is considered remarkably flexible in choosing nest sites and will often nest on the ground. However, this nesting strategy causes a considerable increase in nest predation rates. Additional ANS sites in selected areas may help reduce predation and disturbance from Off-Road Vehicles (ORVs). Care should be given in selection of ANS sites to not increase raptor predation on other sensitive species such as Mountain plovers (Dinsmore 2003) and Greater sage-grouse. Recommended ANS locations are in T29N, R107W, Section 26 south of nest number FH1. This location is ideal because it is a historical Ferruginous hawk nesting site that was active in 2007 but was predated. Constructing an ANS here would potentially decrease predation. Another historical site where an ANS would be beneficial is in T30N, R109W, Sections 34 and 35. This location is near prairie dog town 5, creating a nearby hunting ground for the species.

Ferruginous hawk nest building is often secretive and the pair may abandon the nest and choose another site if disturbed (Berchard *et al*. 1995). Since adults may repair several nest sites during one nesting season before laying eggs (Berchard *et al*. 1995), all possibly active nests should be classified as active until the pair decides on a nest. Observers should use extreme caution when approaching potentially active nests. Additional disturbances should be minimized as much as possible during the breeding and nesting seasons. It may be advisable to report active Ferruginous hawk nests immediately after the first survey so protection measures can be enacted and reduce the chance of any accidental disturbances during that period.

Prairie falcon

Only a few Prairie falcon nests fall within the study area and mitigation and protection measures recommended for this species is site specific to the nesting area. There were many signs of frequent travel

along a two-track at the top of Blue Rim by trucks and ORV's. Recreation vehicle traffic use in this area should be evaluated. Closing the area to dirt bikes, truck traffic or posting signs could be effective in helping these nests and educating the public.

Short-eared owl

Although no Short-eared owls were discovered during survey efforts, there is potential for presence because appropriate habitat exists in the area. Mitigation and protection measures for this species consist of changing the survey technique and cattle grazing regime. Short-eared owls are ground-nesters and prefer to large patches of relatively tall, ungrazed grasslands (Wiggins *et al*. 2006). Historic nests are often located near draws and waterholes, thus intense cattle grazing may inhibit nesting activity of the Short-eared owl due to high animal densities around waterholes. Nests are usually difficult to locate because females are reluctant to flush until an observer is within a few meters of the nest. TRC located 3 historic nests while riding the draws on ATV. If an accurate depiction of Short-eared owl nesting is desired, then extensive reconnaissance of the draws, either on foot or with an ATV, would be required.

Common raven

Monitoring and protection measures currently underway for the Common raven include a first year study evaluating raven predation on sage-grouse nests in the Upper Green River Valley. This study is being conducted by a graduate student from the University of Wyoming. The Common raven appears to rely heavily on man-made structures, as all nest locations were located on these types of structures in the JIDPA. Productivity is thought to be high based on density of ravens observed, suggesting that this species is benefiting from disturbance activities. If the raven study implemented is shown to impact sensitive species like the sage-grouse, then it is recommended that manually destroying nests late in egg incubation can reduce future raven populations. For this reason, monitoring of existing Common raven nests, as well as surveying for new nests, may allow concerned parties to monitor and potentially control Common raven populations.

4.0 Western Burrowing Owl

The Western burrowing owl is often located in disturbed areas such as on university campuses, vacant lots, culverts, and other developed areas. Habitat for the owls appears to be enhanced by the disturbance activities in the JIDPA. Soils in areas of reclamation are more aerated and provide better habitat for fossorial mammals, therefore providing increased habitat for the owl. They often select nesting sites in vacant prairie dog burrows surrounded by vegetation in early successional stages (Thompson 1984). Vegetation with high forb content is presumed to provide cover for chicks while still providing open areas for adults to monitor their surroundings. Forbs increase invertebrate production, which are a primary food source for Western burrowing owls, and have been estimated to comprise 88% of their diet (Thompson *et al*. 1988). Promoting the conservation of burrowing mammals such as prairie dogs, badgers, and ground squirrels will ensure that suitable burrows are available for the owls to nest in.

4.1 Western Burrowing Owl Methods

Survey methods for Western burrowing owls and their nesting habitats were conducted simultaneously with the raptor surveys as reported in section 3.1, and were surveyed in April, May, and June. Total field days documented were 10 and were logged separately as part of the Jonah Wildlife Inventory Project. Additional time was spent during July and August outside project time due to continued nest monitoring required for the species. Methods employed for burrowing owl densities coincided with criteria developed by Thompson 1984. Burrowing owl searches consisted of visual observation by scanning prairie dog towns, road edges, and pipeline corridors with binoculars for inhabited burrows. Since Western burrowing owls are closely associated with prairie dogs towns, mapping of these towns aided in the surveys. The towns were walked to search for presence of pellets, feathers, whitewash and prey remains around the mouth of the burrow, or nesting material as indicators of potential use. Efforts were enhanced by gas field workers that observed owls during their daily work operations and reported a nest location to our biologists.

4.2 Western Burrowing Owl Results

Western burrowing owls activity status was determined by presence of birds, pellets, whitewash and prey remains at mouth of burrow, feathers, or nesting material. There were 21 new Western burrowing owl nests located during survey effort. Of the total 41 nests monitored in 2007, 16 were deemed active. Of these

active nests: 3 were documented as abandoned on the July 30 survey; 6 were still active but productivity was unknown; and 7 nests had chicks present. A total of 19 burrowing owl chicks were observed during the July productivity counts. Refer to Table 6 in section 3.2 for details. Refer to Appendix B for data sheets, shapefiles, and table of delisted nests.

4.3 Western Burrowing Owl Monitoring and Protection Measures

Picture of juvenile Western burrowing owls at their burrow.

A protocol for the survey, protection, and mitigation of the Western burrowing owl was developed by The Santa Cruz Predatory Bird Research Group at the University of California (UCSC 2007). The protocol outlines four mitigation measures for unavoidable impacts by means of nest relocation: 1) On-site passive relocation, evicting birds and allowing them to move to newly created habitat patches; nearby; 2) Active relocation, moving birds to newly created habitat outside their nesting territory, but inside their geographic region; 3) Allowing owls to move to newly created habitat patches ("build it and they will come"); and 4)

Reintroduction of owls into new geographic regions (UCSC 2007). These strategies have been incorporated by the U.S. Forest Service to assist in protection of the Western Burrowing owl (Trulio 1997). These strategies can be incorporated by the BLM and other agencies to develop a management plan and additional mitigation and protection measures implemented.

Mitigation and protection measures for Western burrowing owls in the JIDPA need to be evaluated due to the increased number of nesting owls on the field and the expected rate of disturbance proposed. Western burrowing owls did not seem disturbed by heavy traffic as they nested within feet of major roads throughout the JIDPA and were even sighted in a culvert. Disturbance seems to be beneficial for the species and should be managed accordingly since these sites will likely be used by the owls in the future. Banding burrowing owls nesting on the JIDPA would provide valuable information in regards to burrow fidelity.

If habitat becomes an issue for nesting owls then artificial burrows could be constructed at off-site mitigation sites to provide suitable habitat away from disturbance activities within the JIDPA. Aster Canyon recommends using this type of mitigation as a protection measure when surface disturbance activities cannot be avoided at existing nest sites. The design of the artificial structures should be predator-proofed to help increase nesting success. Artificial nests for Western burrowing owls have been successful in Arizona and California where nonprofit organizations such as Arizona partners in flight and Wild at heart have successfully teamed to relocate burrowing owls as mitigation and protection from disturbance activities. As of April 15, 2007 they have installed about 2500 artificial burrows and have relocated over 1000 burrowing owls to artificial habitat statewide in Arizona (Clark 2001). A relocation effort from Arizona to Utah, a long-distance low elevation to high elevation relocation, was conducted in 2005 by Scott Franklin of the BLM, Wild at heart, Arizona Game and Fish Department, and Red Cliffs Audubon was deemed a success (Clark 2001).

5.0 MOUNTAIN PLOVER

The Mountain plover was proposed for listing under the Endangered Species Act by the USFWS in 1999, but was withdrawn from listing in 2003. Recent data suggests that the species is experiencing a significant long term decline, and may be an indicator of the health of the ecosystem (Dinsmore 2003). Sites within the study area are considered to be potential Mountain plover habitat, and were surveyed for 2007.

5.1 Mountain Plover Methods

Methods employed for Mountain plover surveys by Aster Canyon in 2007 coincide with surveys conducted previously during inventory efforts from 1997 through 2005. Surveys were conducted in 2007 to determine the presence or absence of this species in habitats previously identified as having the potential for Mountain plover breeding grounds. Productivity was not surveyed for or determined for Mountain plovers. Potential habitats discovered incidentally during other wildlife surveys by Aster Canyon were also investigated. Surveys were conducted on April 24 through July 3, 2007 by Molly Tranel, Nikki Mann, Dani Geer, and Jacey Roche of Aster Canyon. A total of 11 days were logged, and surveys were conducted in accordance with the 2002 USFWS guidelines (USFWS 2002) listed below:

- Surveys were conducted during the period when plovers are tending nests and territories (May 1-June 15).
- Surveys were conducted between sunrise and 10:00 am to facilitate spotting the white breast of the plovers.
- Surveys were only conducted during favorable weather conditions.
- Surveys were conducted by truck or on All Terrain Vehicles (ATV; for inaccessible areas) on roads and two tracks throughout the habitat.
- Binoculars were used to scan the habitat for birds. If needed, a spotting scope was used to confirm a sighting. Vehicles were frequently turned off in the habitat and biologists listened for birds as well.
- Suitable habitat was surveyed up to three times, with each survey approximately 14 days apart.

Locations of individuals sighted were recorded on the Mountain plover survey forms (Appendix C). Habitats surveyed were classified as good, fair, or unsuitable. If a habitat was considered to be fair or unsuitable on the first survey it was not surveyed again. The ‘fair’ classification was given to habitats

which were not optimal this year but may be suitable in other years (i.e. grass was slightly too tall but if grazed would be the correct height). New habitats found incidentally were not surveyed additional times because they were located later in the season. Portions of habitats were numbered to facilitate the survey process and ensure that no areas were missed. The shapefile of these numbered portions is provided in Appendix C.

5.2 Mountain Plover Results

A total of 14 Mountain plovers were documented during survey efforts. At sites 1 and 5, birds were recorded during both survey efforts. Thus, the birds seen in each area may have been counted twice rather than additional birds recorded. Mountain plovers were spotted in the southern buffer of the study area but none were sighted within the JIDPA. A large portion of potential habitat identified as suitable by TRC in 2005 occurs in Section 36, T29N, R108W and was determined to be unsuitable habitat in 2007. As nest searches were not conducted, no Mountain plover nests nor chicks were found. However, on four of the habitat sites surveyed, Mountain plovers did demonstrate breeding behavior. Mountain plovers were most often recorded on dry playas with large amounts of bare ground (Table 8). Figure 3 shows areas of surveyed habitat, classified as suitable, unsuitable, and fair and the distribution of Mountain plovers spotted in the study area. Not all numbers of potential habitat sites are visible on the map due to scale, refer to Appendix C for more details. Habitat boundaries were not mapped in the field, rather they were hand digitized using former prairie dog boundaries and field notes.

Table 8. Number of confirmed Mountain plover sightings by date and site during the 2007 survey of the study area. Table includes birds found outside formal Mountain plover surveys and the habitat they were found in.

Site Name	Date	Number of Birds	Habitat Type
1	5/4/2007	3	Playa- lots of bare ground
1	7/1/2007	2	Playa- bare, shortgrass edges
2	5/8/2007	1	Playa- lots of bare ground
3	5/8/2007	1	Playa- lots of bare ground
5	4/24/2007	1	Playa- lots of bare ground
5	6/6/2007	2	Playa- lots of bare ground
10	6/19/2007	1	Playa- grassy
11	5/8/2007	2	Shortgrass
12	6/18/2007	1	Prairie dog town w/ short grass
Total		**14**	

5.3 Mountain Plover Monitoring and Protection Measures

The Mountain plover is a sensitive species and is often adversely affected by disturbance activities, outlined below are monitoring and protection measures. Protection measures in place for the Mountain plover include no surface-disturbance activity from April 10 through July 10 within potential habitat until 2 surveys show no nesting activity. Surface-disturbing activities must take place 72 hours post-survey completion where no Mountain plovers are observed to avoid requirements to perform additional surveys. Formal surveys for Mountain plover are conducted on or after April 20th with the second survey following 14 days later (BLM 2005). These surveys are performed by an Operator-financed, BLM approved biologist in accordance with USFWS guidelines (USFWS 2002). If breeding Mountain plovers are observed within 0.25 miles of a proposed surface disturbance, activity will be postponed until July 10th with no additional surveys, or another survey will be implemented immediately prior to construction to search for active nests. A 0.25 mile buffer will be placed around active nests to prevent disturbance, and planned activities will be delayed 37 days or 1 week post-hatching (USFWS 2002), and activities will be delayed 7 days when flightless chicks are observed.

Mountain plovers were not found using the JIDPA in 2007. It has been suggested that reclaimed areas of pipelines and wellpads could provide additional habitat for Mountain plovers (TRC 2005). 2007 surveys did not indicate any use of these areas by Mountain plovers. Furthermore, according to Knopf (1996), Mountain plovers prefer open, flat habitat, avoiding areas below ridges due to predation by species such as Prairie falcons and Loggerhead shrikes. Reclaimed areas and wellpads within the JIDPA are scattered with structures which could be used as perches, and Aster Canyon biologists have observed avian predator species doing so on several occasions. Mountain plovers may avoid using wellpad and pipeline habitats to escape such increased predation pressures.

Some of the habitats which were suitable in previous years have now become too heavily vegetated for Mountain plovers to occupy. Rotational grazing (Dinsmore 2003) or burning (Dinsmore 2003) of these areas could be effective tools in returning this habitat to conditions suitable for Mountain plovers. An increase in prairie dog colonies could also create more Mountain plover habitat, as there is a strong association between the two species (Dinsmore 2003).

Some of the areas previously identified as plover habitat were too small to be considered suitable breeding habitat for Mountain plovers. With this in mind, it is suggested that very small habitat patches not be surveyed in future years, and efforts instead be focused on surveying all portions of larger habitats. This species was most often documented in dry, bare playas. Alteration of these ephemeral wetlands, such as pitting or excavation, would cause these areas to become unsuitable for Mountain plovers. Protection of these playa lakes is essential to the success of the local plover population.

A possible threat to the future breeding success of Mountain plovers in the study area includes the potential infestation of exotic grasses like cheatgrass (*Bromus tectorum*) in their habitats (Dinsmore 2003). This invasive weed has the ability to dominate disturbed ground in shrub-steppe ecosystems, and over time alters the natural fire regime to create a monoculture. Cheatgrass was especially present on reclaimed sites and occasionally observed in native areas of the JIDPA and 3-mile buffer by Aster Canyon biologists. Since cheatgrass grows too tall for plovers to nest in, infestation in current Mountain plover habitat would greatly reduce the breeding success of these birds in the buffer area. It is recommended that cheatgrass be monitored and eradicated when found to prevent a problem in the future.

Picture (taken 4/24/07) showing an adult Mountain plover foraging at the edge of a dry playa with large amounts of bare ground.

6.0 LANDBIRDS

Recent studies have shown that sagebrush obligate passerines are declining in disturbed areas of habitat due to development (Madson 2006). The purpose of the 2007 inventory is to monitor bird distribution and abundance, and detect population trends in both developed and non-developed habitat in the study area over time. This study was not limited to passerines, and all observed avian species were recorded at each transect. As a result, the term "landbirds" will be used to describe all birds observed during the point transect survey. While the majority sighted was songbirds, other birds such as raptors, shorebirds, upland game birds, etc. were also included under this heading.

6.1 Landbird Methods

Past efforts to document landbirds in the JIDPA have consisted of general observations recorded during other wildlife surveys. However, the BLM requested that more formal surveys be conducted as identified in the Comprehensive Wildlife Conservation Strategy for Wyoming (WGFD 2005). For this study, sensitive species of interest included Sage sparrow, Brewer's sparrow, Sage thrasher, and Loggerhead shrike. From 2001 to 2005, Point Reyes Bird Observatory (PRBO) conducted nest surveys on all of these sensitive species except the Loggerhead shrike. While PRBO focused on nesting success on the JWSA and control areas, the design of this study allows for analysis of population trends for most diurnal, regular-breeding landbird species. This study was designed so it could be analyzed in the program DISTANCE 5.0 (Thomas *et al.* 2006), a Windows-based software program which provides an analysis of distance sampling data to estimate density and abundance of a wildlife population. This design was selected because it is easily repeated annually. Due to loss and fragmentation of shrub-steppe habitat, understanding population trends is essential to managing these avian species. Land managers and personnel can use this study in decisions regarding future project development and landbird management.

Survey Techniques

This survey was conducted according to the Rocky Mountain Bird Observatory (RMBO) Point Transect Protocol, and standard data sheets were used (Appendix D). An amendment to this protocol was employed for Aster Canyon's 2007 study area consisting of estimated radial distances rather than exact distances. This change was made due to the nature of the shrub-steppe habitat where the majority of the bird species

are ground nesters and birds are often detected by song rather than visually. Since radial distances are used for area purposes, it is more feasible to group the distances (i.e. 0-25m, 25-50m, and >50m), then evaluate the data using the DISTANCE 5.0 program. According to Lancia *et al.* (2005), the data can be either measured accurately as ungrouped data or in a distance category as grouped above. Vegetation was not recorded in this study as was in the RMBO protocol because all the transect habitat was defined as shrub-steppe.

Transect Selection

Thirty point transects were selected with 15 transects in the JIDPA and another 15 transects in the 3-mile buffer. An access point was taken from the road for each transect, and transect access points were spread along main roads and two tracks to cover as much of the study area as possible. See Figure 4 for access point locations and transects walked from those access points. A random numbers table was used to generate a bearing for each of the 30 transects. If the first bearing that was randomly selected intersected with another, then the next bearing was selected and so forth.

Picture of a Sage thrasher nest with eggs found during landbird point count transect surveys.

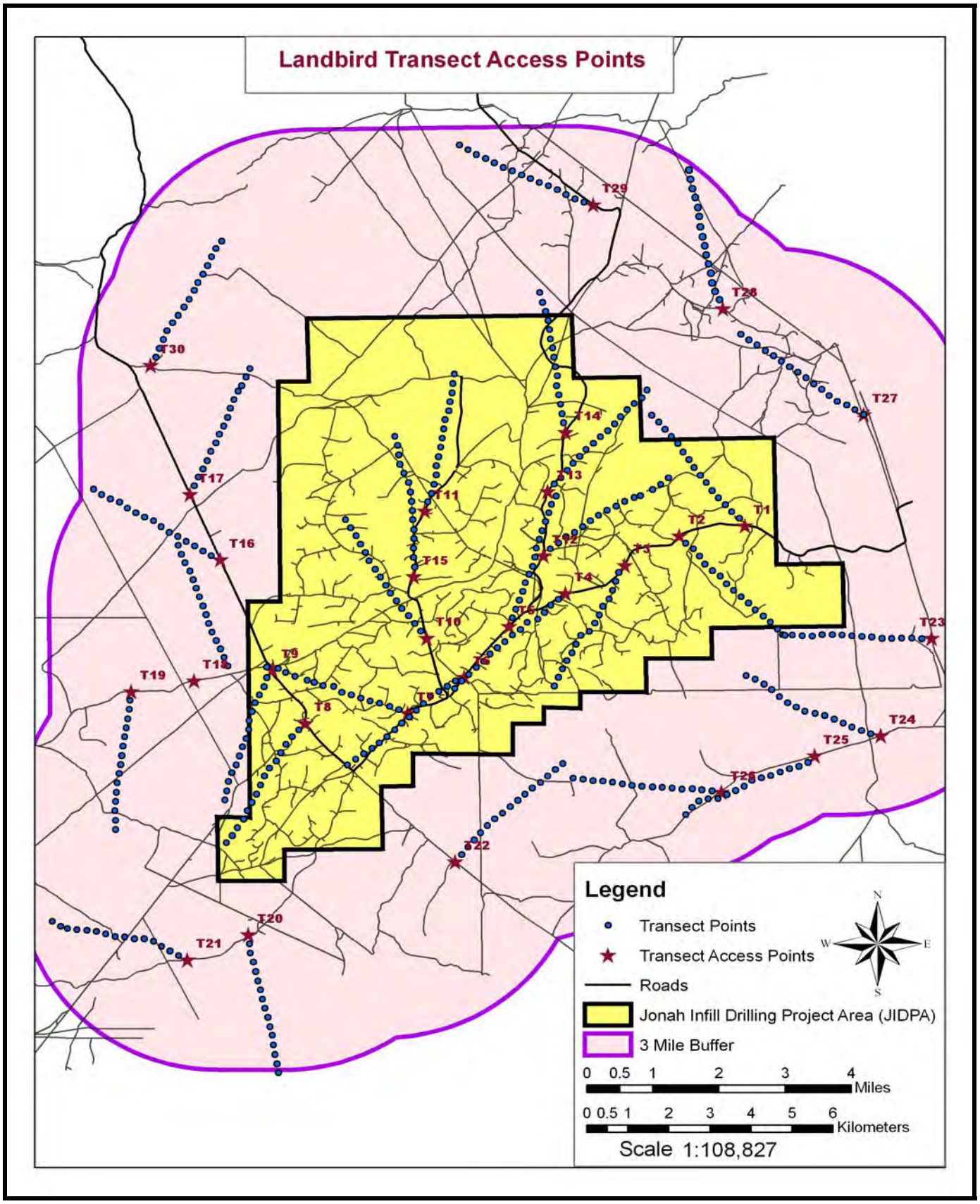

Figure 4. The thirty landbird survey transect access points found within the study area (indicated by red stars) and random transects surveyed from those points.

For some of the transects, observers were unable to follow the bearing for the entire transect due to physical obstructions such as active drilling, evaporation pits, and busy roads. When this occurred, the observer would circumnavigate the obstacle and attempt to relocate the original bearing. In the case of transect points falling directly on a road, the observer walked to the nearest safe location, always less than 50 meters from the original point.

Survey Protocol

The 30 point transects were surveyed between May 23 to July 2, 2007 to ensure that all migratory species were present on the breeding grounds, but completed before vocal activity decreased due to raising young and extreme heat. Surveys were conducted by Molly Tranel, Nikki Mann, Rebecca Fogerty, Melanie Purcell, Jacey Roche, Mike Vincent and Sarah Vincent. Approximately 74 days were spent surveying for landbird species. Transects were not conducted in high winds, rain, or snow. Surveys were started at first light to ensure that the final point count would be completed before avian activity decreased due to heat. Each transect was surveyed once and consisted of 15, five-minute point counts, each at 250 meter intervals along a pre-selected bearing. From the original access point, the one observer and one recorder walked 250m along the bearing to establish the first point.

Throughout the duration of the five-minute point count, birds were recorded at 1 minute intervals. All bird species were counted at each point, radial distance was determined using a Nikon ProStaff Laser 440 rangefinder, and bearing from the observer to the bird was recorded with a compass. Birds were recorded using four letter bird codes (Leukering *et al.* 1988) as shown on page 79 of this document and detected according to the following categories: visual, calling, singing, flyover, and other. Sex was recorded as male if the bird was singing emphatically, while any other vocalization was not sufficient to determine sex. Target species in our study area were sexually monomorphic, so birds detected visually were always recorded as unknown sex. Clusters of birds were recorded if the detection of one bird was not independent from another. Target species were recorded at interpoints if they were not seen during the previous point count and subsequently recorded on the data sheet as point 99. This ensured that birds considered as SGCN were not missed while walking to the next point. If birds were flushed from the nest during point counts, efforts were made to locate the nest without straying too far from the original bearing. When nests were found the location was recorded.

Due to the amount of activity on the JIDPA and the buffer area, bird detection was often compromised due to excessive noise from traffic, drilling, and venting tanks. If noise was excessive at a transect, then it was noted on the data sheet. This was more common for the 15 transects within the JIDPA than the 15 transects within the 3 mile buffer.

6.2 Landbird Results

Twenty-four different species of birds were recorded during the point transect surveys. The 4 bird species most often recorded included; Horned lark, Brewer's sparrow, Sage sparrow, and Sage thrasher (Figure 5). More birds were detected in the 3-mile buffer (1,916) than were recorded within the JIDPA (1,683). Table 9 compares the abundance of the species documented within the JIDPA versus those documented within the 3-mile buffer. There were also differences detected in the types of bird species recorded. For example, Sage sparrows constituted only 280 of the birds within the JIDPA, and 486 of the birds found within the 3-mile buffer. See Table 10 for details. For species distribution by each of the 30 transects, please refer to Appendix D.

Picture of a Brewer's sparrow observed during songbird transect point counts.

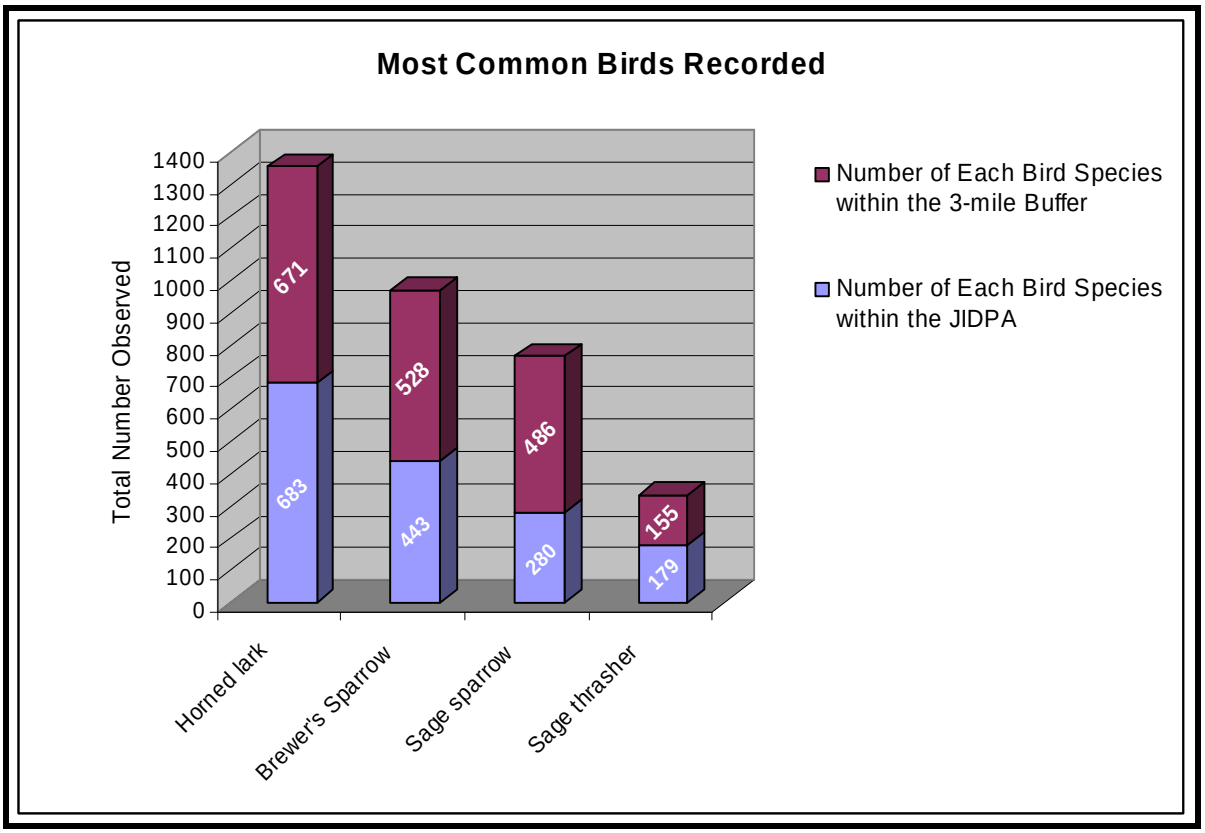

Figure 5. Target species and Horned larks recorded and separated by survey efforts between the JIDPA and the 3-mile buffer.

Table 9. Total number of birds sorted by species recorded during point count transects.

Bird Species	Total Number
Horned Lark	1354
Brewer's Sparrow	971
Sage Sparrow	766
Sage Thrasher	334
Common Raven	109
Greater Sage-grouse	17
Rock Wren	11
Golden Eagle	4
Ring Billed Gull	4
Western Burrowing Owl	3
Common Nighthawk	3
Loggerhead Shrike	3
Northern Harrier	3
Ferruginous Hawk	2
Great Blue Heron	2
Killdeer	2
Mourning Dove	2
Mountain Plover	2
Unknown Sparrow	2
American Avocet	1
American Kestrel	1
Prairie Falcon	1
Unknown Bird	1
Vesper Sparrow	1

Table 10. Total number of birds separated by transects falling within the JIDPA and transects falling within the 3-mile buffer. *Horned larks and Common ravens were only counted at transect points, and these birds seen at interpoints were disregarded.

Species	Total Number Within the JIDPA
*Horned Lark	683
Brewer's Sparrow	443
Sage Sparrow	280
Sage Thrasher	179
*Common Raven	67
Greater Sage-grouse	8
Ring-billed Gull	4
Loggerhead Shrike	3
Western Burrowing Owl	3
Rock Wren	2
Mourning Dove	2
Northern Harrier	2
Killdeer	1
Ferruginous Hawk	2
Unknown Bird	1
Unknown Sparrow	1
Vesper Sparrow	1
American Kestrel	1
Total Number of Birds	**1683**

Species	Total Number Within the 3-mile Buffer
*Horned Lark	671
Brewer's Sparrow	528
Sage Sparrow	486
Sage Thrasher	155
*Common Raven	42
Greater Sage-grouse	9
Rock Wren	9
Golden Eagle	4
Common Nighthawk	3
Great Blue Heron	2
Mountain Plover	2
Northern Harrier	1
Killdeer	1
Prairie Falcon	1
Unknown Sparrow	1
American Avocet	1
Total Number of Birds	**1916**

6.3 Landbird Monitoring and Protection Measures

Although there are no stipulations for the target species of landbirds in this area, some recommendations are made in the 2007 Final EIS for the Jonah Field. Since these species have the potential to be adversely affected by disturbance activities due to habitat loss, it is recommended that protection measures be included so that road construction and other developments avoid reducing sagebrush habitat patch size to less than 50 acres. Furthermore, loss of sagebrush, shrublands, and woodlands should be minimized for the Loggerhead shrike (BLM 2007).

Aster Canyon's observations illustrate that disturbance activities may be resulting in reduced numbers of sagebrush obligate species while increasing populations of Horned larks and Common ravens. While it is possible that increased noise within the JIDPA caused some birds to be missed, the difference in number of birds is more likely explained by the fact that there was less suitable habitat within the JIDPA. Transect points within the JIDPA more often fell on roads and wellpads. Species such as the Horned lark, respond positively to this type of disturbance while others are negatively affected. Horned larks were the most recorded species and numbers are likely underestimated since they were not recorded at interpoints as species of concern were.

Compensatory mitigation activities suggested thus far are:

- "Purchase a conservation easement on an irrigated hay meadow adjacent to existing greater sage-grouse habitat that is as close to the JIDPA as possible, that is not encumbered by fluid mineral leases, and restore that meadow to sagebrush vegetation similar to the adjacent sagebrush community" to benefit soil, vegetation, Greater sage-grouse and other sagebrush obligates (BLM 2007)
- "Purchase a large block of sagebrush ecosystem land as close as possible to the JIDPA, that is unencumbered by fluid mineral leases and is adjacent to existing greater sage-grouse habitat, and enhance sagebrush habitat function on that land for the LOP at a ratio of 3:1, or three acres enhanced for every acre impacted in the JIDPA" to benefit soils, vegetation, and TEPC, WSS, and SGCN species (BLM 2007).

Although the 2007 efforts will provide a valuable baseline inventory of avian population parameters, future research is required to accurately understand population trends and suggest further monitoring, mitigation, and protection measures to ensure the success of avian sagebrush obligates. Including a vegetation and micro-habitat aspect to the study would be beneficial to assist in understanding and defining specific habitat requirements of target species. Transects could be established in habitats containing niche areas. For example, drainages, playa wetlands, and grasslands could be surveyed to determine if particular habitats are being used more by certain species. Another interesting aspect of research would be to compare nesting success of target species between developed and non-developed areas. PRBO nesting data from previous years would be valuable information to compare in attempting such research.

7.0 GREATER SAGE-GROUSE

Greater sage-grouse are sagebrush obligate species that require a variety of vegetation structure and sagebrush age classes during different parts of their life cycle, making this species especially important to manage and monitor. The main objective of these efforts was to establish presence or absence of Greater sage-grouse within the JIDPA and surrounding 3-mile buffer area and inventory sage-grouse seasonal habitats (JIO 2007). Since more information was desired on breeding activities of Greater sage-grouse in the JIDPA, our efforts were aimed at locating sage-grouse hens and their nests or young chicks (early broods) and locating sage-grouse sign from all seasons of use. Wyoming provides one of the largest sagebrush-steppe environments still available and suitable to Greater sage-grouse, causing inventories for this species to be crucial.

7.1 Greater Sage-Grouse Methods

The BLM requested sage-grouse nest searches and early brood counts be conducted near active leks within the JIDPA and the buffer area. Lek locations were provided through shapefiles from the 2005 inventory report (TRC 2005). If new leks were discovered in 2006 Aster Canyon was not notified and therefore only surveyed the reported active leks from 2005. Surveys were conducted from May 2 through July 12, 2007 by Sarah Malick, Dani Geer, Jamie Coble, Lindsey Wilsey, Sarah Vincent, Mike Vincent, Melanie Purcell, Molly Tranel, and Renan Yanish of Aster Canyon. A total of 122 days were spent surveying for this species. In 2007, monitoring of Greater sage-grouse leks was conducted by the BLM and WGFD and was not requested in the WMPP.

Several methods have been used over the years to monitor the presence and absence of sage-grouse and their nests. The method employed in this inventory was a ground search survey utilizing the keen olfactory capabilities of trained pointing dogs (Aster Canyon 2007). This technique was discussed and accepted by the BLM and JIO in planning meetings conducted in April, 2007. Dogs can be used to locate incubating sage-grouse and is a preferred technique in locating birds such as king and yellow rails and woodcocks. This technique has also been implemented in locating sage-grouse chicks for mark and recapture studies in southeastern Idaho as stated in the Connelly management guidelines (Connelly *et al.* 2000).

Survey Techniques

The Greater sage-grouse inventory was conducted from approximately 4:00 am to 11:00 am, during the cool morning hours of the day. At this time conditions are optimal for the pointing dogs, which have an easier time picking up potential bird scent when the humidity is higher. Since weather conditions can hinder the dogs' effectiveness (Robert and Laporte 1997), temperature, humidity, and wind speed were recorded using a Kestrel 3000 at the start and end of each survey. If temperatures exceeded 70° F the survey was not continued. Additionally, surveys were not implemented during adverse weather conditions such as rain, extremely high winds, or abnormally cold temperatures. All Public Land Survey System sections within two miles of each active lek (as per Lisa Solberg, BLM Pinedale Field Office) within the study area were intensively surveyed for sage-grouse and their sign according to the following protocol:

Picture of English Pointer "Joe" at point during a sage-grouse survey in the study area.

- A circular pattern was walked by one biologist and one dog at 0.20 miles and one biologist and one dog at 0.40 miles from the center point of each section. Dogs covered the area between the two biologists while the humans systematically looked for any sign of sage-grouse.
- Sign was recorded using alpha numeric codes according to the sage-grouse code list developed by Aster Canyon such as: foraging pellets, roost pellets, "clockers", cecal casts, and nests (Appendix E). Season and year was determined according to the color, sun bleaching, and content (i.e. sage, insects, forbs) of the droppings.
- When the dog pointed a sage-grouse, the biologist approached the dog, and the dog stayed at point while the biologist searched the area for the birds to determine the status and/or flush the bird.
- Once sign or a bird was located (by pointing dog or by visual from the biologist), a GPS waypoint was taken and appropriate field notation was recorded.
- Data collected in the field was post-processed in the office. An example data form is included in this document in Appendix E.

7.2 Greater Sage-grouse Results

Survey crews recorded a total of 296 sage-grouse throughout the 2007 nesting and early brood season including: 116 females; 129 males; 19 unknown adults; and 32 chicks (Table 11). Biologists observed sign of nesting history from 2005-2007 (Table 12). The number of sage-grouse nests recorded were: 2 from the 2007 season; 11 from the 2006 season; and 6 from the 2005 season; while the number of clockers recorded were: 6 from the 2007 season; 34 from the 2006 season; and 10 from the 2005 season. Table 13 displays the Greater sage-grouse and nests discovered within the 2-mile buffers of each of each of the 12 leks within the study area in 2007. The Clay Hill Lek and Yellow Point Ridge were not considered active leks and were not surveyed for sage-grouse. Figure 6 identifies birds found within buffers of individual leks, and Figure 7 shows the map Greater sage-grouse locations.

Table 11. Number of sage-grouse observed by age and sex within the 2007 study area.

Age/Sex	Number of sage-grouse
Male	129
Female	116
Chick	32
Unknown	19
Total	**296**

Table 12. Number of sage-grouse nesting evidence and appropriate age by year recorded in the 2007 study area.

	Approximate Age		
	2005	**2006**	**2007**
Nest(s)	6	11	2
Clocker(s)	10	34	9

Picture displaying Greater sage-grouse cecal cast (dark brown mass) surrounded by pellets.

Table 13. Number of sage-grouse by age and sex, as well as nests discovered within the 2-mile buffers of each active lek within the study area in 2007. Overlapping of lek buffers may have led to double counting.

Lek Name	♂ GRSG	♀ GRSG	Chicks	Unknown Sex/Age	2005 nest	2006 nest	2007 nest
Alkali Draw	70	68	3	0	0	3	1
Alkali Draw 2	65	55	0	0	0	3	0
Antelope State	6	12	0	0	0	1	0
Blue Alkali	76	56	0	0	0	3	0
Blue Rim	63	39	0	0	0	4	0
Buckhorn Well	16	2	3	0	0	3	1
Prairie Dog	4	9	0	0	0	2	0
Sand Draw	6	7	0	19	0	4	0
Sand Draw Reservoir	27	23	0	19	4	3	1
Shelter Cabin	17	1	0	0	0	1	0
Stud Horse Butte	2	7	0	0	0	4	1
The Rocks	21	6	3	0	2	4	1

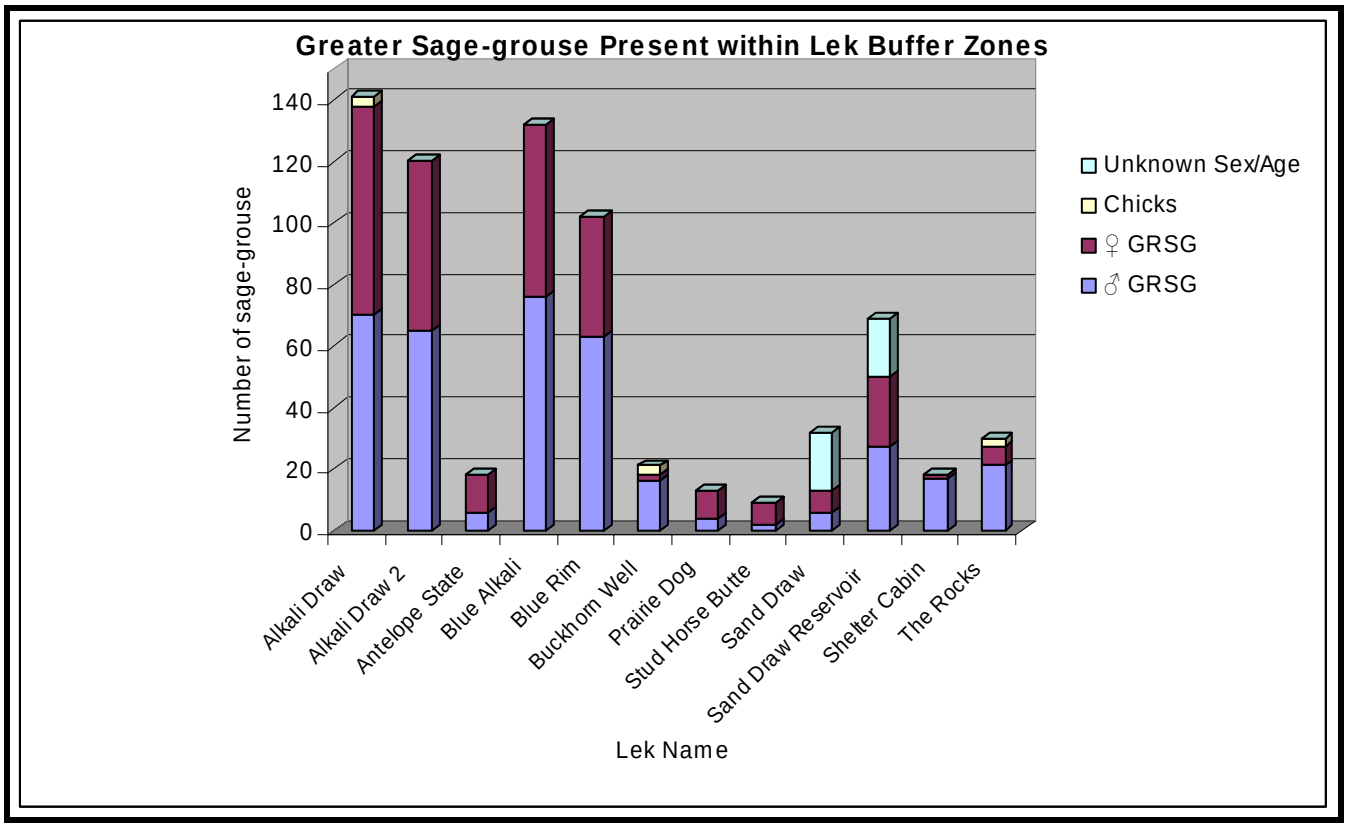

Figure 6. Illustrated above are Greater sage-grouse discovered within the buffer zones of each lek contained within the JIDPA and 3-mile buffer. Overlapping of lek buffers led to double counting of some birds.

7.3 Greater Sage-grouse Monitoring and Protection Measures

Primary protection measures employed for Greater sage-grouse as outlined in the ROD (BLM 2006) include: disturbance avoidance of leks during the breeding season; avoidance of nesting habitat within a 2-mile lek buffer; and as deemed appropriate, habitat disturbance outside the lek buffers is prohibited during March 15 - July 15. Surface disturbance activities are prohibited within 0.25 miles of the perimeter of leks, and human activity in these areas is to be avoided between 8:00 pm and 8:00 am from March 1 to May 15. Compressor stations are to be placed at least 2.0 miles away from lekking areas. Nest surveys are required prior to construction activities within identified nesting habitat. Optimal sage-grouse nesting habitat is to be avoided, which is identified by the BLM as consisting of: sagebrush heights = 20-31 inches; cover = 15-25%; and an understory cover of > 15% (BLM 2006). During the sage-grouse strutting period (March 1-May 15), Jonah Field Operators agree to avoid all drilling and construction activities. Directional drilling practices are to be implemented to access resources beneath the 0.25 mile active sage-grouse lek buffer and beneath a 600 ft buffer of Sand Draw (BLM 2006). Finally, Operator cooperation with ongoing sage-grouse studies and WGFD improvements to Upland Game Bird Management Area 7 are presented. Operators will maintain a 0.5 mile facility-free buffer on the Yellow Point Ridge South lek south of the JIDPA, and no features requiring repeated human presence would be built within this area (BLM 2006). All protection measures outlined here will be adhered to unless specific clearance is granted by the BLM.

Aster Canyon conducted nest searches in the 2007 nesting and early brood rearing season and recorded type (i.e. roost, forage) and ages (i.e. 2006, 2007) of sign in order to identify habitat use and trends. This is the first year of the field wide surveys therefore it is too early to identify trends. The corresponding results and shapefiles from these surveys are provided in Appendix E and the current sage-grouse habitat models being developed could incorporate this data. BP America Production Company (BP) has retained The Nature Conservancy (TNC) to model sage-grouse habitats using the canopy cover and average heights of sagebrush outlined in the WMPP. Additionally, EnCana has employed Enercrest/KC Harvey to model sage-grouse habitats using the same requirements outlined in the WMPP.

The JIO has numerous off-site mitigation projects underway to protect sage-grouse habitat in the Upper Green River Valley, as shown in Table 4. Other mitigation efforts currently underway include sage-grouse study evaluating raven predation on sage-grouse nests, and sage-grouse use of the Pinedale Anticline.

8.0 PYGMY RABBITS

In 2007, Aster Canyon's objective for pygmy rabbits was to inventory suitable habitat within the JIDPA and identify the specific locations occupied for future planning and mitigation. The pygmy rabbit is considered a BLM Sensitive Species, a WGFD Species of Special Concern, and a USFWS Species At Risk. The pygmy rabbit relies on sagebrush for food and cover, and monitoring is important since many sagebrush lands are continually being converted for other land use purposes. There is little known about their population status in Wyoming and they could potentially be an indicator of ecosystem health in sagebrush ecosystems (Purcell 2006).

8.1 Pygmy Rabbit Methods

Picture depicting typical sagebrush habitat inhabited by pygmy rabbits (this is a portion of Sand Draw in Sec. 2).

As identified during planning meetings with the BLM, JIO and Jonah Field Operators, a pygmy rabbit habitat model with the specific habitat to be inventoried in 2007 was presented and accepted. At this time of reporting, all suitable habitat has been surveyed in the JIDPA. Results are provided in section 3.2.5.

According to TRC, pygmy rabbits in the 2005 report was identified by documenting sign while performing general surveys for sensitive species. In the winter of 2006-2007, Wyoming Wildlife Consultants, LLC (WWC) surveyed sections as per EnCana Oil & Gas (USA), Inc.'s drilling schedule. Information in this report encompasses TRC's data, as well as most of WWC's data. If UTM locations were not made available, locations were screen digitized from hard copy reports written by WWC.

Pygmy rabbit behavior is elusive, thus it is essential to be familiar with their habitat and sign to locate populations. The two main features of habitat to consider are relatively taller, denser big sagebrush (*Artemisia tridentata*) and deep, friable soils. Burrows tend to be found in the more dense big sagebrush, but height can vary widely from about 1.5 to 7 ft. as well as density (usually > 30% cover). The drainage

areas within the JIDPA were the habitats considered most suitable to support the species and therefore were specifically searched.

The pygmy rabbit surveys were conducted by Aster Canyon biologists Melanie Purcell, Molly Tranel, Sarah Malick, Nikki Mann, Sarah Vincent, Mike Vincent, Jacey Roche, Renan Yanish, Curt Yanish, Dani Geer, and Lindsay Wilsey. A total of 45 field days was logged for this species.

Survey Techniques

The basic survey techniques as described by Ulmschneider (2004) and Oles (2005) are to start the search for pygmy rabbits by identifying the relatively taller, denser big sagebrush and areas where the structure of the sagebrush stand is uneven in both height and density. When visually scanning across a valley, these sagebrush clumps stand out as taller or as having a different color. Biologists found these taller areas to be the most successful place to start a survey. Pygmy rabbits are very small and are the only rabbits in North America known to dig their own burrows. Identifying presence of pygmy rabbits is a combination of locating burrow entrances and fresh pygmy rabbit pellets. It is common to find old burrows with no fresh pellets, and rabbits may seasonally use different burrow complexes or habitat areas. Measures used to identify sign are:

- Burrow entrances range from 4-10 inches and are fairly round but often slightly wider than tall. Burrows become enlarged with age due to digging activities of the rabbits themselves and possibly potential predators.
- The majority of burrows are placed at the base of sagebrush, or occasionally another shrub species.
- Burrows are found at the base of rock outcrops surrounded by sagebrush.
- The opening of the burrow may flare out and have a large pile of dirt outside the entrance, 1-3 ft in diameter.
- Burrow systems often have anywhere from 1-12 entrances, with 2-4 being the most common.
- The burrow can slope down steeply or moderately and often narrows down from the flared entrance to about 4-5 inches in diameter.
- Burrow systems are rarely isolated, so there are often a number of them in the habitat area. Isolated burrows without pellets are difficult to identify with certainty.

- Pygmy rabbit burrow systems show evidence of having been built up over many years because they tend to remodel the same spot year after year, whereas ground squirrel or badger diggings tend to be a one-time occurrence.

Data was recorded on the corresponding data sheets (Appendix F). Pygmy rabbit burrow system classifications are those described by Ulmschneider (2004) however, Aster Canyon only recorded burrow systems that are considered active (i.e. burrow and fresh pellets present). Therefore, other classifications have been omitted. Other recordings were made only if necessary and in most cases to record a location that should be searched again at a later time. Basic procedures utilized by Aster Canyon in conducting pygmy rabbit surveys in the JIDPA include:

- Biologists surveyed the area by walking in loose, meandering transects, targeting specific pygmy rabbit habitat described earlier in this document.
- Initial surveys were conducted with biologists walking each side of the drainages containing good habitat. While walking back, biologists meandered within 600 ft of the drainage, targeting habitat patches.
- All sections were driven by truck to determine if other habitat areas needed to be surveyed for pygmy rabbits.

Picture of pygmy rabbit burrow with fresh pellets underneath rock outcrop.

- Unsuitable habitat, such as grassland or barren habitat was surveyed rather quickly if the area was relatively small. If the “low quality” area became quite prevalent, the area was not surveyed.
- It was assumed that all habitats were sampled equally.
- The combination of burrows and fresh pellets was considered sufficient for “presence” of pygmy rabbits.
- All burrows in a location were counted as one burrow system.

- An additional 300 ft were walked before recording the next burrow as a separate burrow system, unless the burrow appeared in a different kind of habitat.
- Locations were marked with a GPS unit and documented using GIS software.
- A camera was used to make visual documentation of burrows and pellets, as well as the surrounding area.
- Areas that were dangerous or unrealistic to traverse, such as a rocky cliff or a salt flat were not surveyed.

8.2 Pygmy Rabbits Results

Aster Canyon located a total of 226 pygmy rabbit burrow complexes and 40 pygmy rabbit sightings. Many pygmy rabbits were found in the areas identified by the approved model. Additional areas were spot checked outside the modeled habitat where sagebrush appeared sufficient to support the species. Figure 8 illustrates all locations where pygmy rabbits have been documented in the area. Some of the data provided were from surveys and reports written by WWC in the winter of 2006/2007. Information from these reports were implemented into the map either by scanned documents or screen digitized events done post-survey. Scanned events are those in which the data was scanned into the computer and a table was subsequently made from the provided data and projected as a GIS layer. Digitized events are located on the new map from original maps rather than a data table. All sections within the JIDPA were surveyed and are listed below in Table 14. This Table indicates areas where pygmy rabbits were found by section and drainage.

Picture of a pygmy rabbit huddled at its burrow underneath a sagebrush during the winter.

8.3 Pygmy Rabbits Monitoring and Protection Measures

Pygmy rabbit protection measures are identified through on-site visits for APD, ROW, and Sundry Notices to determine the presence of potential habitat, and surveys are usually required for further investigation. In 2006 and 2007, suitable pygmy rabbit habitat was identified and surveyed for the entire JIDPA boundary. Areas that pygmy rabbits currently inhabit should be avoided to protect them. Riparian areas like Sand Draw have a no surface occupancy year-round restriction within 500 ft. Therefore, this protection measure encompasses pygmy rabbit habitat (BLM 2007). If avoidance of pygmy rabbit habitat is not possible, then the project should aim to be located in the least sensitive habitat as possible.

In addition, contamination of soil (such as sodium contamination) should be monitored since it has the ability to alter soil characteristics, possibly impacting pygmy rabbit habitat. Sodium contamination has the ability to harden the soils and inhibit the digging activities of this species (Purcell 2006). Soils are also affected differently during wet and dry seasons, suggesting that pygmy rabbits use different habitats on a seasonal basis. It should be further noted that pygmy rabbit locations are harder to detect after heavy rains. The pellets of all the species inhabiting the area are washed into various sized debris clumps and burrows are typically collapsed.

Recommended mitigation for the species consists of surveys performed every 3 years to document changes in distribution and habitat use. Additionally, pygmy rabbit pellet collection and genetic analysis would provide needed information in regards to Wyoming populations and genetic connectivity to other populations in the West.

9.0 WHITE-TAILED PRARIE DOG AND BLACK-FOOTED FERRET

The purpose of the inventory for white-tailed prairie dogs is to determine the potential for black-footed ferret habitat. White-tailed prairie dog towns are also important areas that provide habitat and forage for a variety of other wildlife species. They often provide Mountain plover habitat, nesting and foraging sites for the Western burrowing owl, prey base areas for Ferruginous hawks and other raptor species, as well as the badger, coyote, and bobcat (TRC 2005). Inventories for this species encompassed re-mapping of old towns and mapping of new towns located during reconnaissance of the Jonah field and buffer area. Data collection for black-footed ferrets was not required for the 2007 inventory because the area has been block cleared.

9.1 White-tailed Prairie Dog and Black-footed Ferret Methods

The mapping of white-tailed prairie dog colonies was conducted in 1997-2005 by TRC to determine if they met the black-footed ferret habitat density requirement criteria for re-introduction (i.e. $\geq$ 0.8 burrows per acre) established by the USFWS (1989). In 2007, Aster Canyon's purpose was to identify the previously mapped prairie dog towns and remap them to determine how the towns are shifting over time, as well as to determine burrow densities (Biggins 1993). However, this is only pertinent for black-footed ferret re-introduction. This protocol was amended during planning meetings with the BLM because the prairie dog towns in the area are not considered large enough for re-introduction of the species. Therefore, the main objective was to determine how the prairie dog towns have increased or decreased in response to the disturbance of the area since 2005. Prairie dog town perimeters were mapped either by foot or on ATV by biologists Mike Vincent, Molly Tranel, Jacey Roche, Jamie Coble, Dani Geer, Sarah Vincent, Sarah Malick, and Jennel King. A total of 37 field days was logged for this species.

9.2 White-tailed Prairie Dog and Black-footed Ferret Results

There is a lot of overlap between past and current mapping efforts and white-tailed prairie dog towns do not appear to have shifted significantly over this time allotment. Refer to the map in Figure 9 to compare the shift in prairie dog towns between 1997-2005 mapping conducted by TRC and 2007 mapping conducted by Aster Canyon. The three towns labeled with stars were not mapped during the 2007 inventory and thus were not labeled with corresponding town numbers. TRC labeled the prairie dog towns, however, information regarding how they were labeled is unknown. Aster Canyon found 13 new towns and labeled them as PDT (prairie dog town) numbers 3C, 26B, and 34-44. Some of the town numbers do not show up

on the map because of map scale. The towns indicated by 0 acres in 2007, no longer exist. All other towns show acreage calculated from TRC's data (except new towns discovered by Aster Canyon) and acreage calculated from 2007 (Table 15). Appendix G contains protocol amendment and shapefiles for the prairie dog towns.

Table 15. Description of white-tailed prairie dog towns by town number, corresponding UTM locations for centers of the towns, and size in acres between years 1997-2005 and 2007. * denotes new towns discovered by Aster Canyon in 2007, thus having no previous associated data.

Prairie Dog Town	Prairie Dog Town from years 1997-2005			2007 Data		
	Easting	Northing	Acres	Easting	Northing	Acres
PDT 1	[redacted]	[redacted]	347.033	[redacted]	[redacted]	265.940
PDT 2A	[redacted]	[redacted]	156.481	[redacted]	[redacted]	234.313
PDT 2B	[redacted]	[redacted]	65.215	[redacted]	[redacted]	34.875
PDT 2C	[redacted]	[redacted]	4.422	[redacted]	[redacted]	1.936
PDT 3A	[redacted]	[redacted]	1.809	[redacted]	[redacted]	**0.000**
PDT 3B	[redacted]	[redacted]	25.829	[redacted]	[redacted]	**0.000**
*PDT 3C	X	X	X	[redacted]	[redacted]	5.137
PDT 4	[redacted]	[redacted]	114.268	[redacted]	[redacted]	60.271
PDT 5	[redacted]	[redacted]	102.662	[redacted]	[redacted]	188.782
PDT 6A	[redacted]	[redacted]	637.073	[redacted]	[redacted]	1040.830
PDT 6B	[redacted]	[redacted]	3.704	[redacted]	[redacted]	**0.000**
PDT 9A	[redacted]	[redacted]	111.912	[redacted]	[redacted]	72.541
PDT 9B	[redacted]	[redacted]	165.994	[redacted]	[redacted]	156.232
PDT 11	[redacted]	[redacted]	89.841	[redacted]	[redacted]	50.294
PDT 25A	[redacted]	[redacted]	32.625	[redacted]	[redacted]	43.095
PDT 25B	[redacted]	[redacted]	2.136	[redacted]	[redacted]	0.276
PDT 25C	[redacted]	[redacted]	0.352	[redacted]	[redacted]	**0.000**
PDT 25D	[redacted]	[redacted]	0.893	[redacted]	[redacted]	0.509
PDT 25E	[redacted]	[redacted]	0.367	[redacted]	[redacted]	**0.000**
PDT 26	[redacted]	[redacted]	37.492	[redacted]	[redacted]	0.155
*PDT 26B	X	X	X	[redacted]	[redacted]	0.095
PDT 27	[redacted]	[redacted]	14.668	[redacted]	[redacted]	93.652
PDT 29	[redacted]	[redacted]	6.805	[redacted]	[redacted]	**0.000**
PDT 30	[redacted]	[redacted]	11.906	[redacted]	[redacted]	6.792
PDT 31	[redacted]	[redacted]	7.810	[redacted]	[redacted]	**0.000**
PDT 32	[redacted]	[redacted]	46.485	[redacted]	[redacted]	11.722
PDT 33	[redacted]	[redacted]	5.794	[redacted]	[redacted]	**0.000**
*PDT 34	X	X	X	[redacted]	[redacted]	5.749
*PDT 35	X	X	X	[redacted]	[redacted]	173.036
*PDT 36	X	X	X	[redacted]	[redacted]	1.384
*PDT 37	X	X	X	[redacted]	[redacted]	0.185
*PDT 38	X	X	X	[redacted]	[redacted]	0.137
*PDT 39	X	X	X	[redacted]	[redacted]	0.379
*PDT 40	X	X	X	[redacted]	[redacted]	0.251
*PDT 41	X	X	X	[redacted]	[redacted]	2.442
*PDT 42	X	X	X	[redacted]	[redacted]	6.487
*PDT 43	X	X	X	[redacted]	[redacted]	629.025
*PDT 44	X	X	X	[redacted]	[redacted]	114.646

9.3 White-tailed Prairie Dog and Black-footed Ferret Monitoring and Protection Measures

Since white-tailed prairie dogs provide forage and habitat for a variety of wildlife, it is important to identify the shift in their towns over time and implement monitoring and protection measures. Accordingly, protection of this keystone species provides additional protection for those sensitive species which depend on them. The WMPP requires re-mapping of prairie dog towns every 3 years, which is necessary in order to monitor plague events and other species of concern that rely on these habitats. Development activities in white-tailed prairie dog towns greater than 200 acres will be avoided when possible (BLM 2007). At this current time, prairie dog towns in the area do not meet the requirement for support of black-footed ferret reintroduction. If mapped towns do meet sufficient habitat requirements in the future, black-footed ferret surveys will be required (USFWS 1989). After well abandonment, if re-introduction efforts of the black-footed ferret become a future priority, then objectives could change to include burrow density estimates and population status of these towns.

Picture of prairie collecting vegetation for nesting material

10.0 BIG GAME

Big game in the JIDPA consisted solely of pronghorn antelope during the 2007 summer survey season. No other big game was observed. Disturbance activities are expected to have an effect on local populations of pronghorn but not an overall population effect. Pronghorn antelope populations are considered to be stable in Wyoming, but additional data is needed to aide land managers in making management decisions on the JIDPA.

10.1 Big Game Methods

Pronghorn counts were conducted to observe the change in numbers occurring within the study area over the year. Surveys were started in April and have been performed once per month, each time using the technique requested by the WMPP. These surveys will continue once per month throughout the rest of the year. Figure 10 shows routes of transects while surveying pronghorn. An alternate route was taken during the second two surveys and thus is depicted on the map. Discussions between BLM, JIO, and Aster Canyon resulted in the following Pronghorn antelope survey techniques:

- Pronghorn were surveyed almost entirely within the JIDPA using the four primary roads: Luman, Burma, Windmill and Jonah North.
- Surveys were conducted by vehicle using binoculars.
- Animal locations were marked from the road. Efforts were made to get as close as possible to animals by marking location with the GPS from wellpads off of main roads.
- Biologists approximated the perpendicular distance from the UTM point on the road to the actual pronghorn location using a ProStaff Laser 440 rangefinder or estimates were made when the distance was greater than the rangefinder could read (~ 1311 feet).
- Sex, age (adult or juvenile), activity, habitat type, and comments on weather conditions were recorded on the Pronghorn Count Observation Sheet (Appendix H).
- Surveys were conducted earlier in the morning as the survey season progressed in an attempt to adjust for increasing temperatures.
- Biologists were careful not to double-count Pronghorn when backtracking a small section of Luman Road to rejoin Burma Road.

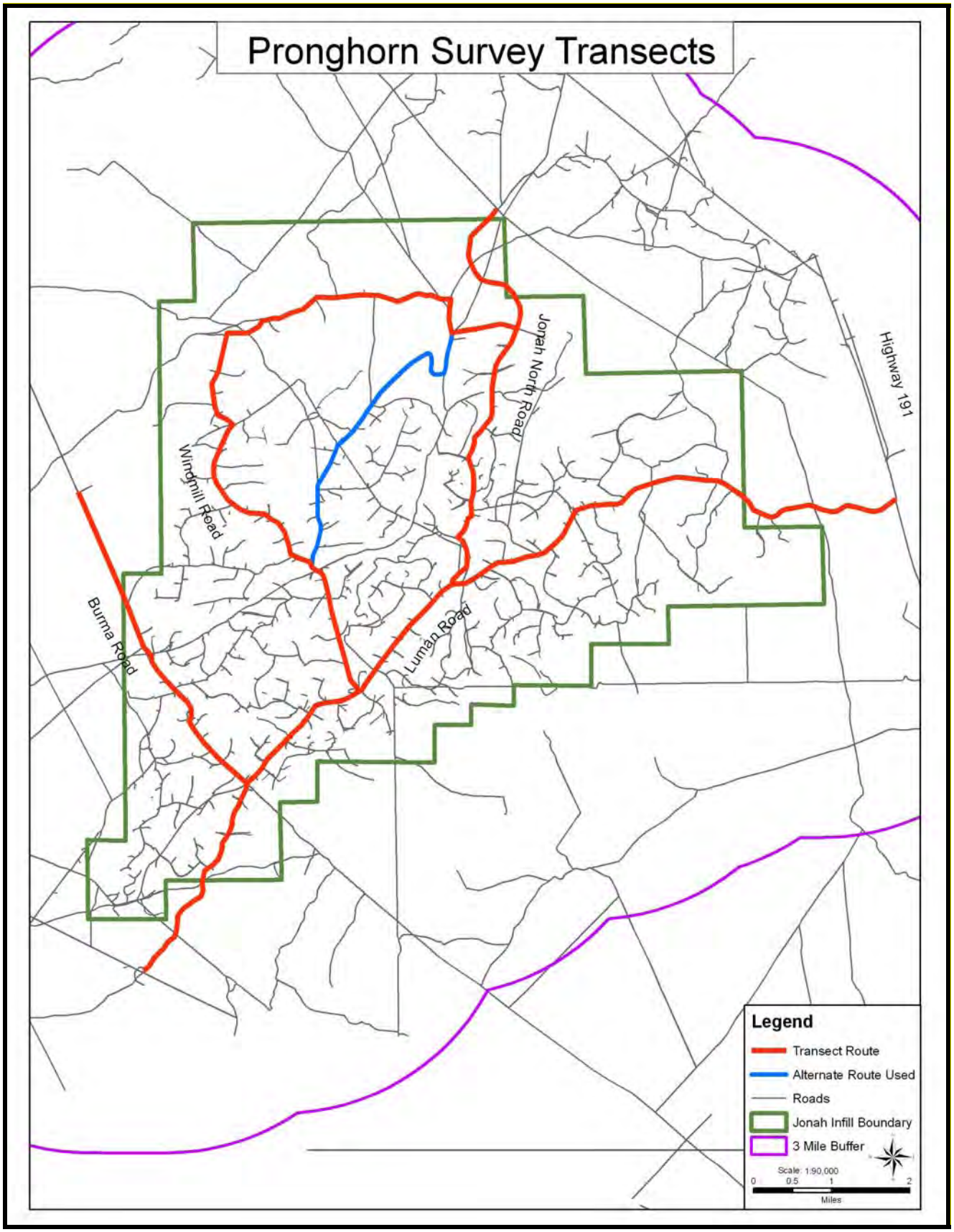

Figure10. Pronghorn antelope survey routes.

10.2 Big Game Results

Pronghorn antelope were the only big game species recorded in the study area. A total of 472 pronghorn were sighted (Table 16). However, this number indicates a total from all surveys, thus, some animals were likely observed on more than one occasion and this number does not depict population size. The April survey recorded the largest number of pronghorn with 208 animals seen. The number of pronghorn recorded decreased throughout the summer with the May survey recording 110 animals, June finding 100, and July recording only 54 animals. More females were counted (243) than males (162), and 48 animals were of unknown sex. Nineteen juveniles of unknown sex were recorded as well. The April and July surveys documented more females than males. However, the May and June surveys portrayed a larger number of males than females. This time of year constitutes the birthing periods for female pronghorn suggesting that females were more dispersed and therefore not seen.

Picture with pronghorn antelope congregated at waterhole during the dry summer months.

Locations of where the pronghorn were recorded are mapped for each of the four surveys (Figures 11-14). The last survey conducted in July was very hot and dry, and small numbers of pronghorn were spotted. It was decided to check the waterholes in the area to see if they had moved closer to water. Two waterholes were searched and > 20 pronghorn were found congregated at each of the waterholes. These numbers were not counted as part of the actual survey because the waterholes were not on the original survey route.

Table 16. Pronghorn survey totals separated by age and sex for summer 2007 survey.

	4/20/2007	5/17/2007	6/15/2007	7/18/2007	Totals
Male	52	38	55	17	162
Female	155	29	33	26	243
Juvenile	0	0	8	11	19
Unknown	1	43	4	0	48
Total	**208**	**110**	**100**	**54**	**472**

10.3 Big Game Monitoring and Protection Measures

The Wildlife Conservation Society (WCS) study of pronghorn in the Upper Green River Basin suggested possible avoidance of areas of intense development within the Jonah Field by some pronghorn (Berger *et al.* 2007). The 2007 survey of antelope by Aster Canyon showed that pronghorn are present in the JIDPA. Combined monitoring by WCS and Aster Canyon should provide more information to evaluate long term trends. The number of pronghorn antelope recorded reduced throughout the summer. This trend can probably be explained by the fact that as temperatures increased during the study pronghorn were less active and therefore harder to spot from the road. As water became less available during the dry months, the pronghorn also began to congregate around waterholes. It is recommended that current monitoring of the pronghorn antelope population in the study area be continued for the life of the field. In following years, it would be beneficial to include the major waterholes within the JIDPA on the survey route so that pronghorn can more accurately be counted during droughts and summer months.

Aster Canyon recommends the implementation of off-site mitigation projects to enhance habitat for pronghorn antelope. Although the overall population is not affected by the disturbance, reclamation practices are likely affected by the pronghorn. Therefore, habitat maintenance and water well construction outside the JIDPA would be beneficial for the species and for reclamation.

11.0 GENERAL WILDLIFE

Aster Canyon biologists recorded all observations of rare, unusual, and elusive wildlife seen during monitoring and inventory surveys. The location information provided for wildlife is documented throughout the study area. Common species such as ravens, cottontails, and jackrabbits were not documented (unless under uncommon circumstances) to efficiently utilize inventory efforts. Some species that were thought to be unusual were documented initially and ceased once it became apparent that they were frequently seen in the area. Sensitive species were always recorded. The data in this section includes only incidental observations while conducting other inventory efforts in the study area.

11.1 General Wildlife Methods

Observations were made in accordance with the Wyoming Observation System (WOS) created by the WGFD. Criteria were not provided until late June, at which time data was collected as per the WOS. Species documented during specific surveys were not reported as part of the general wildlife observations. Sign such as nests and scat were also recorded. An example data sheet and the complete general wildlife observations data sheet is provided in Appendix I.

11.2 General Wildlife Results

Picture depicting a Long-eared owl (right) perched near a Loggerhead shrike (left).

Several species were documented during general wildlife observations throughout the study area. Table 17 summarizes the total number each species documented during these efforts. Numerous observations were recorded, including nests and scat of various species, but are not included in the Table or counted in the total numbers. These include observations of 3 Loggerhead shrike nests, 2 Sage thrasher nests, 9 observations related to Greater sage-grouse, 11 pygmy rabbit burrow complex

locations, and 2 white-tailed prairie dog towns. Also, one documented observation is of mountain lion scat. The scat was extremely large with hair and bones and was half buried, which is indicative of feline behavior. Additionally, a Long-eared owl was documented along the southern edge of the buffer area, which appeared to be attempting to predate a Loggerhead shrike nest. Long-eared owls are known to use abandoned stick nests of other bird species and may have been nesting somewhere in the vicinity. There were 6 Rufous hummingbirds seen feeding on Rocky Mountain beeplant at a reclaimed pipeline of the JIDPA. Figure 15 shows locations of all the animals seen during the survey.

Picture illustrating an American badger "posing for the camera" in the study area.

Table 17. General wildlife observations with numbers of each species documented.

Species	Total Number Observed
Birds	
American avocet	12
American green-winged teal	31
American kestrel	1
American wigeon	5
Brewer's sparrow	3
Canada goose	9
†Common raven	100+
Dark-eyed junco	4
Eared grebe	22
Ferruginous hawk	9
Gadwall duck	10
Golden eagle	8
Great blue heron	1
Greater sage-grouse	111
Killdeer	33
Loggerhead Shrike	20
Long Eared Owl	1
Mallard	15
Northern harrier	1
Northern mockingbird	1
Northern pintail	4
Northern shoveler	2
Osprey	2
Prairie falcon	3
Red-tailed hawk	2
Redhead duck	3
Ruddy duck	8
Rufous Hummingbird	6
Sage sparrow	5
Sage thrasher	17
Say's phoebe	2
White-crowned sparrow	1
Willow flycatcher	1
Yellow-headed blackbird	1
Wilson's phalarope	26
Unknown bird	1
Unknown Dowitcher	1
Unknown Duck	10
Unknown Scaup	4

Species	Total Number Observed
Mammals	
Badger	2
Coyote	8
*Mountain lion	0
Pygmy rabbit	16
Thirteen-lined ground squirrel	1
White-tailed prairie dog	22
Wild horses	22
Reptiles	
Greater short-horned Lizard	3

***** denotes scat observed, not animal

† denotes that 1 flock of 100+ were observed

11.3 General Wildlife Monitoring and Protection Measures

General wildlife do not typically have specific protection measures, however, the main protection measures include avoidance of all disturbance activities within crucial habitat for the persistence of all wildlife species in the area. Furthermore, these crucial areas should include water bodies. Because water is a limited source in this area, it is important to protect all bodies of water that occur in the JIDPA and surrounding area. Several species not specifically discussed earlier are addressed in this section below. Although some species, such as the Long-eared myotis, have been documented in the area they do not typically occur in the specific habitat and were not considered target species for the inventory. Accordingly, incidental observations would be the only inventory required for this species.

Birds

Although surprising, several species of shorebirds were found south of the Jonah Field near the edge of the buffer at Mudhole Reservoir. This area is probably important breeding ground for these types of species, especially in this semi-arid environment. There were several Killdeer, Eared grebe, and American avocet nests found in the area as well. Therefore, water bodies should be protected within the area. Bald eagles, which prefer large bodies of water and mature stands of hardwood trees (Buehler 2000), were not present probably due to the lack of trees in the area.

Rufous hummingbirds were located feeding on a reclaimed pipeline on Rocky Mountain beeplant (*Cleome serrulata*). The JIDPA area coincides with the migration route of this species, and this particular plant makes a good stopover point for the high energy bird to re-fuel (Healy and Calder 2006). Therefore, this plant may be beneficial vegetation for animals that feed on nectar.

Picture of a Rufous hummingbird foraging at a Rocky Mountain beeplant within the JIDPA.

A Willow flycatcher and a Long-eared owl were newly documented in the study area in 2007. Both species were detected in tall sage draws within the buffer area. Many avian species in the area will nest or inhabit the drainages where the sagebrush is rather tall. Tall sagebrush mimics the tree in an environment that otherwise lacks trees. This further suggests that avoidance of drainage areas is important during disturbance activities. Additionally, the Redhead duck and Northern Pintail duck were recorded in the water bodies in the survey area these species are considered sensitive in this area.

Mammals

The mountain lion, also known as the cougar or puma, inhabits every major habitat type in North America. They have very large home ranges and likely travel through the drainages that have tall sagebrush and along some of the rims where there is cover to conceal such an elusive species. The scat that was found in the study area was typical of this species. Since Mountain lions inhabit a large variety of habitats, populations are considered stable and there are no additional protection measures recommended.

The thirteen-lined ground squirrel is a common species that prefers grassy areas, thus it may be uncommon to see in sagebrush habitat but does persist in the area. It is fairly adaptable and found along roadsides, in yards, cemeteries, and golf course where grasses are short. As a result, sites where reclamation practices increase grass species may cause this ground squirrel to appear more often in the area (Knopf 1996).

Picture displaying newly hatched Sage thrashers.

Reptiles

Picture illustrating a Greater short-horned lizard.

The Greater short-horned lizard is a common species in sagebrush ecosystems. It is one of only a few reptile species where the eggs develop inside the female and she gives birth to live young. This species is not of significant concern at this time and was not specifically surveyed because it is common in the area. However, this lizard plays an important role in the food web by preying on a wide variety of invertebrates and providing a food source for other predators such as hawks. This species may need to be specifically addressed for protection measures if sagebrush habitats continually decline due to disturbance activities.

Amphibians

No amphibians were recorded in the JIDPA, but surveys for species of concern such as the Northern leopard frog and boreal toad near waterholes such as Mudhole Reservoir would be beneficial in future years. Both species are found in Sublette County, and are experiencing population declines in part due to habitat loss and fragmentation (WGFD 2005).

LIST OF ACRONYMS

Agencies and Companies:

AEC = Anderson Environmental Consulting, Inc.
BLM = Bureau of Land Management
JIO = Jonah Interagency Mitigation and Reclamation Office
NRCS = Natural Resource Conservation Service
PRBO = Point Reyes Bird Observatory
RMBO = Rocky Mountain Bird Observatory
TRC = TRC Mariah Associates Inc.
USFWS = U.S. Fish and Wildlife Service
WGFD = Wyoming Game and Fish Department
WWC = Wyoming Wildlife Consultants, LLC

Other:

ANS = Alternative Nest Structure
APD = Application for Permit to Drill
ATV = All Terrain Vehicles
EIS = Environmental Impact Statement
GIS = Geographic Information System
JIDPA = Jonah Infill Drilling Project Area
JWSA = Jonah Wildlife Study Area
NAD83 = North American Datum 1983
NEPA = National Environmental Policy Act
ORV = Off Road Vehicles
ROD = Record of Decision
ROW = Right of Way
SGCN = Species of Greatest Conservation Need
TEPC = Threatened, Endangered, Proposed, Candidate
TNC = The Nature Conservancy
UTM = Universal Transverse Mercator
WMPP = Wildlife Monitoring Protection Plan
WOS = Wildlife Observation System
WWS = BLM Wyoming Sensitive Species

LIST OF DEFINITIONS

Alternative Nest Structure (ANS) = manmade structures placed in suitable nesting habitat to encourage birds to nest in the area. ANS's for raptors usually consists of a telephone pole with a platform atop it.

Avian sagebrush obligate = A bird species which depends on large patches and expanses of sagebrush steppe for successful breeding.

Buteo = Genus of medium to large soaring hawks characterized by broad, rounded wings, a robust body and a fan shaped tail.

Cecal cast = Large, dark–green brown, liquid-like, tend to be deposited once a day, usually in morning.

Clocker = Larger-than-normal intestinal droppings, 4–8 cm long and 1–3 cm in diameter, females deposit these during incubation when feeding away from nest or near nest at time of hatching.

Elusive = a species that is rare, or secretive and not easily detected.

Fledgling = a young bird that has recently acquired its flight feathers or has just become capable of flying. Fledglings are often still dependent on their parents for a week or more.

Fossorial mammal = a mammal that burrows and has limbs adapted for digging.

Friable soils = Loose, open, un-compacted, and well drained soil that has the crumbly texture ideal for the root growth of plants. Such friable soil is usually a "loam".

Lek = gathering place of male Greater sage-grouse, to attract females for breeding by strutting and displaying. Leks are in or adjacent to sagebrush dominated habitat and typically surrounded by potential nesting habitat.

Midden = Complex nest of twigs, often incorporating cactus for protection from predators. Packrats often build in small caves or rock outcrops and collect in or around their nests a great variety of small objects.

Niche = the mode of existence that a species has within an ecosystem, includes the sum of all activities and relationships a species has while obtaining and using the resources needed to survive and reproduce.

Playa = Round, seasonal depressions in the surface of the ground. Playas fill with rainwater, and the impermeable clay bottoms hold water for long periods through rainless months.

Raptor = a bird of prey.

Sexually monomorphic = Male and female of the species are similar in appearance and size.

Strutting = a behavioral pattern combining wing swishes, with a variety of sounds, and tail rattles by male Greater sage-grouse to attract females during the breeding season.

Whitewash = Bird defecation, white in color, easily visible, often indicate a nest or hunting perch.

SPECIES LIST OF COMMON NAMES, SCIENTIFIC NAMES OF WILDLIFE PRESENTED IN THIS REPORT

Common Names	Codes	Scientific Names
Birds		
American avocet	AMAV	*Recurvirostra americana*
American green-winged teal	AGWT	*Anas carolinensis*
American kestrel	AMKE	*Falco sparverius*
American wigeon	AMWI	*Anas americana*
Bald eagle	BAEA	*Haliaeetus leucocephalus*
Black-billed magpie	BBMA	*Pica hudsonia*
Brewer's sparrow	BRSP	*Spizella breweri*
Canada goose	CAGO	*Branta canadensis*
Common nighthawk	CONI	*Chordeiles minor*
Common raven	CORA	*Corvus corax*
Dark-eyed junco	DEJU	*Junco hyemalis*
Eared grebe	EAGR	*Podiceps nigricollis*
Ferruginous hawk	FEHA	*Buteo regalis*
Gadwall duck	GADW	*Anas strepera*
Golden eagle	GOEA	*Aquila chrysaetos*
Great blue heron	GBHE	*Ardea Herodias*
Green-tailed towhee	GTTO	*Pipilo chlorurus*
Greater sage-grouse	GRSG	*Centrocercus urophasianus*
Horned lark	HOLA	*Eremophila alpestris*
Killdeer	KILL	*Charadrius vociferous*
Loggerhead shrike	LOSH	*Lanius ludovicianus*
Long-eared owl	LEOW	*Asio otus*
Mallard duck	MALL	*Anas platyrhynchos*
Mountain plover	MOUP	*Charadrius montanus*
Mourning dove	MODO	*Zenaida asiatica*
Northern harrier	NOHA	*Circus cyaneus*
Northern mockingbird	NOMO	*Mimus polyglottos*
Northern pintail	NOPI	*Anas acuta*
Northern shoveler	NOSH	*Anas clypeata*
Osprey	OSPR	*Pandion haliaetus*
Prairie falcon	PRFA	*Falco mexicanus*
Redhead duck	REDH	*Aythya Americana*
Red-tailed hawk	RTHA	*Buteo jamaicensis*
Ring-billed gull	RBGU	*Larus delawarensis*
Rock wren	ROWR	*Salpinctes obsoletus*
Ruddy duck	RUDU	*Oxyura jamaicensis*
Sage sparrow	SAGS	*Amphispiza belli*
Sage thrasher	SATH	*Oreoscoptes montanus*
Say's phoebe	SAPH	*Sayornis saya*
Short-eared owl	SEOW	*Asio flammens*
Vesper sparrow	VESP	*Pooecetes gramineus*
Western meadowlark	WEME	*Sturnella neglecta*
White-crowned sparrow	MWCS	*Zonotrichia leucophrys*
Willow flycatcher	WIFL	*Empidonax traillii*
Wilson's phalarope	WIPH	*Phalaropus tricolor*
Yellow-headed blackbird	YHBL	*Xanthocephalus xanthocephalus*

Common Names	Codes	Scientific Names
Mammals		
American badger		*Taxidea taxus*
Coyote		*Canis latrans*
Cottontail rabbit		*Sylvilagus spp.*
White-tailed jackrabbit		*Lepus townsendii*
Mountain lion*		*Puma concolor*
Pronghorn antelope		*Antilocapra Americana*
Pygmy rabbit		*Brachylagus idahoensis*
Thirteen-lined ground squirrel		*Spermophilus tridecemlineatus*
White-tailed prairie dog		*Cynomys leucurus*
Wild horses		*Equus ferus*
Reptiles		
Greater short-horned lizard		*Phrynosoma hernandesi*

* denotes actual animal not seen, but scat observed

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