ASTER CANYON CONSULTING, INC.

2008 JONAH FIELD WILDLIFE INVENTORY AND MONITORING

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Suggested Citation:
Aster Canyon Consulting, Inc. 2008. 2008 Wildlife Monitoring Inventory, Jonah Field Natural Gas Development Project Annual Report. Jonah Field, Sublette County, Wyoming.

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1.0 EXECUTIVE SUMMARY

Aster Canyon Consulting, Inc. (Aster Canyon) has prepared this 2008 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 these inventories are as follows: to present findings which result from the monitoring of wildlife in the Jonah Infill Drilling Project Area (JIDPA) and its 3-mile buffer; to compare trends of observations and data collected over time; to identify existing mitigation and protection measures as described in the BLM Jonah Field Record of Decision (ROD; BLM 2006); and to make recommendations for new measures and monitoring efforts.

Data presented in this report were collected between August 15, 2007, and August 15, 2008. 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 from these listings, which were independently inventoried in 2008, include: raptors and owls, mountain plovers (*Charadrius montanus*), landbirds, greater sage-grouse (*Centrocercus urophasianus*), pygmy rabbits (*Brachylagus idahoensis*), white-tailed prairie dogs (*Cynomys leucurus*) and black-footed ferrets (*Mustela nigripes*), and big game.

Other species not specifically referred to in the WMPP but who are on the TEPC, WSS, or SGCN lists are addressed in this document under general wildlife. This report evaluates trends in wildlife on the JIDPA over the period of time from 1997-2008. This report is presented by species, and provides an introduction, methods, results, and discussion of current and recommended protection measures for each. A summary of inventory results is given below.

RAPTORS AND OWLS

- A total of 153 raptor and owl nests were monitored during the 2008 breeding season. There were 122 nests that were considered inactive, 23 were active, and we were unable to determine the status of 8 nests.

- From the 10 successful western burrowing owl (*Athene cunicularia*) nests, we observed a total of 46 chicks. Two successful ferruginous hawk (*Buteo regalis*) nests fledged a total of 4 chicks. We observed a total of 14 chicks from the 5 successful common raven (*Corvus corax*) nests.
- No bald eagles were seen on the JIDPA in the 2008 season. No golden eagles were found nesting on the JIDPA, but we observed many golden eagles using the JIDPA for hunting and resting.
- Trends in the data indicate the number of nesting western burrowing owls and common ravens has apparently increased on the JIDPA since 2001, while nesting ferruginous hawk numbers have remained relatively stable.
- Increasing the number of ferruginous hawks and decreasing the number of nesting common ravens on the JIDPA is suggested. We advise placing additional artificial nesting structures on the JIDPA and its buffer to provide more nesting sites for ferruginous hawks. Selected sites should be in areas unlikely to be disturbed and in close proximity to active prairie dog towns. We also recommend deterring common ravens from nesting on natural gas structures by placing traffic cones on platforms to prevent nest-building and by removing nesting material.

MOUNTAIN PLOVERS

- A total of 6 mountain plovers were observed during the 2008 nesting season. This number is down from the 2007 nesting season.
- New habitat rankings were given to the previously identified habitat sites within the JIDPA and 3-mile buffer. No habitat sites were ranked as high-quality, 21 habitat sites were ranked as medium-quality, and 7 habitat sites were ranked as low-quality.
- Mountain plover habitat on the JIDPA could be improved in several ways to promote nesting. We recommend removing unused fences, windmills, and other structures in areas in close proximity to identified mountain plover sites. This will reduce the number of perches predators, such as raptors, can use. We also encourage the removal of exotic grasses in reclaimed locations. These plants are negatively correlated with mountain plover presence.

LANDBIRDS

- A total of 1,970 birds were observed during 2008 transects. The control area had 1,056 of these bird observations, while the JIDPA had 914 such observations.
- Twenty-one different species of birds were observed. Six of these are listed as sensitive species in Wyoming and included the Brewer's sparrow (*Spizella breweri)*, greater sage-grouse, northern pintail (*Anas acuta*), sage sparrow (*Amphispiza belli*), loggerhead shrike (*Lanius ludovicianus*), and sage thrasher (*Oreoscoptes montanus*). The northern pintail was only seen in the control area, and the loggerhead shrike was only seen in the JIDPA. The rest of these sensitive species were seen in both the JIDPA and the control area.
- Important habitats which support diversity of species were identified as rock outcrops, drainages, and water sources. It is recommended that areas which support such resources be maintained and mitigated for in the future. Two specific areas suggested for increased protection are Sand Draw and the rocky area east of North Jonah Road in sections 12 and 13 of township 29N and range 108W.
- The 6 most commonly observed species were the horned lark (*Eremophila alpestris*), Brewer's sparrow, sage sparrow, sage thrasher, common raven, and greater sage-grouse, respectively. This pattern of abundance ranking was maintained across various analyses and is recommended as a tool to gauge changes in populations over future years.
- The ecological site description data collected (soil type, dominant vegetation, and seral stage) showed a higher number of birds in sagebrush dominated vegetation cover and mid-stage of seral growth. These findings prompted the suggestion that reclamation efforts aim to reestablish a diverse mosaic of vegetation cover.
- The ecological soil site descriptor revealed a discrepancy between soil type observed and soil type mapped. The soil type observed to have the highest number of points and birds in the 2008 transects was sandy, while the soil type mapped which had the highest number of points and birds was found to be loamy.

GREATER SAGE-GROUSE

- There were a total of 79 greater sage-grouse sign observations during the 2008 survey.
- Fewer greater sage-grouse sign was seen during the 2008 survey than during the 2007 survey.

- Most of the sign found was in the northern sections of the JIDPA or in the Sand Draw area.
- Continued monitoring of sage-grouse on the JIDPA through survey transects will allow us to determine trends in grouse numbers over the years and will provide more information on their habitat use throughout the field.

PYGMY RABBITS

- Two pygmy rabbits were recorded as incidental wildlife in 2008.
- No monitoring for pygmy rabbits occurred in 2008 on the JIDPA.

WHITE-TAILED PRAIRIE DOG AND BLACK-FOOTED FERRETS

- Four prairie dog towns were surveyed in 2008 on the JIDPA and surrounding 3-mile buffer, as requested by the BLM. Other towns were not remapped.
- No monitoring for black-footed ferrets occurred in 2008 on the JIDPA.

BIG GAME

- A total of 1,785 pronghorn (*Antilocapra americana*) was observed in 2008, whereas 559 were seen in 2007.
- Pronghorn counts were highest during the fall and winter of 2007-2008. The highest number of pronghorn, approximately 1,000 was observed on January 29, 2008.
- During the winter months, pronghorn were distributed into large, isolated groups. In contrast, during the fall of 2007, pronghorn were observed in smaller, more scattered groups.
- In the future, waterhole and drainage locations from 2007 should be prioritized as survey locations during the summer months, so that pronghorn can be counted more accurately.
- The only other big game sightings observed in 2008 on the JIDPA were of 3 mule deer (*Odocoileus hemionus*) seen south of the EnCana field office.

GENERAL WILDLIFE

- Twenty-eight different species were recorded through 80 sightings under general wildlife observations.

- Species of note included mule deer, coyotes, and a female mallard duck with 12 young that we suspected to be nesting on the field.
- Draws, dry creek beds, rocky outcrops, and bluffs are all noted features important to providing shelter and breeding sites for many wildlife species. These areas and those with water are critical and should be protected.

The principle protection measure underway on the JIDPA for most wildlife species is the avoidance of sensitive/critical habitats during certain times each year, specifically, raptor and burrowing owl nest sites, mountain plover breeding grounds, and sage-grouse leks. The principle mitigation measure underway for the development in the JIDPA is the allocation of 24.5 million dollars by the JIO. These funds are in place for distribution and management of off-site mitigation. Please refer to the following website for a list of 2008 project approval decisions by the JIO: www.wy.blm.gov/jonah_office/about_jio.htm.

Two juvenile western burrowing owls seen in 2008 on the JIDPA.

2.0 INTRODUCTION

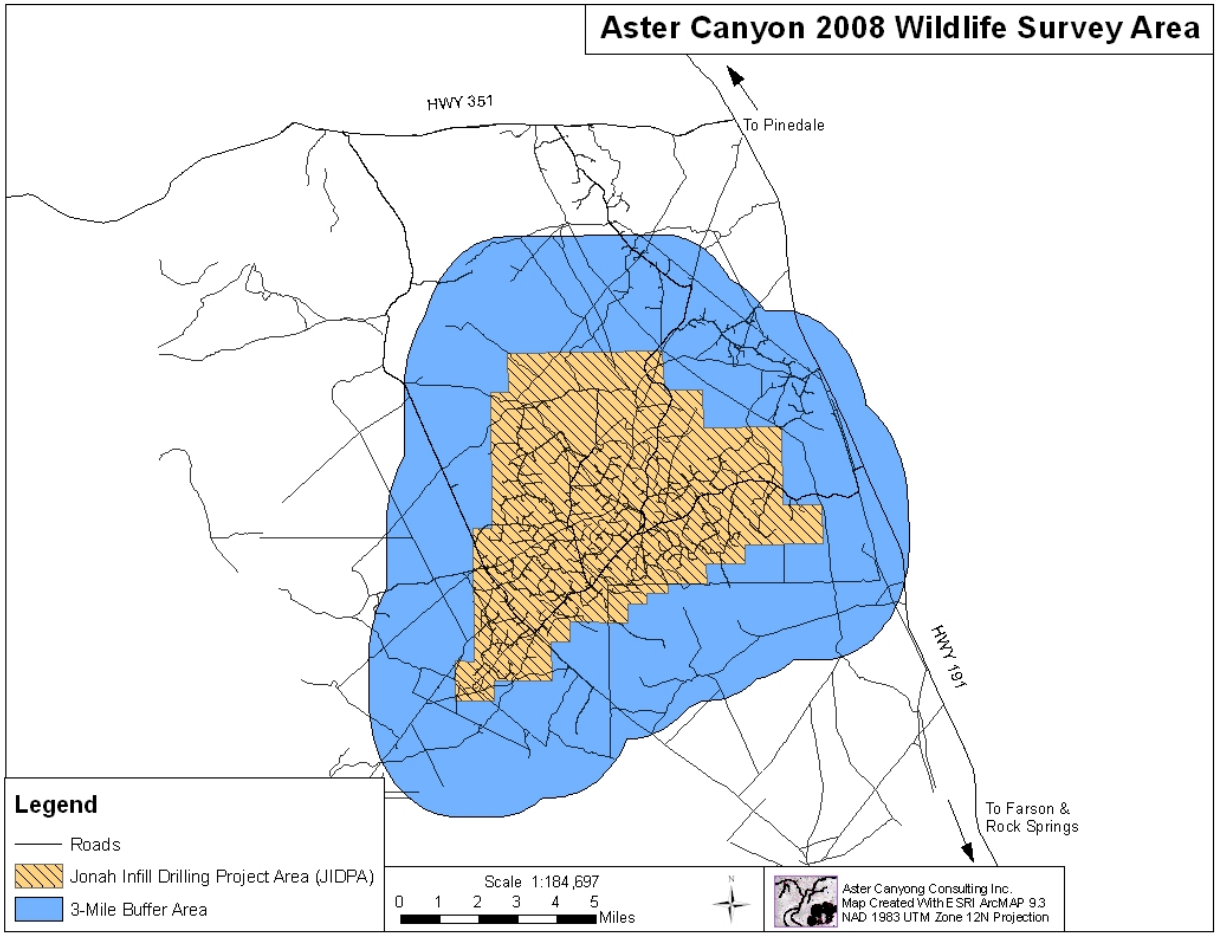
The JIDPA, located in Sublette County, Wyoming, is currently a major source of natural gas production in the United States. The sagebrush dominated ecosystems located in the area are critically important to many of Wyoming's wildlife species. The natural resource value of Wyoming's wildlife and open spaces provides the state with sustainable revenue through agriculture, hunting, fishing, and tourism (Holloran 2005). Accordingly, the 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. These studies were instituted in 1996 with Anderson Environmental Consultants, Inc. TRC Mariah Associates, Inc. (TRC) conducted the inventories from 1997 through 2005, and Aster Canyon inventoried during 2007 and 2008. Funding was not allocated for the project for 2006, thus no data was collected for that year.

Study Area

Aster Canyon's 2008 Jonah Field Wildlife Inventory and Monitoring study area includes the JIDPA and a surrounding 3-mile buffer (Map 1), as well as a control area on the east side of Highway 191, which was used in the landbird transect surveys. The JIDPA encompasses approximately 30,500 acres of townships 28N and 29N, ranges 107W through 109W 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.

Area within the JIDPA revealing typical shrub-steppe habitat seen throughout the study area.

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).



Map 1. 2008 study area, the JIDPA and 3-mile buffer.

2.1 Purpose and Objectives

The main purpose of the 2008 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. When able to use previous data,

trends in wildlife populations and survival success are presented. Aster Canyon's monitoring of the study area was done in an effort to determine disturbance effects on wildlife resources within the JIDPA and its 3-mile buffer. This information will 1) assist land managers in determining appropriate mitigation and protection measures; 2) address recommendations for responses to environmental change; 3) provide suggestions for continued monitoring; and 4) provide the data necessary to validate and revise EIS wildlife models and projections.

2.2 Datum and General Information

Specific methods and techniques employed follow those presented in the WMPP. Revisions to these methods were discussed and made in accordance with the BLM Pinedale Field Office and JIO. All Geographic Information Systems (GIS) locations are projected in NAD83 UTM Zone 12 North. Geographic Positioning Systems (GPS) units used during survey efforts included Garmin e-trex legend and the Garmin Rino 110. Details of previous information and data were used from the 2007 Aster Canyon report. Additional data was provided by TRC, the BLM Pinedale Field Office, and the JIO. TRC provided their 2005 report from the JIDPA, including all GIS layers and data tables.

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

There are several species on the TEPC species list generated by the U.S. Fish and Wildlife Service, the BLM WSS list, and the SGCN list by the Wyoming Game and Fish Department (WGFD; Table 1). The species are discussed in the WMPP and include the following (JIO 2007): the black-footed ferret (in which surveys were not required in 2008); ferruginous hawk, golden eagle (*Aquila chrysaetos*); bald eagle (*Haliaeetus leucocephalus*); western burrowing owl (in which surveys were conducted in conjunction with raptor nest searches which follow the BLM Raptor Procedures and Data Standards; Appendix A-4); mountain plover (in which surveys were conducted following 2002 United States Fish and Wildlife Service (USFWS) guidelines and 2004 BLM instruction memorandum No. WY-2004-035 (Appendix B-4); the pygmy rabbit (Ulmschneider et al. 2004, Oles 2005); landbirds (which follow the Rocky Mountain Bird

Observatory (RMBO) protocol); and white-tailed prairie dogs (Oldemeyer et al. 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 general wildlife observations.

Table 1. Sensitive species list for the vicinity of the JIDPA, Pinedale, Sublette Co., Wyoming (Appendix I).

Common Name	Scientific Name	Habitat Preference	Other Designation and Ranking
Mammals			
Long-eared bat	*Myotis evotis*	Conifer and deciduous forests, caves, and mines	G5/S1B, S1?N, NSS2
White-tailed 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)
Western 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
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

Each species presented in this report has monitoring and protection measures specific for their needs. These measures as well as additional recommendations are presented independently in each species' section. However, some common applications of measures apply to the wildlife seen throughout the JIDPA and its 3-mile buffer. A recurring theme discerned from monitoring efforts is the importance of protecting critical habitat. Resources which have been found to be vital to the success of the JIDPA's natural occupants include rock outcrops, intermittent stream beds, prairie dog colonies, and unfragmented sagebrush stands. Two specific areas observed to contribute to the JIDPA's species diversity include Sand Draw and a rocky area east of the North Jonah Road in sections 12 and 13. Therefore, an overall recommendation is the minimization of disturbance to these areas. Table 2 presents the wildlife stipulations for all surface disturbance activities in the JIDPA.

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	Nesting season	Within 0.5-mile radius
Riparian areas	No surface occupancy	Year-round	Within 500 feet

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 has also been determined that prairie dogs are an important resource for several species on the JIDPA. They provide food for raptors, as well as habitat for burrowing owls and mountain plovers.

As stated in the ROD, intensive surface disturbance practices on the JIDPA will likely have significant impacts on natural resource values, including wildlife displacement and/or local extirpation of local populations. Therefore, mitigation is encouraged 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 and BP American Production Company. Organizations interested in mitigation efforts submit project proposals to the JIO, and the proposed projects must meet criteria described in the JIDPA EIS (JIO 2008). The purpose of the JIO is to maintain, preserve, and enhance sagebrush-steppe habitat for native wildlife (JIO 2007). The JIO and BLM jointly authored the WMPP for the 2008 inventory and monitoring project.

Mitigation measure projects approved by the JIO appear to be providing protection and habitat for wildlife species in the area. The 2008 approved mitigation proposal list indicates several projects aimed at enhancing areas for wildlife and livestock species off of the JIDPA to accomplish reclamation goals. For example, the Boulder Lake Common Allotment Improvement Project serves to create a “landscape mosaic of native vegetation species diversity” while also providing a watering source for wildlife and cattle.

Other mitigation funds were approved by the JIO for several conservation easement projects. These include the Cottonwood Ranches Easement which protects 1,042 acres of important wildlife habitat on private land from future subdivision, and the Diamond H Ranch Conservation Easement. These easements preserve valuable wildlife habitat by protecting different types of habitat. This includes shrub-steppe for sagebrush obligate species, and riparian corridors for all wildlife. These projects often have the potential to create natural sanctuaries for wildlife.

The Wyoming Landscape Conservation Initiative (WLCI) is another source of funding for wildlife projects. The WLCI is a “long-term science-based effort to assess and enhance aquatic and terrestrial habitats at a landscape scale in Southwest Wyoming, while facilitating responsible development through local collaboration and partnerships” (WLCI 2008). They compliment existing habitat reclamation and mitigation efforts by exchanging “information, data, and

research findings among partners, industry, and stakeholders to improve habitat conditions and long-term viability of species" (WLCI 2008).

The Wyoming Wildlife and Natural Resource Trust (WWNRT) funds both large and small scale conservation projects. Large projects are defined as single projects that require $200,000 or more. Projects spanning more than one year are considered a single project (WWNRT 2008). Projects are required to provide a public benefit and are funded twice annually with funds made available in July and January. A number of ventures would be allowed funding. Some of these are summarized below:

- Improvement and maintenance of existing terrestrial habitat necessary to maintain optimum wildlife populations.
- Preservation of open space by purchase or acquisition of development rights.
- Acquisition of terrestrial or aquatic habitat when existing habitat is determined crucial/critical, or is present in minimal amounts, and acquisition presents the necessary factor in attaining or preserving desired wildlife or fish population levels.
- Conservation, maintenance, protection and development of wildlife resources, the environment, and Wyoming's natural resource heritage.
- To address and mitigate impacts detrimental to wildlife habitat, the environment and the multiple use of renewable natural resources attributable to residential, mineral and industrial development.

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, Right of Way 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.

3.0 RAPTORS AND OWLS

Both raptors and owls are considered birds of prey and are characterized by hooked bills and sharp talons (Gill 1995). Species potentially nesting on the JIDPA include the northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk, golden eagle, American kestrel, prairie falcon (*Falco mexicanus*), western burrowing owl, long-eared owl (*Asio otus*), and short-eared owl (*Asio flammeus*). The effect of disturbance on these species varies, but ferruginous hawks appear to be highly sensitive to disturbance whereas western burrowing owls may actually benefit from it (White and Thurow 1985, Andersen et al. 1990, Millsap and Bear 2000). Due to the differences in response to disturbance and habitat requirements for nesting, the presence of these species varies greatly, and recommendations for management on the JIDPA are species specific.

3.1 Raptor and Owl Methods

The JIDPA has been surveyed since 1996 for nesting raptors, and although study area boundaries have changed, the methods of recording raptor nests have remained the same and are defined below. As per the 2007 WMPP, the study area includes the JIDPA and a 3-mile buffer surrounding the area.

We conducted raptor surveys according to the Raptor Survey Procedures and Data Standards outlined by the BLM in 2004 (Appendix A-4) to determine productivity and activity of previously listed nests. Surveys for new raptor nests were conducted by searching potential raptor habitat such as rock outcrops, cliffs, ridges, knolls, and washes on foot. Surveys for new western burrowing owl nests were conducted by scanning and walking prairie dog towns, road edges, and pipeline corridors for inhabited burrows and searching burrows for whitewash and pellets. Measures were taken to reduce the disturbance effects of the biologist surveys on nesting birds (Rosenfield et al. 1987). These measures included:

- Scanning for nests from afar, when feasible, with binoculars and/or spotting scope to determine presence, activity, and status

- Restricting ground surveys of nests until late in the season or until biologists were confident the nest was inactive
- Approaching nests in an obvious manner to alert birds to the presence of the observer
- Minimizing the number of visits to avoid repeated disturbance
- Leaving the area as soon as nest status and activity were assessed
- Avoiding nesting areas during extreme weather conditions

Because ferruginous hawks are especially sensitive to disturbance, we avoided ground surveys in areas where we suspected they were nesting until late in the breeding season.

Aster Canyon biologists Susan Cooper, David Haynes, Renan Yanish, Brad Teson, Steven Saletta, Makeda Trujillo, Jennifer Faulkner, Patricia Brandage, Nicole Thiele, and Iain Crichton conducted raptor nest searches and monitoring on foot and by truck. We recorded data on the standardized form as seen in Appendix A. We also recorded and reported any raptors observed hunting or perching away from nest sites as part of the general wildlife observations in the field (see Section 10.0).

We added new photographs of nests to data sheets if conditions had changed significantly from previous years and included photographs of new nests that we found (Appendix A-2). New nests were assigned a temporary nest name consisting of the bird species (2 letters) and the next consecutive nest number for that species. For example, a new burrowing owl nest found in 2008 was temporarily named BO380. On completion of the nesting season, we assigned nests with a Nest ID following BLM guidelines (pers. comm. 2008). This 9 digit nest name is composed of the township, range, and section in which the nest is located, followed by a number which is assigned consecutively as nests are found. For example, BO380 is the only nest in section 32 of township 29N and range 108W, so its Nest ID is 291083201.

Raptor surveys were initiated on April 15 and concluded on August 15, 2008. At the request of the BLM, 3 western burrowing owl nests were additionally checked beginning on April 1. Most raptor and owl nests were checked once a month in May, June, July, and August for a total of 4-5 nest checks. We spent a total of 52 field days on this project. We visited all listed raptor nests within the JIDPA and its 3-mile buffer at least one time to determine nest condition and activity

status. Nests that were gone or considered in remnant condition were usually not revisited. We considered nests to be active if we observed one of the following: 1) eggs in the nest; 2) nestlings in the nest; 3) fledged or nearly fledged young near the nest; or 4) copulating, incubating, or brooding adults. We deemed nests successful if we were able to see at least one nestling chick. Assessments of productivity were made by using binoculars and counting the number of chicks on a nest or burrow. Several visits were made to most nests to determine productivity, and monitoring efforts were continued until this could be determined.

3.2 Raptor and Owl Results

A total of 153 raptor and owl nests were monitored during the 2008 breeding season (Map 2). There were 122 nests that were considered inactive, 23 were active, and we were unable to determine the status of 8 of the nests (Table 3). The majority of the nests on the JIDPA and its associated buffer are American kestrel, ferruginous hawk, western burrowing owl, or common raven. Since monitoring was initiated in 1996, no bald eagles have nested on the JIDPA or the buffer, likely due to its unsuitable habitat and distance from major sources of water. Of the currently monitored ferruginous hawk nests, historically, only 1 nest was used by a species other than ferruginous hawk. In 1999, 1 golden eagle egg was found in nest 291081308 (FH14). Otherwise, golden eagles seem to use the JIDPA primarily for hunting and foraging (Map 3).

Table 3. Total number of raptor nests monitored in the JIDPA and 3-mile buffer in 2008 and their status in terms of activity and number of young observed.

Species Monitored in 2008	Total Number Nests	Number Inactive Nests	Number Active Nests	Number Unknown Status	Number Young Observed
American Kestrel	32	30	2	0	4
Bald Eagle	0	0	0	0	0
Ferruginous Hawk	49	47	2	0	4
Golden Eagle	0	0	0	0	0
Long-eared Owl	1	1	0	0	0
Prairie Falcon	0	0	0	0	0
Short-eared Owl	2	2	0	0	0
Western Burrowing Owl	45	34	11	0	47
Common Raven	21	12	8	1	14
Unknown Raptor	3	2	0	1	0
Totals	153	128	23	2	69

AMERICAN KESTREL

We monitored 32 American kestrel nests during the 2008 breeding season. Only 2 nests were determined to be active with adults and 2 fledglings seen at each of these nests. The rocky area east of North Jonah Road in sections 12 and 13 of township 29N and range 108W was avoided by observers until mid-July because we suspected there was a nesting ferruginous hawk. Due to this avoidance, we may have missed some active kestrel nests in this area. Research has indicated that no new nesting material is brought into cavities by kestrels but that they will use nests with existing material (Lane and Fisher 1997, Smallwood and Bird 2002). Therefore, determining species use of cavities based on presence or absence of nesting material is difficult. We did not find any new American kestrel nests this year.

FERRUGINOUS HAWK

We determined 2 ferruginous hawk nests to be active during the 2008 breeding season. Nests 291073301 (FH126) and 291073202 (FH128), both of which are artificial nesting platforms, each successfully produced 2 chicks. From visual observations, 2 light morph chicks were hatched from FH126, and we also observed one light morph adult at this nest. There was 1 light morph and 1 dark morph chick hatched from FH128, and we also observed 1 light morph and 1 dark morph adult associated with this nest.

Location of one of the inactive ferruginous hawk nests that was monitored on the JIDPA in 2008.

Early in the season, ferruginous hawks were seen foraging and flying in 2 other areas on the JIDPA. On April 18, 2 ferruginous hawks were seen flying in the bluff area south of Jonah Gulch and Reservoir. We avoided ground surveys in this area until July to decrease potential disturbance. A July 15 ground survey of these nests indicated no recent use, and no new nests were found. Therefore, the nests in this area were deemed inactive for the season. The second area where ferruginous hawk sightings were made was east of North Jonah Road in sections 12 and 13 of township 29N and range 108W. On April 22 and May 15, one

ferruginous hawk was seen flying in this area, so we suspected nesting activity may have been occurring and thus avoided ground surveys here. During a survey on April 18, BLM archaeologists were observed walking in this area, potentially creating a source of disturbance. On July 16, ground surveys indicated that no previous ferruginous hawk nests were used in this area this year, and no new nests were found. Therefore, nests in both of these areas were given an inactive status for the season (Map 2).

PRAIRIE FALCON

No prairie falcon nests from previous years needed to be monitored in 2008, as previously active nests were surveyed by other consultants as part of the Pinedale Anticline Project Area monitoring. No new active prairie falcon nests were found. There were 2 incidental sightings during the monitoring period (Map 3), but no nests were found in these areas upon further investigation.

SHORT-EARED OWL

No short-eared owl nests were located within the JIDPA or the 3-mile buffer. Two areas where sightings were made in previous years were investigated by walking the associated draws and riverbeds, but no sign of owls was found. One short-eared owl was sighted on August 5 in section 35 of township 30N and range 108W, which is 1 section to the north of 1 of last year's sightings. No nest was found in this area, so it is unknown whether it was nesting.

WESTERN BURROWING OWL

We monitored a total of 46 western burrowing owl nests in 2008. Ten of these nests were considered to be gone, 2 of which had been destroyed by manmade events, and 8 of which had naturally collapsed. We found 11 active nests, 6 of which were new locations found this year. Sightings of owls were made at 4 other mounds, but subsequent visits indicated that these mounds were either abandoned prior to egg laying or were used incidentally as resting or dispersal sites. Ten of the 11 active nests were successful with the total chick count for all nests equaling 46. Brood counts ranged from 1 to 9, with an average of 4-5 chicks per successful nest. Assuming 2 adults per active nest and including the 4 incidental sightings, the total number of western burrowing owls observed on the JIDPA for 2008 was 62.

COMMON RAVEN

We monitored a total of 21 raven nests during this breeding nesting season. By the end of the season, 14 of these nests were gone, presumably removed by gas field workers. Eight nests were determined active, and 4 of these were new locations for 2008. Of the 8 active nests, 5 were successful, 2 failed, and the fate of 1 was undetermined. Two nests were also given the activity status of undetermined because although birds were seen defending or near the nest, no birds were actually seen incubating or on the nest. Exact counts of chicks were difficult to obtain due to the location of nests being on either natural gas structures or windmills, neither of which could be safely accessed by observers. At least 14 chicks were counted among the 5 successful nests with counts ranging from 2 to 4 chicks. Fledging dates were earlier for ravens than the other raptor species monitored, with all nests fledged by mid-July.

Two common ravens in their nest on the top of condensate tank stairs, June 16, 2008.

The cause of failure for 1 of the raven nests, nest 291072804 (CR368), is unknown. Biologists from the BLM, USFWS, and Aster Canyon had been planning to implement protocol from the Avian Protection Plan (2007) by moving the nest from the walkway of a condensate tank to an artificial nesting platform. When they arrived at the nest site on May 15, there were no eggs in the nest and no sign of eggshells in the vicinity. Therefore, they removed the nest from the condensate tank.

3.3 Raptor and Owl Monitoring and Protection Measures

A review of currently implemented and suggested monitoring and protection measures for raptors and owls is presented in this section. Protection measures already in place dictate that well pads, access roads, and other facilities not be located within 1,000 feet of active ferruginous hawk nests and 825 feet for all other active raptor nests (BLM 2006). Seasonal restrictions apply for surface disturbance activities near active raptor sites and are to be avoided within 1 mile of active ferruginous hawk nests and 0.5 mile for all other active raptor nests (February 1 – July 31; BLM 2006).

Additional protection measures implemented include the requirement for operator coordination with the BLM, USFWS, and WGFD for all mitigation activities related to raptor or other sensitive species and their habitats, and the need for operators 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-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 artificial nest structure in the area and relocation of the nest (BLM 2006). Further recommendations suggested for future monitoring and protection measures are outlined below for individual species.

American Kestrel

American kestrels are the most widespread falcon in the United States, and populations appear stable throughout their range (Smallwood and Bird 2002). Research has indicated that they are tolerant of disturbance and may refuse to flush from nests when approached (Smallwood and Bird 2002). This may decrease the likelihood of detecting nesting kestrels. Although a decrease in the number of nesting attempts made by kestrels has been observed since 2004 (Table 4), this may be a result of differences in searching effort or timing when nest searches were made. Because the American kestrels found on the JIDPA are typically in rocky bluffs unsuitable for development and because they are adaptable to disturbance, it is unlikely that the number of nesting kestrels will change significantly on the JIDPA. One area where a number of American

kestrels were seen is the rocky area east of North Jonah Road in sections 12 and 13 of township 29N and range 108W. Protection of this area is important not only for American kestrels but also for other nesting raptors. Although only one nesting American kestrel was found in this area, a number of old kestrel and hawk nests are located here, and 1 prairie falcon was sighted. To ensure continued use of the JIDPA and potentially increase the number of nesting American kestrels, the addition of a network of nest boxes on the JIDPA would increase the availability of nest sites, not only for kestrels but also for other cavity-nesting species, such as western bluebirds (*Sialia mexicana*), wrens, and swallows (*Hirundo* spp.).

FERRUGINOUS HAWK

Based on trends in the data, the number of nesting ferruginous hawks appears relatively stable over the past 5 years. The range of successful nests (1-3) and young observed (1-6) has remained relatively stable (Table 4). The biggest observable difference is that only artificial nest platforms were used in 2008, whereas in previous years, hill and rock outcrop substrates had also been used but were unsuccessful in fledging young, likely due to ground predation. Inadequate nest sites, disturbance, and prey availability are all limiting factors for nesting ferruginous hawks (White and Thurow 1985, North American Conservation Plan 2005), and should be considered when making management decisions. Research has indicated that prairie dogs are an important food source for ferruginous hawks (Bak et al. 2001, Cook et al. 2003), and ferruginous hawk nests on the JIDPA

Two light morph nestling ferruginous hawks from nest 291073301 (FH126), July 15, 2008.

have typically been found near active prairie dog towns. Therefore, maintenance and preservation of areas with active prairie dogs is important for nesting ferruginous hawks.

Ferruginous hawks are considered highly sensitive to disturbance during the nesting season (White and Thurow 1985, Richardson and Miller 1997) and may become more sensitive to repeated disturbance (White and Thurow 1985). Measures for monitoring methods have already been taken to reduce the amount of disturbance that observers may create during surveys (See Section 3.1). As previously mentioned, ferruginous hawk territories are fairly stable from year to year, so planning disturbances around previously active nest sites will decrease chances of nest abandonment. If nesting areas cannot be entirely avoided during the breeding season, steps to visually shield hawks from vehicles, rigs, and other machinery should be made (Suter and Joness 1981, Richardson and Miller 1997). This may be done using the natural topography of bluff lines and hills or structures already present on the JIDPA.

Finally, although ferruginous hawks have been shown to use a variety of substrates for nesting, such as rock outcrops, hillsides, trees, and artificial nest platforms (Woffinden and Murphy 1983, Cartron et al. 2002, Dechant et al. 2002), additional artificial nesting structures would increase the availability of sites for nesting ferruginous hawks on the JIDPA. Artificial nesting structures may be more advantageous than natural nesting sites for ferruginous hawks since the majority of previously discovered nests were located on hillsides and bluffs and were not active in 2008. These natural locations may be more easily predated by ground predators, such as carnivores, than artificial nest platforms. Both fidelity and philopatry to successful nesting sites has been observed in ferruginous hawks (White and Thurow 1985, Andersen et al. 1990, Schmutz et al. 2008), so it is likely that adults and fledglings will return to the JIDPA in subsequent breeding seasons. Therefore, construction and erection of more artificial nesting structures platforms would benefit ferruginous hawks by providing more nesting locations. Based on proximity to active prairie dog towns, probability of limited disturbance, and previous ferruginous hawk sightings, site recommendations for additional artificial nesting structures are the Jonah Gulch and Reservoir area in sections 22 and 23 of township 28N and range 108W, and the western boundary of the 3-mile buffer in sections 22, 27, and 34 of township 29N and range 109W.

PRAIRIE FALCON

No prairie falcon nests were found in 2008, but 2 incidental sightings were made and may have been in areas important for hunting and nesting falcons (Table 5, Map 3). The northwest corner of the JIDPA buffer, also known as the Blue Rim area, is highly suitable for nesting prairie falcons. This area was surveyed by the Anticline contractor, and results will be reported by them. Studies have indicated that prairie falcons are tolerant of low levels of disturbance (Squires et al. 1993), but protection of areas of rock outcrops and bluffs is an important measure in encouraging prairie falcons to nest successfully on or near the JIDPA.

SHORT-EARED OWL

Although there was only one sighting of a short-eared owl and no nests were found on the JIDPA in 2008 (Map 3), the presence of this species is likely since they have been found in past years, and they show some fidelity to nest sites. In 2 studies, previously used nests were rebuilt in subsequent breeding seasons, suggesting nest site fidelity (Holt and Leasure 2006). Nesting sites for short-eared owls include open shrub-steppe country, and females prefer areas with high amounts of vegetation in order to conceal them while incubating (Holt and Leasure 2006). On the JIDPA, preferred sites are most likely draws, creekbeds, and other areas with denser, taller sagebrush. Ground surveys in several draws were completed in 2008, but possibly due to their ground-nesting habits and reluctance to flush from nests, no short-eared owls were found and may be underrepresented in these results (Lehman et al. 1999, Holt and Leasure 2006). Although areas of high disturbance can limit the presence of short-eared owls, some disturbance, such as small fires or plowing, may be necessary to create suitable habitat for them (Dechant et al. 1998). Of most importance to the future nesting success of short-eared owls is the continued protection of dry creek bed areas, such as Sand Draw.

WESTERN BURROWING OWL

Since monitoring began in 2001, the number of western burrowing owl nesting attempts and the total number of successful nests observed have increased (Table 4), suggesting the development activities occurring on the JIDPA may be beneficial for nesting owls. Burrowing owls exhibit some preference for landscapes with moderate disturbance and habitat fragmentation (Orth and Kennedy 2001), which results as roads and well pads are built. This disturbance may allow for

prairie dogs to colonize new areas, providing more nest sites for burrowing owls. Burrowing owls are strongly associated with prairie dogs in many parts of their range (Desmond et al. 2000, Lantz et al. 2007, Tipton et al. 2008), and the majority of active nests in 2008 on the JIDPA were found within active prairie dogs towns. Burrowing owls exhibit nest fidelity to burrow locations and areas, but this may shift as active prairie dog towns shift. Prairie dogs may recolonize previously abandoned areas (Lantz et al. 2007), so protection of both active and previously used prairie dog areas is important.

Western burrowing owl perched on sagebrush on the JIDPA.

In terms of management, recommendations similar to those for ferruginous hawks should be considered. Although it appears western burrowing owls are benefiting from the disturbance occurring on the JIDPA, caution should still be taken during the breeding season and attempts to visually shield nesting owls from new disturbances should be made (Suter and Joness 1981, Richardson and Miller 1997). Because of their dependence on prairie dogs for burrow sites, it is also important to protect prairie dog towns. These measures should ensure that nest sites are available and that less stress and disturbance is placed on nesting owls during the breeding season.

COMMON RAVEN

Trends in the data indicate that the nesting raven population on the JIDPA has been stable over the last 5 years (Table 4), but we expect to see an increase in both the number of nesting attempts and the number of successful nests as monitoring continues over the years. Research has demonstrated a positive association between the presence of nesting common ravens and human

activity (Craighead and Mindell 1981, Marzluff et al. 2000). A dependence on manmade structures for nesting sites is apparent on the JIDPA, with all common raven nests being found on condensate tanks or windmills. Potentially, as the gas field continues to be developed, more nesting habitat for ravens is being created. Although increased competition for nesting sites with other raptors is unlikely to occur, ravens have been shown to predate nests and harass other birds, creating a potential threat to other species (Craighead and Mindell 1981, Marzluff et al. 2000). Another issue is the interference which nesting ravens on condensate tank structures create with work that needs to be done by gas field workers. Although common ravens are protected by the Migratory Bird Treaty Act, the Avian Protection Plan (2007) will allow some deterrence of nests on these structures. Beyond removing nesting material being placed by ravens, we also suggest placing an orange construction cone, streamers and flags, or a plastic owl on the platforms and stairs of tanks as a deterrent. In order to continue to attain comparable data, detailed information on nesting attempts and nests that are removed is critical. This effort will rely heavily on gas field workers reporting their deterrence activity of raven nests.

Active western burrowing owl nest that was monitored on the JIDPA in 2008. Adult owl is standing on the right, and 6 juvenile owls are visible with their heads out of the burrow on the left.

Table 4. Raptor nest productivity documented by species from years 2001-2008, except 2006 when data were not collected. Study area for 2001-05 differed from that of 2007-08.

Species/Parameter	2008	2007	2005	2004	2003	2002	2001
American kestrel							
Number of Nesting Attempts with Known Outcome	2	2	3	5	0	0	0
Total Number of Successful Nests (% Successful)	2(100%)	2 (100%)	3 (100%)	5 (100%)	n/a	n/a	n/a
Total Number of Young Observed	4	3	9-10	20	n/a	n/a	n/a
Number of Young Per Successful Nest	2	≥1.5	≥3.0-3.3	≥4	n/a	n/a	n/a
Ferruginous hawk							
Number of Nesting Attempts with Known Outcome	2	4	11	10	3	1	n/a
Total Number of Successful Nests (% Successful)	2(100%)	1 (25%)	3 (27%)	1 (10%)	2 (67%)	0	n/a
Total Number of Young Observed	4	3	6	1	3	n/a	n/a
Number of Young Per Successful Nest	2	3	≥2.0	1	1.5	n/a	n/a
Prairie falcon							
Number of Nesting Attempts with Known Outcome	0	Unknown	7	2	2	1	1
Total Number of Successful Nests (% Successful)	n/a	Unknown	4 (57%)	2 (100%)	2 (100%)	1 (100%)	1 (100%)
Total Number of Young Observed	n/a	Unknown	12-14	7	10-11	5-6	2
Number of Young Per Successful Nest	n/a	Unknown	3.0-3.5	≥3.5	5.0-5.5	5.0-6.0	≥2
Short-eared owl							
Number of Nesting Attempts with Known Outcome	0	0	0	0	1	0	0
Total Number of Successful Nests (% Successful)	n/a	n/a	n/a	n/a	1 (100%)	n/a	n/a
Total Number of Young Observed	n/a	n/a	n/a	n/a	3	n/a	n/a
Number of Young Per Successful Nest	n/a	n/a	n/a	n/a	3	n/a	n/a
Western burrowing owl							
Number of Nesting Attempts with Known Outcome	11	13	7	0	0	1	2
Total Number of Successful Nests (% Successful)	10 (91%)	7 (54%)	6 (86%)	n/a	n/a	1 (100%)	2 (100%)
Total Number of Young Observed	46	19	23	n/a	n/a	1	1
Number of Young Per Successful Nest	4.6	≥2.7	≥3.8	n/a	n/a	≥1	≥1
Common raven							
Number of Nesting Attempts with Known Outcome	8	10	9	8	8	4	2
Total Number of Successful Nests (% Successful)	5 (63%)	9 (90%)	7 (78%)	7 (88%)	6 (75%)	1 (25%)	1 (50%)
Total Number of Young Observed	14	32	23	20	18	2	2
Number of Young Per Successful Nest	≥2.8	≥3.6	≥3.3	≥2.9	≥3.0	2.0	≥2.0

4.0 MOUNTAIN PLOVER

The mountain plover was proposed for listing as a threatened species under the Endangered Species Act by the USFWS in 1999, but was withdrawn from listing in 2003. The USFWS made this determination because threats to the species were not as significant as they originally believed (USFWS 2003). The mountain plover is currently considered a sensitive species by the BLM (Smith and Keinath 2004).

Mountain plover observed on the JIDPA in 2007.

Mountain plovers breed in short-grass prairies and shrub-steppe landscape of the Rocky Mountain States from Canada south to Mexico (Keinath and Ehle 2001). Plovers nest in areas that have been impacted by herbivores, prairie dogs, pronghorn, and historically American bison (*Bison bison*). Heavy grazing or other impacts that provide the same results create the habitat that mountain plovers require (Smith and Keinath 2004). Mountain plovers are insectivores, with beetles and grasshoppers being the main components of their diets (Keinath and Ehle 2001). Mountain plovers have been recorded within the JIDPA since 2000 but most likely were in this area when John Kirk Townsend first collected the mountain plover for scientific research in 1832 along the Sweetwater River in Wyoming (Knopf 1996).

In 2008, mountain plover monitoring consisted of conducting presence/absence and nesting surveys in previously identified habitats and re-evaluating habitats based on the ranking system developed by Wyoming Natural Diversity Database (Beauvais and Smith 2003, Keinath and Ehle 2001).

4.1 Mountain Plover Methods

Methods employed for mountain plover surveys by Aster Canyon in 2008 coincide with previous surveys conducted during inventory efforts from 1999 through 2007. Data was not collected in 2006. No nests were observed in 2008; therefore, productivity could not be evaluated for mountain plovers. 2008 surveys were conducted on April 21 through June, 23, 2008 by Jen Faulkner, Susan Cooper, David Haynes, Patty Brandage, Stephen Saletta, and Nicole Thiele of Aster Canyon. A total of 12 survey days were logged, and surveys were conducted in accordance with the 2002 USFWS guidelines (USFWS 2002) and BLM Instruction Memorandum No WY-2004-035 (2004).

- 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 on main 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 between 1 and 7 times, with each survey usually 14 days apart.
- Surveys were initiated after the beginning of mountain plover breeding/nesting season, around April 20th for Wyoming.
- Areas were searched for nests and eggs if it was deemed non-intrusive.

Locations of individuals sighted were recorded on the mountain plover survey forms (Appendix B).

Habitat Ranking

We adopted a habitat ranking method from "Survey for Mountain Plover (*Charadrius montanus*) on Federal lands in the Powder River Basin", prepared by Douglas A. Keinath and Donna Ehle for the Cheyenne BLM. This ranking system is a 3-level categorical scale, based on formal habitat information. They are as follows:

- High-Quality Sites- "an area of about 160 acres or more with low vegetation (≤ 4"), at least 25% bare ground and flat topography (slope of less than about 5%)"

- Medium- Quality Sites- "generally met the criteria of high-quality sites but had 1 or 2 of the negative habitat modifiers"
- Low-Quality Sites- "an area that had 3 or more of the negative habitat modifiers (see below)"
- Unsuitable Sites- "areas of forest, wetlands, dense and tall stands of sagebrush, riparian areas, and canyons" These were not applicable for our sites, therefore we had no unsuitable rankings.

  The negative habitat modifiers used to determine habitat quality are as follows:

  - The average height of shrubs is greater than 4 inches.
  - The average height of grass is greater than 4 inches.
  - The topography is not flat (e.g., slopes are >5 or overlooking hills are near the site).
  - The site contains less than 25% bare ground.
  - There are no prairie dogs present on the site (this is not used to downgrade an otherwise good site).
  - Water is present near the site. This was not included in 2008 but will be evaluated in 2009.
  - Killdeer (*Charadrius vociferous*) are present on the site.
  - The size of the patch is too small (i.e., < 160 contiguous acres).
  - Active agriculture is present (i.e., the site contains plowed or planted fields).
  - Trees are present (e.g., cottonwoods).
  - There is human development (e.g., houses, barns, fences, well pads).

For the 2008 habitat analysis Jonah phase 2 vegetation, soils, and sage-grouse habitat mapping data by EnCana was used to evaluate negative modifiers within each mountain plover nesting site. Eleven sites within the 3-mile buffer of the JIDPA did not have mapping data available on them. These 11 sites were evaluated by on-site investigations in 2008 (Table 6). All sites will be evaluated by on-site investigations during the 2009 mountain plover nesting season to receive the most accurate real-time, on-the-ground habitat rankings.

All negative habitat modifiers that applied and were available for the 28 habitat sites were evaluated. Five negative modifiers were not evaluated. These were average height of grass, prairie dog presence, water near the site, active agriculture, and the presence of trees.

The reason the average height of grass was not used this year as a negative modifier is due to the lack of mapping data available on this factor; this will be evaluated in the 2009 mountain plover nesting season. Prairie dog presence on the site was not evaluated this year because of the decreased prairie dog activity later in the season when this habitat evaluation was completed. Mapped prairie dog towns were reviewed and included in Table 7 but were not used to downgrade a site as stated by Keinath and Ehle. Prairie dog presence will be evaluated during the 2009 mountain plover nesting season, and activity will also be evaluated based on the number of prairie dogs seen during a 3-5 minute count method used in Keinath and Ehle's habitat ranking.

Biologist measuring percent of bare ground using a daubenmire plot.

On-site investigations, which were conducted this season, consisted of analyzing human development by recording the amount of structures used as possible perches (i.e. well pads, fence lines, pipeline markers). We analyzed the percent of bare ground by randomly laying down a daubenmire plot within the habitat sites and then estimated the percentages of bare ground within the plots. When multiple plots were used, the average was taken. The amount of plots used per site was determined by acreage and variation of vegetation within the site. Shrub height was taken within the daubenmire plot. Shrubs were measured using a measuring stick; shrubs were measured to the top of the leaves excluding the seed heads. Averages were taken when multiple shrubs were measured. Slope was estimated by the biologists. This was used to determine if the slopes could be used as perch sites for raptors. Water near the site was not evaluated this year due to lack of surface water mapping and lack of surface water this late in the season. Surface water present near the site will be evaluated during the 2009 mountain plover nesting season. Active agriculture and trees are not present on the JIDPA and therefore not used as negative ranking factors.

4.2 Mountain Plover Results

The results presented here are for mountain plover field surveys showing presence/absence and nesting surveys along with habitat ranking model measurements and field measurements.

A total of 6 mountain plovers were documented during survey efforts (Map 4, Table 6). At sites 6 and 27, birds were recorded during 2 different survey efforts. Thus, the birds seen in sites 6 and 27 may have been counted twice rather than being additional birds recorded. Two sightings took place in site 6. These mountain plovers were located next to a well pad. No mountain plover nests or chicks were found in 2008.

Table 6. Number of confirmed mountain plover sightings by date and site during the 2008 survey of the study area, includes the new habitat rankings.

Site #	Date	# of Birds	Habitat Type and Ranking	# Times Site visited
6	6/12/2008	1	Large grassy area-Prairie dog colony/medium	4
6	6/16/2008	1	Large grassy area-Prairie dog colony/medium	4
27	6/23/2008	1	Light to moderate sage and grass cover/medium	2
27	5/7/2008	2	Light to moderate sage and grass cover/medium	2
29	6/23/2008	1	Low to moderate coverage of sage/medium	3
Total		**6**		

Site 6 was ranked as unsuitable habitat last year, but is now ranked as medium-quality due to the new ranking system (Map 4). The habitat is not ranked as high-quality only due to the fact that it contains human development. Having one negative habitat modifier downgrades this site to medium-quality. Three mountain plover observations took place in site 27, ranked as medium-quality due to slopes in the area. One mountain plover observation was made in site 29, ranked as medium-quality due to its smaller size of 143 acres. All plover observations were made within 1 mile of past observations (Map 5). This excludes 2006, when data was not collected, and 1999 and 2001 when no mountain plovers were observed within the present JIDPA study area.

The new ranking system changed the past rankings from suitable, fair, unsuitable, and unknown to high-quality, medium-quality and low-quality. There are no high-quality nesting habitat sites located on the JIDPA or 3-mile buffer due to at least 1 negative modifier being present. There

are 21 medium-quality sites (Table 7). All mountain plovers observed this year were recorded in medium-quality habitats. There are 7 low-quality habitat sites present in the JIDPA. No mountain plovers were found in low-quality habitat this year. All ranking factors will be re-evaluated during the 2009 mountain plover nesting season and subsequent nesting seasons, as grass and shrub height, prairie dog presence, and other ranking factors may change from year to year.

Table 7. Negative modifiers that apply to each plover site.

Site	Ht. of Shrubs >4in	Slope >5 %	< 25% Bare Ground	**Lack of P-dog Town	Killdeer	< 160 Acres	Human Development	Total Negatives	Quality
1*				x		YES	YES	2	medium
4*	YES			x		YES		2	medium
6							YES	1	medium
6						YES		1	medium
8*	YES			x		YES		2	medium
10	YES			x		YES		2	medium
13	YES		YES	x		YES	YES	3	low
14		YES		x		YES		2	medium
15		YES		x		YES		2	medium
16		YES		x		YES		2	medium
17*	YES	YES		x		YES		3	low
18*	YES			x		YES		2	medium
19				x		YES	YES	2	medium
20	YES			x	YES	YES	YES	4	low
21	YES			x		YES		2	medium
22	YES			x		YES	YES	3	low
24*	YES			x				1	medium
25*	YES					YES		2	medium
26*	YES							1	medium
27		YES						1	medium
28				x		YES	YES	2	medium
29*						YES	YES	2	medium
30*	YES		YES					2	medium
32	YES	YES	YES				YES	4	low
33		YES				YES	YES	3	low
34		YES					YES	2	medium
35	YES	YES					YES	3	low
38*	YES					YES		2	medium

*Evaluated by on site investigations rather that modeling

**Lack of Prairie dog town does not denote sites and therefore not added to total negative modifiers

4.3 Mountain Plover Protection Measures, Mitigation & Recommendations

The mountain plover is a sensitive species and is often adversely affected by destruction of habitat by human development (Smith and Keinath 2004). This species deserves continued monitoring, protection measures, and mitigation efforts. The results from the 2008 and previous nesting seasons, existing protection measures, and recommendations for further mitigation are discussed below.

A total of 6 mountain plovers were documented during 12 days of survey efforts from April 21, to June 23, 2008. Two of the 6 sightings took place in site 6. One plover was seen on 2 different days; it may or may not have been the same mountain plover. These sightings were on a reclaimed well pad, no nest was located for this plover. Site 6 was ranked as unsuitable habitat last year due to the high amount of well pads and development which can serve as perches. Human development is a cause of raptor perches on the JIPDA. After using the three-level categorical scale, it was discovered that human development is the only negative habitat modifier within this habitat site. Habitat site 6 has all of the positive factors that a high-quality site has; with its 1 negative modifier being human development. This caused it to be downgraded to a medium-quality site. This could explain why the plovers were seen in site 6, which was formerly thought to be unsuitable habitat. Plover nests have been found on bare ground created by oil and gas development activities (USFWS 2002).

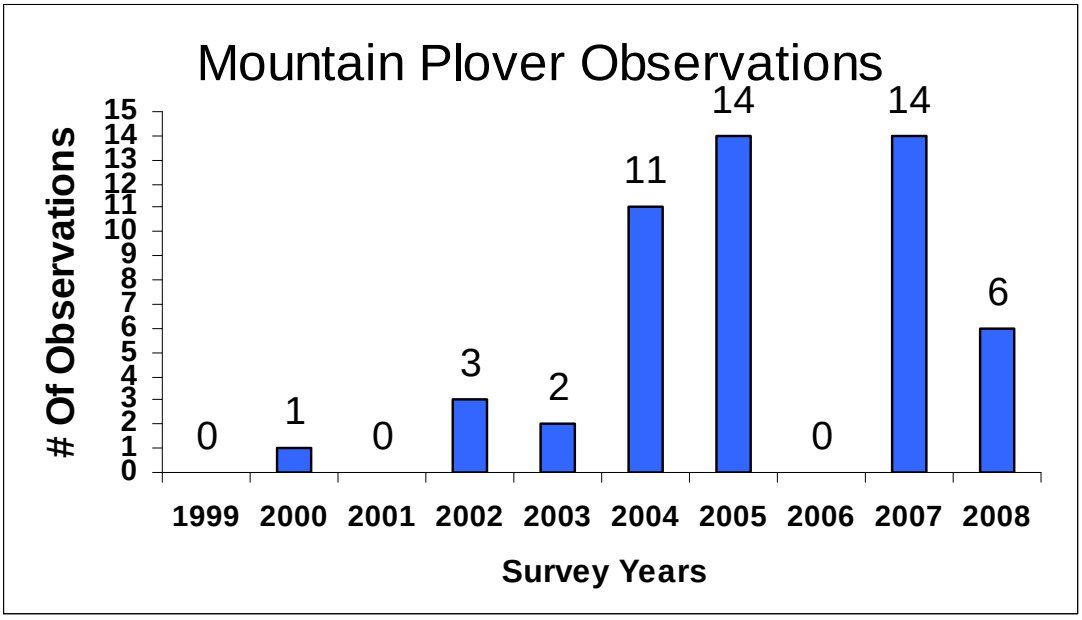
Three mountain plovers were observed in site 27, ranked as medium-quality. This was due to having only one negative habitat modifier, which was slopes in the area that could possibly inhibit plovers' visibility and provide cover for predators (BLM 2004a).

One observation was made in site 29. This site is ranked as medium-quality due to its smaller area of 143 acres, which does not meet the high-quality area requirement of 160 acres.
All observations were made in areas that plovers have been observed during the past 10 survey years, except site 6. Observations from this site were the furthest away from past observations, at about 1 mile in distance (Map 3). Breeding-site fidelity is prevalent among most shorebirds

(Manning and White 2001). Both males and females return to the same breeding site (within 0.5 mile) annually (Graul 1973). Site-fidelity may increase success by allowing mountain plovers to gain experience in a habitat site (Manning and White 2001). The experience received can help mountain plovers avoid areas of predators and allow them to know where abundant food can be found.

The 2008 total plover observations were lower than those found in 2004, 2005, and 2007, but were greater than 1999, 2000, 2001 and 2002, and 2003 (Fig. 1). In 1999 and 2001, no mountain plovers were found within the current JIDPA study area. This may have been due to changes in the boundaries of the study area at that time. Several factors may have contributed to reduced plover observations during the 2008 nesting season. First, this season was particularly cold and the last snowfall this year was June 20. This weather could have delayed the mountain plovers from nesting until a later date than logged (USFWS 2002). Additionally, there were fewer field survey days in 2008, thus, incidental observations were likely reduced. Finally, cattle grazing was removed on the Jonah in 2008 and may have affected habitat quality.

Figure 1. Trend of recorded mountain plover sightings from 1999 to 2008, data was not collected in 2006. No mountain plovers were found within the present JIPDA study area in 1999 and 2001.



The most common negative modifier throughout the JIDPA and 3-mile buffer is small habitat size (Table 7). The next most common negative habitat modifier is height of shrubs and then human development.

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 20, with the second survey following 14 days later (BLM 2004b). 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 mile of a proposed surface disturbance, activity will be postponed until July 10 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). Activities will be delayed 7 days when flightless chicks are observed (USFWS 2002).

In addition to these protection measures, the preservation of plover habitat is also recognized as an important benefit for this species. Therefore, identified mountain plover breeding sites should be maintained and protected. Some provisions exist which can benefit mountain plovers. Increasing acreage of identified habitat sites can be developed by seeding areas adjacent to existing mountain plover areas with native grasses (Smith and Keinath 2004). Habitat site number 1, in the south-west potion of the 3-mile buffer contains a newly installed pipeline that did not appear to be seeded yet. Reclamation of this pipeline with native grasses would increase the quality and possibly acreage of the existing plover habitat. Maintaining grass height at 4 inches or below with rotational grazing is ideal to produce the preferred vegetation used by mountain plovers. Reducing the destruction of prairie dog towns is recommended. Maintenance of prairie dog towns is crucial to maintaining breeding populations of mountain plovers. Prairie

dog towns provide the type of habitat used by mountain plovers (low vegetation). They may provide islands of habitat otherwise unsuitable for mountain plovers (Smith and Keinath 2004).

An increase of development and manmade structures can act as perches for raptors and visual obstructions for the mountain plovers. An additional recommendation is therefore not to place such obstructions near identified breeding habitats. Unused existing fences and windmills should be removed, as they provide excellent perches for hunting raptors which can predate mountain plovers. Site number 29 is just 1 example of habitat with a fence running through it (see picture).

Mountain plover site number 29 with a fence running through it.

Another threat to the future breeding success of mountain plovers in the study area includes the infestation of exotic grasses, like cheatgrass (*Bromus tectorum*), into their habitats (Dinsmore 2003). Cheatgrass was especially present on reclaimed sites and moderately observed in native areas of the JIDPA and 3-mile buffer by Aster Canyon biologists in 2008. Infestation in current mountain plover habitat would greatly reduce the breeding success of these birds. It is recommended that cheatgrass be monitored and eradicated when found to prevent a problem in the future.

In addition to these recommendations for the 2009 nesting season, it is also suggested that nesting season surveys are to continue using the new habitat ranking system to evaluate habitats. Habitats should be evaluated on a yearly basis because they may change annually. Nest fidelity may be used to predict the return of plovers and can help with drilling schedule planning.

Banding plovers can also assist with determining nesting fidelity. If nesting habitats are considered low-quality with many negative habitat modifiers, it may be appropriate to remove them from survey efforts.

Mitigation measures that can benefit plovers include the preservation of off-site mountain plover habitats through private conservation easements. Within conservation easements, areas of flat-tablelands, prairie dog colonies, alkali flats, agricultural fields and heavily grazed sites can be preserved without fragmentation as mountain plover habitat.

Much remains to be learned about mountain plovers, especially at the landscape scale. Habitat protection and sound management practices must continue to be put into action "The status of mountain plovers on large tracts of private land in Wyoming is relatively unknown. "Current species management would benefit from any additional information related to overall distribution and abundance of mountain plovers" (Smith and Keinath 2004). Continued monitoring of this species on the JIPDA is extremely important to the overall knowledge and existence of the mountain plover.

Typical mountain plover habitat. One mountain plover can be seen in the foreground on the right with the pronghorn behind it.

5.0 LANDBIRDS

The JIDPA is ranked as homogeneous shrub-steppe habitat. It historically provides habitat for many bird species, some of which are sagebrush obligates and are listed as sensitive species by the BLM, United States Forest Service Rocky Mountain Region Two, and are on the USFWS Birds of Conservation list.

Birds which inhabit areas in the JIDPA, and are listed as sensitive species in Wyoming include the Brewer's sparrow, sage sparrow, sage thrasher, loggerhead shrike, northern pintail, burrowing owl, ferruginous hawk, mountain plover, and greater sage-grouse (Holmes and Johnson 2005). Please refer to the table of contents of this report for direction to detailed information on independent monitoring efforts on burrowing owls, raptors, mountain plovers, and greater sage-grouse. In addition to sensitive species listings, migratory birds that exist on the JIDPA are offered protection by the Migratory Bird Treaty Act (USDI 2002).

These concerns prompted the initiation of a bird monitoring effort on the JIDPA. An *Avian Protection Plan* has been drafted, and began being implemented in part on the JIDPA in the spring of 2007. Birds will continue to be monitored as development in the JIDPA continues so that trends in their populations can be identified, and recommendations for maintaining their stability can be made. This report presents and discusses 2008 findings, as well as makes some comparisons to data obtained in 2007.

5.1 Study Design

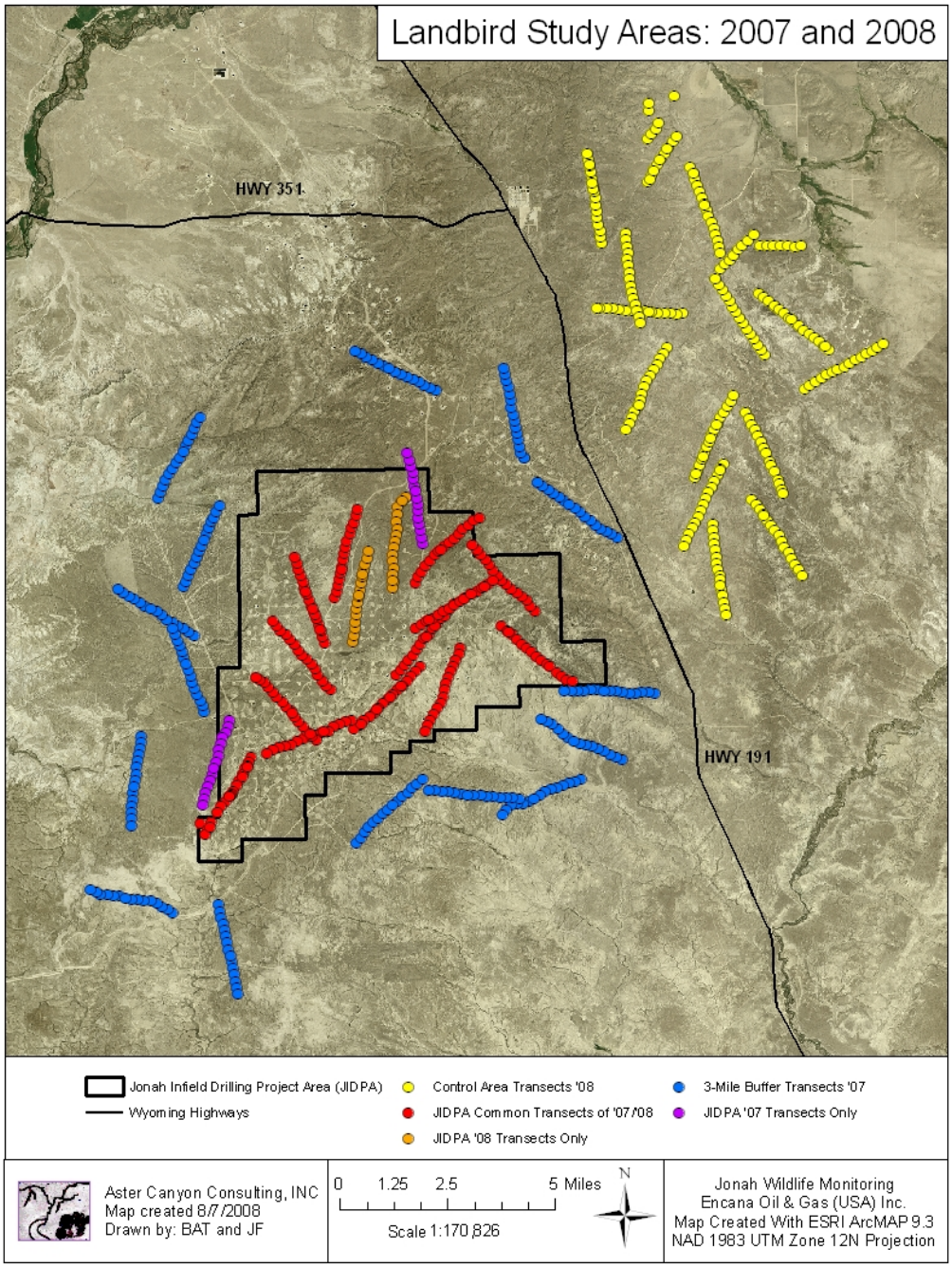
Overview

The study design used for 2008 data collection of birds on the JIDPA mimics that of the 2007 sample year. This design was selected because it is easily repeated annually, and allows for analysis of population trends for most diurnal, regular-breeding landbird species (Leukering et al. 2006). Basic trends are presented here. However, further analysis is possible with the widely

used *Program Distance*. As data is collected over future years, it is recommended that it be analyzed in this model.

In 2007, surveys for birds were done along a total of 30 transects. Fifteen of these were located throughout the JIDPA (Map 6, red and purple transects), and another 15 were surveyed in the JIDPA's 3-mile buffer (Map 6, blue transects). This buffer was used as a control area in 2007. In 2008, 30 transects were again surveyed. Thirteen of the 15 transects within the JIDPA were repeated from 2007 (Map 6, red transects), with 2 of the transects relocated within the JIDPA for the 2008 surveys (Map 6, gold transects).

The relocation of 2 of the 2007 transects within the JIDPA (Map 6, purple transects) was made in 2008 for 2 reasons. The first was that a portion of these 2 transects ran into the 3-mile buffer of the JIDPA. This buffer was not used as a control in 2008 because gas development has begun encroaching into this area. Instead, a control area was established on BLM land on the east side of Highway 191, which is in the same horizontal geographic plane and is similar in size and habitat structure to the JIDPA (Map 6, yellow transects). The second justification for modifying the transect locations was that none of the existing transects were located along Sand Draw, which is thought to be an ecologically abundant area within the JIDPA. One objective of the 2008 sample year was to determine if a correlation exists between ecological sites and bird abundance and diversity. Because Sand Draw contains soils and vegetation which are rare throughout the JIDPA, its inclusion in the 2008 sample year was deemed necessary. The transect, which ran partially through Sand Draw in 2008, is the upper right gold transect on Map 6.



Map 6. 2007 and 2008 landbird transects.

Transect access points were spread along main roads and two-track roads to cover as much of the study areas as possible. A random numbers table was used to generate a bearing for each of the 30 transects. If it was determined that the first bearing randomly selected would intersect with that of another, the next random bearing was selected. For some of the transects, it was

impossible 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 circumvent 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 (Aster Canyon 2007).

Target species for this study consisted of 4 sagebrush obligates and 2 non-obligates that are listed as sensitive species in Wyoming. The 4 target species dependent on sagebrush are the Brewer's sparrow, sage sparrow, sage thrasher, and greater sage-grouse. The 2 non-obligate sensitive species are the western burrowing owl and loggerhead shrike. The study was not limited to passerines. All observed avian species were recorded throughout each transect.

Survey Methods

Surveys for birds were conducted by biologists Jennifer Faulkner, Susan Cooper, Nicole Thiele, Iian Crichton, and Patty Brandage over the coarse of 33 field days. Surveys were conducted according to the RMBO Point Transect Protocol (Appendix C). Amendments to the protocol were made which involved estimation of distances rather than the recording of precise distances (Appendix C). This was done because the habitat where birds were surveyed was homogenously shrub-steppe. Birds occupying these areas are typically ground and shrub nesters and are often detected by song rather than visually, therefore require an estimation of location.

The 30 transects, which included 15 point counts each, were surveyed from May 20 to June 26 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. 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. Transects consisted of 15 5-minute point counts, each at 250-meter intervals along a pre-selected bearing. From the originally selected access point, the observer walked 250 meters along the bearing to establish point 1. Initial weather conditions (sky, wind, temperature) and start time were recorded, and the location recorded in Universal Transverse Mercator coordinates using North American Datum

1983 (NAD83) on Garmin e-trex GPS units (Aster Canyon 2007). After the 5-minute count at point 15, end data for weather conditions (sky, wind, temperature) and end time were recorded. At all 15 points, it was noted if the point fell within 100 meters of a road. Other habitat data recorded at point numbers 1, 5, 10, and 15 included the soil type and dominant vegetation cover present. Vegetation was also ranked by its seral stage.

Throughout the duration of the 5-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 the bearing from the observer to the bird was recorded with a compass. Birds were recorded using the 4 letter bird codes (Leukering et al. 2006), and detected according to these categories: V=visual; C=calling; S=singing; O=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 the study area are sexually monomorphic, so birds detected visually were not sexed and were recorded as unknown. Clusters were recorded if the detection was not independent from another. Target species were recorded at inter-points if they were not seen during the previous point count, and recorded on the data sheet as point 99. This ensured that birds were not missed while walking to the next point. Due to the amount of activity on the JIDPA in 2007 and 2008, bird detection was often compromised due to excessive noise from traffic, drilling, and venting tanks. This was more common in the 15 transects within the JIDPA than the 15 transects within the control area (Aster Canyon 2007).

Objectives and Analytic Methods

The objectives of the 2008 landbird monitoring effort were extrapolated from those of the previous year's goals and findings. The aims for the 2008 report are presented in 2 parts.

Part 1 presents results and discussion from data collected on the transects surveyed in 2008, and also compares this year's findings to those of 2007. Part 1 is divided into the following 3 categories: 1) *2008: The JIDPA and Control Area Transects*; 2) *All Transects Surveyed in 2007 and 2008*; 3) *Only Common Transects Across 2007 and 2008*. These categories will be maintained throughout the report to try to present the reader with organizational ease.

Part 2 of this report presents findings from data collected on ecological site descriptions in comparison to the abundance and diversity of bird species observed. Part 2 is also divided into 3 categories. They are as follows: 1) *Dominant vegetation*; 2) *Seral Stage*; and 3) *Soil Type*. A common goal of this project will be to make recommendations for future monitoring efforts of landbirds and will include refinements to the study design.

5.2 Part One: Landbird Transects

The objectives and analytic methods for specific components of part one of this report are as follows:

1) *2008: The JIDPA and Control Area Transects*

Objectives:

- Further establish baseline data for continual monitoring of landbirds, especially sagebrush obligates, on the JIDPA and a relatively undisturbed control area.
- Compare bird populations in the JIDPA with those of the control area to establish if, where, and how the development in this area is affecting sagebrush-steppe bird populations.

Analytic Methods: For 2008 data, species abundances for the JIDPA and the control area are presented separately as raw numbers of birds counted per point. Percentages of species were derived using these totals. A two-tailed t-test was used to determine significant differences in numbers of birds within species across study areas. Significant differences were determined with a confidence interval of 90% at p-values less than 0.05.

2) *All Transects Surveyed in 2007 and 2008*

Objective:

- Make general comparisons between data gathered in 2007 to this year's findings. This includes all 30 transects for each year, which means that some of the transect locations

across years were not in the same location. (Please refer to *study design overview* and Map 1 for further explanation).

Analytic Methods: In this section, raw numbers were used to compare the most common species totals and total percent of population across the entire study of each year to show general differences between years.

3) *Only Common Transects Across 2007 and 2008*

Objectives:

- Make stricter comparisons of data which was collected from transects with common locations across both years. This will comprise of data from 13 of the 15 transects within the JIDPA.

Analytic Methods: For this section of data, a more rigorous analysis is presented in which only common transects to the JIDPA across years were included. This meant 2 JIDPA transects, as well as the control areas from each year, were excluded from the data set to maintain consistency. Percentages of bird species were used for comparison in this data presentation to show a change in population over the years, relative to the number of birds observed per each year.

5.2a Landbird Transect Results

1) *2008: The JIDPA and Control Area*

A total of 1,970 birds were observed across the JIDPA and the control area in 2008. The control area had a higher number of birds recorded at a count of 1,056, while the JIDPA's total count was 914 birds. The difference in numbers between these two areas is found to be extremely significant ($p=0.0000958$), as was revealed by a two-tailed t-test.

Twenty-one different species of birds were observed across the 2 areas. The control area had a slightly more diverse population of birds, with the recording of 18 different species compared to

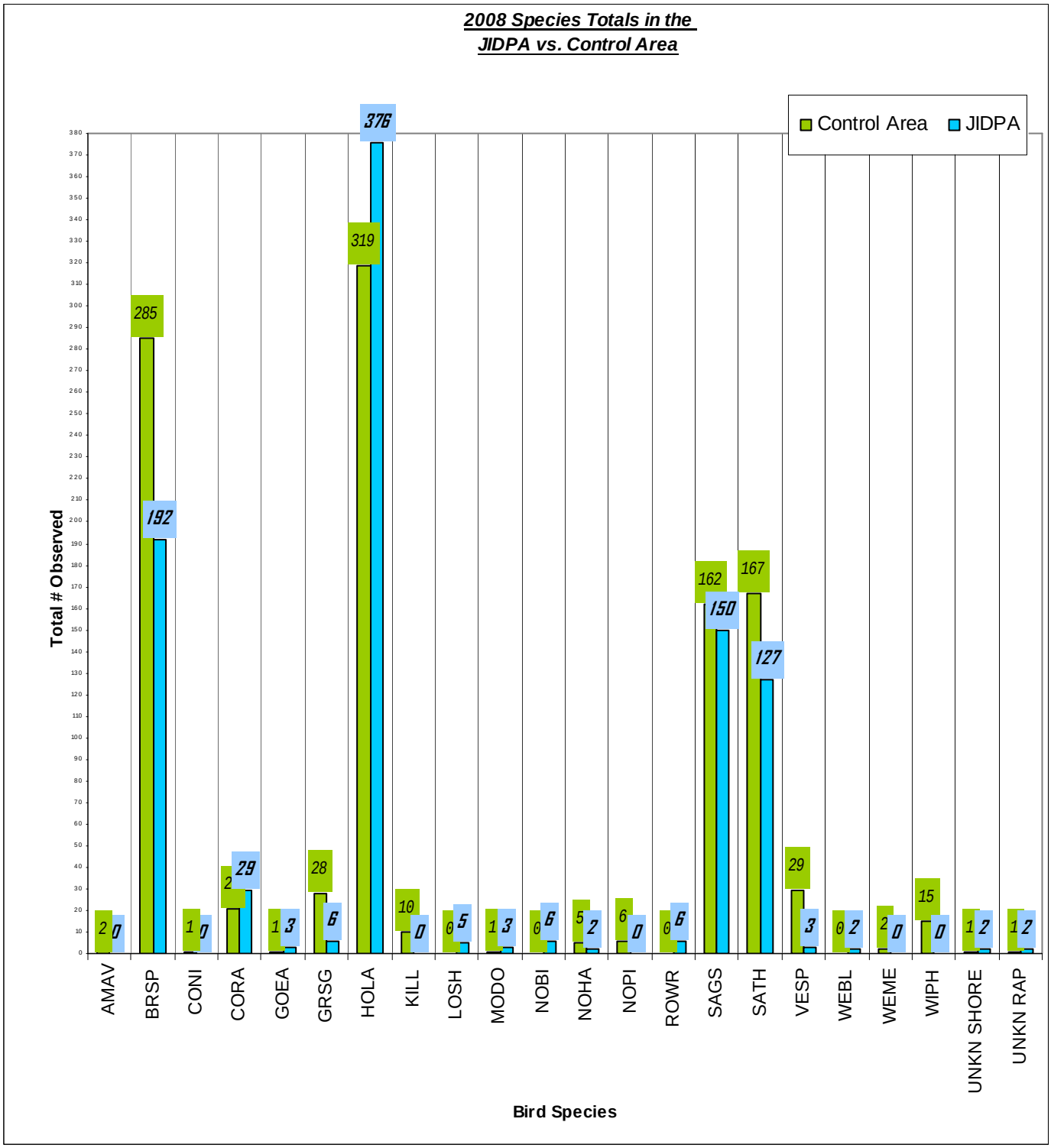
the JIDPA's 15. The control area had no points along its transects which were void of recorded birds, while the JIDPA had 6 such points. All of the Wilson's phalaropes (*Phalaropus tricolor*), American avocets (*Recurvirostra americana*), killdeer, northern pintails, western meadowlarks (*Sturnella neglecta*), and common nighthawk (*Chordeiles minor*) were observed in the control area. Conversely, the pair of western bluebirds as well as all of the loggerhead shrikes and rock wrens seen in the surveys were observed within the JIDPA (Table 8, Fig. 2).

Of the birds seen in the 2008 surveys, 6 are listed as sensitive species in Wyoming. These include the Brewer's sparrow, greater sage-grouse, loggerhead shrike, northern pintail, sage sparrow, and sage thrasher.

Table 8. Species names, codes, and totals for the control area and JIDPA in 2008.

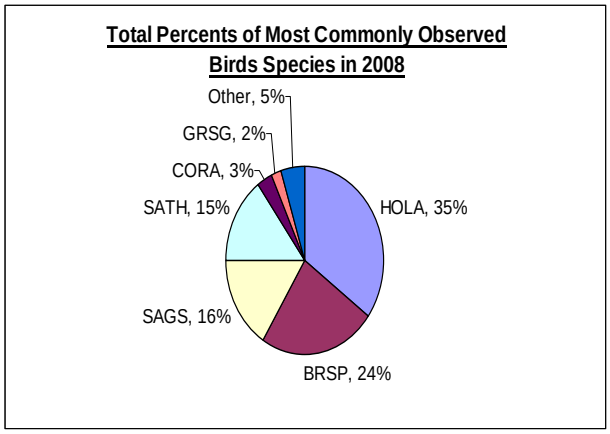
Species Name	**Species Code**	**Control Area**	**JIDPA**	**Total**
American Avocet	AMAV	2	0	2
Brewer's Sparrow	BRSP	285	192	477
Common Nighthawk	CONI	1	0	1
Common Raven	CORA	21	29	50
Golden Eagle	GOEA	1	3	4
Greater Sage-grouse	GRSG	28	6	34
Horned Lark	HOLA	319	376	695
Killdeer	KILL	10	0	10
Loggerhead Shrike	LOSH	0	5	5
Morning Dove	MODO	1	3	4
No Birds at Point	NOBI	0	6	6
Northern Harrier	NOHA	5	2	7
Northern Pintail	NOPI	6	0	6
Rock Wren	ROWR	0	6	6
Sage Sparrow	SAGS	162	150	312
Sage Thrasher	SATH	167	127	294
Vesper Sparrow	VESP	29	3	32
Western Bluebird	WEBL	0	2	2
Western Meadowlark	WEME	2	0	2
Wilson's Phalarope	WIPH	15	0	15
Unknown Shorebird	UNKN SHORE	1	2	3
Unknown Raptor	UNKN RAP	1	2	3
	GRAND TOTAL	**1056**	**914**	**1970**

Figure 2: Species totals in the JIDPA versus the control area for 2008.



The most common species across the entire study were the horned lark, Brewer's sparrow, sage sparrow, sage thrasher, common raven, and greater sage-grouse respectively. These 6 species combined yielded 95 percent of the birds observed in the sample year (Fig. 3).

Figure 3. Total percents of bird species in JIDPA and control area in 2008.

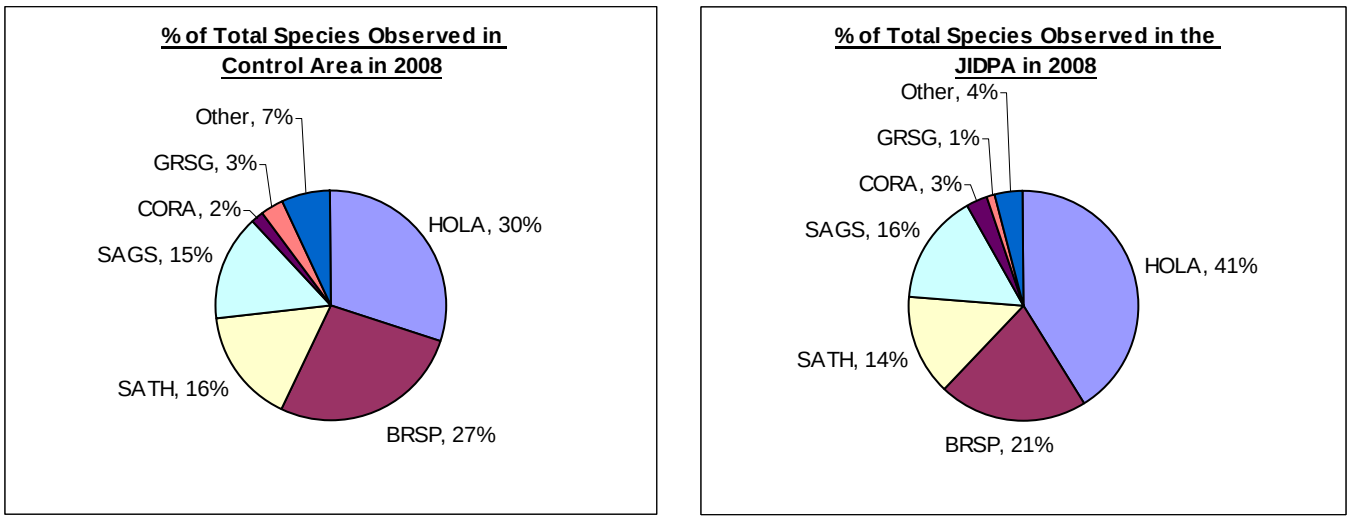


When comparing the percents of each species observed in the JIDPA transects to those of the control area, similar results exist as were seen across the combined area totals. The most common species remained true in the JIDPA and control area when analyzed independently (Fig. 4). Both the control area and the JIDPA had horned larks and Brewer's sparrows as their most prevalent species. The control area had a slightly higher percentage of sage thrashers than sage sparrows, while the JIDPA had a reverse trend between these two species. Please note, although the total *percentage* of sage sparrows was higher in the JIDPA, the *actual number* of sage sparrows recorded in the control area was higher (Table 9). The control area also hosted a slightly higher percentage of greater sage-grouse and a smaller percentage of common ravens than did the JIDPA.

Table 9. Numbers and percents of most common birds in the JIDPA and control area in 2008.

Bird Species Name	Bird Species Code	# of Birds in Control Area	% Birds in Control Area	# Birds in JIDPA	% Birds in JIDPA
horned lark	HOLA	319	30	376	41
Brewer's sparrow	BRSP	285	27	192	21
sage sparrow	SAGS	162	16	150	14
sage thrasher	SATH	167	15	127	16
common raven	CORA	21	2	29	3
greater sage-grouse	GRSG	28	3	6	1
Other	Other	74	7	34	4

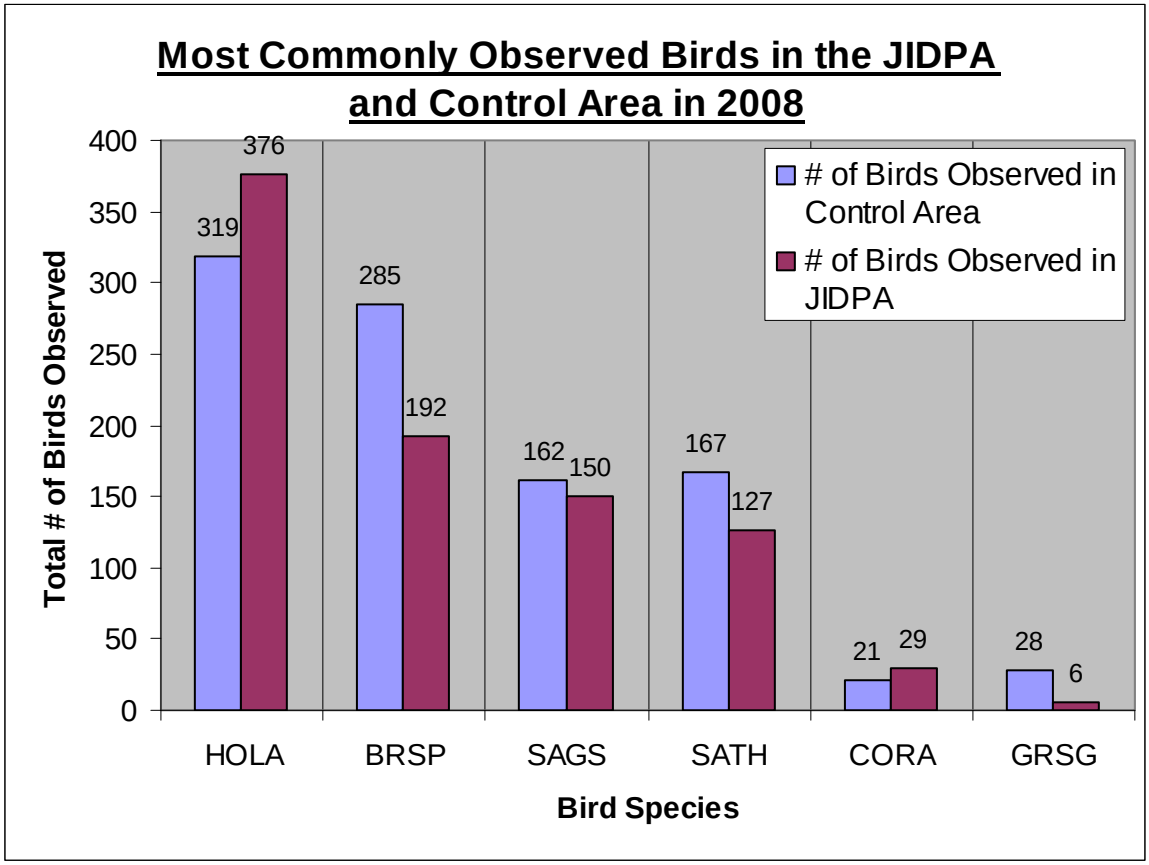
Figure 4. Percentages of species in the control area and the JIDPA in 2008.



When comparing the actual numbers of the most commonly observed birds across the 2 areas, a few results are noted. A total of 6 species observed in 2008 revealed significant differences in detection numbers between the JIDPA and control area. From order of highest to lowest degree of significance these species were the: Brewer's sparrow (p=0.00000773); vesper sparrow (*Pooecetes gramineus*; p=0.00000773); sage thrasher (p= 0.004795); American avocet (p=0.010389); rock wren (p=0.015444); and loggerhead shrike (p=0.037349).

Another result worth noting is that all of the sagebrush obligate species detected in the 2008 sample year were among the 6 most commonly observed species across the 2 areas. These included the Brewer's sparrow, sage sparrow, sage thrasher, and greater sage-grouse. These are the same 4 species, of the most commonly observed, which had a higher number of detections in the control area over the JIDPA (Fig. 5). Two of these species, Brewer's sparrows and sage thrashers showed significant differences across the two areas.

Figure 5. The 6 most commonly observed species totals in the JIDPA versus the control area in 2008.



2) *All Transects in 2007 and 2008*

Some comparisons between the results of all of the data collected during 2007 and 2008 are worth mentioning. It should be noted that *only generalizations* between these 2 years are made in this section of the report because differences, which are detailed in the *study design overview* and Map 6, exist in 2 of the JIDPA transect locations, and all of the control area transect locations from transects surveyed in 2007.

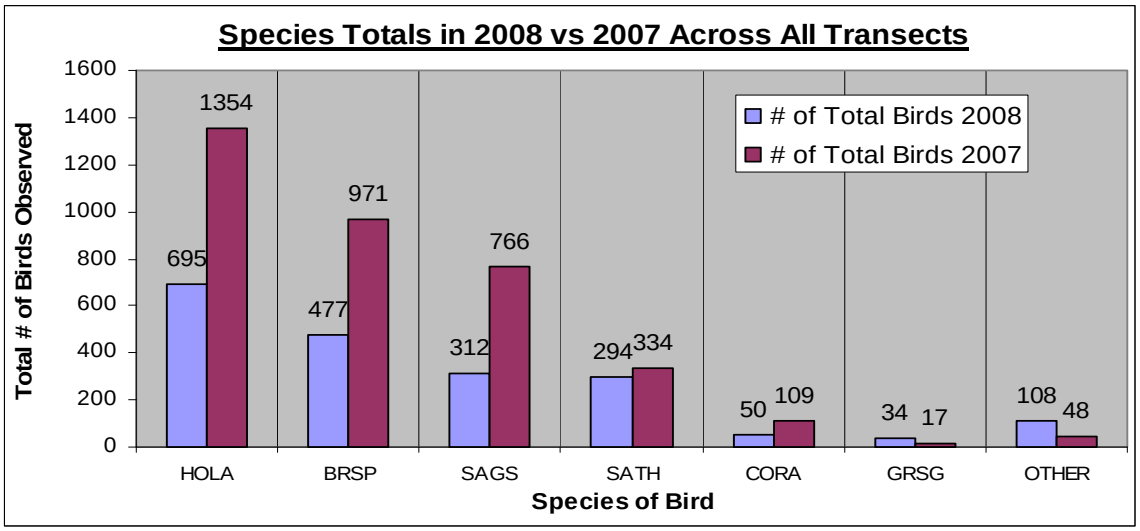
When comparing the 2007 and 2008 sample years, the same species of birds which were most common in and across study areas of 2007 remained in the same order of abundance in the 2008 surveys (Table 10).

Table 10. Species totals and percents of all birds observed in 2007 and 2008.

Species Name	Species Code	# of Total Birds 2008	% of Total Birds 2008	# of Total Birds 2007	% of Total Birds 2007
horned lark	HOLA	695	35	1354	38
Brewer's sparrow	BRSP	477	25	971	27
sage sparrow	SAGS	312	16	766	21
sage thrasher	SATH	294	15	334	9
common raven	CORA	50	3	109	3
greater sage-grouse	GRSG	34	2	17	0
Other	OTHER	108	5	48	1

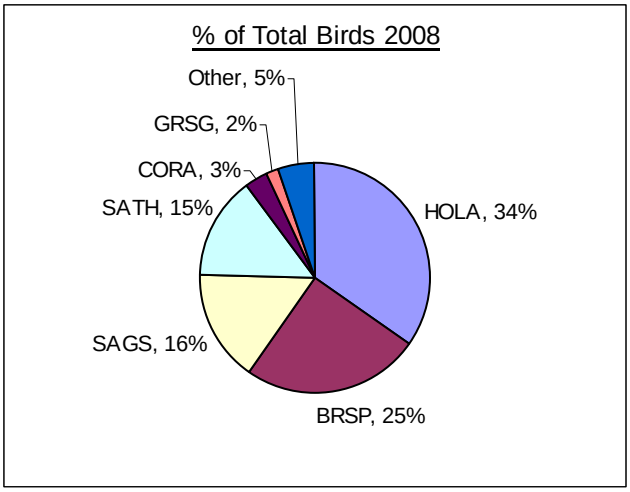
Another notable result across the two sample years was the difference in numbers of detections among the most commonly observed species (Fig. 6).

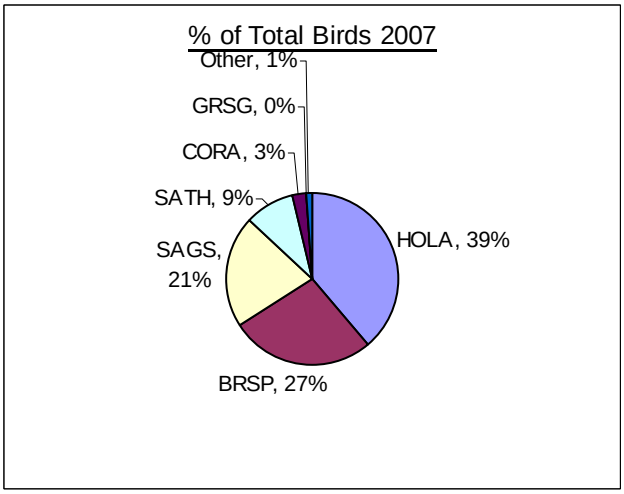
Figure 6. Species totals in 2008 and 2007.



The 5 most commonly observed species show differences in number of detections between years, but the same order of abundance. When comparing the actual percentages of bird species observed in 2007 and 2008, the differences are much less severe than between the numbers of detections observed. The 2008 sample year saw a decrease in the percentage of the population made up of horned larks, Brewer's sparrows, sage sparrows, but a larger percentage of the population made up of sage thrashers, greater sage-grouse, and other bird species, with a constant percentage of common ravens compared to the 2007 results (Fig. 7).

Figure 7. Total percentages of birds observed across all



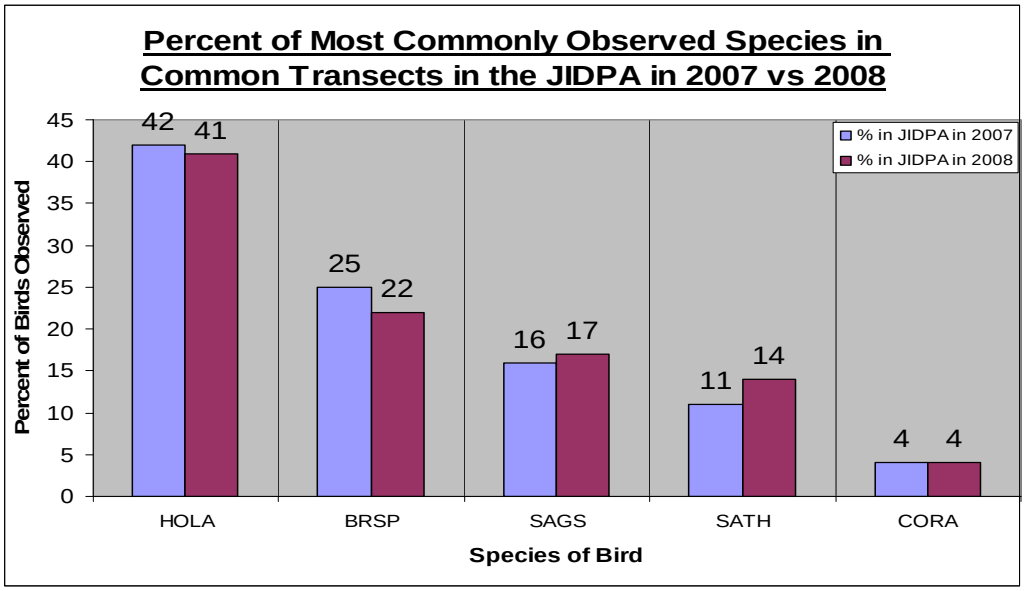


3) *Only Common Transects Across 2008 and 2007*

Data from 2 transects within the JIDPA, which were relocated in 2008 (see *study design overview* and Map 6), will be excluded in this section of the report to maintain consistency within the data set. Because the control area was relocated in 2008, to an area less likely to be developed, the data from transects in the 2007 3-mile buffer and the 2008 control area will be excluded from this analysis. This limits across-year data comparison to 13 transects within the JIDPA (Map 6, red transects). Also, only the most commonly observed species will be compared across the years. The greater sage-grouse does not appear in these totals because all of these birds which were detected in 2008 in the JIDPA, were seen along the transect which was relocated to Sand Draw.

When comparing the above-mentioned 13 transects between 2007 and 2008, only slight differences were found among the 5 most commonly observed types of birds. The horned lark and the Brewer's sparrow percentages show a decline over the past year, while the sage thrasher and sage sparrow percentages show an increase. The common raven percentages show no change over the past year (Fig. 8).

Figure 8. Most prevalent species in JIDPA in 2007 versus 2008 in commonly surveyed transects. This figure excludes data from two relocated transects within the JIDPA and control areas, as they were not commonly located across years.



5.2b Landbird Transect Discussion of Protection Measures and Recommendations

Discussion of survey results and recommendations for protection measures for landbirds on the JIDPA are as follows. Specific topics that are addressed are species diversity and abundance comparisons between the JIDPA and the control for 2008, and comparisons totals for all transects between 2007 and 2008.

1) *The JIDPA Compared to the Control Area in 2008*

The comparison of the 2 study areas in 2008 indicates that there is a level of consistency in the species that are most abundant. The species which were most commonly observed were the same across the entire study, as well as independently within the JIDPA and the control area. These included the horned lark, Brewer's sparrow, sage thrasher, sage sparrow, common raven, and greater sage-grouse.

This sampling effort did, however, find a significant difference in the bird populations between the JIDPA and the control area in 6 of the observed species from 2008. These included the

Brewer's sparrow, vesper sparrow, sage thrasher, American avocet, rock wren, and loggerhead shrike respectively. Two of these species had a significantly higher number of detections in the JIDPA over the control area. These were the rock wren and loggerhead shrike. Each of these types of birds was only observed in the JIDPA. The loggerhead shrike is also considered a species of concern in Wyoming. The remaining 4 species with significant differences in detection numbers had higher numbers in the control area over the JIDPA. Two of these species were the vesper sparrow and American avocet. The other two species with significantly higher detections in the control area over the JIDPA were the Brewer's sparrow and sage thrasher. These 2 species are also sagebrush obligates and species of concern in Wyoming.

These findings are in tandem with those of other studies which investigate the effects of landscape alteration and fragmentation on local sagebrush bird species. Populations of shrubland bird species show the most consistent decline across the United States in the last 30 years of any bird species (Sauer et al. 1996). Research shows that the fragmentation of shrub-steppe habitat, through various alterations in landscape, is the cause for this change. A well-known study investigating the relationship between landscape characteristics of fragmented shrub-steppe habitats and breeding passerine birds found that:

> Site selection by shrub-steppe species (Sage and Brewer's sparrows, and Sage thrashers) depended on local vegetation cover and landscape features, such as patch size of shrub habitats or the spatial similarity of sites. Marginal sites for these species (with species present in one of three years) were intermediate between unoccupied (never present) and occupied sites along environmental gradients characterized by increasing size of shrub habitat patches and total shrub cover and by decreasing disturbance. Horned larks and Western Meadowlarks, typical grassland species, were not sensitive to landscape features, and their occupancy depended on the amount of grassland or shrub cover (Knick and Rotenberry 1995).

Fragmentation of native shrub-steppe habitat has been caused by several contributing factors throughout the United States. Among these are farming, grazing of livestock, and an increase in the prevalence of large-scale fires. These fires can destroy large amounts of sagebrush, and can also propagate the spread of non-native annuals which makes reclamation by sagebrush unlikely (Paige and Ritter 1999).

A study was published examining the effects of a prescribed burn on songbirds and vegetation in a mountain big sagebrush community. It was found that Brewer's sparrows and sage thrashers occurred in lower abundance 3 years after sites were largely or completely burned, relative to unburned shrub covered areas. It was also found that on these same burned sites, horned larks became more abundant after the fire treatment (Holmes 2007). These are the same trends observed in bird numbers and species in 2008 between the JIDPA and the control area. Although the development occurring in the JIDPA differs from fire's alteration of the landscape, similarities in the effects of these treatments do apply. It is found that some of the results of these landscape alterations to the local bird numbers also apply.

Fragmentation of sagebrush habitats has been caused by other forms of landscape alteration. These include urban expansion, an increase in roads and traffic, as well as oil and gas development (Paige and Ritter 1999). Research completed by Franz Ingelfinger (2001), studied passerine responses to roads associated with natural gas development in sagebrush-steppe habitat in Wyoming's Upper Green River Basin. It was found that the density of Brewer's and sage sparrows was reduced 39-60% within a 100-meter buffer of dirt roads with low traffic volumes. This study also found the abundance of horned larks to be higher in this buffer compared to areas outside this zone. Again, these findings coincide with those found in this year's landbird sampling.

From established findings combined with this study's results, it is apparent that the fragmentation of sagebrush through alteration of habitat does negatively affect sagebrush obligate species, while benefiting other species such as horned larks and common ravens. It would therefore be prudent of land managers and developers of these areas to establish the amount and types of habitat most needed to maintain a minimal abundance of species. Part 2 of this report focuses on 3 habitat descriptions (soil type, dominant vegetation, and seral stage) and how they relate to the birds found on their related sample points. Other additional habitat characteristics were also observed during the 2008 field season as contributors to bird species'

diversity. These habitats of interest include rock outcroppings, intermittent stream beds, as well as water sources in the control area.

The rock wrens observed were seen only in the JIDPA, and were found to be most prevalent in a particular rocky area on the eastern side of the JIDPA. One of the 2 northern harriers seen along the landbird transects in the JIDPA and all 3 of the golden eagles, as well as 3 of the 4 mourning doves (*Zenaida macroura*) seen in the 2008 sampling, were observed in this same eastern edge of the JIDPA. Curiously, this same area was identified, by observers collecting raptor data for the 2008 season, as habitat of high nest density in the JIDPA. Sections 12 and 13 east of North Jonah Road in the JIDPA is therefore recommended to be given a higher degree of protection from development and fragmentation in the future.

Another area in the JIDPA was also found to support a higher diversity of bird species. This was found along the Sand Draw transect. The only greater sage-grouse, vesper sparrows, and loggerhead shrikes, as well as one of the 2 northern harriers observed in the JIDPA 2008 landbird transects were found along Sand Draw. Protection measures do exist in this area, which include a 600-feet NSO buffer around Sand Draw. Because other landbirds seen utilizing this draw included the loggerhead shrike, which is also listed as a species of concern, it is recommended that provisions be made for this species. The peak breeding season for loggerhead shrikes is from early May to mid-July (United States Geological Survey 2006), therefore the buffer a Sand Draw should be considered throughout this same time period.

Loggerhead shrike perched in Wyoming big sage.

A third and final habitat that was noticed to support a diversity of bird species during the 2008 surveys included the water sources found in the control area. All of the: western meadowlarks, northern pintails; Wilson's phalaropes; killdeer; American avocet; common nighthawk; and

unknown shorebird seen in 2008 were observed in the control area only, and were usually seen in association with water from ponds or reservoirs. Such habitat is not found on the JIDPA, and therefore explains why these species were not seen in this area. The JIO delegates money toward various projects to offset the effects of development to the land and wildlife in the JIDPA. Knowledge that water sources provide for species diversity among landbirds should be considered when distributing funds for off-site mitigation. Projects approved by the JIO in 2008 which made such considerations included the *Noble Cora Peak Wildlife Project* and the *Range Improvement Water Trough Bird Ramp* project (USDI 2008). The first of these projects serves to improve wildlife habitat by providing animals with drinking water, and enhancing riparian vegetation through upgrading of an existing spring. The second project was approved to install escape ramps for birds on existing BLM water tanks. Each of these projects will help maintain diversity and success in bird species across homogenously shrub-steppe habitat, and are encouraged to be implemented in the future.

Wilson's phalaropes.

Another measure suggested to increase bird diversity is the placement and maintenance of bluebird nesting boxes throughout the JIDPA. The only pair of bluebirds seen during the 2008 landbird transects was observed on a fence-line on the JIDPA. Nesting boxes are known to be a strong attractant for this species, and have been a successful tool in bringing this species back from decline in other parts of the United States (Maryland Department of Natural Resources 2004).

2) *All Transects from 2008 and 2007*

The results of a comparison of the entire data set from the transects surveyed in 2007 and 2008 show again that there is consistency in the type of species which are most prevalent in the study areas. Although the actual percentages of total species observed across the 2 sample years differ slightly, the results show the same ranking of abundance as was observed in the 2008 sample

year alone. The difference in total number of species' detections, however, was found to be highly variable between the 2 sample years.

Common nighthawk.

With the point count method employed here, as outlined by the RMBO, a few biases are recognized. This includes estimates of spatial trend, i.e. open habitats such as shrub-steppe, verses closed habitats such as woodlands. An additional bias consists of temporal trends in regard to habitat succession, and use of observers of varying ability over different years (Buckland et al. 2004).

Bias that may have affected the differences in sampling years could be that the biologists surveying in 2007 were not the same as those recording detections in 2008, and thus were not making calibrated observations across years. The surveyors in 2007 and 2008 found that the 250-meter distance between point counts along transects posed a problem of possible over-sampling. Mostly topographic changes in landscape as well as wind interference affect the sound levels of song birds. Because the habitat make-up of this study is homogenously shrub-steppe, without a high degree of topography alteration, the songs of birds in this area often travel over distances longer than 250 meters when winds are not interfering. For this reason, 2008 observers often suspected hearing birds at successional points along their transects, that had already been recorded and therefore were conservative with detection numbers. This difference in methods poses obvious problems of consistency and accuracy within and across sample years. It is therefore recommended that the future study design is modified to address this problem.

3) Transects Only Common Across 2008 and 2007

These data showed the horned lark percentages slightly decreased from 2007 to 2008, while the common raven's percentages remained stable. Two sagebrush obligate species' percentages, the sage sparrow and sage thrasher, showed increases. The third sagebrush obligate species among

the most commonly observed across 2007 and 2008 was the Brewer's sparrow, which showed a decrease in percentage of population across the 2 years.

It will be important to monitor these changes over a longer time period. The more transects which remain consistently located across a higher number of years, will grant the best data set for trend analysis. Although the different comparisons made yielded varying and sometimes unsubstantial results, this data also showed some consistencies. The common theme among the landbird transects was found in the ranking of the abundance of each species observed. Because every analysis focusing on the most common species observed in the 2007 and 2008 sampling provided the same order (horned larks, Brewer's sparrow, sage sparrow, sage thrasher, common raven, greater sage-grouse), this pattern should be given special attention in the future. A change in this order may be a good indicator of instability of habitat conditions for the target species of this study.

5.3 Part Two: Landbird Ecological Site Descriptions

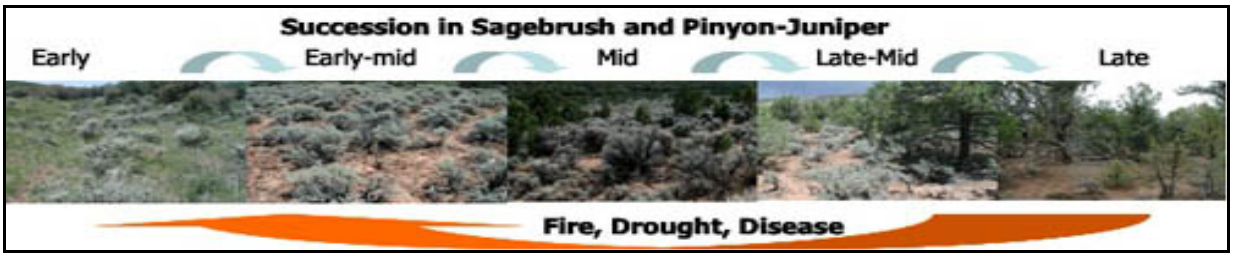
To establish if specific areas of the JIDPA provide for a higher bird species abundance and diversity, ecological data on sites throughout the point transects were collected. In the 2008 landbird surveys, 3 ecological aspects of sites were recorded and analyzed. These included observed and mapped soil type, dominant vegetation, and seral stage of growth.

5.3a Landbird Ecological Site Descriptions Methods

Soil type observed, dominant vegetation, and seral stage data were collected at 4 sample points in each of the 30 transects across the JIDPA and control area. This was done prior to beginning bird point counts at point numbers 1, 5, 10, and 15 of each transect. The soil type was recorded as it was observed and classified through use of a texture triangle (Schoeneberger et al. 2002). Through collaboration with Karen Clause, a range management specialist at the Natural Resource Conservation Services (NRCS), a mapped layer of soil types was provided for

comparison to observed soil types. This layer was not given to Aster Canyon as an electronic file. Rather, NRCS was given the UTMs of the avian point transects and then provided Aster Canyon with 8 X 10 inch maps which had the transects plotted on top of their soil layer. Aster Canyon biologist Jennifer Faulkner used the NRCS database on Ecological Site Descriptions to match the mapped code with its appropriate corresponding soil type.

Dominant vegetation was recorded as either sagebrush, sagebrush/grass, grass, or other. The other classification was a combination of the different vegetation types or a different cover such as Russian thistle or bare ground. Seral stage is the transitory plant community which occurs in the succession toward a climax community (biome). It was recorded as either *early*, *mid*, or *late* stage of growth. Early-stage growth in a shrub-steppe community occurs after the climax stage, and includes early grass and forbs production. Mid-stage growth produces mature sagebrush stands and less grass production. Late-stage growth reveals older shrubs, which are partially dead. Although the late climax stage seen here is not the same as that seen on the JIDPA, it illustrates different seral stages of sagebrush and pinyon-juniper stands



http://www.upproject.org/landscape_assessments/restoration/seral_stages.htm

5.3b Landbird Ecological Site Descriptions Results

1) Soils

Eight different soil categories were observed throughout transect surveys in 2008 (Table11). The soils observed most frequently were sandy, loamy, sandy/loamy, and clayey/loamy, respectively. These soils combined to make up just over 89% of the soil types observed throughout all of the transects. When comparing the frequency of observed soil types to the number of birds observed per each soil type sample point, there is a direct relationship in numbers. The soil types most

often observed, hold sample points with the highest number of birds per sample point (Table 11). Because of this direct relationship, it is hard to determine if one soil type provides more likely habitat for the detected birds than another.

Table 11. Number and percentage of soil type points observed and birds per soil type point out of the 120 points in which ecological site description data were collected.

Soil Type Observed	Soil Type Code	Total # Pts/ Soil Type	# Birds/Soil Type Pt	% Pts/ Soil Type	% Birds/ Soil Type Pt
Sandy	sy	39	177	32.5	33.2
Loamy	ly	32	127	26.7	23.8
Sandy/Loamy	sy/ly	22	106	18.3	19.9
Clayey/Loamy	cy/ly	14	67	11.7	12.6
Clayey	cy	7	32	5.83	6.57
Sandy/Clayey	sy/cy	3	10	2.50	1.88
Gravely/Sandy	gr/sy	2	9	1.67	1.69
Shallow/Loamy	sw/ly	1	5	0.83	0.93
Shallow/ Clayey	sw/cy	0	0	0.00	0.00
Shallow/Sandy	sw/sy	0	0	0.00	0.00
	Total	120	533	100%	100%

An additional aspect of the analysis of soil data in 2008, was a comparison of the soil type observed to soil type mapped. These mapped soil types were overlaid onto an NRCS map soil by Karen Clause. She then e-mailed maps of individual transects to Aster Canyon that were used to determine the mapped soil type for the 120 transect points in which the ecological data was collected. This allowed for a comparison of observed soil type to mapped soil type. This ground-truthing of data revealed discrepancies between observed and mapped soil types (Table 12). Unlike the observed soil type points, the mapped soil type points show loamy soil types to be the most prevalent along the transects. This soil type is followed by sandy soils, then clayey/loamy soils, then sandy/loamy soils as the order of highest number of soil type sample points mapped. Although, these rankings differ compared to the observed soil type sample points, they show the same direct relationship to the number of birds seen per soil type sample point. Again, the highest number of mapped soil type sample points had the highest number of birds seen per sample point (Table 12).

Table 12. Number and percentage of soil type points mapped and birds per soil type point out of the 120 points in which ecological site description data was collected.

Soil Type Mapped	Total # Pts/ Soil Type	# Birds/Soil Type Pt	% Pts/Soil Type	% Birds/ Soil Type Pt
sy	21	79	17.5	14.8
ly	74	330	61.7	61.9
sy/ly	9	42	7.50	7.88
cy/ly	10	58	8.33	9.76
cy	3	12	2.50	2.25
sy/cy	0	0	0.00	0.00
gr/sy	0	0	0.00	0.00
sw/ly	1	6	.833	2.63
sw/cy	1	2	.833	.375
sw/sy	1	4	.833	.375
	120	533	100%	100%

2) Dominant Vegetation:

The second ecological site description which had data collected at points 1, 5, 10, and 15 along the landbird transects included dominant vegetation. The different vegetation types recorded were classified as either dominantly grass (gr), sagebrush (ss), sagebrush/ grass (ss/gr), or other. When considering the data set across the JIDPA and control area combined, the most prevalent vegetation type observed was sagebrush, followed by a sagebrush/grass classification, then grass, with the *other* classification as the least observed dominant vegetation type. The ranking in abundance of birds per vegetation type followed this same trend, with similar percentages of vegetation type sample points compared to percentages of birds per vegetation type point (Table 13).

Table 13: Total number and percent of vegetation type points and birds per vegetation point across JIDPA and control area.

Dominant Vegetation Type	Total Veg Type Pts	Total Birds/ Veg Type Pt	Veg Type % of Total Pts	% Birds/ Veg Type Pt
sagebrush (ss)	67	303	56	57
sagebrush/grass (ss/gr)	25	123	21	23
grass (gr)	18	68	15	13
other	10	39	8	7
total	120	533	100%	100%

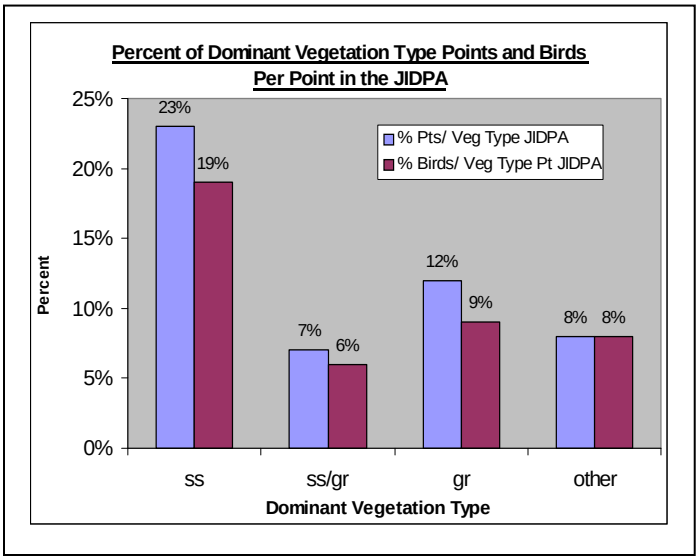
When analyzing the JIDPA versus control area data based on vegetation type sample points, the trends seen across the total study area do not remain in the same order as those seen in each area independently. The control area had more sample points dominated by sagebrush and sagebrush/grass than the JIDPA. The JIDPA had its highest number of dominant vegetation type sample points as sagebrush, but its second highest number of sample points were grass dominated (Table 14, Fig. 9).

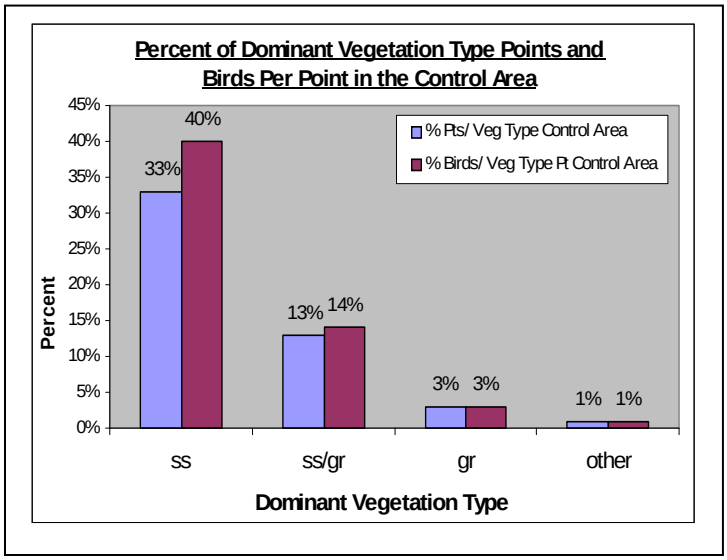
Table 14. Number of points per dominant vegetation type and birds per vegetation type point in JIDPA and control area.

Veg. Type	# Pts/ Veg Type JIDPA	# Pts/ Veg Type Control Area	# Birds/ Veg Type Pt JIDPA	# Birds/ Veg Type Pt Control Area
ss	28	39	104	211
ss/gr	9	16	32	73
gr	14	4	46	18
other	9	1	44	5
total	60	60	226	307

The percentage of birds observed at each point was again directly related to the percentage of points that occurred in the JIDPA and control area. The control area did host a higher total percentage of birds by 15 % (Fig. 9).

Figure 9. Percent of dominant vegetation type points and birds per point in the JIDPA and control area. ss = sagebrush, ss/gr = sagebrush/grass, and gr = grass.





3) Seral Stage:

The third ecological site description which was recorded at transect points 1, 5, 10, and 15 was the seral stage. This was classified as either early, mid, late, or other. The other classification applied to a combination of the early, mid, or late descriptions. Among seral stage classifications, mid-stage sample points were observed most frequently, with the number of early and late stage sample points nearly equal. The percentage of birds per seral stage sample point was directly related to the number of seral stage sample points (Table 15).

Table 15. Number and percentage of seral stage points and birds per seral stage point in JIDPA and control area combined.

Seral Stage	# Pts/ Seral Stage	# Birds/ Seral Stage Pt	% of Pts/ Seral Stage	% Birds/ Seral Stage Pt
early	27	112	22.5	21.0
mid	61	265	50.8	49.7
late	26	132	21.7	24.8
other	6	24	5.00	4.50
total	120	533	100%	100%

When considering the JIDPA and control area seral stage numbers independently, they reflect different patterns of seral stage type prevalence. Both areas held the mid-level seral stage sample points as their highest in frequency. The control area had more late-stage sample points than early-stage points, however, with the opposite trend in the JIDPA. The relationship between the number of birds per seral stage sample point remained direct in the JIDPA and the control area (Table 16).

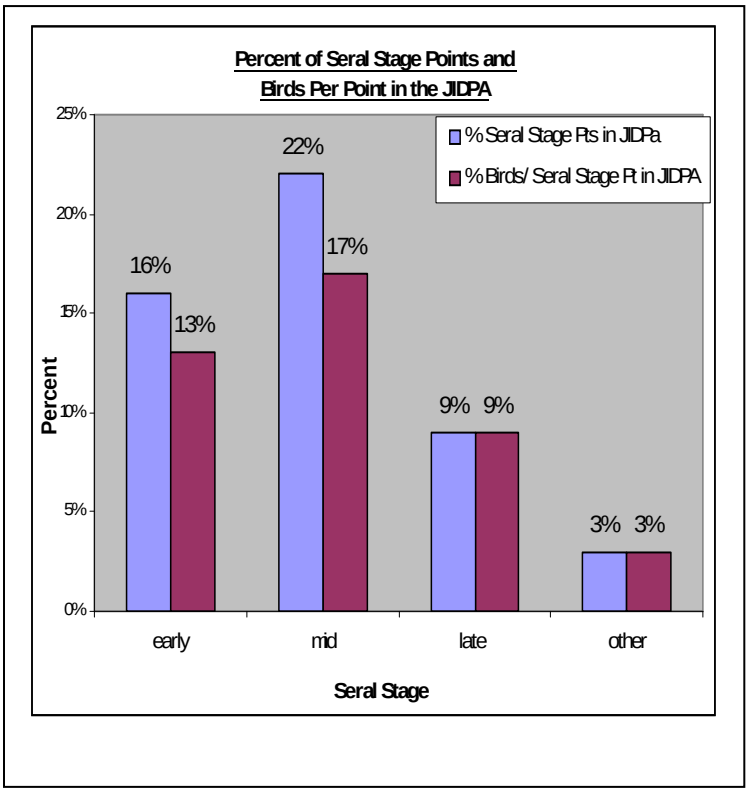
Table 16. Number of points per seral stage and birds per seral stage point in the JIDPA and control area.

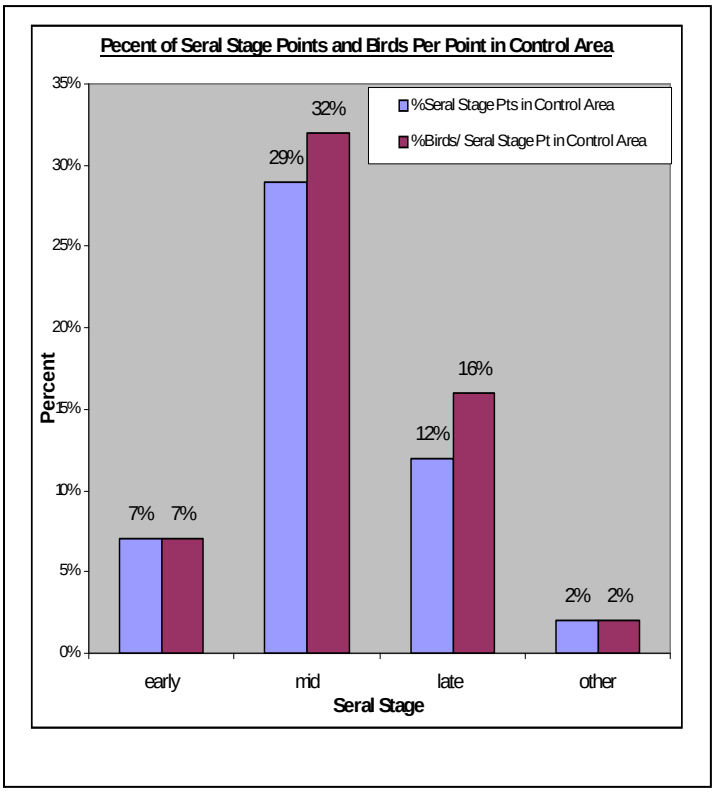
Seral Stage	# Pts/ Seral Stage JIDPA	# Pts/ Seral Stage Pt Control Area	# Birds/ Seral Stage Pt JIDPA	# Birds/ Seral Stage Pt Control Area
early	19	8	72	40
mid	26	35	92	173
late	11	15	46	86
other	4	2	16	8
total	60	60	226	307

When considering the percentage of seral stage points in relationship to the number of birds per point, again it remains direct. The control area had 16% more birds per sample point than did the

JIDPA. The total percent of birds per sample point in the JIDPA was 42%, while the control area's total was 58% (Fig. 10).

Figure 10. Percent of seral stage points and birds per point in the JIDPA and control area.





5.3c Landbird Ecological Site Descriptions Discussion, Recommendations, and Protection Measures

In an effort to establish if certain areas and habitat within the JIDPA are especially important for bird abundance and diversity, ecological site data was collected at four points throughout the avian transects. A discussion of the results from this data collection as well as the protection measures and recommendations are presented below.

For each of the ecological site descriptions recorded along the 2008 landbird transects, there was a direct relationship between the number of the ecological type of points and the number of birds detected per point. These results seem to indicate that birds are proportionally dispersed across ecological habitats. The most prevalent classification of points seen across the JIDPA and the

control area were: *sandy* among observed soil types and *loamy* among mapped soil types; *sagebrush* among dominant vegetation types; and *mid*-level growth among seral stage type. These most frequently observed points also hosted the most frequently observed birds.

These findings correlate with a study published in 1999 titled *Shrubsteppe Bird Response to Habitat and Landscape Variables in Eastern Washington, U.S.A.* The results of this study found that:

> Brewer's Sparrows and Sage Sparrows reached their highest abundance in deep, loamy soils, whereas Loggerhead Shrikes were most abundant in deep, sandy soils. Sage sparrows occurred most frequently in landscapes dominated by shrub-steppe, indicating a negative relationship with fragmentation (Vander Haegen et al. 1999).

Each of the above-mentioned species is classified as species of concern in Wyoming, and their habitat requirements should be considered in areas of development. The Brewer's sparrow and sage sparrow are sagebrush obligates, and their success will require maintenance of sagebrush communities. The vegetation data collected during the landbird transects indicates that the JIDPA may be undergoing a transition toward early seral-stage and grass dominated vegetation cover, as each of these categories is higher in the JIDPA than the control area. The loggerhead shrike was only observed in the JIDPA along the Sand Draw transect. This is likely due to its preference for the Wyoming big sage (*Artemesia tridentada wyomingensis*) which grows in sandy soils such as those found along Sand Draw. It is therefore recommended that this area be given special consideration for protection in the future.

Further research investigating the relationship between bird abundance and diversity compared to ecological site descriptions provides recommendations to help identify and manage priority habitat for sensitive bird species. The overall goal for helping birds in areas where mining, oil, and gas development is occurring depends on "our ability to provide a mosaic of native plant communities across the landscape" (Nicholoff 2003). This recommendation suggests that maintaining sagebrush stands which are diverse in age and composition is important to the success of sagebrush obligate species. The 2008 landbird survey's ecological site data seems to

support these measures, as the mid seral-stage growth and sagebrush dominant points held the highest number of birds in the JIDPA and control area.

It has also been recommended to place rock piles on reclamation sites to create habitat for birds and other small wildlife (Nicoloff 2003). This has been implemented on the JIDPA in a few locations.

Other recommendations listed above have been implemented on the JIDPA including the adherence to non-drilling in buffers around nesting raptors and sage-grouse. Additionally, vegetative reclamation efforts are in place following site development in the JIDPA. Reestablishment of sagebrush dominated landscapes is a difficult process, however, and the amount of this habitat that is removed will likely determine the success of the sagebrush obligate bird species.

Because development of the JIDPA causes the elimination of some sagebrush steppe habitat, offsite mitigation efforts are being implemented to offset this loss. This is being accomplished through the allocation of funds toward conservation easements governing critical wildlife habitat throughout areas in the same vicinity as the JIDPA. Please see the following website for a list of mitigation measures directed by the JIO: http://www.wy.blm.gov/jonah_office/about_jio.htm.

6.0 GREATER SAGE-GROUSE

Greater sage-grouse are now among the 338 or more species whose population persistence is considered at risk (Wisdom et al. 2003). Although their specific requirements vary seasonally and over their life cycle, sage-grouse are almost completely reliant upon sagebrush habitats for survival (Connelly et al. 2000, Crawford et al. 2004). Some populations are migratory and require ranges exceeding 1,300 kilometers² (Wambolt et al. 2002). Greater sage-grouse are widely considered in scientific and public arenas to be a species of significant conservation concern (Connelly and Braun 1997, Schroeder et al. 1999, Schroeder et al. 2004). Since the 1960's, their populations have declined dramatically throughout the western United States (Holloran 2005). In response to those concerns, states and provinces that are occupied by sage-grouse have implemented extensive conservation efforts. Despite the ruling that the species did not warrant listing as endangered or threatened under the Endangered Species Act (ESA) in December 2004 (USFWS), protection measures do exist for this species. Results of the 2008 monitoring along with a discussion of the protection measures and recommendations for sage-grouse are given below.

Male greater sage-grouse displaying at a lek.

6.1 Greater Sage-Grouse Objectives

This study serves to provide the interested parties with information on the seasonal use of habitat within the JIDPA by greater sage-grouse. It is designed to assist the WMPP directed by the 2007 ROD. The primary objectives of the study were:

1. To search for greater sage-grouse within specified survey areas and locate any sign of foraging, nesting and/or any sign of roost pellets within survey areas for determination of potential sage grouse seasonal use.
2. To provide sage-grouse seasonal use data for the JIDPA as per the ROD and a planning meeting with the BLM biologists. In 2008, the BLM biologists requested visual identification of greater sage-grouse sign for approximately 33 sections in the southern region of the JIDPA.
3. To provide a sage-grouse seasonal use database for a ground truth of habitat modeling analysis efforts on the JIDPA.
4. Give recommendations for future monitoring of sage-grouse.

6.2 Greater Sage-Grouse Methods

In 2007, the active sage-grouse lek buffers were surveyed with trained pointing dogs and biologists to ascertain sage-grouse use of the project area during the nesting season and early brood rearing. The 2008 surveying of visual sage-grouse sign was conducted on the southern half of the JIDPA (those areas not covered in 2007) as requested by the BLM. The request was made for approximately 33 sections in the southern region of the JIDPA. Surveys were conducted between July 17 and August 4, 2008, by Nicole Thiele, Iain Crichton, David Haynes, William Daut, Brad Teson, Jen Faulkner, Steven Saletta, Makeda Trujillo, and Patricia Brandage. A total of 10 days was spent surveying for sage-grouse sign.

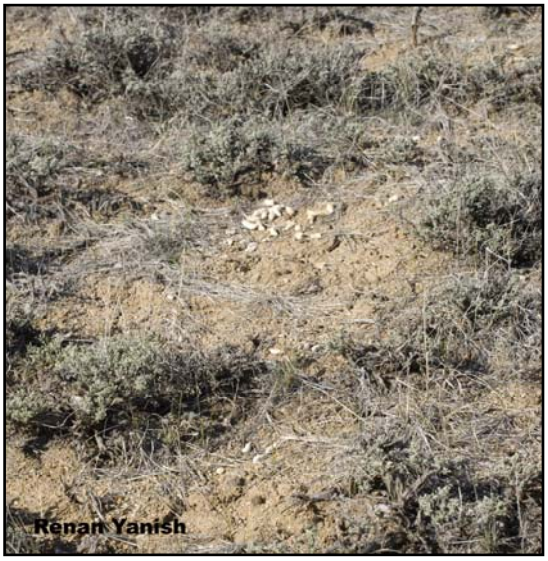
Survey Methods

Several methods have been used over the years to monitor the presence/absence of sage-grouse and their sign. In this case, the technique used was a ground search by biologists trained in the visual identification of sign left by sage-grouse. The surveys were conducted during normal daylight hours when sage-grouse sign would be easily visible (Appendix D). No adverse weather was encountered which would have made identification of sage-grouse sign difficult. Within the study area the following protocols were observed:

- GIS coordinates for the center of each section were located using ArcMap software.
- A circular pattern was walked by 2 researchers, one at 0.40 mile and the other at 0.20 mile, from the center of the section utilizing Garmin Rino hand-held GPS units.
- Once sign or a bird was located, a GPS waypoint was taken and appropriate field notation recorded.
- Sign was recorded using alpha numeric codes according to the sage-grouse code list developed by Aster Canyon such as: roost pellets, foraging pellets; clockers; and nests (Appendix D). Season and year of the sign was determined according to the color, sun bleaching and content (i.e. sage, insects) of the pellets.
- Data collected in the field was post-processed in the office.

6.3 Greater Sage-Grouse Results

Aster Canyon conducted a greater sage-grouse sign survey in 2008 and recorded type (i.e. roost, forage) and ages (i.e. 2006, 2007) of sign in order to identify habitat use and trends. As this is the 2nd year that this type of survey has been conducted, it is too early to identify any trends. However, data from 2007 and 2008 combined can provide a baseline of sage-grouse use and when sampled in future years, can provide information about expansion into vacant or former habitat.



Typical greater sage-grouse winter roost sign.

Survey crews recorded a total of 79 sage-grouse sign sightings (Appendix D). These consisted of the following: 7 scattered summer foraging pellet groups from the 2008 nest year; 1 scattered summer foraging pellet group from the 2007 nest year; 2 summer roost pellet groups from the 2008 nest year; 20 scattered winter foraging pellet groups from the 2007-2008 winter; 8 scattered winter foraging pellet groups from the 2006-2007

winter; 3 scattered winter foraging pellet groups from multiple years; 22 winter roost pellet groups from the 2007-2008 winter; 8 winter roost pellet groups from the 2006-2007 winter; 1 winter roost pellet group from the 2005 nest year; 1 clocker from the 2007 nest year; and a single covey consisting of 5 adult female sage-grouse (Table 17).

Table 17. Description of sage-grouse sign and codes.

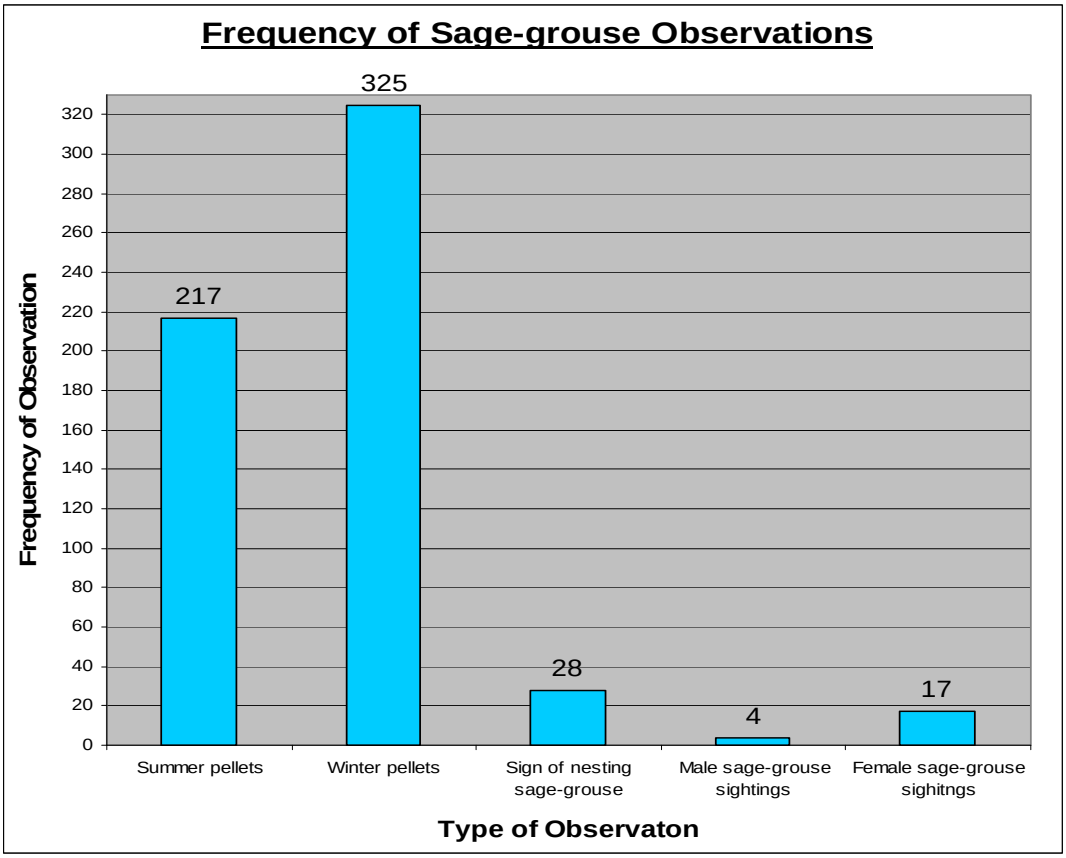
		Number Seen	
Code	Description	2008	2007
SFA	Scattered summer foraging pellets, 2008 Nest Year	7	0
SFB	Scattered summer foraging pellets, 2007 Nest Year	1	31
SFC	Scattered summer foraging pellets, 2006 Nest Year	0	76
SFD	Scattered summer foraging pellets, 2005 Nest Year	0	11
SRA	Summer roost pellet group, 2008 Nest Year	2	0
WFA	Scattered winter foraging pellets, 2007-2008 winter	20	58
WFB	Scattered winter foraging pellets, 2006-2007 winter	8	23
WFM	Scattered winter foraging pellets, Multiple years	3	8
WRA	Winter roost pellet groups, 2007-2008 winter	22	88
WRB	Winter roost pellet groups, 2006-2007 winter	8	86
WRC	Winter roost pellet groups, 2005-2006 winter	1	0
SR7	Summer roost pellet group, 2007 Nest Year	0	35
SR6	Summer roost pellet group, 2006 Nest Year	0	50
SRC	Summer roost pellet group, 2005 Nest Year	1	3
N6	Nest, 2006 Nest Year	0	4
N5	Nest, 2005 Nest Year	0	1
HR6	Hen and chick roost, 2006 Nest Year	0	3
GM	Male sage-grouse	0	4
GF	Female sage-grouse	5	12
C7	Clockers, 2007 Nest Year	1	5
C6	Clockers, 2006 Nest Year	0	13
C5	Clockers, 2005 Nest Year	0	1
TOTAL		79	512

Summer roost pellet group containing insect remains (note cecal cast).

Most of the sage-grouse sign located during the 2008 survey, was found in the Sand Draw area, and in the northern most sections of the JIDPA. The remaining sections contained very little sign, or none that could be interpreted (Map 7). Less sage-grouse sign was found during the 2008 surveys than in the 2007 surveys (79 sightings in 2008, compared to 512 sightings in 2007). This was possibly due to the northern sections of the JIDPA having more suitable sage-grouse habitat and/or less disturbance. The northern part of the JIDPA has active leks, whereas the southern half does not have active or historic leks. Another possible factor for fewer observations of sage-grouse sign may have been the different survey methods used during the 2 surveys. The use of pointing dogs in 2007 may have contributed to the higher count as the dogs cover more ground than a biologist, and their keen sense of smell enables them to find live birds that a biologist operating alone may not.

Most of the sage-grouse sign seen in both the 2007 and 2008 surveys consisted of pellets (Fig. 11). Winter pellets were seen considerably more frequently than summer pellets. This is possibly due to the fact that summer pellets contain large quantities of insect remains, making the pellets fairly coarse. This may cause them to break down more quickly than the winter pellets which consist almost entirely of sagebrush leaves. There were 28 instances of nesting sage-grouse sign recorded. These observations consisted of either an actual nest with eggs, or the broken shells from eggs that had hatched or were predated. During the 2 surveys, 4 male and 17 female sage-grouse were seen. One possible explanation for the fact that so many more females were seen than males is that the females incubate the eggs and were probably seen on or near the nests. The males however do not tend the nest, and are therefore free to move away when disturbed.

Figure 11. Sage-grouse sign recorded in 2007 and 2008 on the JIDPA.



Greater sage-grouse flying.

6.4 Greater Sage-Grouse Mitigation and Protection Measures

The greater sage-grouse is one of the pivotal species to inhabit the JIO, and as such, it attracts the attention of groups such as conservationists, hunters, ranchers, both state and federal agencies, and the general public. The sage-grouse's survival will depend on conservation efforts from all of these groups, as well as the oil and gas industry. Research, monitoring, and implementation of conservation efforts will require both time and funding. Recommendations must be weighed against the various interests of the different parties, while balancing the needs of the sage-grouse. What is apparent, however, is that the continued existence of the species is of special concern.

Primary protection measures employed for greater sage-grouse as outlined in the ROD (BLM 2006) include: avoiding disturbance 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 mile of the perimeter of leks, and human activity in these areas is to be avoided between 8:00pm and 8:00am from March 1 to May 15. Compressor stations are to be placed at least 2 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. Such habitat is identified by the BLM as consisting of: sagebrush heights = 20-31 inches; cover = 15-25%; and an understory cover of >15% (BLM 2006). The relatively random distribution of nests in relation to lek location indicates that most effort should be directed towards management of specific nesting habitat, regardless of hypothetical distances between leks and nests (Wakkinen et al. 1992). Schroeder and Robb (2003) found some female sage-grouse nested >12.4 miles from their original nest site in consecutive years in habitat fragmented by natural gas development in Wyoming. During the sage-grouse strutting period (March 1-May 15), Jonah Field Operators agreed 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 600ft 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.

The use of a beneficial seed matrix for sage-grouse is recommended in reclamation areas. These seed mixes, when properly applied, can provide both food and cover in those areas that have lost their original vegetative species due to disturbance. Habitat management should be focused on: avoiding fragmentation of habitat; maintaining wildlife corridors within landscapes; the seasonal distribution of habitat; and quality and quantity of habitat necessary to support minimum viable populations (Braun et al. 1994). Additionally, operators are encouraged to make use of drilling rigs that have noise dampening equipment, manage water production to enhance or maintain sage-grouse habitat, and to develop new technologies that would reduce the disturbance of sage-grouse habitat.

Herein we summarize critical habitat management considerations made by Braun (2006) that are applicable to the JIDPA. Because the JIDPA is part of an area used by an existing large sage-grouse population, habitat management that maintains the present abundance and distribution of sage-grouse should be a priority. It is critical to maintain not only currently inhabited sites but also the adjacent areas. Also, it is important to maintain areas with large blocks ($\geq$1 section but preferable >20 sections) of contiguous sagebrush per township. Livestock grazing should not remove more than 25-30% of the annual growth of herbaceous vegetation, and grazing should be delayed until after June 20. Fences in sage-grouse use areas should be no more than 3 strands with the top and bottom wires being barbless, and unused fences should be removed. Although sage-grouse have not been shown to need open water, water should be allowed to flow (seep) over the ground to encourage growth of succulent forbs. The best measurement of management success is sage-grouse lek surveys. Changes in % bare ground, % forbs coverage, % grass cover, % sagebrush canopy cover, and height of residual herbaceous vegetation could also be used as alternative and secondary measures of success. Sage-grouse pellet transects provide an easy way to measure continued use of previously used areas, as well as expansion of birds into vacant or former habitat.

Further conservation measures as recommended in the Upper Green River Basin Sage-Grouse Conservation Plan Draft Version (2006) include: enhancing the habitat within and in close proximity to natural gas fields; establishing refuge areas around fields to maintain sage-grouse populations that can reestablish the field following reclamation; and reclaiming areas of pad locations that are not in use as soon as possible after wells are on production.

The JIO has proposed numerous off-site mitigation projects underway to protect sage-grouse habitat in the Upper Green River Valley. Specifically, these include: the provision of drinking water and habitat improvement for sage-grouse; the installation of wildlife escape ramps in existing range water tanks; and the conservation of sage-grouse habitat

All of these mitigation measures may assist in the preservation of the greater sage-grouse by providing the necessary habitat, protection, and efficient monitoring that are required for its continued survival. It is important to ensure that as a species, sage-grouse continue to inhabit the JIDPA through ongoing efforts from conservation groups, the oil and gas industry, and government departments. Funding by the oil and gas companies along with monies from other sources, may help the species by acquiring new habitat, conserving existing habitat, and improving that which is damaged. By applying the most current data with present management strategies and sufficient funding, it may be possible to ensure the long term survival of the greater sage-grouse within the JIDPA.

7.0 PYGMY RABBIT

The pygmy rabbit is considered a BLM Sensitive Species, a WGFD Species of Special Concern, and a USFWS Species at Risk (Aster Canyon 2007). The pygmy rabbit was petitioned for consideration as a threatened and endangered species with the USFWS on January 8, 2008. It is currently under a 12 month status review to determine its substantiation for petition. In view of this, it is essential to monitor this species and its habitat requirements (USFWS 2008a).

Pygmy rabbit burrows are commonly found at the bases of tall, dense stands of sagebrush (occasionally other shrub species), or below rock outcroppings with adjacent tall sagebrush. Deep, stable soils are generally associated with pygmy rabbit burrows (Keinath and McGee 2004). Their burrow openings range from 7-14 centimeters wide and have a characteristically wide, flared opening relative to the burrow tunnel itself. The pygmy rabbit is the only Leporid in the United States known to excavate tunnels. Research has indicated that they sometimes occupy abandoned burrows of other animals (e.g., burrowing owls, badgers, marmots) (Keinath and McGee 2004). Pygmy rabbits are an important food source for the coyote, badger, and the common raven. They are a

Contrast between the 3 types of rabbit species found on the JIDPA and the 3-mile buffer. Pygmy rabbit pellet (.3 cm); cottontail rabbit pellet (.5cm); jackrabbit pellet (1cm).

less important food source for large raptors and owls, bobcats, and weasels (Keinath and McGee 2004).

In 2007, Aster Canyon located a total of 226 active pygmy rabbit burrow complexes and recorded 40 visual observations of rabbits within the JIDPA and the surrounding 3-mile buffer (Aster Canyon 2007). This data was collected in concordance with a pygmy rabbit habitat model developed as a result of preliminary planning meetings with the BLM, JIO, and Jonah Field Operators during 2007. Inventories for pygmy rabbits and monitoring of their existing and known burrow complexes within the JIDPA and the surrounding 3-mile buffer were not required in 2008 and are only necessary every 3 years. However in 2008, pygmy rabbit sightings (map 11) and sign were recorded as incidental wildlife observations during surveys for other species.

Pygmy rabbit snow burrow with pellets at the entrance.

8.0 WHITE-TAILED PRAIRIE DOG AND BLACK-FOOTED FERRET

The black-footed ferret is a federally listed endangered species under the ESA. The white-tailed prairie dog is currently under a status review to determine if it warrants protection as a threatened and endangered species. The results of this review are scheduled to be submitted to the USFWS by June 1, 2010 (USFWS 2008b).

Prairie dog amidst burrows.

The white-tailed prairie dog is considered a keystone species, and their presence or absence in an area greatly affects the habits and range of many other wildlife species (Knowles 2002). White-tailed prairie dog towns provide important habitat for species such as mountain plover, burrowing owl, and black-footed ferret (Dinsmore 2003, Korfanta et al. 2001, Esch et al. 2005). They are a vital food source for coyotes, badgers, bobcats, and large raptors (e.g., ferruginous hawks and golden eagles).

In 2007, Aster Canyon surveyed 13 white-tailed prairie dog towns within the JIDPA and the surrounding 3-mile buffer. Aster Canyon also conducted re-mapping surveys based off of prairie dog inventory results from the years 1997-2005 (Aster Canyon 2007). The inventories between the years 1997-2005 were conducted by TRC. In 2008, Aster Canyon surveyed and mapped 3 towns that were not surveyed in 2007 (PDT 46, PDT 47, and PDT 27b; Map 8). As per a request by the BLM, Aster Canyon also surveyed and mapped the perimeter of 1 new town (PDT 45).

The discovery and mapping of PDT 45 in 2008 brings up some important issues concerning prairie dog town distribution and abundance. The majority of burrows in PDT 45 were observed on well pads, pipelines, and along roadsides. PDT 45 could be the consequence of prairie dog movement and colony redistribution. Two possible explanations for this are: (1) the proximity

of PDT 45 to several neighboring towns (PDT 2b, PDT 2a, PDT 42, and PDT 41), and (2) the selection of disturbed areas (i.e. well pads, pipeline corridor) by prairie dogs. Persistence of prairie dog towns has been shown to be positively correlated to the persistence of neighboring towns (Wagner et al. 2006). Prairie dog town boundaries can also fluctuate by as much as 50% (Seglund et al. 2004). It is possible that PDT 45 is the result of an overall colony expansion and/or a general fluctuation of neighboring towns. Prairie dogs also prefer to forage grasses and forbs over shrubs and depend upon good visibility to detect predators (Knowles 2002, Clark 1977). The relatively open and reclaimed areas of well pads and pipelines could be selected by prairie dogs. Further investigation would be required to elucidate this.

Prairie dog upright near burrow entrance

The distribution of the black-footed ferret depends almost entirely on active prairie dog towns (Esch et al. 2005). Therefore, the monitoring of existing prairie dog towns and the inventorying for new towns is essential to the survival of the black-footed ferret. Inventories for the black-footed ferret were not required in 2008 because the area has been block-cleared for this species (USFWS pers. comm. 2008).

9.0 BIG GAME

The pronghorn is an ungulate mammal native to the western interior of North America, and is the last surviving member of the family Antilocapridae. Pronghorn typically use habitat with low rolling, expansive terrain. They inhabit open landscapes with hills, ridges, and draws. Snow accumulation, availability of seasonal forage, and water sources are the main deciding factors affecting their survival during the winter and summer months. Elevations for pronghorn range from near sea level to 11,000 feet, however, the highest densities occur between 4,000 and 6,000 feet (O'Gara and Yoakum 2004). High densities of pronghorn also occur where the mean annual precipitation ranges from 8 to 15 inches. Pronghorn populations above or below these levels have lower survival rates and densities (Sundstrom 1973). Precipitation during the winter has a more lasting effect on pronghorn survival than summer precipitation.

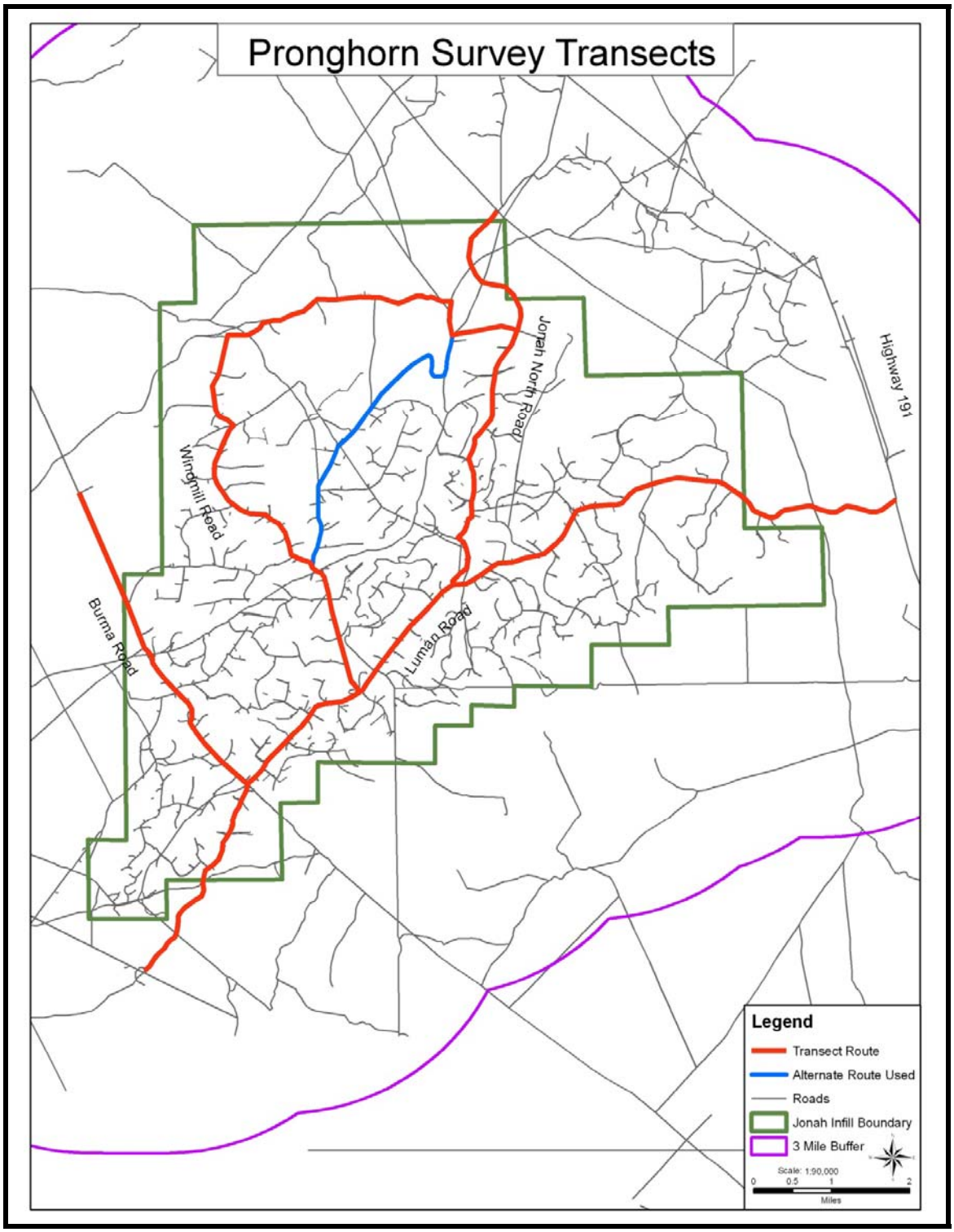
The 2008 pronghorn inventory on the JIDPA was designed to meet criteria as described in the WMPP. Data presented in this report was collected from August 16, 2007, to August 14, 2008. It will be used in a comparison of data from previous years to give recommendations for future monitoring and protection measures.

9.1 Big Game Methods

Big game monitoring in the JIDPA consisted almost entirely of pronghorn during the 2008 survey season. Pronghorn were surveyed 14 times, each time using the same methods and following the same survey route as requested by the WMPP (Map 9). Surveys were conducted by Aster Canyon biologists Renan Yanish, Nicole Thiele, David Haynes, Susan Cooper, Brad Teson, Steven Saletta, Makeda Truillo, and William F. Daut. Nine surveys were conducted for pronghorn approximately 1 month apart during 2008 on January 17, January 29, February 14, March 13, April 16, May 15, June 17, July 15, and August 14. During the 2007 season, 5 surveys were conducted on August 16,

September 17, October 11, November 14, and December 14. These surveys will continue once a month throughout the rest of the year. Discussions between BLM, JIO, and Aster Canyon resulted in the following pronghorn survey techniques:

- Pronghorn were surveyed almost entirely within the JIDPA using the 4 primary roads: Luman, Burma, Windmill and Jonah North.
- Surveys were conducted by vehicle using binoculars to scan for animals.
- Animal locations were marked from the road.
- Sex, age (adult or juvenile), activity, habitat type, and comments on weather conditions were recorded on the Pronghorn Count Observation Sheet (Appendix G).
- 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.



Map 9: Pronghorn survey transects.

9.2 Big Game Results

Pronghorn made up the majority of the big game species recorded in the study area. The only exception was in the early spring of 2008 when 3 mule deer were sighted in the southern portion of the JIDPA (see general wildlife section). Survey counts revealed that numbers of pronghorn were highest during the fall and winter of 2007-2008. A total of 1,785 pronghorn were sighted in 2008 (Fig. 12), compared with 559 pronghorn observed in 2007 (Fig. 13).

During the 2008 season (Fig. 12), pronghorn counts were highest in January (1,000+), February (360), and July (105). More females (188) were counted than males (109), and 1,465 animals were of unknown sex. Twenty three juveniles of unknown sex were recorded as well (Table 18, Fig. 12).

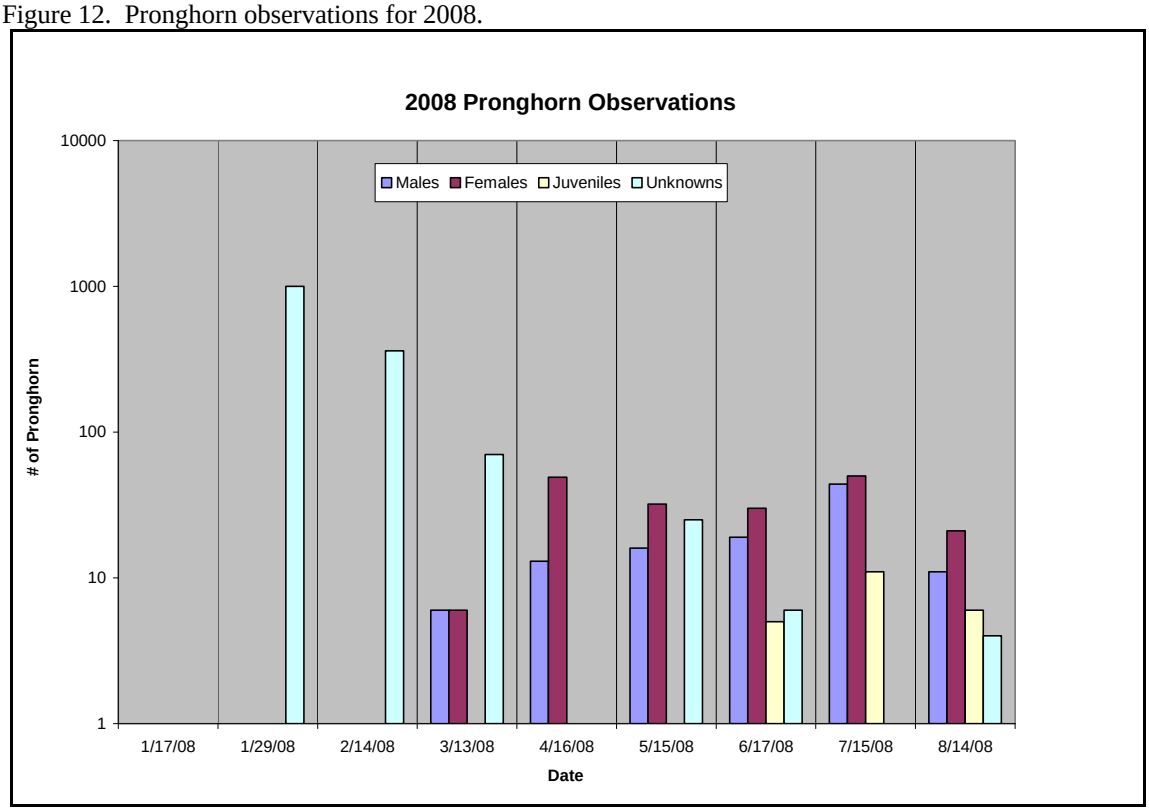
Approximately 1,000 pronghorn seen on January 29, 2008.

The January 29 informal survey in 2008 recorded the largest number of pronghorn with approximately 1,000 animals observed in one location (Fig. 12). The pronghorn were observed in township 29N, range 108W, section 34 near well pad Stud Horse Butte 12-34.

Table 18. Pronghorn survey totals for 2008 surveys, separated by sex and age.

	1/17/08	1/29/08	2/14/08	3/13/08	4/16/08	5/15/08	6/17/08	7/15/08	8/14/08
Male	0	0	0	6	13	16	19	44	11
Female	0	0	0	6	49	32	30	50	21
Juvenile	0	0	0	0	1	0	5	11	6
Unknown	0	1000+	360	70	0	25	6	0	4
Total	**0**	**1000+**	**360**	**82**	**63**	**73**	**60**	**105**	**42**

Figure 12. Pronghorn observations for 2008.

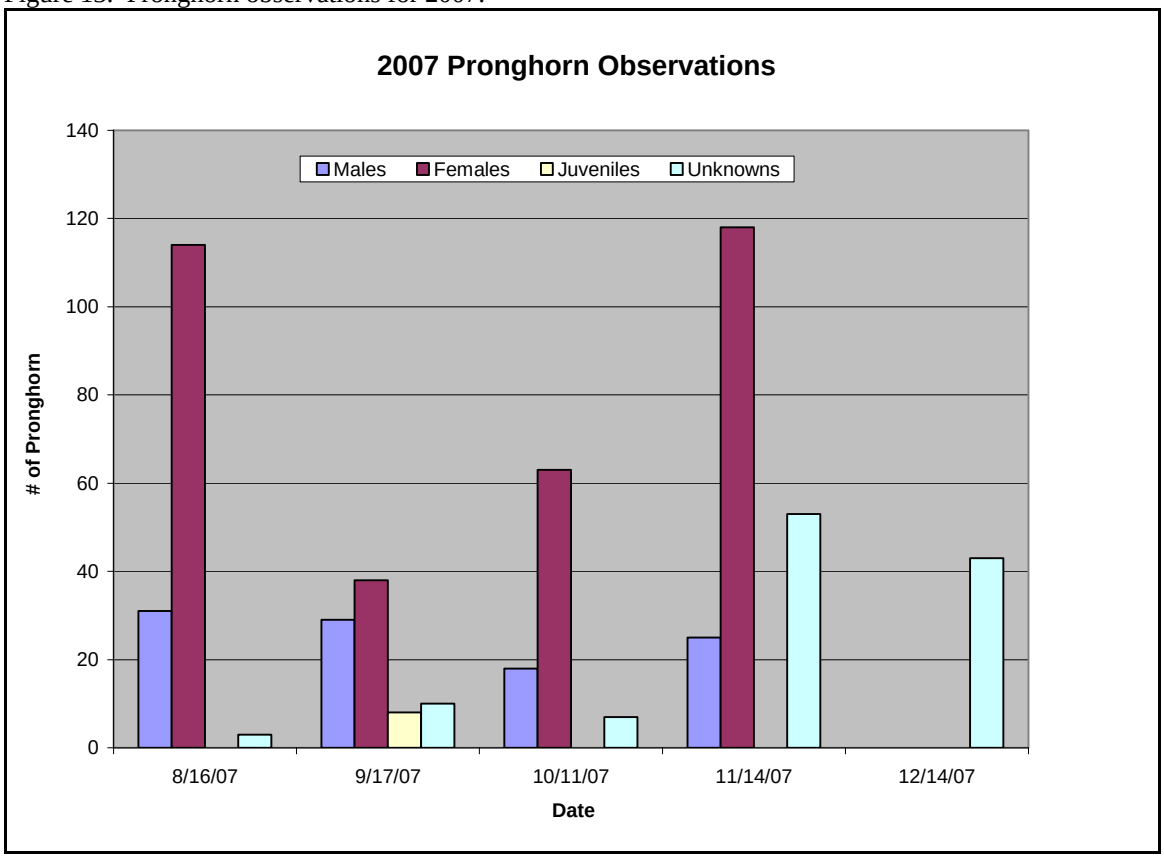


The number of pronghorn recorded in 2007 was highest in August (147), and November (196). More females were counted (333) than males (103), and 116 animals were of unknown sex. Eight juveniles of unknown sex were recorded as well (Table 19, Fig. 13)

Table 19. Pronghorn survey totals for 2007 surveys, separated by sex and age.

	8/16/07	**9/17/07**	**10/11/07**	**11/14/07**	**12/14/07**
Male	31	29	18	25	0
Female	114	38	63	118	0
Juvenile	0	8	0	0	0
Unknown	3	10	7	53	43
Total	**147**	**85**	**88**	**196**	**43**

Figure 13. Pronghorn observations for 2007.



Pronghorn distribution on the JIDPA was the highest during the fall (Aug.-Nov.) of 2007. Animals were observed in several different locations along survey transects (Appendix G.3). Female observations during the fall were the highest (333), followed by males (103), unknowns (73), and juveniles (8). In contrast, winter (Dec.-Mar.) locations for pronghorn were contained to large isolated patches off of Burma and Windmill roads

(Appendix G.4). Pronghorn numbers were highest for unknowns (1473), with only 6 females and 6 males observed. Due to harsh winter conditions causing poor visibility, it was difficult to identify the sex of pronghorn on several occasions.

During the spring (Apr.-May) of 2008, females (81) and males (29) were consistently observed together at approximately a 3:1 ratio (Appendix G.5). Pronghorn were observed together largely in pairs during the summer (Jun.-Aug.) as well (Appendix G.6); 101 females, 76 males, 22 juveniles, and 10 unknowns. They were usually observed together in groups, with one male being associated with several females and juveniles.

[redacted]

Locations of where the pronghorn were recorded are mapped for 12 out of 14 surveys. No pronghorn were observed on January 17, and so a map could not made be made for that survey.

In addition to these recordings, one radiocollared pronghorn was observed on July 29 in section 3 of township 29N and range 108W. The pronghorn was approximately 0.25 miles east of well pad Stud Horse Butte 13-3.

9.3 Big Game Discussion and Recommendations

The pronghorn is a big game species that uses the JIDPA as part of their home range. Extensive energy development on the JIDPA can have a negative impact on pronghorn distribution, however, there is also evidence that some pronghorn on the JIDPA do not avoid areas with high levels of human activity (Berger et al. 2007). This species warrants continued management to monitor pronghorn behavior in relation to energy development. Monitoring and management recommendations are discussed below.

The number of pronghorn recorded for 2008 was highest in January and February, with pronghorn counts high in November of 2007 as well. This trend can be explained by the fact that as temperatures decrease and snow depth levels increase, pronghorn gather into larger groups (Berger et al. 2007). During this time, they will move to the few remaining areas with access to forage. It is common for pronghorn of both sexes and all ages to congregate in large herds during the winter, with minimal social conflicts (O'Gara and

Yoakum 2004). They conserve energy during the winter by reducing their daily travel, traveling single file, and selecting habitats with lower wind velocities and soft snow. Snow is deeper at the northern end of the JIDPA compared to the southern end, which may have resulted in more pronghorn being observed in the southern portion of the study area. Pronghorn have difficulty foraging when snow depths are high enough to cover sagebrush. The JIDPA receives strong winds during the winter months, which can result in snow drifts up to 6 feet in height. However, this also creates patches of habitat with low snow depths allowing pronghorn to forage sufficiently. This would explain why such a high number of pronghorn were observed in January 2008.

Several pronghorn were also observed to be active at water holes and drainages during the 2007 season. On August 16, 1 male and 5 females were observed at a water hole near a pipeline. Seven males and 37 females were seen at 2 different watering holes on November 14, with 10 unknowns observed at a possible watering hole. During periods of hot weather in Wyoming, pronghorn are usually observed within four miles of a water source (Sundstrom 1968). It would be beneficial to prioritize these locations within the JIDPA in the future so that pronghorn can more accurately be counted during periods of drought and extreme heat.

Weather conditions and visibility had a strong affect on the amount of pronghorn recorded in a given survey. On the January 17 survey the visibility was poor with white-outs in several areas, and no pronghorn were observed. However, on January 29 approximately 1,000 pronghorn were observed on a windy day with average visibility. Visibility was poor later in the day with white-outs in some areas. Considering the contrast between these two surveys only 12 days apart, visibility and weather conditions should be taken into account when assessing the accuracy of pronghorn surveys. Weather conditions play a large role in pronghorn movements. It is recommended that current monitoring of pronghorn antelope occurrences in the study area be continued, this is most important during the summer months when traditional WGFD surveys do not take place.

10.0 GENERAL WILDLIFE

Aster Canyon biologists recorded observations of rare, unusual, and elusive wildlife seen during monitoring and inventory surveys. To efficiently utilize inventory efforts, common species, such as ravens, cottontail rabbits, and jackrabbits, were not documented. Pronghorn were recorded as a part of the big game monitoring effort (see Section 9.0). The data in this section includes only incidental observations while conducting other inventory efforts in the study area.

10.1 General Wildlife Methods

Sighting of a female mallard duck with 12 juveniles following her seen in June on the JIDPA.

As per the WMPP, observations were made in accordance with the Wyoming Observation System (WOS) created by the WGFD. At this time the JIO database is not available. Species documented during specific surveys were not reported as part of the general wildlife observations. For example, raptor nests located during raptor monitoring and greater sage-grouse pellets recorded during pygmy and sage-grouse surveys were not included.

10.2 General Wildlife Results

A total of 28 different species and 80 sightings were recorded during the 2008 field season (Table 20). Incidental sightings were made throughout the JIDPA and associated buffer (Map 11). Raptors and songbirds were the most commonly recorded species. Raptors were regularly seen perched on various natural and manmade structures, including condensate tanks and power-line poles, and were frequently seen hunting on

the JIDPA. Most of the shorebird species were seen in the beginning of the summer when water was still present in reservoirs and ditches. Although sightings of wild horses were minimal, a large amount of sign from these animals was seen in the southern portion of the JIDPA buffer. The mule deer sighting was made in mid-April just south of the EnCana office complex. Many pronghorn were seen throughout the JIDPA so were not considered uncommon enough to include in the incidental wildlife sightings. Other notable species sighted were badger, coyote, pygmy rabbit, short-eared owl, burrowing owl, and mallard duck.

Golden eagle seen perched at cattle guard on the JIDPA.

10.3 General Wildlife Discussion and Recommendations

The JIDPA is used for breeding, migratory, wintering, and transient species. Thus, management recommendations for general wildlife are broad. Minimizing the amount of traffic and disturbance throughout the field is crucial. This will decrease the number of collisions between vehicles and animals and the amount of habitat that will be altered. Due to the arid climate on the study area, water sources are especially critical for wildlife. Avoiding further development near seasonal and permanent water will benefit all wildlife, from amphibians to birds to mammals. Although humans and manmade structures are avoided by some species, such as ferruginous hawks and coyotes, other species actually benefit from them. Many observations were made of cottontail rabbits using areas below condensate tanks as shelter. We also observed a number of raptors using condensate tanks and fence posts for perch sites. Other areas of importance to various wildlife species include draws and creek beds, which tend to provide more cover due to the denser and older sagebrush, rocky outcrops, and bluff areas.

Table 20: General wildlife observations with number of observations made.

Species	Number of Observations Made	Number of Individuals Observed
Birds		
Mallard duck	1	13
Wilson's phalarope	1	1
American avocet	2	3
Spotted sandpiper	1	2
Mountain plover	4	5
Greater sage-grouse	6	18
Northern harrier	7	10
Red-tailed hawk	11	11
Rough-legged hawk	1	1
Ferruginous hawk	3	3
Golden eagle	15	15
Prairie falcon	2	2
American kestrel	3	3
Short-eared owl	1	1
Burrowing owl	1	1
Western meadowlark	2	2
Vesper sparrow	1	1
White-crowned sparrow	1	1
Brewer's sparrow	1	1
Green-tailed towhee	1	1
Loggerhead shrike	2	2
Sage thrasher	1	1
Rock wren	1	1
Mammals		
Badger	1	1
Coyote	5	6
Pygmy rabbit	1	2
Mule deer	1	3
Wild horse	3	8

LIST OF ACRONYMS

Agencies and Companies:

BLM = Bureau of Land Management
JIO = Jonah Interagency Mitigation Office
NRCS = Natural Resource Conservation Services
RMBO = Rocky Mountain Bird Observatory
TRC = TRC Mariah Associates, Inc.
USFWS = United States Fish and Wildlife Service
WGFD = Wyoming Game and Fish Department
WWNRT = Wyoming Wildlife and Natural Resource Trust

Other:

EIS = Environmental Impact Statement
ESA = Endangered Species Act
GIS = Geographic Information Systems
GPS = Geographic Positioning Systems
JIDPA = Jonah Infill Drilling Project Area
ROD = Record of Decision
SGCN = Species of Greatest Conservation Need
TEPC = Threatened, Endangered, Proposed, and Candidate Species
WMPP = Wildlife Monitoring Protection Plan
WLCI = Wyoming Landscape Conservation Initiative
WSS = Bureau of Land Management Wyoming Sensitive Species

LIST OF DEFINITIONS

Artificial nesting structure = manmade structures placed in suitable nesting habitat to encourage birds to nest in the area. Artificial nesting structures for raptors usually consist 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.

Cecal cast = large, dark-green brown, liquid-like deposits from Greater Sage-Grouse, which tend to be deposited once a day, usually in the 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.

Covey = a brood or small flock of partridges or similar birds.

Diurnal = used to describe a species that is primarily active during the daytime

Elusive = used to describe a species that is rare or secretive and not easily detected.

Fidelity = quality or state of being faithful. For birds, this is often used to refer to individuals that return to the same breeding ground on an annual basis.

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

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

Philopatry = description of a species where females stay near their natal area and males tend to disperse further away upon maturation.

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

Seral = relating to a series of ecological communities formed in ecological succession

Sexually monomorphic = male and female of a species are similar in size and appearance.

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 indicating a nest or perch site.

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

COMMON NAME	SCIENTIFIC NAME
Birds	
American avocet	*Recurvirostra americana*
American kestrel	*Falco sparverius*
Bald eagle	*Haliaeetus leucocephalus*
Brewer's sparrow	*Spizella breweri*Common
nighthawk	*Chordeiles minor*
Common raven	*Corvus corax*
Ferruginous hawk	*Buteo regalis*
Golden eagle	*Aquila chrysaetos*
Green-tailed towhee	*Pipilo chlorurus*
Greater sage-grouse	*Centrocercus urophasianus*
Horned lark	*Eremophila alpestris*
Killdeer	*Charadrius vociferous*
Loggerhead shrike	*Lanius ludovicianus*
Long-eared owl	*Asio otus*
Mallard duck	*Anas platyrhynchos*
Mountain plover	*Charadrius montanus*
Mourning dove	*Zenaida asiatica*
Northern harrier	*Circus cyaneus*
Northern pintail	*Anas acuta*
Prairie falcon	*Falco mexicanus*
Redhead duck	*Aythya americana*
Red-tailed hawk	*Buteo jamaicensis*
Rock wren	*Salpinctes obsoletus*
Rough-legged hawk	*Buteo lagopus*
Sage sparrow	*Amphispiza belli*
Sage thrasher	*Oreoscoptes montanus*
Short-eared owl	*Asio flammeus*
Spotted sandpiper	*Actitis macularia*
Swallows	*Hirundo* spp.
Vesper sparrow	*Pooecetes gramineus*
Western bluebird	*Sialia mexicana*
Western meadowlark	*Sturnella neglecta*
White-crowned sparrow	*Zonotrichia leucophrys*
Wilson's phalarope	*Phalaropus tricolor*
Mammals	
American badger	*Taxidea taxus*
American bison	*Bison bison*
Black-footed ferret	*Mustela nigripes*
Coyote	*Canis latrans*

Mountain cottontail	*Sylvilagus nuttallii*
Mule deer	*Odocoileus hemionus*
Pronghorn	*Antilocapra americana*
Pygmy rabbit	*Brachylagus idahoensis*
White-tailed jackrabbit	*Lepus townsendii*
White-tailed prairie dog	*Cynomys leucurus*
Wild horse	*Equus ferus*

Plants

Cheatgrass	*Bromus tectorum*
Rabbitbrush	*Chrysothamnus* spp.
Sagebrush	*Artemisia* spp
Saltbrush	*Atriplex* spp.
Wyoming big sagebrush	*Artemisia tridentata* var. *wyomingensis*

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