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2006-2007 Wildlife Inventory in the Jarbidge Field Office

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Technical Bulletin:

2006 - 2007 Wildlife Inventory in

The Jarbidge Field Office

BLM Jarbidge Field Office
Twin Falls, Idaho
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Abstract
Large scale habitat alterations within the Jarbidge Field Office (JFO) created concern for special status species and wildlife in general. In September 2005, BLM agreed to a Stipulated Settlement Agreement to a lawsuit filed by Western Watersheds Project. One of the settlement points of litigation was to conduct a wildlife inventory on a number of wildlife species. The focus of the inventory was to sample for a variety of lesser known wildlife species within the JFO, presently categorized by Idaho BLM as sensitive species. While inventorying for the focus species, BLM collected data on all wildlife captured.

In January 2006, JFO held a meeting inviting biologists from Idaho Department of Fish and Game (IDFG), BLM, the Nature Conservancy, Nevada Division of Wildlife (NDOW), the Conservation Data Center, and Idaho Power Company. The specialists reviewed the existing data as well as some of the scientific information and made recommendations for wildlife inventory in the JFO (Sather-Blair 2006). Based upon these recommendations, BLM attempted to inventory for a variety of small mammals, amphibians, and reptiles. Additionally, we noted the condition of habitat in general and big game winter range. Wildlife target species included the following – mammals: pygmy rabbit (*Brachylagus idahoensis*), Piute (Great Basin) ground squirrel (*Spermophilus mollis*), cliff chipmunk (*Neotamias dorsalis*), little pocket mouse (*Perognathus longimembris*), pinyon mouse (*Peromyscus truei*), and Merriam's shrew (*Sorex merriami*); – reptiles: longnose snake (*Rhinocheilus leconti*), Western groundsnake (*Sonora semiannulata*), Great Basin collared lizard (*Crotaphytus bicinctores*); – amphibians: Woodhouse toad (*Bufo woodhousei*), western toad (*B. boreas*), northern leopard frog (*Rana pipiens*) and Columbia spotted frog (*R. luteiventris*).

In May into July 2006 BLM inventoried several wetlands in daylight surveys. From early May into June 2007 night-time amphibian call surveys were conducted. Surveys in 2007 did not result in any new locations for BLM sensitive amphibians being found. Columbia spotted frogs were confirmed in Rocky Canyon, but found in no other drainages. Pacific chorus frogs were the most widespread of the amphibians. They were found in beaver ponds along creeks, springs and wet meadows, and some livestock ponds. No Woodhouse toads or northern leopard frogs were documented within the JFO.

We collected information on plant communities as they may influence the diversity, abundance, and species composition of reptiles, birds, and small mammals in the planning area. Along reptile visual observation transects the most frequently observed lizard was the short horned lizard (*Phrynosma douglasii*). Areas with sandy soils had more leopard lizards (*Gambelia wislizenii*) and western whiptail lizards (*Cnemidophorus tigris*). Reptiles trapped differed from reptiles encountered on observation transects. Western whiptails were caught relatively frequently, whereas the more frequently observed horned lizards were trapped infrequently. The gopher snake (*Pituophis catenifer*) was the most frequently observed and trapped snake. Gopher snakes were present in most of plant communities at a variety of elevations from 3200 to 6500 feet.

Bird species generally reflected the habitat type being sampled. Horned larks (*Ermophila alpestris*) and vesper sparrows (*Pooecetes gramineus*) were found in several habitats including

sagebrush steppe and grassland types. Sage sparrow (*Amphispiza belli*) and Brewer's sparrow (*Spizella breweri*) were generally associated with sagebrush steppe communities.

Small mammals and reptiles were inventoried in 40 study plots of public land in 23 vegetation communities within the JFO. Our overall mean captures per 100 trap nights were 15.71 across all plant communities, higher than those reported by either Reynolds (1980) in ungrazed big sagebrush or Hanser and Huntly (2006) in big sagebrush. However, Johnson (1961) did not report capture rates by habitat. Our rates of capture were similar to those reported by McAdoo et al. (2006) in northeastern Nevada. Given that 2006 was a one year inventory, it is not known if the relatively high number of small mammals caught was normal or due to there being a peak in the rodent population cycle. Other researchers have found that rodent populations shift substantially between years (Larrison and Johnson 1973, Feldhamer 1979, McAdoo et al. 2006). Although Reynolds (1980) and Johnson (1961) used snap-traps, Hanser and Huntly (2006) and McAdoo et al. (2006), like our study, used baited Sherman live traps. In their studies, as well as in ours, deer mice (*Peromyscus maniculatus*) were the most common small mammal species captured and were dominant or co-dominant in all habitats sampled. In sagebrush habitats other small mammals trapped included sagebrush voles (*Lemmiscus curtatus*), Great Basin pocket mouse (*Perognathus parvus*), and least chipmunk (*Neotamius minimus*).

Visual surveys for ground squirrels were conducted from mid-April through mid-May 2007 to document the approximate distribution of the Piute ground squirrel. This ground squirrel species was generally found in a broad east-west belt through the central portion of the field office area. Belding ground squirrels (*Spermophilus beldingi*) were generally found at the higher elevations (5,500 feet) in the southern part of the planning area. Whereas, antelope ground squirrels (*Ammospermophilus leucurus*) were found in the northern portion of the planning area, generally within a few miles of the Snake River Canyon at 3800 feet or less in elevation.

INTRODUCTION

In September 2005, BLM agreed to a Stipulated Settlement Agreement to a lawsuit filed by Western Watersheds Project. In the Stipulated Settlement Agreement, BLM agreed to inventory for Idaho BLM sensitive species and include the data in a new planning effort. To make the most efficient use of staff and funding BLM held a data workshop in January 2006 with the U.S. Fish & Wildlife Service (FWS), IDFG, the Idaho Conservation Data Center, and non-government organizations to determine which species or groups of species were in highest priority for inventory. At the data fair both biologists and botanists reviewed data on species presence in or adjacent to JFO, documented and suspected distribution, prior inventory efforts, and where inventories had been conducted. Another consideration was the amount of peer reviewed scientific information on species of concern from other portions of the species range. Biologists and botanists then identified the data gaps for groups of species and prioritized species for inventory in the Jarbidge Field Office.

The biologists' priorities for inventory were for species which had not been inventoried within the planning area, species which are generally uncommon, and species for which inventory data were more than 12 years old. Species, such as northern goshawk (*Accipiter gentilis*) and Lewis woodpecker (*Melanerpes lewis*), for which there is naturally very limited habitat were a lower priority compared to species such as pygmy rabbit and Piute ground squirrel for which there is a substantial amount of suitable habitat. Priority species for inventory were amphibians emphasizing the Columbia spotted frog, but recording information on western toad, northern leopard frog, and Woodhouse toad; reptiles [long-nose snake, western groundsnake, and Great Basin black-collared lizard], and small mammals [pygmy rabbit, Piute ground squirrel, cliff chipmunk, dark kangaroo mouse (*Microdipodops megachephalus*), little pocket mouse, pinyon mouse, and Merriam's shrew.

The various biologists determined that additional inventory efforts on bats would not likely provide much new information in part because of existing presence data in Bruneau and Jarbidge River Canyons and the Clover and Salmon Falls Creek Canyons collected in the mid-1990's. Existing information on ferruginous hawk (*Buteo regalis*) and prairie falcon (*Falco mexicanus*) were deemed adequate. Specialists at the data fair determined scientific information on sagebrush songbirds (sage sparrow, Brewer's sparrow, loggerhead shrike (*Lanius ludovicianus*), sage thrasher (*Oreoscoptes montanus*)) were adequate so that a more site specific inventory for these species was a low priority.

STUDY AREA

The JFO is located in south-central Idaho. It extends south from the Snake River on the northern boundary to the Idaho/Nevada state line and into northern Nevada about 6 miles to the Humboldt-Toiyabi NationalForest Boundary. The resource area covers about 1.4 million acres of federal lands administered by BLM. Salmon Falls Creek is the eastern boundary, whereas, the western boundary is the Bruneau River. The elevation of the areas inventoried ranged from 2,800 feet along the Snake River Plain to 7,600 in the higher elevations. Topography is generally gently rolling upland plateaus dissected by several deep river canyons. The climate is characteristic cold desert, with hot, dry summers and cold to mild winters. Precipitation is generally the greatest in the late fall (November) through spring (May). Precipitation is primarily in the form of snow from December into March; however, rain may fall during the winter at

lower elevations. Livestock grazing has been occurring in the Jarbidge Field Office since the late 1800's. Livestock can readily access the majority of the study area due to relatively flat topography in the uplands.

We inventoried small mammals and reptiles at 40 sites (Figure 1) within 23 habitats. The habitats sampled included, sagebrush steppe (7 sagebrush dominated communities), salt desert shrub, mountain shrub, black greasewood, aspen woodland, mountain mahogany woodland, non-native annual grassland (cheatgrass – *Bromus tectorum*), and non-native perennial grass (crested wheatgrass – *Agropyron cristatum* seeding). In sagebrush steppe communities the dominant shrub was a species or subspecies of sagebrush – Wyoming big sagebrush (*Artemisia tridentata* var. *wyomingensis*), mountain big sagebrush (*A. t.* var. *vaseyana*), basin big sagebrush (*A. t.* var. *tridentata*), black sagebrush (*A. nova*), or low sagebrush (*A. arbuscula*). Other shrub species found in the sagebrush steppe habitats include rabbitbrushes (*Chrysothamnus nauseosus* and *C. viscidflorus*). Major grasses include Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), bottlebrush squirreltail (*Elymus elymoides*), with some Thurber needlegrasses (*Achnatherium thurberiana*) and cheatgrass. Salt desert shrub had some Wyoming and/or black sagebrush with spiny hopsage (*Grayia spinosa*), rabbitbrush, shadscale (*Atriplex confertifolia*), and spiny horsebrush (*Tetradymia spinosa*). The dominant grass in this habitat was Sandberg bluegrass with some cheatgrass. Aspen woodlands had an overstory of quaking aspen (*Populus tremuloides*) with mountain snowberry (*Symphoricarpos oreophileus*) and Kentucky bluegrass (*Poa pratense*) in the under story. Mountain shrub habitats were dominated by mountain big sagebrush but also contained a variety of other shrub species including Utah serviceberry (*Amelanchier utahensis*), antelope bitterbrush (*Purshia tridentata*), and mountain snowberry. Grass species present included bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass. The mountain mahogany site had an over story dominated by curl-leaf mountain mahogany (*Cercocarpus ledifolius*) with mountain big sagebrush and mountain snowberry the two other shrubs present. Grasses in this habitat included Idaho fescue, bluebunch wheatgrass, and Sandberg bluegrass. The annual grassland type was dominated by cheatgrass an invasive non-native species. Limited amounts of other native grasses, primarily Sandberg bluegrass were also present. Other non-native forb species included tumbleweed (*Salsola kali*), tumble mustard (*Sisymbrium altissimum*), tansy mustard (*Descurainia sophia*), and bur buttercup (*Ceratocephala testiculata*). Non-native perennial grassland had been seeded to crested wheatgrass (*Agropyron cristatum* and *A. desertorum*). Cheatgrass was usually present and either dominated or co-dominated the seedings sampled. The most common native grass within non-native perennial grass seedings was Sandberg bluegrass.

Other specialized habitats sampled included dune lands (an area of sparsely vegetated sand dunes), cottonwood riparian, semi-wet meadow, willow riparian, juniper riparian, and canyon land – a mix of cliffs, talus, rock outcrops). McAdoo et al. (2006) noted that "special habitat features", including springs, seeps, rock outcrops, and so forth, provide unique habitats used by some species.

METHODS

AMPHIBIANS

In 2006 observers walked the banks on both sides of selected creeks and the perimeter of selected ponds to search for amphibian adults, metamorphs, tadpoles, and/or egg masses.

Searches were done sporadically in the late spring and into the summer. Dip nets with openings of 18 x 33 cm (7.5 x 13") with fine mesh (1/8 inch or 4 mm) on 4 foot (1.3 m) handles were used to capture amphibian adults, metamorphs, and tadpoles for identification. Inventory in 2006 for amphibians was not random in order to maximize the chance of detecting amphibians. Higher gradient reaches (Rosgen stream channel types A and B, Rosgen 1996) were not inventoried due to the lack of ponds, large pools, or oxbows typically used by amphibians for reproduction. Portions of 9 streams 11 ponds, and 1 playa were inventoried for amphibians. In addition to BLM crews, IDFG also conducted some amphibian inventory in 2006 using the same protocols.

In May and June 2007 amphibian inventory efforts included night field-checks to determine amphibian species calling at night. Nighttime call surveys are an effective method for surveying for amphibian species presence, as many species are nocturnal or crepuscular, therefore inactive and difficult to find during the daylight hours (Weir 2005). Amphibian calls are distinct for each species found locally; therefore species presence in an area during breeding season may be rapidly determined. The focus was on surveying a larger number of sites rather than returning repeatedly to the same areas. Call surveys can be a good estimator of relative abundance, but are not appropriate for determining actual population sizes (Crouch and Paton 2002).

The survey protocol used was based on the North American Amphibian Monitoring Program (NAAMP, Weir 2005). Observers were trained to distinguish calls using an IDF&G provided digital recording of amphibian calls. Call surveys were performed between April 30 and June 15, avoiding rainy or windy days, because these factors make access or call recognition difficult. Although exact timing of peak amphibian breeding behavior varies by species, geography, elevation and weather, prior research had shown that in south-central Idaho amphibian breeding occurs prior to early June (Shive and Peterson 2002). Call surveys were conducted beginning a half hour after sunset, and completed by 1:00 AM (Weir 2005). Routes were driven at low speed in areas with water, and near each water source a three minute call survey was performed. In linearly distributed habitat patches such as canals, or low gradient stream reaches with a series of beaver ponds, call surveys were performed every 0.1 mi, or at each possible access point. When possible, searchers captured a calling individual to confirm species identification. Where amphibians were found the locations had its location recorded on a GPS unit and photos of different amphibians were taken. Survey sites were chosen based on historic amphibian observations and apparent suitability of habitat, as well as nighttime accessibility. In areas inaccessible at night, daytime surveys were used to attempt to determine species presence/absence. Air and water temperatures were also recorded.

Because Columbia spotted frogs are diurnal, nighttime call surveys are not an effective method to determine presence of this species. Daytime surveys were conducted in shallow pools along upland streams, preferred spotted frog breeding habitat, with emphasis on historical locations (Watson et al. 2003). According to the literature Columbia spotted frog breeding peaks in mid April, but locally appropriate habitat was inaccessible at that time so surveys were conducted from May 10 through June 8 (Engle and Munger 2003). These surveys were conducted by two person teams walking along the edges of stream banks and ponds searching for adults, tadpoles or egg masses. Amphibians sighted were captured by hand or dip nets to confirm identification.

General Study Design At Sampling Plots

A subset of 60 Ecological Site Inventory (ESI) points was randomly selected from the 600+ original ESI sites established by BLM in the early 1980's. Field verification resulted in 14 sites being dropped because the original vegetation community had been altered by fire. An attempt was made to sample all habitat types (aspen woodlands, mountain mahogany savannah, annual grasslands, exotic perennial grassland, mountain shrub, mountain big sagebrush/Idaho fescue, black sagebrush/Sandberg bluegrass, low sagebrush/Idaho fescue, Wyoming big sagebrush/bluebunch wheatgrass, salt desert shrub, cottonwood riparian, juniper riparian, willow riparian, semi-wetmeadow, dune land, and canyon lands.) a minimum of one time and then proportional to the number of original ESI points. Because wildlife, particularly a number of sensitive species, are not expected to be randomly scattered throughout all habitats, wildlife sample sites included a number of sites where ESI data were not collected. These unique habitats included several different types of riparian zones, canyon lands, and a dune land area. In all a total of 40 sites were inventoried for reptiles and small mammal trapping (Figure 1).

Limited time, personnel and budget limitations precluded inventory of large sample sizes in each plant community.

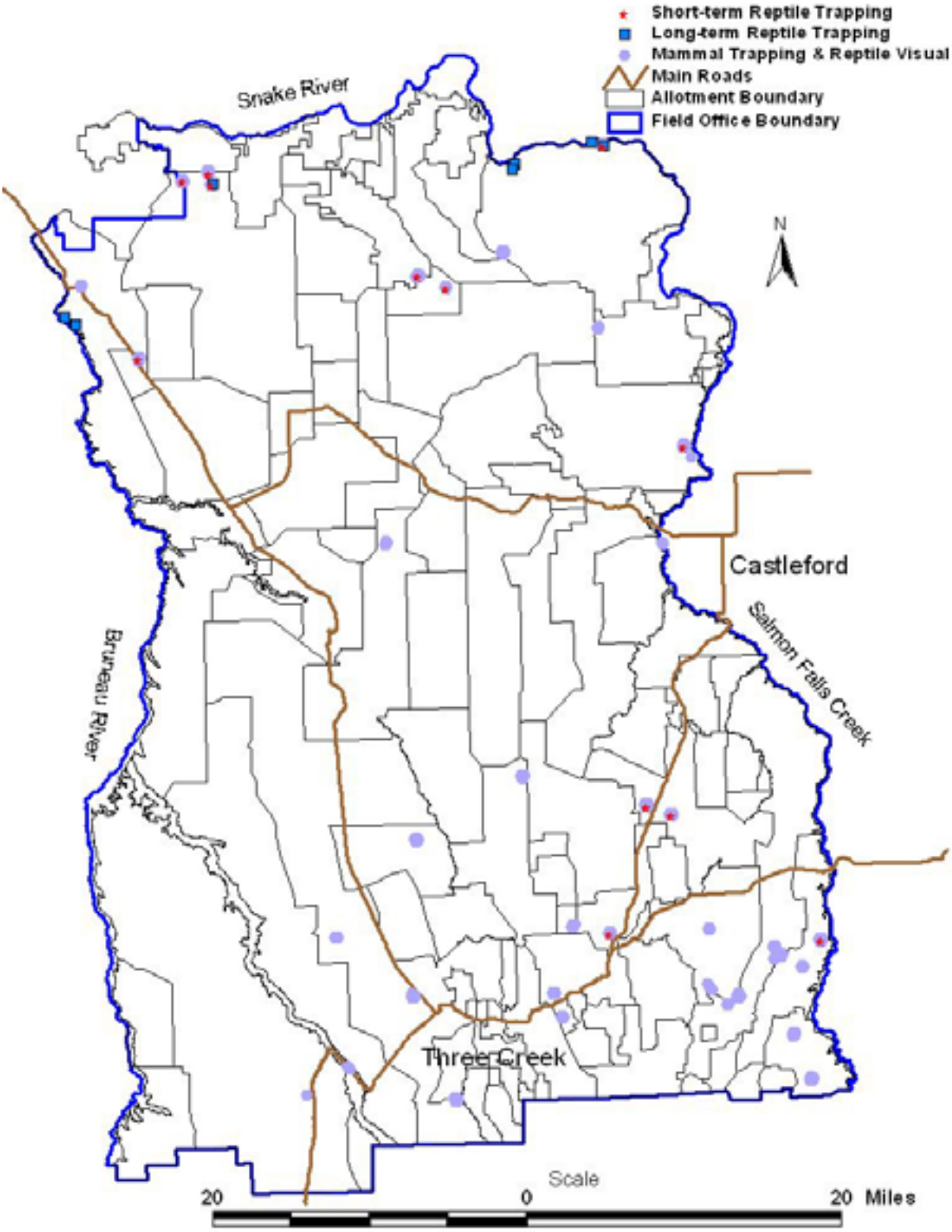
The Methodology for the study design is based on Manley et al. (2005). Manley et al. (2005) noted that a hexagon measuring 200 m x 200 m x 200 m can be used to obtain data for a variety of wildlife species. Habitat units to be sampled would be at least 400 m x 350 m (1320 feet x 1150 feet) in size to accommodate the hexagon configuration recommended in Manley et al. (2005). In the event that the inventory hexagon straddled an ecotone, the hexagon was shifted to the extent practical so than one corner of the hexagon was at the ESI plot so that the vast majority of the hexagon was in a single habitat. If the habitat area to be sampled was too small to fit the 200 m hexagon, (aspen stands, mountain mahogany savannah, etc.) a 100 m hexagon was used instead, or an alternative inventory site of the same habitat was selected using 2004 NAIP imagery and Natural Resource Conservation Service (NRCS) soil potential natural community data from soil surveys in the area. Once the plot center was established, the direction of the main axis of the hexagon was determined by a random numbers table (0 to 99). Plot centers and the corners of the hexagon were marked and the locations were recorded with a global positioning system (GPS) unit for future reference. To reduce human error all compasses had the declination set to 0. Riparian zones in the study area are usually linear features. Riparian zones were sampled with line transects running parallel to the stream bank rather than attempting to use a hexagon.

Reptiles

ReptileVisual Encounter Surveys at Hexagons

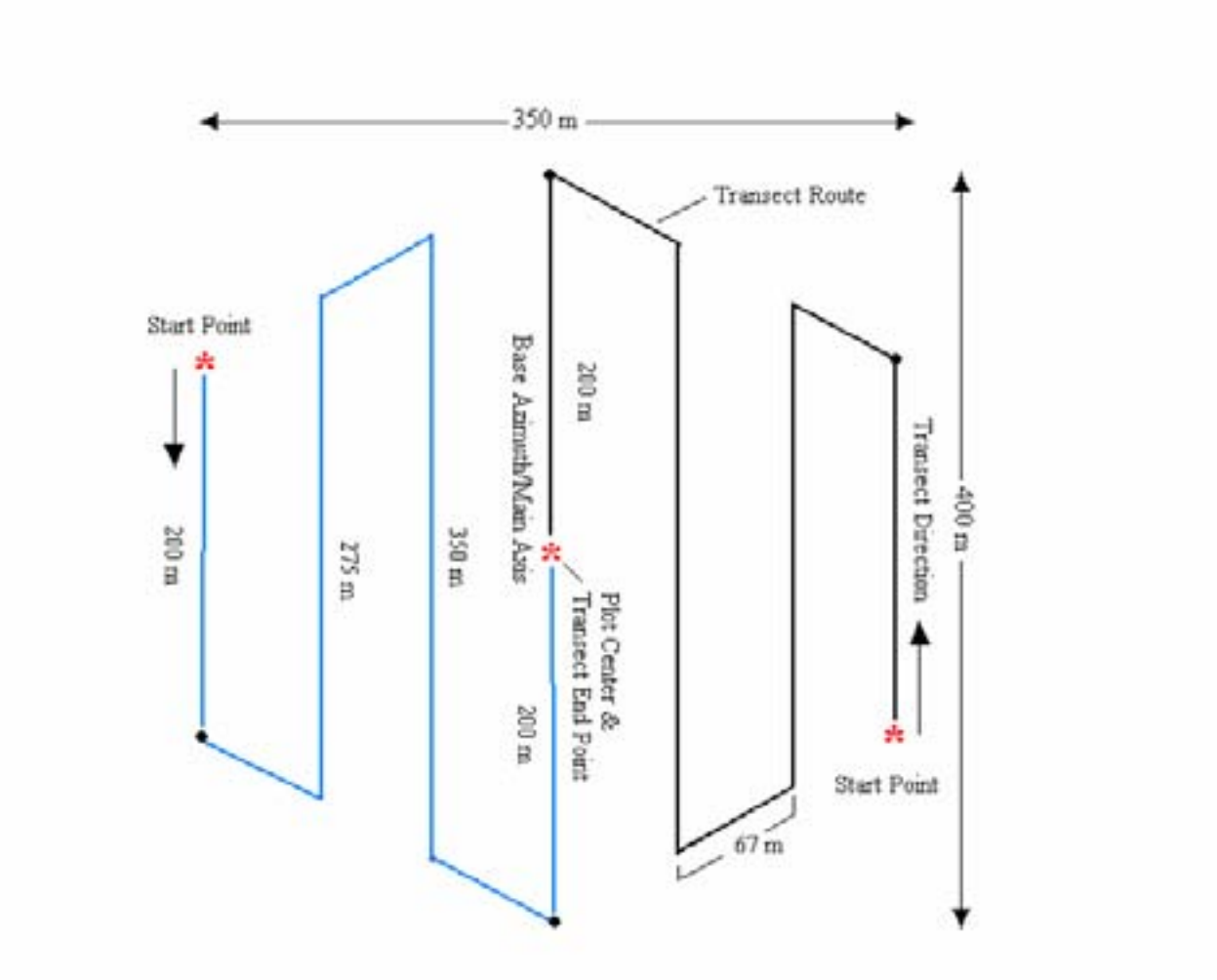
Diurnal reptiles are best detected by visual encounter surveys (Manley et al. 2005). Observers started at either end of the hexagon design and walked the transect searching under exposed rocks, as well as in crevices and other cover along each transect. Each transect was a belt 10 meters on either side of the center line for a total of 2,450 m long (Figure 2). The observer spent more time investigating high quality habitats along the transect belt. Locally, high quality habitat included talus areas, rock outcrops, rock piles, and crevices. Cover and surface objects were carefully replaced so that the microhabitat was not altered. Snake hooks were used to probe rock crevices for reptiles sheltering in those areas. Search time varied depending upon the habitat

Figure 1. Map of the Jarbidge Field Office with sampling locations depicted. Due to overlap at the scale of the map not all hexagons are visible.



complexity for each hexagon but was completed within 1 – 2 hours. Reptile were captured only to verify species identification. The following data collected for each reptile observed: observer, transect number, time, species, detection type [auditory, visual], and substrate type as appropriate [e.g. rock, bare ground, log, vegetated], habitat, and snout-vent length for captured specimens. Each hexagon was searched for reptiles on 2 days during same time the area is being trapped for small mammals. Notes were also made of any reptiles, mammals or other wildlife detected while checking the small mammal traps.

Figure 2. Reptile visual encounter surveys along the hexagon.



Reptile Trapping

To inventory for fossorial (underground) and/or nocturnal reptile species a combination of drift fences and funnel traps were used to augment visual encounter surveys in some locations. The layout of the drift fence/funnel trap arrays is depicted on the visual encounter transect diagram (Figure 3). The azimuth of the top (first drift fence) of the array was the same as the hexagon base azimuth with the other two drift fence at 120 degrees from the first fence. Traps were numbered (1) for funnel trap on the base azimuth, then funnel traps 2 and 3 clockwise from the first. The pit fall trap (5 gallon plastic bucket with <0.25" holes drilled in the bottom) in the center was labeled trap 4. The pitfall trap also had a small (4"x 7") cover board placed inside

Figure 3. Layout of reptile trapping array showing locations of funnel and pitfall traps. Figure is not to scale.

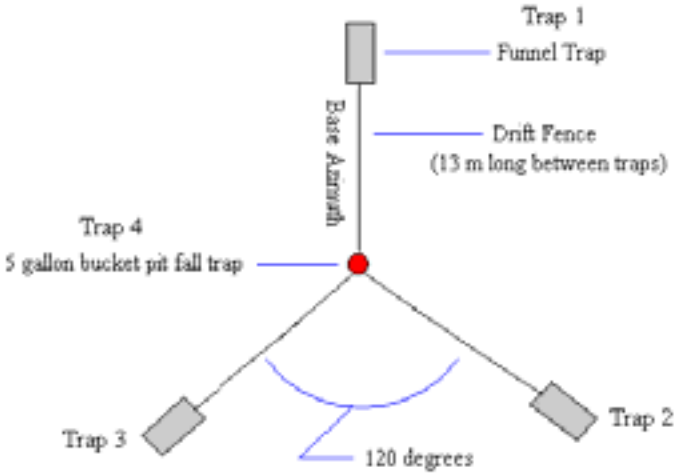


Figure 4. Example of reptile array installed in the field. Habitat is big sagebrush/annual grassland.

to provide shade in the bottom of the trap and 2" of soil placed in the bottom. Once set up, the arrays looked similar to Figure 4. The drift fences were 6 mil plastic sheeting cut to a 24" width. The plastic sheeting wings were buried 4" to 6" into the ground and attached to 24" long wooden 1" x 2"survey stakes with lath and screws to hold the fence upright. The funnel trap frame [24" wide, 16" tall, and 48" long] was constructed from 1"x2" lumber. The frame was covered with 0.25" mesh screen on three sides. The 0.25" mesh screen was used to form the funnel at the ends of the trap. The top was covered in wafer board to provide shade for captured animals. A second wood cover board (about 12" x 16") was placed within each funnel trap on top of a short piece of wood (1.5"x 1.5"x 6") to provide additional shade/cover for reptiles trapped inside. Additionally, 1" to 3" of soil was placed in the bottom of the trap.

Initially, reptile trapping arrays were run for a minimum of 28 consecutive days at the first 12 sites sampled for small mammals (Manley et al. 2005). However, based upon suggestions by Dr. Charles Peterson, a herpetologist from Idaho State University, we installed 8 reptile arrays placed in four areas for longer term (3 month) sampling in an attempt to detect less common species (night, longnose, and western ground snakes) (Peterson pers. comm. 2006). Sites for long-term trapping were selected based upon historic location data provided by the Idaho Conservation Data Center and the presence of suitable habitat. Figure 1 indicates the locations of short term (28 days), long-term, and reptile visual inventory locations.

Traps were checked at less than 48 hour intervals prior to 11:00 am. Field personnel wore leather gloves to remove lizards from traps. Snakes were removed using snake hooks as well as snake tongs. Information collected on trapped reptile species included species, snout-vent length, length of tail, land trap type (funnel or pitfall). As a safety precaution any rattlesnakes captured were released without any physical data being collected.

Other Reptile Visual Encounter Surveys

Crews also conducted reptile visual encounter surveys in a 4 areas in the spring of 2006 that were not associated with sample hexagons. Sites targeted included canyons and rock outcrops along the lower Bruneau River, Snake River near Pilgrim Gulch and C.J. Strike Reservoir, and Salmon Falls Creek at Lily Grade. Observers recorded all reptiles observed when walking through areas and checked under rocks and in crevices.

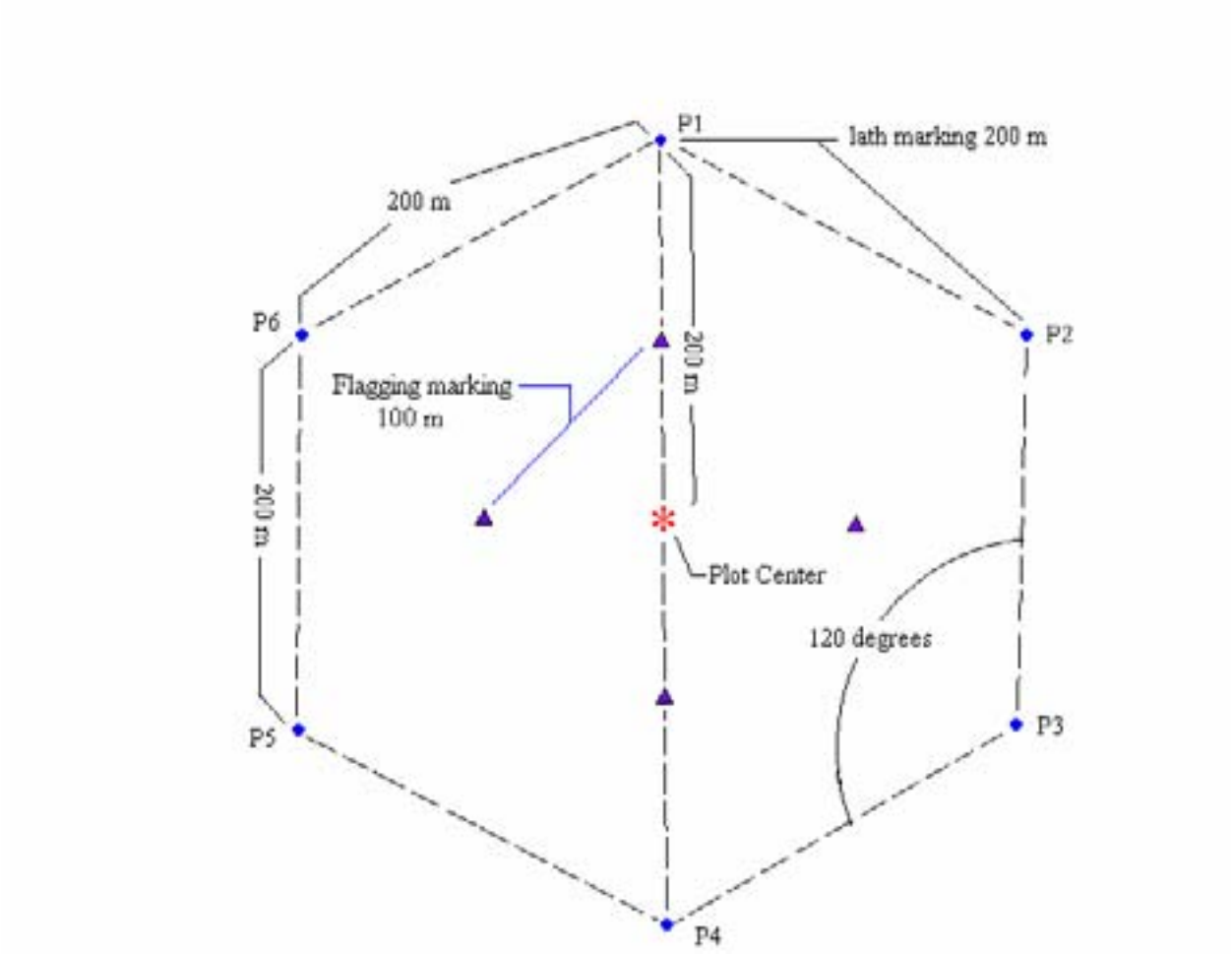
BREEDING BIRD SURVEYS

Bird point counts were conducted in June of 2006 in grassland and sagebrush steppe habitats. Bird counts were done from the plot center of the hexagon (see Figure 5). To aid in determining the distance category of individual bird observations, flagging was tied on shrubs or grasses at a distance of 100 m from the plot center in the cardinal directions (Manley et al. 2005). Point counts started between 6:30 and 8:30 AM. Counts were done each monitoring station for 10 minutes when the weather and winds were suitable during the week. Data were recorded in the following time frames (3 minutes, then 2 minutes, then the remaining 5 minutes).

Only one member, the most experienced birder, listened and observed to identify birds; other crew members watched the time and observed. Data were collected for each bird observed per time interval (species, number observed, distance category). Distances to birds were estimated and placed into two categories (<100 m and > 100 m) (see data form in appendix). The 10 minute time allowed observers more time to identify species and detect species that vocalize less

frequently. Hexagon were counted in the morning prior to small mammal traps being checked with at least 2 morning counts at individual hexagons. Counts were not done during precipitation (rain, thick fog, or snow) or excessively windy conditions (Beaufort wind scale 5 – small trees in leaf sway or more [19 mph or greater]). Bird counts concluded in late June due to a marked reduction of males singing.

Figure 5. Layout of the hexagon with the plot center and location of distance estimation flagging.



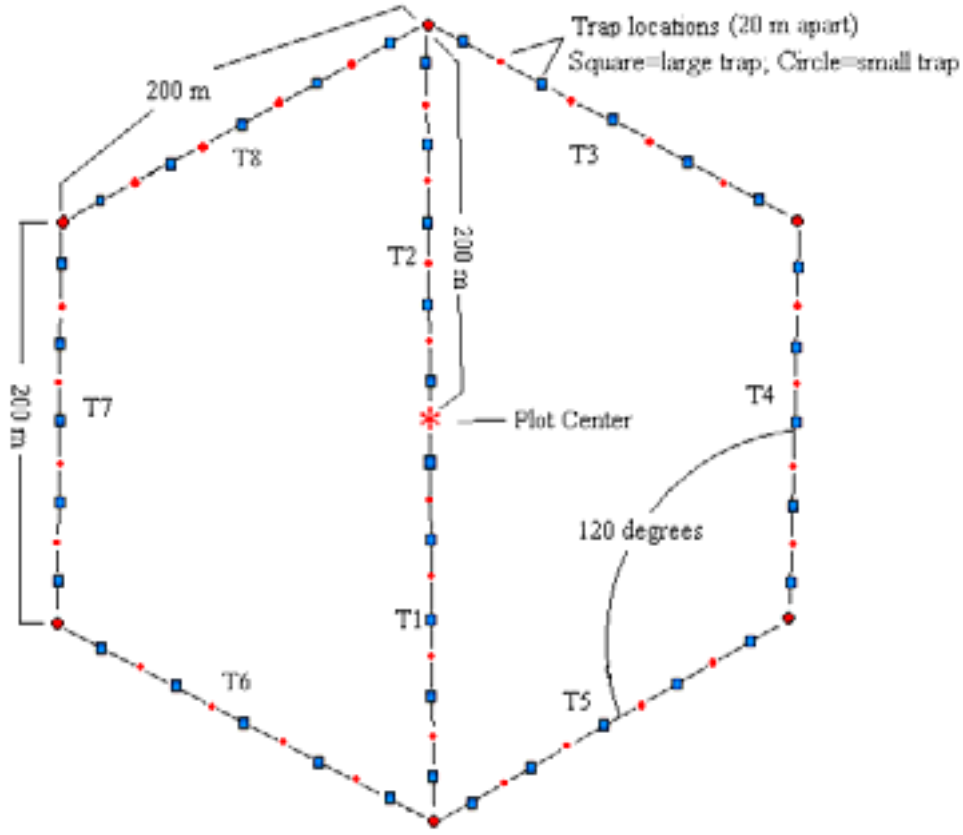
SMALL MAMMALS

Small Mammal Trapping

Small mammals were inventoried as outlined in Manley et al. (2005). Two sizes of Sherman live traps [3"x 3.5"x 9" and 4"x 4.5" x 15"] were set alternately at 20 m intervals along eight 200 m transects (total of 79 traps). Traps were laid out in a hexagonal shape (Figure 6) and were baited with a mix of peanut butter, rolled oats, and/or millet and sunflower seeds. This bait mixture provided the trapped animals with a food high in carbohydrate, protein, and fat. Bait was placed in gauze and suspended from the inside of the back door to improve baiting and reduce the chance that the bait would impede the treadle mechanism. In addition to bait, polyester batting (about a 1.5" diameter sphere) was placed in each trap to help moderate temperature extremes. Traps were placed within 7 feet (2 m) of the transect center line and situated to take advantage of

microhabitat (particularly shade, logs/sticks, shrubs, rocks) and rodent burrows. Traps were moved 17 feet (5 m) away from ant hills to help minimize ants swarming and removing bait. When shrubs or other cover were present traps were placed under them to minimize exposure to the sun. Small pieces of wood (3" longer and wider than the traps and 3/16" thick) were taped on top of the traps to provide additional protection from the environment, especially if overhead (shrub) cover was not present.

Figure 6. Small mammal trapping hexagon with specific transects indicated.



The traps were set out Monday afternoon and checked every morning for three days. The traps were checked prior to 11:00 am to decrease mortality due to heat or other factors. Bait and/or polyester batting were replaced as needed. Individual traps were replaced by clean traps if they held grasshopper mice, skunks or weasels to reduce the chance that small mammals would avoid traps that smelled as if predatory species were present. After the traps were checked on Thursday all the traps were removed.

Crews wore latex gloves while handling small mammals and equipment used to process small mammals. Latex gloves were replaced daily at a minimum and more frequently if they became

torn or punctured. Heavy duty 1 gallon plastic bags were placed over one end of the trap, then the captured animal was shaken into the bag. Animals were weighed to the nearest gram with Pesola scales. The scale and bag were suspended in a 5 gallon bucket if a breeze caused the weight to change to get a more accurate measurement. The bag weight was subtracted from the animal weight. Data collected on individuals trapped included species, sex – when readily apparent, age class [juvenile, subadult, adult – when apparent], breeding status [non-breeding, enlarged testes, lactating, pregnant – if obvious], relevant body measurements [left ear, left hind foot, tail, and total length in millimeters], and trap location (see data form in appendix). Notes were made if traps were covered with ants, had sprung doors, had bait or batting removed, or if the trap had been moved or tipped over. Each live small mammal captured was marked by having a patch of hair carefully trimmed from the back or hip using scissors. The change in color between the longer guard hair and shorter trimmed under-fur made identification of recaptures possible for the trapping period without permanently marking captured animals. Marked animals were reported as recaptures when trapped again. Mortalities were noted and measurements were taken of any deceased animals. After the data were recorded on the animals in the trap, the traps were reset later in the afternoon.

Every Thursday afternoon the traps were transported to the office for cleaning. Crews soaked the traps in a mixture of water (20 gallons) and bleach (2 cups) for 30 minutes to reduce scent, disinfect the traps, and kill potential hanta virus. Following soaking, the insides of the traps were cleaned using a small scrub brush to remove old bait, rodent droppings, and other material, then the traps were placed on racks to air dry. Once dry the traps were checked, counted and packed for use the following week.

2007 Ground Squirrel Inventory

In 2007 IDF&G randomly identified 22 survey sites of 640 acres based on available distribution and habitat maps of the geographic range of Piute ground squirrel in the JFO. Seventeen of the randomly selected sites were surveyed three times between early April and late May. Each site visit was scheduled to be at least one week apart. Every site was surveyed on foot until at least one ground squirrel or burrow was found or until 1.5 survey hours had elapsed. Validity of ground squirrel detection was made through a hierarchical system. While observations of Piute ground squirrel were most ideal, and were used to determine species presence, other evidence (i.e. detecting ground squirrel alarm calls and/or burrow location) were used to determine potential presence. Subsequent visits were used to confirm the species of ground squirrel calling or using burrows. Additionally, BLM wildlife crews used Trimble GPS units to record the coordinates of ground squirrel locations when ground squirrels were encountered incidental to other work.

VEGETATION SAMPLING

Sampling at inventory hexagons

Vegetation at each hexagon was sampled by line-point method. At 10 m intervals starting with a random number between 1 and 9 m the right side of the tape was read to determine types of cover present. Data collected included bare ground, rock, biological soil crust, litter, and/or plant species. For all eight transects (each hexagon side as well as the center) totaled 160 hits. For vascular plants additional data recorded included perennial grass, forb, and shrub height. For the vegetative height of grasses, the plants were measured to the top of their natural droop, or the top

of the seed stalk (if present), which ever was taller. For shrubs the height was measured from the tallest part of the shrub, less seed stalks for sagebrush. In forested habitats the number of trees within a 11.8 m radius circle (38.9 ft or 0.01 ac) were recorded as well as general diameter class (<1"dbh, 1"- 6" dbh, 6"-10" inch dbh, >10" dbh) at the plot center and alternating hexagon points. In case the wooded area was a linear feature data were collected at the end and center points of the plots. Biological soil crusts were classified as "open" when they were in the plant interspaces, and "covered" if they lay under the vegetal canopy.

For unknown plants, crews recorded the plot number, assigned a unique number, and collected a voucher specimen. Voucher specimens were identified by a botanist and the unknowns on the data sheets were corrected. In cases where the plant could not be identified, it remained classified as unknown.

Sampling of Big Game Winter Range

100 random points were generated by using a geographical information system (GIS in Arc Map) for sampling within the presently designated big game winter habitat. Using 2004 NAIP imagery, configured to NAD83 UTM, Zone 11 North, the points were initially evaluated in the office. Points (8) occurring within playas, reservoirs, major roads, and cliffs were removed from subsequent habitat evaluation. Field crews visited 80 of the winter range locations in the late fall and winter of 2006. Once at a site, field crews assigned the plot a habitat type. Because transects crossed more than one habitat or inclusions within a habitat, they were categorized by the majority of the shrub species encountered. Habitats were categorized as grassland when shrub cover was less than 10%. Twelve sites were not visited due to access and weather limitations.

Crews used GPS units to navigate to the coordinates of random sampling points in the field. Browse was evaluated using the extensive browse method (Interagency Technical Reference 1996) for shrub composition, age class, form class, and amount of recent browse use. From the starting point crews took a random direction and stopped every 5 steps and examined the shrub nearest to the observer's foot. Data recorded included shrub species, age class (seedling, young, mature, decadent), and form class (1-All available, little or no hedging, 2- All available, moderately hedged, 3- all available, severely hedged, 4- partially available, little or no hedging, 5- partially available, moderately hedged, 6- partially available, severely hedged, 7- Unavailable, 8- Dead). Each shrub was partitioned into quarters along the cardinal directions using the second hand on a watch to randomly determine which quarter was to be selected for sampling. Then 10 twigs only within that quadrant were evaluated for utilization as un-browsed or nipped/browsed (Stickney 1966).

DATA ANALYSES

All of the collected data were entered into an ACCESS data base (Microsoft Office 2003). Small mammal data were totaled by plot number and averaged into plant communities. Captures per 100 trap-nights were calculated for each plant community. In the absence of a reasonable estimate of true population abundances, an index of relative abundance such as captures per trap effort can be an appropriate for comparisons (Hopkins and Kennedy 2004). Small mammal diversity indices for each plot and habitat type were calculated using the Shannon index (Shannon and Weaver 1949). Shannon's index accounts for both abundance and richness of the species present. Incidental trapping of small mammals also occurred in some habitats in reptile

trap arrays, but in order to standardize trap effort, these captures were excluded from statistical analysis.

Within habitat groups (e.g. Wyoming sagebrush/tall grass, low sagebrush high elevation, etc.) the cover – for grasses, forbs, shrubs, litter, and biological soil crusts, as well as shrub and grass height, were averaged across all plots within the same group. Shrub cover was calculated for each plot, and averaged across habitat types with multiple plots.

Small mammal trapping data were pooled into the following categories: Wyoming sagebrush (*Wyoming sage-tall grass, Wyoming sage-short grass, and Wyoming sage-annual grass sub-communities*); low sagebrush (both high and low elevations); mountain shrub (mountain big sagebrush and mountain shrub communities); riparian (including cottonwood, juniper, and willow communities); grassland (including non-native annual and non-native perennial grasslands) to increase sample sizes for analysis. Data from small mammals for these grouped vegetation categories were statistically analyzed using analysis of variance (ANOVA) (Zar 1984, R Development Core Team 2006). These vegetation groups included 27 of 40 mammal trapping plots. Other habitat types (e.g. salt desert shrub, black sagebrush, semi-wet meadow, dune land, canyons, recent burn) had too few sample sites to be included in an ANOVA and could not be grouped in a biologically meaningful way. All calculations were performed in statistical environment R (R Development Core Team 2006).

Simple linear regression (Zar 1984, R Development Core Team 2006) was used to evaluate the possible relationships between plant cover and species richness. Regressions and ANOVAs were performed in R using techniques described by Faraway (2002) and ANOVAs were double checked by hand using methods shown by Zar (1984).

RESULTS

AMPHIBIANS

In 2006 amphibian inventories documented three different species (western toad, bull frog (*Rana catesbeiana*), and Pacific chorus frog - *Pseudacris regilla*) present in the Jarbidge Field Office. In 2007 five species (Great Basin spadefoot toad - *Spea intermontanus*, western toad, Pacific chorus frog, bull frog, and Columbia spotted frog) of amphibians were located. Only two locations had two or more species of amphibian present, Rocky Canyon and King Hill Canal (Table 1). Two bull frogs were documented in Tuana Gulch in 2006 and bull frog tadpoles were found in the King Hill Canal in 2007. Western toads had been documented in Tuana Gulch in 1993 and 1994. Bull frogs were not known to be present in Tuana Gulch at that time. Western toads were not detected during night surveys in 2007 or day surveys in 2006 in Tuana Gulch. Western toads (adults and metamorphs in two locations) were documented at two locations along the King Hill Canal and a lone adult in Big Pilgrim Gulch in 2006. The portion of the King Hill Canal occupied by bull frogs is separated by a concrete siphon from the portion occupied by western and spadefoot toads. The only amphibians observed during inventory in early July 2006 were Pacific chorus frogs found at one of four stock ponds surveyed in the day time. The pond where Pacific chorus frogs were observed had floating vegetation including water buttercup (*Ranunculus longirostris*). Tadpoles, metamorphs, and adults were present. Chorus frogs were historically known to be present in some oxbows along the East Fork of the Jarbidge River, at Camas Slough, a pond in Devil Creek Canyon; and a pond in Poison Creek. Based on day light

surveys in 2006 by IDF&G and BLM, Cherry, China, Flat, House, Pole, Columbet, and Dorsey Creeks did not appear to have any amphibians (Motychek and Barrett 2006, BLM unpublished data). Streams surveyed were typically low gradient streams with high sinuosity and recent to old beaver dams.

Table 1. Water bodies inventoried for amphibian and species found in spring/early summer 2006 and 2007.

Inventoried water body name	Pacific chorus frog	Western toad	Spade-foot toad	Bull frog	Columbia spotted frog
Tuana Gulch	N	N	N	P	N
King Hill Canal	N	(>10)	P(1)	P	N
Camas Slough	(5)	N	N	N	N
China Creek	(>10)	N	N	N	N
Whiskey Slough	P	N	N	N	N
Lower Cedar Creek	P	N	N	N	N
Devil Creek (pond)	(>10)	N	N	N	N
Devil Creek (Bengeochea Crossing)	N	N	N	N	N
Grassy Hills Pond (2)	(3)	N	N	N	N
Garner Spring	P	N	N	N	N
Rocky Canyon	P	N	N	N	(4)
House Creek	(5)	N	N	N	N
Columbet Creek	P	N	N	N	N
Dorsey Creek	N	N	N	N	N
Grindstone Wildlife Tract Pond	N	N	N	N	N
Black Rock Pond	(1)	N	N	N	N
Grindstone Canal	N	N	(>10)	N	N
Pole Creek	N	N	N	N	N
Flat Creek	P	N	N	N	N
Dead Horse Spring	(>10)	N	N	N	N
Gardner Spring	(6-10)	N	N	N	N
Pilgrim Spring	N	P	N	N	N
Stock pond 2.3 km N Camas Slough	(2)	N	N	N	N
Windmill Pond (Grassy Hills)	N	N	N	N	N
Pond 600 m NE Camas Slough	(1)	N	N	N	N
Whiskey slough (small pond at China Crk. Rd.)	(3)	N	N	N	N
Whiskey Slough (large pond on pvt.)	(>10)	N	N	N	N
Worley Draw (reservoir on pvt.)	(2)	N	N	N	N
Heil Reservoir	(3-4)	N	N	N	N
Cedar Creek (at dam)	(2)	N	N	N	N
P = indicates species present – no numbers estimated; N = Not detected; () = number in parenthesis indicates the approximate number heard calling or observed;					

Night surveys in the spring of 2007 documented Pacific chorus frogs in China Creek, Camas Slough, Columbet Creek and numerous other areas. The 2007 night inventory indicated that Pacific chorus frogs were generally widespread and locally abundant. Checks of some of the same sites during the daylight hours of 2007 showed few to no chorus frogs. A pond where a dozen chorus frogs were found in 2006 contained a few hundred metamorphs when checked in late July 2007.

Motychek and Barrett (2006) did not find any Columbia spotted frogs in Rocky and Timber Canyons, or other areas checked in 2006. The BLM fisheries crew documented a single Columbia spotted frog in the lower portion Timber Canyon in a beaver pond. A check of this area in 2007 indicated that the beaver pond where the spotted frog had been found had breached and the habitat was no longer suitable. In 2007 four adult Columbia spotted frogs were documented by a BLM wildlife crew in Rocky Canyon.

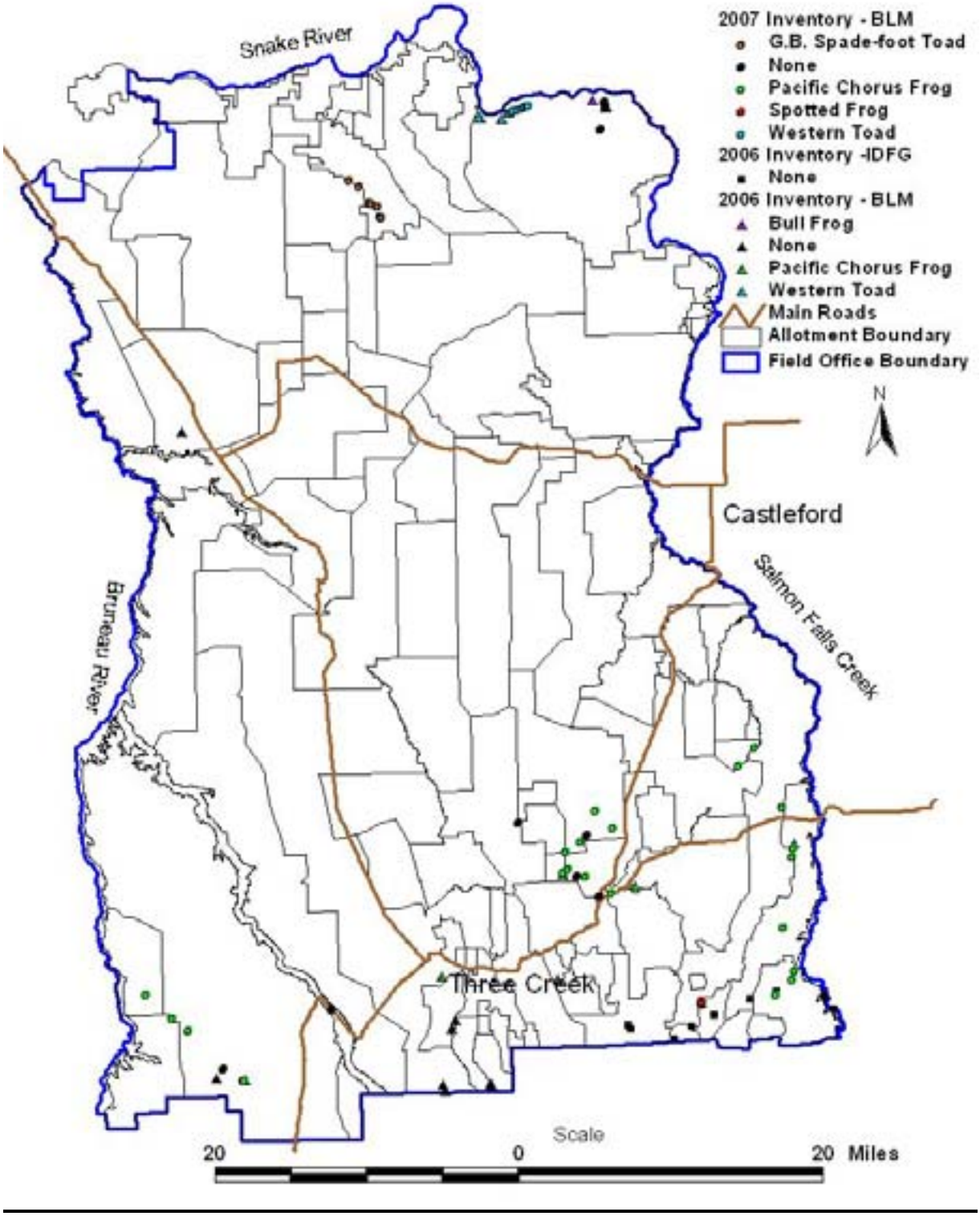
Spadefoot toads were found at several locations, along a 10 km stretch of the Grindstone Canal, and one calling male was heard in the King Hill Canal. No playas (shallow basins with clay bottoms) were inventoried for amphibians due to their remote locations. No Woodhouse or northern leopard frogs were documented in either 2006 or 2007 inventories. Woodhouse toads have been documented at a pond in Bruneau Dunes State Park near the northwest corner of the JFO. In 1975 northern leopard frogs were reported to be present in Salmon Falls Creek from the dam downstream to Balanced Rock Crossing (Trost 1975). Subsequent surveys for this species have failed to document this amphibian (McDonald and Marsh 1995) in Salmon Falls Creek. CDC records indicate that northern leopard frogs were historically (prior to 1970) present lower portion of the Bruneau River within the Jarbidge Field Office. Amphibian calling ceased in early June of 2007. Because fluctuations in temperature, wind speed and other factors affect calling in amphibians, absence data are <u>not</u> a reliable indicator of whether or not an amphibian species is present (Bridges and Dorcas 2000). Amphibian inventory in 2006 or 2007 did not cover the majority of ponds nor any playas in the area. Figure 7 shows the approximate location of specific sites inventoried in 2006 and 2007.

REPTILES

Trapping

Ten reptile and one amphibian species were trapped in reptile arrays during the 2006 inventory (Table 2). The western whiptail was the most abundant lizard trapped with 92 captures (Table 2), whereas the gopher snake was the most abundant snake at 21 captures (Table 2). Short-horned lizards were likely under represented in the trapping data compared to those observed in the field. Traps were closed at the Bruneau Canyon sites for the month of September when the access route to the trap sites became impassible. Reptile numbers were substantially higher at Big Pilgrim Gulch and Tuana Gulch compared to the Dune lands and Bruneau Canyon sites. Both Big Pilgrim and Tuana Gulch had a combination of rimrock and ledges, sandy soils, and riparian zones within 0.3 miles. The Dune land sites lacked rim rock and were more than 3 miles from perennial water. Bruneau Canyon sites contained gravelly rather than sandy soils, although rim rock was within 0.1 miles of the trap sites.

Figure 7. Map depicting the locations of ponds and streams inventoried in 2006 and 2007.



Visual Encounter Surveys at Hexagons

The western terrestrial gartersnakes were seen in the riparian zone associated with Cedar Creek and the East Fork Jarbidge River. Gopher snakes, racers, and western rattlesnakes were detected in most habitats and at a variety of elevations (3,300 feet to over 6,000 feet). Short-horned lizards were observed in most habitats (Table 3). The most common snake observed was the gopher snake (Table 3). Western whiptails and longnose leopard lizards were found only in the northern portion of the field office area, usually in areas with sandy soils. Because riparian zones were not trapped for reptiles, species such as rubber boa, gartersnake, and western skink were not captured. When crews conducted visual surveys for black-collared lizards in May 2006, several side-blotched, western whiptails, sagebrush lizards, and a few western fence lizards were noted.

Table 2. Reptiles captured in drift fence/funnel trap arrays during long term trapping (total trap nights per location in parenthesis).

Species	Long-term trapping sites							
	Tuana Gulch 1 (404)	Tuana Gulch 2 (244)	Big Pilgrim Gulch 1 (296)	Big Pilgrim Gulch 2 (304)	Dune Lands 1 (452)	Dune Land 2 (388)	Bruneau Canyon 1 (148)	Bruneau Canyon 2 (148)
Gopher snake	4	10	2		3	1		1
Racer		1				1	2	
Western rattlesnake		1	2	4		1	1	
Striped whipsnake			1				1	4
Western terrestrial gartersnake		1	1					
Short horned lizard					1	2		
Western whiptail	22	19	17	14	5	7	1	7
Longnose leopard lizard					2			
Sagebrush lizard	1		1	1				1
Side-blotched lizard		2	1	3			1	2
Western toad			2					
Totals	**27**	**34**	**27**	**22**	**11**	**12**	**6**	**15**

Other Visual Encounter Surveys

Side-blotched lizards were the most commonly observed lizard near the Bruneau River Canyon, the C.J. Strike area and the Snake River Canyon in the vicinity of Big Pilgrim Gulch. Near the Bruneau Canyon other reptiles observed included Western whiptail, sagebrush lizard, and a single Great Basin collared lizard. In the Pilgrim Gulch area a few leopard lizards and Western whiptails were also detected. In one rocky area near Big Pilgrim Gulch a Western fence lizard was noted. At Lily Grade only a single western fence lizard was seen.

Table 3. Reptiles observed at the 40 wildlife sampling locations.

Habitats Sampled	Species												
	Gopher snake	Racer	Western rattlesnake	Striped whipsnake	Western terrestrial gartersnake	Short horned lizard	Desert horned lizard	Western whiptail	Longnose leopard lizard	Sagebrush lizard	Side-blotched lizard	Western fence lizard	Total
Annual grassland	4	2											6
Crested wheatgrass seeding	5	1											6
New burn													0
Black greasewood		2						7					9
Mountain mahogany										12			12
Aspen													0
Black sagebrush	1		1			2				1			5
Low sagebrush (low elev.)						1							1
Low sagebrush (high elev)	1					4						2	7
Mountain big sagebrush	1		1										2
Wyo. sagebrush/short grass	1	1	1			4				5			12
Wyo. sagebrush/tall grass	1					2							3
Mountain shrub		1	1										2
Semi-wet meadow													0
Riparian – willow/sedge (Excl)					2								2
Riparian – willow/sedge			1		1								2
Riparian – cottonwood					1								1
Riparian – juniper			2										2
Canyon/talus*													NA
Dune land	1							7	3				11
Salt desert shrub						3				2			5
Basin big sagebrush/annual						1							6
Wyo. big sagebrush/annual	2	1											3
* not inventoried due to cool temperatures, windy conditions and lateness in the year (late September).													

BIRDS

The most widely reported bird species was the western meadowlark (Table 4). Cliff swallows were noted in two locations and were likely foraging well away from their nesting areas. Plots where ring-necked pheasants were found were within 2 miles or less of agricultural land. Areas where pheasants were heard typically had fairly tall (>16 inches) dense grass at the site or nearby. Habitat where the grasshopper sparrow was heard consisted of a tall (>20 inches) "wolfy" crested wheatgrass seeding. "Wolf" grass plants are those with more than two years of

old stems and leaves in the center of the plant. Raptors, ravens, and magpies were recorded flying through some plot areas during the counts. Brewer's sparrows were found in all Wyoming big sagebrush habitats. Sagebrush habitat blocks where sampling occurred were generally greater than 30 acres in size and were usually within a much larger (>400 ac) block of habitat. A vocalizing Brewer's sparrow was detected at one non-native perennial grass plot. This plot had a small patch of sagebrush about 0.5 acres in size. Gray flycatcher, loggerhead shrike, and sage thrasher were present in areas where some tall (> 40 inches [1 m]) shrubs (e.g. bitterbrush and sagebrush) were present mixed with shorter sagebrush. By late June, male bird territorial singing dropped substantially in duration and frequency.

Table 4. Numbers of birds by species detected during variable circular plot breeding bird surveys at habitats sampled. The number of plots per habitat sampled is in parentheses.

Species	Habitat Sampled						
	Dune land (1)	Annual Grassland (2)	Crested Seeding (1)	Mountain Shrub (1)	Wyoming big sagebrush/short grass (2)	Wyoming big sagebrush/annual (1)	Basin big sagebrush/annual (1)
Western meadow lark	5	3	3	1	4	7	3
Horned lark				4	4		
Brewer's blackbird		6				2	
Brewer's sparrow	1	1	1	4	4	2	
Sage sparrow				3	4		
Vesper sparrow				1	2		
Grasshopper sparrow			1				
Loggerhead shrike	1					1	
Mourning dove		1		1	1		1
Sage thrasher				3	1		
Gray flycatcher	2			1			
Green-tailed towhee						1	
Raven			1				1
Black-billed magpie						2	1
American kestrel		1				1	1
Northern harrier		2					
Barn owl		1					
Golden eagle							1
Cliff swallow		35					12
Ring-necked pheasant	1	2	2			2	
California quail		1				1	

A number of bird nests were found incidental to doing other field work at the plots. A summary of the nests, substrate, and habitat are listed in Table 5. More bird species were detected nesting in aspen habitats than in other habitats inventoried. This was likely due to greater habitat complexity (tree boles and larger canopies). No nests were found in riparian zones or the mountain mahogany site; however, this is likely due in part to the time of year (mid to late summer) when these areas were inventoried. A few bird nests with eggs were seen in early July. These were likely second (or possibly third) clutch or nesting attempt for a number of species including vesper sparrow, sage sparrow, and mourning dove. Crews did not actively search for bird nests in various habitats sampled, therefore, no analyses comparing nesting between habitats would be appropriate.

Table 5. Nest substrate and habitats where bird nests were documented.

		Nest substrate			
Species	Habitat where found	Sagebrush	Bitterbrush	Aspen	Comments
Brewers sparrow	Wyoming big sagebrush	4			
Sage sparrow	Wyoming big sagebrush	1			
Vesper sparrow	Wyoming big sagebrush	1			
Woodpecker/sapsucker	Aspen			2	Species not confirmed
Red-tailed hawk	Aspen			1	Nest in tree fork
Northern flicker	Aspen			1	Nest cavity
Tree swallow	Aspen			1	Nest cavity
House wren	Aspen			1	On ground near nest tree
Unknown	Mountain shrub		1		Nest in bush
Unknown	Aspen			1	2 juveniles in nest

SMALL MAMMALS

Incidental Mammal Observations

Least chipmunks were commonly seen in areas with sagebrush. Several ground squirrel species were noted in early June. Piute ground squirrels were only observed until mid June. Numbers of Belding (*S. beldingi*) numbers declined early June through late July even at the highest elevations. Declines in both Piute and Belding ground squirrels were presumably related to entering torpor. Antelope ground squirrels (*Ammospermophus leucurus*) remain active into October and are known to be active year round (Belk and Smith 1991). Golden-mantled ground squirrels (*S. lateralis*) were only noted at higher elevations near the mountain mahogany site and near Cedar Creek in areas with numerous large rocks.

Other small mammals observed included yellow-bellied marmot (*Marmota flaviventris*) at one mountain big sage site on a rock outcrop. A pygmy rabbit was noted at a mountain shrub site. Black-tailed jackrabbits (*Lepus californicus*) were seen at several habitats [black greasewood –1; basin big sage/annual grassland – 3; annual grassland – 2; Wyoming big sage/tall grass – 1; Wyoming big sage/short grass – 2; and dune land site – 1]. White-tailed jackrabbits (*Lepus townsendi*) were observed enroute to two sampling sites, but were not observed at any sample location. White-tailed jackrabbits appear to be present at higher (≥5000 ft) elevations Mountain cottontails (*Sylvilagus nuttallii*) were noted at mountain shrub – 1, mountain big sage – 1, Wyoming big sage/ tall grass – 1, and canyon/talus site – 1. Larger mammals noted included badger (*Taxidea taxus*), coyote (*Canis latrans*), weasel (*Mustela* sp.), pronghorn (*Antilocapra americana*), and mule deer (*Odocoileus hemionus*).

Small Mammal Trapping

In total we had 2,145 captures of 1,653 individual animals, consisting of 21species in 15 genera (Table 6) among the 23 habitats sampled. Deer mice were the most abundant rodent captured and were found in all habitats (Table 6) and all but one site sampled. Specific to Sherman live traps, there were a total of 9,492 trap nights across all habitats. Several species were captured only once including water shrew (*Sorex palustris*), spotted skunk (*Spilogale gracilis*), and desert woodrat (*Neotoma lepida*) (Tables 6 & 7). Great Basin Pocket mice (*Perognathus parvus*) and sagebrush voles (*Lemmiscus curtatus*) were present at several sites. Across all habitats sampled with Sherman lives-traps deer mice comprised (83%) of the captures, followed by sagebrush vole (2.6%), least chipmunk (2.7%), Great Basin pocket mouse (2.4%), Ord kangaroo rat (*Dipodomys ordii*) (1.3%), chisel-tooth kangaroo rat (*Dipodomys microps*) (<1%), and harvest mouse (*Reithrodontomys megalotis*) (<1%). There was a difference in capture rates of certain species of small mammal between baited Sherman live traps and reptile (unbaited pitfall and large wire funnel traps) arrays (Table 6). More harvest mice, montane voles (*Microtus montanus*), bushy-tailed woodrats (*Neotoma cinerea*), and Ord kangaroo rats were captured in reptile arrays than in baited Sherman live traps. For other common small mammals, more captures were made in baited Sherman live traps.

Several small mammal species were only found in specific habitats (Table 7). Yellow pine chipmunks were found in the only aspen stand sampled. This species was previously not known to be present in the planning area. The water shrew and western jumping mouse were limited to riparian zones as expected. The majority of long-tailed voles were captured in riparian areas. Canyon mice were found at two sites. In both cases they were in areas with talus/cliff in close proximity. The low elevation/low sagebrush site had a low number of small mammals compared to other sagebrush habitats. The area was a shallow clay pan range site with stony soils. The low sagebrush/low elevation site may not be as conducive for small mammals or this may be an artifact of trapping only one site. The semi-wet meadow also had a relatively low number of small mammals. Soils at the semi-wet meadow site are saturated from April into June. During this time burrows would be flooded, which may reduce habitat suitability for some small mammal species. Ord kangaroo rats were trapped at sites with lower elevations (<4500 feet).

Table 6. All mammal captures, including baited Sherman live traps and incidental captures in un-baited wire mesh and pitfall traps.

Common Name	**Scientific Name**	**Count**	*Sherman live trap captures*	*Pitfall & funnel trap incidental captures*	**Percent Comp**
Deer mouse	*Peromyscus maniculatus*	**1240**	*1224*	*16*	75%
Montane vole	*Microtus montanus*	**72**	*11*	*61*	4%
Great Basin pocket mouse	*Perognathus parvus*	**71**	*36*	*35*	4%
Sagebrush vole	*Lemmiscus curtatus*	**61**	*39*	*22*	4%
Ord kangaroo rat	*Dipodomys ordii*	**48**	*20*	*28*	3%
Least chipmunk	*Neotamias minimus*	**40**	*40*	*0*	2%
Yellow pine chipmunk	*Neotamias amoenus*	**35**	*35*	*0*	2%
Shrew (unknown)	*Sorex spp.*	**16**	*15*	*1*	1%
Long-tailed vole	*Microtus longicaudus*	**15**	*12*	*3*	1%
Mountain cottontail	*Sylvilagus nuttallii*	**9**	*9*	*0*	1%
Short-tailed weasel	*Mustela erimea*	**8**	*7*	*1*	0.5%
Harvest mouse	*Reithrodontomys megalotis*	**7**	*3*	*4*	0.4%
Chisel-tooth kangaroo rat	*Dipodomys microps*	**6**	*6*	*0*	0.4%
Western jumping mouse	*Zapus princeps*	**5**	*5*	*0*	0.3%
Canyon mouse	*Peromyscus crinitus*	**4**	*4*	*0*	0.2%
Bushy-tailed woodrat	*Neotoma cinerea*	**2**	*0*	*2*	0.1%
Grasshopper mouse	*Onychomys leucogaster*	**2**	*2*	*0*	0.1%
Northern pocket gopher	*Thomomys talpoides*	**2**	*1*	*1*	0.1%
Desert woodrat	*Neotoma lepida*	**1**	*1*	*0*	0.1%
Long-tailed weasel	*Mustela frenata*	**1**	*1*	*0*	0.1%
Spotted skunk	*Spilogale gracilis*	**1**	*1*	*0*	0.1%
Water shrew	*Sorex palustris*	**1**	*1*	*0*	0.1%
Total Captures		**1647**	*1473*	*174*	100%

Usually the soils at these sites were sands to sandy loams. Vegetation was very sparse at the dune land site. The Jarbidge Field Office has few documented locations for spotted skunk. This species was trapped in a juniper dominated riparian zone with a large amount of boulders and large rock in the flood plain and adjacent uplands. At one annual grassland site (273 trap nights) no small mammals were captured. At two other annual grassland sites, deer mice, montane voles, Ord kangaroo rats, and Great Basin pocket mice were trapped. Weather is not believed to be a factor because small mammals were captured at two other sites trapped at the same time.

Table 7. Number of small mammal captures by species and habitat sampled.

Species	Habitats sampled											
	Annual Grass	Crested Seeding	New Burn	Black Greasewood	Mountain Mahogany	Aspen	Black Sagebrush	Low Sagebrush (low elev.)	Low Sagebrush (high elev.)	Mtn Big Sagebrush	Wyo Sagebrush (short grass)	Wyo Sagebrush (tall grass)
Deer mouse	28	40	32	16	19	46	39	7	136	125	129	164
Montane vole	2	1				3	1		2			
G.B. pocket mouse	5	4	1	3	2		2		1	1	4	3
Ord's kangaroo rat	5	1	3	4				1				
Harvest mouse	1	1	1									
Sagebrush vole		2	3		1			4		6	4	7
Long-tailed vole						1						
Shrew (unknown)						2						
Yellow pine chipmunk						24						
Northern pocket gopher						1					1	
Western jumping mouse						1						
Short-tailed weasel												
Water shrew												
Desert woodrat												
Canyon mouse												
Spotted skunk												
Least chipmunk					1					10	4	
Chisel-tooth kangaroo rat											2	
Mountain cottontail					5							
Grasshopper mouse												
Long-tailed weasel						1				1		2
Total Captures	41	49	40	23	22	79	42	12	139	151	144	176

Table 7 continued

Species	Habitats Sampled											
	Mountain Shrub	Semi-wet Meadow	Riparian (willow/sedge Excl)	Riparian (Grazed)	Riparian Cottonwood	Riparian Juniper	Canyon/Talus	Dune land	Salt Desert Shrub	Basin Big Sagebrush Annual	Wyo. Sagebrush Annual grass	Total
Deer mouse	101	18	30	12	53	48	41	5	51	51	24	*1224*
Montane vole	4	3								14	5	*11*
G.B. pocket mouse									9	11		*36*
Ord's kangaroo rat								7		5		*20*
Harvest mouse									2			*3*
Sagebrush vole	14							1				*36*
Long-tailed vole	2		2	2								*7*
Shrew (unknown)			1	2	1							*4*
Yellow pine chipmunk												*35*
Northern pocket gopher				1								*1*
Western jumping mouse			2									*6*
Short-tailed weasel			2									*7*
Water shrew				1								*1*
Desert woodrat				1								*1*
Canyon mouse						3	1					*4*
Spotted skunk						1						*1*
Least chipmunk	20											*39*
Chisel-tooth kangaroo rat									4			*6*
Mountain cottontail	2											*9*
Grasshopper mouse	2											*2*
Long-tailed weasel												*2*
Total Captures	145	21	37	19	54	52	42	14	66	81	39	

The canyon/talus site trapped in 2006 had burned in 2005 in the Clover Fire. Cheatgrass was the dominant grass component at the site and little live sagebrush was present. It is possible that an unburned canyon area would have had a somewhat different small mammal assemblage.

The Sailor Cap fire during the summer of 2006 burned over an area that was to be trapped. Crews trapped the burned area and an unburned area approximately 0.1 miles to the southwest simultaneously 45 days following the fire. Prior to the fire, both sites had a mix of non-native annual grass, crested wheatgrass, and a native grass/shrub component. Capture rates per 100 trap nights were 5.8 in the burn and 11.3 in the unburned site. At both sites, deer mice were the most abundant rodent captured. Ord kangaroo rats were present at the burned and unburned areas, 1

and 2 captures, respectively. There were 3 sagebrush voles, 1 harvest mouse, and 1 Great Basin pocket mouse also trapped at the unburned site.

Cliff chipmunks are known to be present in the adjoining Burley Field Office east of the JFO. The Burley F.O. BLM wildlife biologist has previously trapped cliff chipmunks in that area (Bartels pers. comm. 2006). Bartels assisted in examining potentially suitable habitat in the Jarbidge Field Office for likely presence of cliff chipmunks. The most suitable site was targeted for trapping this species. No cliff chipmunks were confirmed in the Jarbidge F.O. A lack of cliff chipmunk captures may be due to insufficient trapping effort in suitable habitat, a limited amount of suitable habitat, the overall rarity of the species, or possibly the lack of cliff chipmunks in the area. Pinyon mice have been confirmed in juniper habitats in the Owyhee Field Office west of the JFO. No pinyon mice were detected in the trapping effort in 2006. Only one site (juniper riparian zone) had the potential to have this species. The lack of detections for pinyon mice can be explained the same as for cliff chipmunk. Few shrews were captured in part due to the type of traps and bait used. No Merriam or Preble shrews (*Sorex preblei*) were captured in the 2006 inventory. Because of their relatively small size and light weight, shrews are more likely to be captured in pit fall traps or snap traps than Sherman live traps (Verts and Carraway 1998). However, a total of 16 shrews were trapped in live traps during the inventory effort.

The greatest number of small mammal species captured was in the aspen habitat (8 species), followed by mountain shrub habitats (7 species) (Table 8). Deer mice, sagebrush voles, montane voles, and Great Basin pocket mice were trapped in 7 or more habitats. The number of species in some habitats may have been greater had trapping effort been replicated. Although the small mammal species diversity index for non-native annual grassland and non-native perennial grassland were similar and in the mid-range of the habitats sampled, they had relatively few individuals (Tables 7& 8).

Analysis of Variance was performed on five grouped habitat types to improve sample size: Wyoming sagebrush (including *Wyoming sage-tall grass, Wyoming sage-short grass, and Wyoming sage-annual grass communities*); low sage (both high and low elevations); riparian (cottonwood, juniper, and grazed and ungrazed willow communities); non-native grassland (grouped non-native annual and non-native perennial grasslands); and mountain shrub (Table 9). ANOVA, followed by multiple comparison using pair wise t-tests, showed significant differences between the non-native grassland habitats and all the other habitat type groups ($p < .01$). However, no significant differences were found between Wyoming sagebrush, low sagebrush, mountain shrub and riparian areas. Greater variance in the grouped low sagebrush habitats and riparian zones may have obscured significant differences.

ANOVA comparing diversity indices between habitat groups showed no significant differences. Also, ANOVA showed no differences in species richness between these habitat groups.

Table 8. Abundances, diversity and species richness of small mammals at 40 trap sites in 23 habitats.

Habitat (total trap nights)	Number of Sites	Captures/ 100 trap nights	Number of Species	Shannon Diversity index
Annual grassland (948)	3	3.9	6	0.430
Aspen (237)	1	39.2	8	0.514
Basin big sage/annual grass (474)	2	15.6	4	0.297
Black greasewood (237)	1	8.9	3	0.308
Black sagebrush (237)	1	17.7	3	0.131
Canyon/Talus (237)	1	18.1	2	0.048
Crested wheatgrass seeding (1185)	5	4.6	6	0.439
Dune land (237)	1	3.8	2	0.298
Low sage (high elevation) (474)	2	26.6	3	0.055
Low sage (low elevation) (237)	1	5.5	3	0.390
Mountain big sagebrush (474)	2	32.5	5	0.217
Mountain mahogany (237)	1	12.7	4	0.376
Mountain shrub (711)	3	18.7	6	0.357
New burn (240)	1	8.3	2	0.106
Riparian-Cottonwood (ungrazed) (180)	1	30.6	2	0.039
Riparian-Juniper (ungrazed) (180)	1	34.4	3	0.120
Riparian-Willow (237)	1	8.8	7	0.620
Riparian-Willow (exclosure) (237)	1	18.8	6	0.515
Salt desert shrub (237)	1	29.1	4	0.303
Semi-wet meadow (exclosure ungrazed) (180)	1	8.3	3	0.278
Semi-wet meadow (180)	1	6.7	2	0.196
Wyoming big sage/annual grass (237)	1	11.4	2	0.151
Wyoming big sage/short grass (711)	3	21.1	5	0.167
Wyoming big sage/tall grass (948)	4	18.8	6	0.161

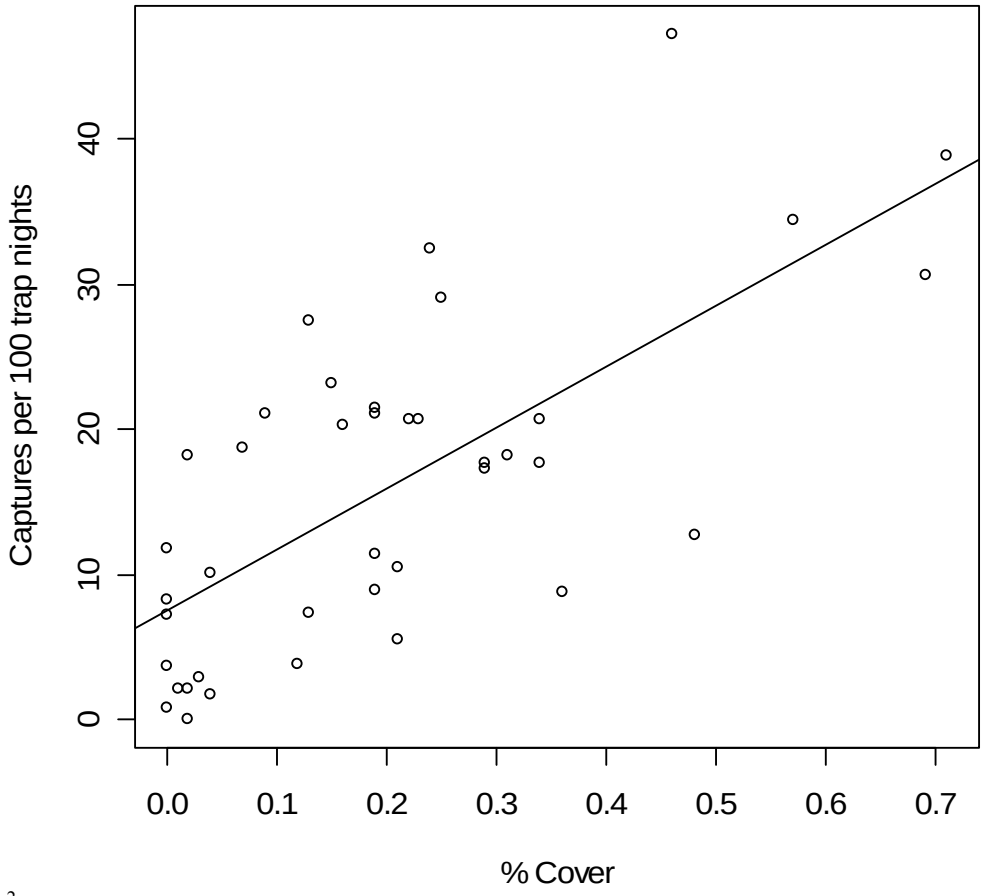
Table 9. Habitat groups used for ANOVA.

	Grouped averages are ± SE			
Habitat Type *(number of plots)*	p value	Averaged captures/hundred trap nights	Small Mammal Diversity index	Average shrub/tree cover (%)
Non-native grassland (9)[A]	0.008	5.1 ± 1.4	.204±.068	1±1%
Wyoming big sage (8)[B]	0.533	21.6±1.7	.228±.040	17±2%
Low sage (3)[B]	0.680	13.5±7.8	.168±.130	22±1%
Mountain shrub (3) [B]	0.855	22.0±4.4	.421±.075	31±1%
Riparian (4) [B]	0.744	23.1±3.5	.358±.132	42±13%

Number in () indicate the number of plots pooled for analysis.
[A] = statistically significant difference non-native grassland and all other groups
[B] = groups classified the same are not statistically significant different

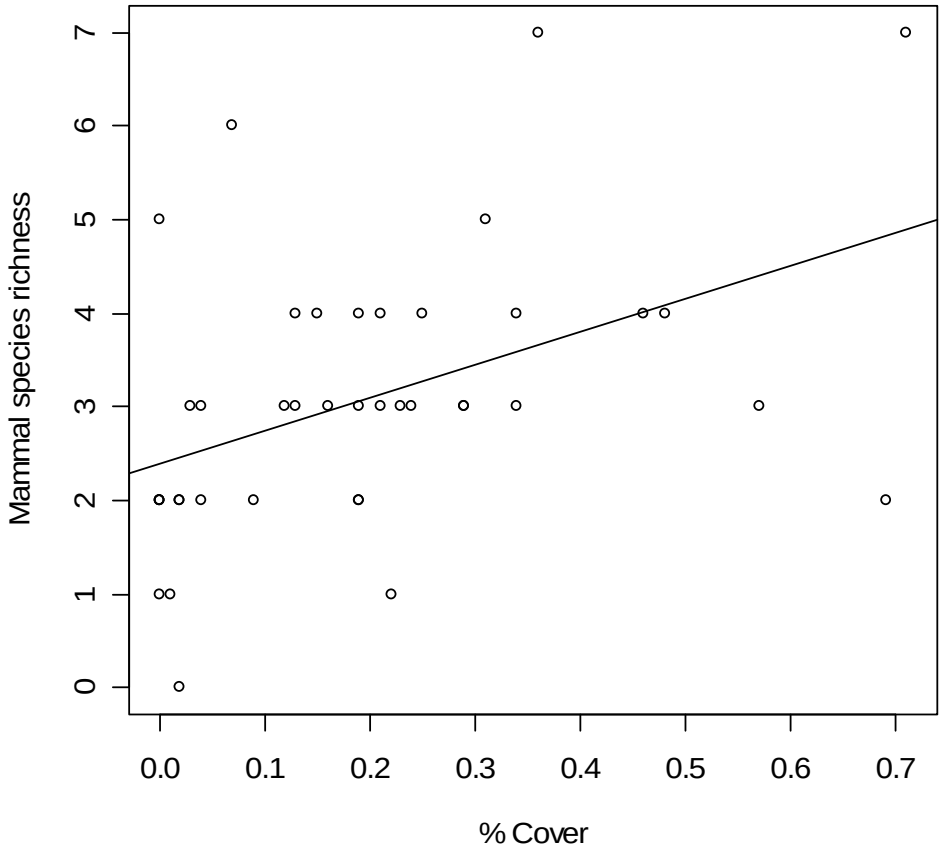
Simple linear regression indicated a positive correlation between percent shrub cover and mammal abundance as measured by captures per 100 trap nights (r^2=.465, p<.0005, Fig. 8). There was no significant relationship between either species richness or diversity index score and shrub/tree cover. There was a weak positive correlation between shrub/tree cover and small mammal species richness (r^2=.171, p=.01, Figure 9).

Figure 8. **Relationship of shrub/tree cover on small mammal abundance, as indicated by captures per 100 trap nights**



r^2=.465 p<.0005 DF=38

Figure 9. Relationship of shrub/tree cover on small mammal species richness, as indicated by total number of species captured



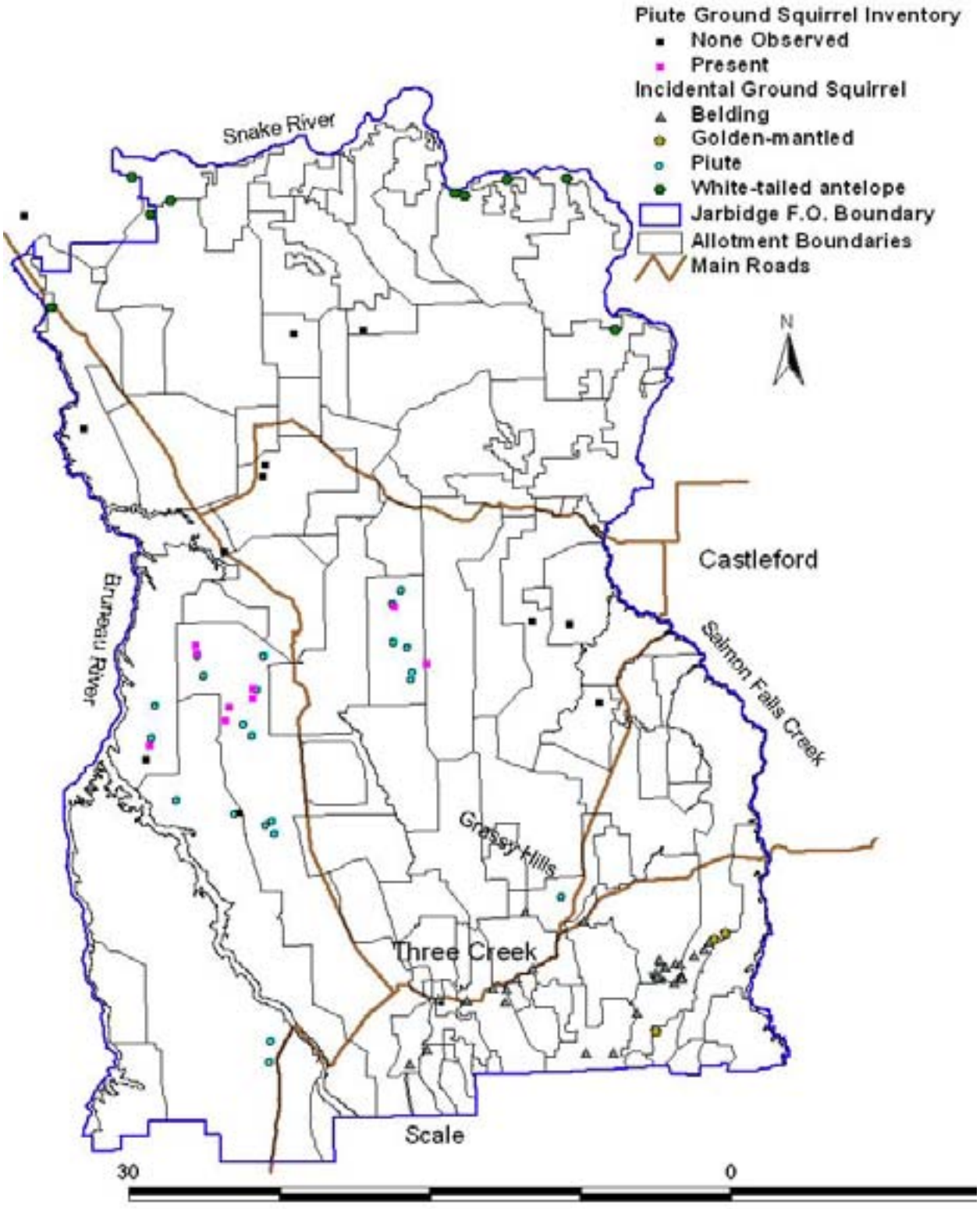
r^2=.171 p=.01 DF=38

2007 Ground squirrel surveys

Approximately, 11,000 acres were inventoried for Piute ground squirrel by technicians walking transects for 1.5 hours per site in the spring of 2007. Piute ground squirrels were found at 8 of 17 sites (47%) surveyed in the central portion of the planning area generally in an east-west belt between 4,000 to 4,800 feet in elevation. At a few sites no ground squirrels were detected. These sites may have been occupied by ground squirrels at low densities, which were not observed. Most of these sites where ground squirrels were not detected had been converted to non-native grassland over 20 years ago.

There were 69 incidental observations of Piute ground squirrels within the JFO, many of which are in close proximity to each other. Incidental observations mean we noted the species incidental to doing other work and not part of a survey. In addition, incidental observations of Belding, white-tailed antelope and golden-mantled ground squirrels, were recorded and documented. Generally Belding ground squirrels were found at the higher elevations from Grassy Hills south into the Jarbidge Foothills. Figure 10 depicts locations of ground squirrels including Piute ground squirrels in the planning area.

Figure 10. Locations of ground squirrel species in the planning area.



VEGETATION

Vegetation Cover

Grasses

The habitat influenced the type of vegetation present (Table 10). In the Wyoming big sagebrush/short grass and Wyoming big sagebrush/tall grass habitats, Sandberg bluegrass was present at varying proportions (5% to nearly 30%) of the native grass cover in sagebrush steppe habitats. Sandberg bluegrass was the dominant grass species at several areas, including sites where bluebunch wheatgrass or Thurber needlegrass were expected to be the dominant grass. In higher precipitation/elevation sites with abundant Idaho fescue, Sandberg bluegrass contributed less grass cover.

In the aspen sampled Kentucky bluegrass provided the majority of the grass cover. In riparian zones, other grass/grasslike species including Kentucky bluegrass, meadow foxtail, rushes, and sedges provided the majority of cover.

Forbs

Native forbs were variable across habitats ranging from <1% to over 14% (Table 10). Sagebrush habitats at higher elevations, as well as in higher precipitation zones generally had more native forb cover than drier lower elevation sites. The higher elevation sites also tended to have more forb species. Sage-grouse preferred-forbs were found to be limited in both annual grassland and non-native (crested wheatgrass) seeding (0.3% in both habitats). In the majority of the sagebrush habitats, sage-grouse preferred-forbs provided 1 to 2% of the cover in sagebrush steppe habitats sampled. Sage grouse preferred-forbs include but are not limited to yarrow (*Achillea millefolium*), dandelion (*Taraxacum officinale*), false dandelion (*Agoseris* spp.), hawksbeard (*Crepis* spp.), phlox (*Phlox* spp.), cancer-root (*Orobanche* spp.), biscuit-root (*Lomatium* spp.), pussy-toes (*Antennaria* spp.), clover, (*Trifolium* spp.), knotweed (*Polygonum* spp.), alfalfa (*Medicago sativa*), prairie-star (*Lithophragma* spp.), and willowweed (*Epilobium* spp.).

Shrubs

Sagebrush in the sagebrush steppe habitats was generally greater than 10% shrub canopy cover (Table 10), however, the species of sagebrush varied with the site as expected. Most sites in sagebrush steppe had a total shrub cover of 20% or more. Rabbitbrush was typically present in low amounts (<1%), however, a couple of sites had 3 to 5% rabbitbrush. Rabbitbrush was generally more abundant in areas that had been previously disturbed, including older (20+ year) burns. Bitterbrush, snowberry, Utah serviceberry, chokecherry (*Prunus virginianus*), and mountain mahogany were present at several shrub steppe habitats and contributed to overall shrub cover. In non-native grassland areas the most abundant shrub was gray rabbitbrush (*Chrysothamnus nauseosus*) (Table 10).

Invasive species

Annual grasslands were dominated by non-native species, primarily cheatgrass with tumbleweed (*Salsola kali*), tumble mustard, (*Sisymbrium altissimum*), and a number of other non-native species. The non-native perennial seeding also had substantial cover of cheatgrass as did the black greasewood and both Basin big sagebrush/annual grassland and Wyoming big sagebrush/annual grassland sites (Table 10). Patches of cheatgrass were also noted in black sagebrush, salt desert shrub, and Wyoming sagebrush/short grass habitats. In the sagebrush

Table 10. Average cover of shrubs, grasses, forbs (grouped), litter, rock, bare ground and biological soil crusts by habitat

Average % Cover by Habitat	Annual grassland	Aspen	Basin big sagebrush (annual)	Black greasewood	Black sagebrush	Burn (recent)	Canyon/Talus	Crested wheatgrass seeding	Duneland	Low sagebrush (high elev.)	Low sagebrush (low elev.)	Mountain mahogany	Mountain shrub	Mtn. big sagebrush	Riparian-Cottonwood	Riparian-Juniper	Riparian-Willow (exclosure)	Riparian-Willow (grazed)	Salt desert shrub	Semi-wet meadow	Wyo. sagebrush (annual grass)	Wyo. agebrush (short grass)	Wyo. sagebrush (tall grass)
Big sagebrush	0.4	1.3	7.8	4.4	0.6	-	1.3	0.4	-	0.3	0.6	8.1	12.1	17.8	-	-	-	-	-	-	18.8	17.9	10.9
Other sagebrush	-	1.3	-	-	28.1	-	-	-	-	20.3	19.4	1.3	4.6	1.3	-	1.7	-	-	21.3	-	-	0.4	-
Rabbitbrush	1.2	-	4.1	-	-	-	0.6	0.5	-	0.9	0.6	-	5.4	1.3	-	0.8	-	-	-	-	-	1.9	3.6
Other shrub	0.1	21.9	0.6	15.0	5.0	-	-	0.6	-	1.3	-	38.1	9.2	5.6	22.9	8.3	6.0	36.3	3.8	12.5	-	0.4	-
Tree	-	58.1	-	-	-	-	-	-	-	-	-	-	-	-	55.4	49.2	-	-	-	-	-	-	-
Sandberg bluegrass	14.0	7.5	5.3	2.5	9.4	5.8	-	9.4	-	10.0	18.1	6.9	9.2	0.3	-	5.0	0.5	1.3	3.8	-	11.3	29.8	23.4
Bluebunch wheatgrass	-	5.0	-	-	-	-	-	-	-	0.9	4.4	4.4	3.1	3.8	-	20.0	-	-	-	-	-	0.2	8.9
Idaho fescue	-	5.6	3.1	-	-	-	-	-	-	11.3	26.9	26.3	29.8	21.3	-	-	-	-	-	-	-	5.0	-
Native annual grass	-	-	-	0.6	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-
Other native grasses	2.5	6.9	2.2	0.6	3.1	-	0.6	-	-	1.3	1.9	0.6	0.6	8.8	19.3	-	37.2	31.3	1.3	71.3	-	9.0	1.4
Native forbs	0.5	66.9	-	-	3.8	-	3.1	2.0	3.8	3.1	2.5	14.4	4.8	12.8	30.1	19.2	37.7	86.3	1.3	2.5	-	2.9	2.5
Sage grouse preferred forbs	0.3	1.3	-	-	3.1	-	0.6	0.3	-	2.5	0.6	3.1	1.2	1.9	3.6	2.5	3.3	1.3	1.3	0.6	1.3	2.7	0.9
# Native plant species	11	34	9	6	9	1	5	12	1	17	11	21	25	22	27	16	31	34	6	9	2	18	11
Non-native annual forbs	9.5	6.9	0.9	-	0.6	-	5.6	0.9	-	-	-	0.6	0.2	-	1.2	-	1.1	-	-	11.9	6.1	1.3	0.4
Non-native annual grass	61.3	-	52.5	30.0	5.6	1.7	53.8	24.5	-	-	-	1.9	0.6	1.9	-	-	-	-	-	-	75.6	6.5	0.5
Non-native perennial forbs	-	0.6	-	-	-	-	-	-	-	-	-	-	-	0.3	3.6	-	2.2	3.8	-	3.1	-	-	-
Non-native perennial grass	0.1	3.1	-	-	-	-	-	18.8	-	-	-	-	-	0.9	28.9	-	29.5	27.5	-	13.1	0.6	-	-
# Non-native plant species	5	3	2	1	2	1	2	4	0	0	0	2	2	3	6	0	6	4	0	3	6	2	2
Bare ground	4.5	1.3	10.9	23.8	13.8	26.7	11.3	15.5	93.1	7.5	8.1	12.5	14.6	14.0	1.2	3.3	1.1	-	11.9	16.9	1.9	14.2	22.7
Rock	0.1	1.9	-	-	31.3	-	16.3	2.1	1.3	30.6	16.3	8.8	5.2	4.1	2.4	3.3	4.4	5.0	43.8	-	-	5.2	2.9
Litter ground open	13.7	2.5	10.6	31.3	5.6	60.8	5.6	22.8	1.9	7.8	8.1	5.6	14.8	18.4	2.4	3.3	3.3	-	11.3	3.1	6.9	10.6	14.4
Litter ground covered	51.1	72.5	48.4	41.3	10.3	-	35.0	33.3	-	11.9	6.9	44.4	12.1	50.9	30.1	27.5	78.1	1.3	15.0	68.8	66.3	16.0	8.4
Litter standing/LWD	2.0	-	12.1	4.4	1.3	-	-	-	-	2.5	4.4	-	4.1	2.8	2.4	-	0.5	-	1.3	-	4.4	1.7	2.0
Biological crust open	0.1	-	7.5	-	3.8	5.0	7.5	1.6	-	4.4	4.4	1.3	3.8	0.9	1.2	3.3	-	1.3	3.8	-	1.3	9.2	13.8
Biological crust covered	0.4	0.6	10.6	-	8.1	-	1.9	3.4	-	5.0	1.9	3.1	5.0	3.8	1.2	11.7	0.5	10.0	1.3	-	15.6	14.2	7.7
Plant diversity index	**0.67**	**1.27**	**0.85**	**0.69**	**0.94**	**0.45**	**0.75**	**0.88**	**0.14**	**0.97**	**0.97**	**1.16**	**1.16**	**1.03**	**1.31**	**1.00**	**1.17**	**1.44**	**0.75**	**0.82**	**0.73**	**1.06**	**0.98**

steppe habitats, cheatgrass was only absent in plots from high elevation - low sagebrush and mountain big sagebrush habitats. However, even in the high elevation sites, cheatgrass was noted in high disturbance areas, primarily along the roads and in road "ditch outs". "Ditchouts" are ditches cut from the road ditch into the uplands to transport water from the road ditch to the uplands. There was also a relatively high frequency of invasive to somewhat invasive non-native forbs (3 to 12%) present at the low elevation plots. The amount of non-native forbs varied from site to site, but several sites included tumble mustard, tumbleweed, bur buttercup, clasping-leaf pepperweed (*Lepidium perfoliatum*), halogeton (*Halogeton glomerata*), and tansy mustard (*Descurainia* spp.). At one quarter of the sites sampled, these non-native annuals were more frequently hit than both native annual and perennial forbs.

Canada thistle (*Cirsium arvense*), a noxious weed, was observed at four of five riparian zones trapped in varying amounts. Sowthistle (*Sonchus* spp.) and bull thistle *(C. vulgare*) were present in some of the riparian zones. Rush skeletonweed (*Chondrilla juncea*) and diffuse knapweed (*Centaurea diffusa*) were noted at some of the annual and non-native perennial grassland sites.

Vegetation Height

Grasses

Perennial grass height varied across habitats and by species (Table 11). In general habitats in higher precipitation zones usually had taller grass height within a grass species. The most frequently found grass (Sandberg bluegrass) varied in average height from 1.7 to 10.7 inches. Height of Sandberg bluegrass was strongly influenced by the presence or absence of seed stalks. The presence or absence of seed stalks in Idaho fescue also influenced the average height of this grass species (3.0 to 12.1 inches). Bluebunch wheatgrass height averaged from 9.0 inches to 15.9 inches (Table 11). No attempt was made to determine the influence of grazing on grass height. At least one site was being grazed at the time vegetation data were collected, but for the most part grazing had been scheduled earlier or later in the year.

Forbs

A number of native forb species are relatively low growing such as phlox, pussy-toes, and some in the genus *Astragalus* and others. Other forbs flower in the spring, but are not identifiable in the summer, violets (*Viola* spp.), biscuit-root, blue-bells (*Mertensia* spp.), and others. A few native forbs, such as some of the paintbrushes (*Castilleja* spp.) or lupines (*Lupinus* spp.), flower in mid to late summer. Native forbs are usually present in low amounts of cover (<10%) and typically do not contribute much to vegetation height at the sites sampled. At sites where lupine exceeded 5% cover, this species may provide a substantial contribution to overall herbaceous height.

Shrubs

The average height of shrubs varied between habitat communities (Table 12) and was influenced by the shrub species presence. The dune land site lacked shrubs at the site sampled. The average Wyoming big sagebrush height varied between habitats and was generally less than 30" tall. However, at the black greasewood site Wyoming big sagebrush averaged 56.5" and some basin big sagebrush was also present. At this site the Wyoming big sagebrush has likely hybridized with basin big sagebrush. As expected habitats dominated by low or black sagebrush had shorter

Table 11. Average height of perennial grasses and grass-like plants by habitat.

Average perennial graminoids height (in inches) by species and habitat	Aspen	Basin big sagebrush/annual	Black greasewood	Black sagebrush	Crested wheatgrass seeding	Dune land	Low sagebrush (high elev)	Low sagebrush (low elev)	Mountain mahogany	Mountain shrub	Mountain big sage	Riparian - Cottonwood	Riparian - Juniper	Riparian Willow Exclosure	Riparian Willow	Salt desert shrub	Semi wet meadow	Wyoming sage/short grass	Wyoming sage/tall grass
Needlegrass	NP	NP	NP	NP	NP	NP	NP	NP	NP	13.0	13.7	NP	NP	NP	6.0	NP	NP	NP	NP
Indian ricegrass	NP	5.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
Sandberg bluegrass	5.8	4.4	1.7	8.4	3.3	NP	2.7	3.7	3.4	3.5	2.0	NP	5.5	NP	NP	10.7	NP	5.3	5.6
Thurber needlegrass	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	11.5	NP
Idaho fescue	9.8	3.0	NP	NP	NP	NP	5.8	12.1	6.5	11.9	5.3	NP	NP	NP	NP	NP	NP	6.9	NP
Bluebunch wheatgrass	14.4	NP	NP	NP	NP	NP	12.8	13.8	9.9	15.9	12.3	NP	10.3	NP	NP	NP	NP	9.0	9.8
Kentucky bluegrass	6.5	NP	NP	NP	NP	NP	NP	NP	NP	NP	11.7	9.2	NP	13.8	16.1	NP	NP	NP	NP
Western wheatgrass	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	7.8	NP	NP	NP	NP	NP	NP	NP	19.0
Meadow foxtail	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	16.6	NP	NP	10.2	NP	NP
Crested wheatgrass	NP	NP	NP	NP	19.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
Baltic rush	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	16.2	NP	14.2	14.5	NP	4.4	NP	NP
Sedges	6.7	NP	NP	NP	NP	NP	NP	3.0	NP	NP	NP	13.9	NP	17.4	14.3	NP	1.0	NP	NP
Spike rush	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	7.4	NP	NP
NP = grass species was not found in the habitat where sampled																			

Table 12. Average height (in inches) of shrubs by habitat.

Average shrub height (inches) by species and habitat	Aspen	Basin big sagebrush/annual	Black greasewood	Black sagebrush	Crested wheatgrass seeding	Dune land	Low sagebrush (high elev)	Low sagebrush (low elev)	Mountain mahogany	Mountain shrub	Mountain big sage	Riparian - Cottonwood	Riparian - Juniper	Riparian Willow Exclosure	Riparian Willow	Salt desert shrub	Semi wet meadow	Wyoming sage/short grass	Wyoming sage/tall grass
Wyoming big sagebrush	NP	NP	56.5	13.0	22.7	NP	NP	NP	NP	29.4	NP	NP	NP	NP	NP	NP	NP	21.0	25.0
Mountain big sagebrush	NP	NP	NP	NP	NP	NP	49.0	NP	28.9	30.9	27.8	NP	NP	NP	NP	NP	NP	NP	NP
Black greasewood	NP	NP	33.2	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
Gray rabbitbrush	NP	31.9	NP	NP	NP	NP	25.0	NP	NP	22.0	39.0	NP	NP	NP	NP	NP	NP	20.5	21.6
Green rabbitbrush	NP	27.0	NP	NP	12.8	NP	13.0	13.0	8.0	14.1	21.0	NP	22.0	NP	NP	NP	NP	8.8	15.6
Bitterbrush	20.2	54.0	NP	NP	NP	NP	NP	NP	25.3	36.8	33.7	NP	36.0	NP	NP	NP	NP	NP	NP
Mountain snowberry	12.5	NP	NP	NP	NP	NP	NP	NP	19.4	22.1	NP	NP	NP	11.0	NP	NP	NP	NP	NP
Basin big sagebrush	30.0	42.0	60.2	NP	NP	NP	NP	NP	NP	59.0	NP	NP	NP	NP	NP	NP	NP	NP	NP
Low sagebrush	11.0	NP	NP	NP	NP	NP	10.3	11.0	7.5	11.8	8.7	NP	8.0	NP	NP	NP	NP	NP	NP
Black sagebrush	NP	NP	NP	11.8	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	10.0	NP	NP	10.0
Shadscale	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	16.0	NP	NP	NP
Serviceberry	20.0	NP	NP	NP	NP	NP	NP	NP	24.0	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
Chokecherry	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	108.0	40.0	NP	NP	NP	NP	NP	NP
NP = shrub species was not found in the habitat where sampled																			

average shrub heights (≈ 12") than sites dominated by big sagebrush (sagebrush heights >20") or greasewood (>33") (Table 12). Bitterbrush averaged from 20" to 54" between habitats, where it was present.

Woodlands

The cottonwood riparian, juniper riparian, aspen, and mountain mahogany habitats all contained an over story of taller trees or tree-like species. The cottonwood riparian zone had the greatest number of tree species – 4, (Table 13). In the cottonwood riparian zone, the older cottonwood (*Populus trichocarpa*) trees were decadent with few young trees, whereas there were numerous young Rocky Mountain junipers (*Juniperus scopulorum*). Aspen form thickets with a common root system or clone. In the aspen stand sampled, there were numerous young aspen suckers to replace the older trees as they age. Aspen suckers are the shoots that sprout from the parent clone's root system. The majority of the mountain mahogany trees were in the smaller diameter class size (1" to 6"), with few (< 1") trees. Because the data were collected at breast height, information on tree seedlings was not collected.

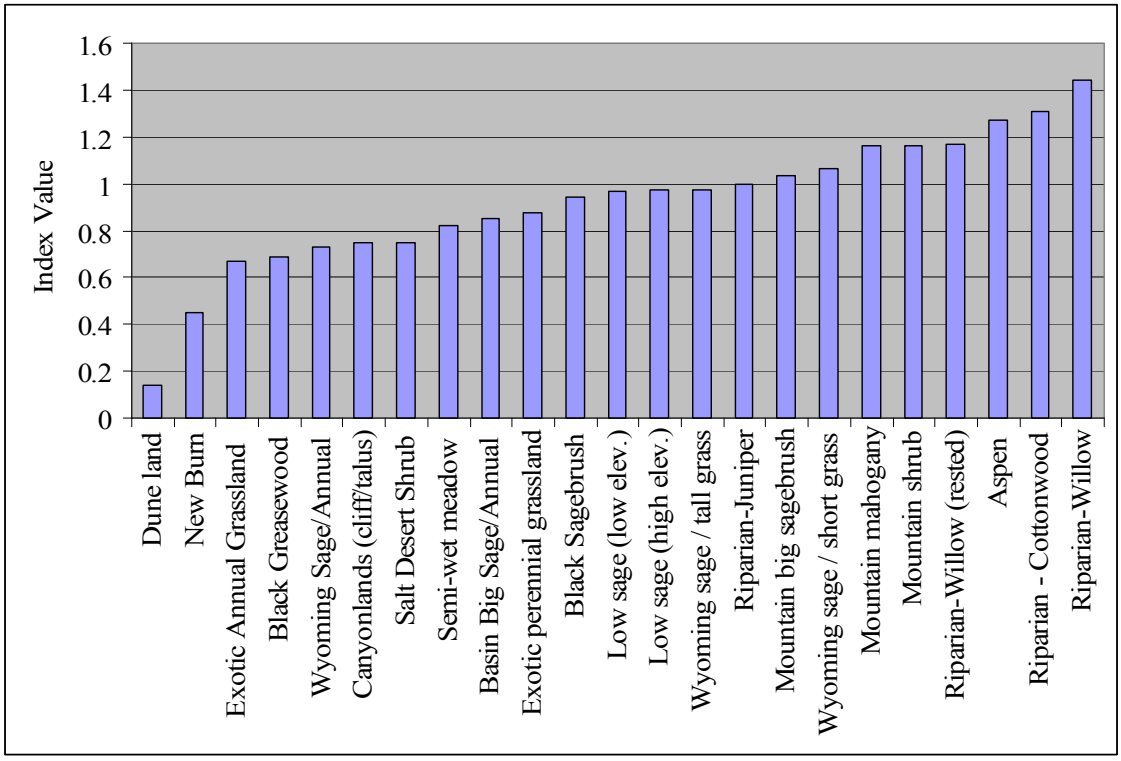
Table 13. Trees species and diameter classes for habitats with trees.

		Diameter Class (dbh in inches)			
Habitat	Species	<1	1.01-6.0	6.01-10.0	10+
Riparian cottonwood	*Populus trichocarpa*	4	1	1	15
	Populus tremuloides	30	19	1	0
	Juniperus scopulorum	20	49	5	0
	Prunus virginianus	1	0	0	0
Aspen woodland	*Populus tremuloides*	526	196	46	0
Juniper riparian	*Juniperus scopulorum*	11	20	14	4
Mountain mahogany	*Cercocarpus ledifolius*	2	61	7	0

Plant Species Diversity

Plant species diversity was typically higher in willow riparian zones, aspen communities, mountain shrub, and mountain mahogany sites. These areas have more moisture and occur at higher elevations than most of the other habitats. The dune land site had the lowest plant diversity (0.138) and had a high amount of bare ground. The new burn also had a low plant diversity index (0.451) in large part because the fire removed the majority of vegetation. Habitats (annual grassland, Wyoming big sage/annual grass, black greasewood/annual grass, basin big sagebrush/annual grass, canyon lands, and non-native perennial seeding) with a strong cheatgrass component typically had lower plant diversity indices (Figure 11) than native sites with a relatively strong native plant component. Sites with a relatively high amount of rock (black sagebrush, salt desert shrub, and low sagebrush sites) generally had a lower diversity index.

Figure 11. Average plant species diversity by habitat type.



Big Game Winter Range

In the fall and winter of 2006 we evaluated 80 random point within identified big game winter range. The highest number (21) of big game winter range points were classified as Wyoming big sagebrush dominated plant communities (Table 14). Wyoming and mountain big sagebrush, were the most common browse species on winter range in the Jarbidge Field Office (Table 15). Mountain big sagebrush and mountain shrub habitats were dominated by mountain big sagebrush with lesser amounts of snowberry, antelope bitterbrush, rabbitbrush, serviceberry, and chokecherry. Wyoming big sagebrush was also present in habitats categorized as low sagebrush and salt desert shrub. Wyoming big sagebrush was generally rated as form class 2 (all available, moderately hedged). Chokecherry and serviceberry showed higher levels of historic use (as demonstrated by having a hedged appearance form class 3 and 2.6 respectively) than the other shrubs. Sites classified as non-native annual grassland, non-native perennial grassland, and rabbitbrush had been burned in wild fires in the past 30 years. At these sites, Wyoming big sagebrush was a minor component of the plant community at this time. Historically, Wyoming big sagebrush was likely the dominant shrub. Where four-wing saltbush had been seeded as part of fire rehabilitation it was rated as form class 2.5 in regard to hedging (Table 15).

The form class of shrubs was influenced by the frequency at which the stems have been nipped over time. For the most part Wyoming big sagebrush, low sage, and rabbitbrush had minimal current use (<5% at the time sampled) (Table 15). On the other hand four-wing saltbush had 52% of the stems nipped. Cattle had been present in the area with four-wing saltbush, prior to the site being evaluated. Bitterbrush had been nipped on 12% of the stems. Cattle were present or had recently been present at several of the sites when browse data were collected in mountain shrub

communities. Browse transects were completed in December, prior to the majority of the big game moving onto winter range. The low level of nipping detected on shrubs would likely have been higher had the evaluation been conducted in the March after big game had used the winter range. This also explains the apparent discrepancy between observed nipping and form class.

Table 14. Habitats within identified big game winter range.

Big game winter range habitats	# plots sampled	% of sample
Non-native annual grassland	2	2.5
Non-native perennial grassland	8	10.0
Native perennial grassland	4	5.0
Rabbitbrush	2	2.5
Salt desert shrub	6	7.5
Low sagebrush	18	22.5
Wyoming big sagebrush	21	26.3
Mountain big sagebrush	6	7.5
Mountain shrub	13	16.3
Total	80	100

The large Murphy Complex and Cedar South fires in 2007 burned the majority of the big game winter range on the Diamond A, as well as in the Inside Desert and east to Signal Butte. Previous wild fires have resulted in loss of both Wyoming big sagebrush as well as high mortality (70+%) to antelope bitterbrush. The impact of historic fires on Utah serviceberry and chokecherry are unknown. Data from the range site write-ups in the soil surveys suggest that antelope bitterbrush and to a lesser extent serviceberry and chokecherry should be present in a number of areas where these species are currently missing.

Table 15. Frequency of nipping and form class on selected browse shrubs by habitat

Habitat	Shrub species	% Shrub Composition	Average form class key browse species	% in age class			Average Frequency of nipping (%)
				Seedling/ Young	Mature	Decadent/ Dead	
Non-native annual grassland	Wyoming big sagebrush	95	2.1	8	67	25	3
	Rabbitbrush	5					
Non-native perennial grassland	Wyoming big sagebrush	58	2.5	17	57	26	3
	Four-wing saltbush	27	2.5	3	87	10	52
	Rabbitbrush	14					
Native perennial grass	Wyoming big sagebrush	15	2.0	9	91		
	Four-wing saltbush	5	1.1	0	100	0	2
	Rabbitbrush	77					
Rabbitbrush	Wyoming big sagebrush	41	1.9	13	64	23	5
	Mountain big sagebrush	4	2.4	0	100	0	
	Rabbitbrush	55					
Salt desert shrub	Wyoming big sagebrush	62	2.2	20	49	31	5
	Shadscale	15					
	Rabbitbrush	18					
	Spiny hopsage	5					
Low sagebrush	Low sagebrush	80	2.2	10	62	28	5
	Mountain big sagebrush	2	1.5	10	55	35	12
	Wyoming big sagebrush	4	2.3	4	51	45	5
	Rabbitbrush	11					
Wyoming big sagebrush	Wyoming big sagebrush	73	2.4	9	57	34	4
	Mountain big sagebrush	1	1.8	7	67	27	4
	Low sagebrush	6	1.8	15	63	22	3
	Rabbitbrush	19					
	Spiny hopsage	1					
Mountain big sagebrush	Wyoming big sagebrush	15	2.1	12	55	33	4
	Mountain big sagebrush	43	1.9	8	60	32	5
	Low sagebrush	10	2.0	27	74	7	4

	Rabbitbrush	29					
Mountain shrub	Wyoming big sagebrush	15	1.9	11	67	22	3
	Mountain big sagebrush	32	1.8	8	77	15	8
	Low sagebrush	24	1.9	10	78	11	8
	Bitterbrush	13	2.3	9	80	11	13
	Chokecherry	T	3	100	0	0	
	Utah serviceberry	1	2.6	9	82	9	
	Rabbitbrush	20					
	Mountain snowberry	4					
Form classes:1 = shrub is all available - hedging not apparent; 2 = shrub is all available - moderate hedging; 3 = shrub is all available - severe hedging							

DISCUSSION

AMPHIBIANS

Amphibian surveys conducted in May and early June of 2007 indicated that Pacific chorus frogs are generally widely distributed, particularly in the southern half of the field area. In several locations calling Pacific chorus frogs were limited to 1 or 2 individuals. Chorus frogs appeared to use habitats opportunistically and were heard calling in some very isolated areas over 1 mile from perennial water and in one instance in a puddle in the ruts of a jeep trail. Without long term monitoring it is unknown if individuals at these sites had successfully reproduced or if their young survived. It is not known how chorus frogs disperse to such areas or if dispersal to these sites was seasonal. No chorus frogs were found along the Jarbidge River, where they had previously been documented.

Columbia spotted frogs were only observed in 2 locations and they appear to be uncommon within JFO. The most spotted frogs (4) seen were in Rocky Canyon in 2007. Rocky Canyon was the only area where this species has consistently been found over the past 9 years. Rocky Canyon has perennial flows with numerous beaver dams and several springs. Willows and sedges have helped stabilize beaver dams. Spotted frogs are known to use both beaver ponds and springs for hibernating. Beaver ponds are also used as breeding habitat by spotted frogs in the spring. Low water flows and the failure of the beaver dam in Timber Canyon, likely contributed to the lack of spotted frogs in this drainage when re-checked in 2007. Bear and Shack Creeks were not inventoried in 2007.

Western toads were only found in the King Hill Canal in 2006 and 2007, at two areas near Little Pilgrim Gulch and Deer Gulch. Both of these sites have open water and substantial emergent aquatic vegetation including bulrush (*Scripus* sp.), spikerush, and arrowhead (*Sagittaria* sp.). The Deer Gulch site receives a substantial amount of trampling by livestock when tadpoles, metamorphs or toadlings, and adults are present. It is not known to what extent that trampling is affecting the western toad population in the Deer Gulch area. Bartlelt (1998) documented that livestock trampling can cause substantial mortality to young toads and hypothesized the impacts were additive to normal mortality.

In the early 1990's western toads had been documented in lower Tuana Gulch and Yahoo Creek (McDonald and Marsh 1995). The Bell Rapids area farms sold their water right in 2005. Since irrigation ceased, water flow in Tuana Gulch has declined, more of the stream has intermittent flows, and the water begins flowing further down gradient. Irrigation from farming is believed to have created a perched water table which augmented water flows in Tuana Gulch. The lack of detections of western toads in Tuana Gulch may be due in part to reduced flows in Tuana Gulch.

Yahoo Creek was not checked in either 2006 or 2007. In 2002 a rain on snow event resulted in the failure of a small earthen dam in Yahoo Creek. The dam has subsequently been reconstructed. The pond is densely vegetated by cattail and has little open water. Water from Coyote Spring maintains perennial flows in Yahoo Creek. Water flows in Yahoo Creek are likely augmented by the irrigation of the private land in the Magic Waters area.

Great Basin spadefoot toads were observed in two areas of the JFO. They were detected by vocalizations throughout a 10 km stretch of the Grindstone canal south of Glens Ferry, and a

single male was heard calling from the King Hill Canal. This detection was made late in the breeding season, therefore it is possible that more were present in the area but had ceased vocalizing.

Northern leopard frogs were historically present in both Salmon Falls Creek and the lower part of the Bruneau River (CDC data). Neither stream was inventoried in 2006 or 2007 due in part to limited personnel and lack of recent observations.

Bull frogs are known to be present along the Snake River and in the lower portions of Salmon Falls Creek and the Bruneau River. In the fall of 2007, at least 4 adult bull frogs were observed in Tuana Gulch by the BLM staff botanist. Bull frog tadpoles were also documented in the King Hill Canal in 2007. It is possible that the 2007 survey dates (May1-June 15) may have missed the peak of bull frog calling activity at other locations. The peak call activity for bull frogs varies in different regions. Bull frogs tend to have a later peak calling activity than other species (Bridges and Dorcas 2002).

REPTILES

Lizards were widely observed in a number of habitats throughout the JFO. Observations of lizards at higher elevations (>6,000 feet) were less common (both in numbers and species) than at lower elevations. A single black-collared lizard was observed in 2006 within the general vicinity (0.7 miles) of a historical (1996) record. No sagebrush lizards or side-blotched lizards were noted in non-native perennial grassland or annual grassland. Side-blotched lizards and western fence lizards were incidentally observed in areas with rock outcrops, cliffs, and talus slopes at lower elevations when inventorying for black-collared lizards. Sagebrush lizards appeared to be widely distributed over the majority of the area at sites sagebrush and native grasses sites. The short-horned lizard appeared to be the most widely distributed lizard in the planning area. We observed several times that western whiptails and leopard lizards had difficulty moving rapidly through dense patches of cheatgrass near the dune land site.

Trapping revealed a greater diversity and abundance of snakes. However, they data can not be compared to that collected by observers along transects. Snakes likely sought cover from approaching observers or moved to cover (rodent burrows, rock outcrops, etc.) to avoid the heat of the day. Also the time spent walking transects was substantially shorter than the operation of the reptile trapping arrays. No special status reptiles (long nose snake or western ground snake) were trapped or observed during the inventory. The Conservation Data Center has records of both species near Bruneau Dunes State Park and near the Bruneau River Canyon northwest of the JFO from the late 1990's.

BIRDS

Horned lark, Western meadowlark and mourning dove were present in both annual and perennial grasslands as well as in shrub steppe habitats as expected. Also as expected sage sparrow and Brewer's sparrow were present primarily in areas with big sagebrush. The Brewer's sparrow detected in the non-native grassland habitat was in a small island (≈ 0.5 ac) of sagebrush near the edge of the site. Wide ranging species such as American kestrel, northern harrier and ravens were noted at several sites. Cliff swallows were observed foraging in the uplands, well away from the cliffs where they nest. Foraging away from the nesting area has previously been

documented (Brown and Brown 1995). Pheasant and California quail were present at sites within 1 mile of agricultural land. Pheasants in the western United States are typically associated with agriculture (Giudice and Ratti 2001). Species such as waterfowl, snipe, and Sandhill crane (excluded from the tables) were associated with riparian habitats well over 400 m from upland habitat plots being sampled. On calm days the calls of some of these species can carry a substantial distances (>0.5 miles) (Tacha et al. 1992, Drilling et al. 2002).

MAMMALS

Incidental Mammal Observations

Least chipmunks were the most commonly seen rodent in sagebrush habitats. No least chipmunks were seen in annual grassland or non-native perennial grass seedings. Early in the season ground squirrels were commonly seen but none were trapped. Other rodents seen include a western jumping mouse in a riparian zone and a Montane vole in big sagebrush/annual grassland area. Van Horne et al. (1997) and Steenhof et al. (2006) used wire mesh Tomahawk traps to trap ground squirrels. To some extent ground squirrels may avoid live-traps with solid sides like Sherman live-traps. Pre-baiting sites and placing the trap adjacent to actives holes are often used to increase trapping success in ground squirrels (Steenhof et al. 2006). Belding, Piute, and golden-mantle ground squirrels are known to enter hibernation in the summer to early fall (Jenkins and Eshelman 1984, Rickart 1987, Bartels and Thompson 1993). Antelope ground squirrels were observed relatively close to the Snake River canyon. Belding ground squirrels were frequently noted in the southern 1/5 of the Jarbidge Field Office, whereas Piute ground squirrels were noted in several areas in the middle to northern of the portions of the Jarbidge Field Office. Golden-mantled ground squirrels appeared to be restricted to higher elevation areas and associated with areas with large rock. Black-tailed jackrabbits were seen at several locations and at several habitats. Black-tailed jack rabbits, coyotes, badger, and pronghorn are wide spread in the Jarbidge Field Office.

Small Mammal Trapping

Numerous studies have indicated that deer mice are widespread and abundant in southern Idaho (Johnson 1961, Trost 1975, Reynolds 1980, Hanser and Huntly 2006). In a food habitats study using snap traps in south central Idaho, deer mice made up 52% of the captures, whereas, chisel-tooth kangaroo rat (≈13%) Ord kangaroo rat (≈12%), harvest mouse (≈12%), and least chipmunk (≈11%) made up smaller percentages of the captures (Johnson 1961). The sample size in the Johnson study was 577 captures. In similar habitats, within the Jarbidge F.O. deer mice contributed a higher proportion (≈83%), and other species smaller proportions – sagebrush vole (2.6%), least chipmunk (2.7%), Great Basin Pocket mouse (2.4%), Ord kangaroo rat (1.3%), chisel-tooth kangaroo rat (<1%), and harvest mouse (<1%). Trost (1975) reported a number of small mammals present in an inventory of Salmon Falls Creek and adjoining uplands. However, Trost (1975) numbers of species trapped or communities in which they were trapped were quantified. Reynolds (1980) reported small mammal proportions as 82% deer mice, 9% least chipmunk, 5% harvest mice, and 2% grasshopper mice in grazed sagebrush stand in eastern Idaho at the Idaho National Laboratory. In a study of fragmented sagebrush steppe habitat in southern Idaho, Hanser and Huntly (2006) found that small mammals with larger home ranges, and habitat specialists were more affected by habitat fragmentation than small mammals with small home ranges and habitat generalists. Hanser and Huntly (2006) noted that with increasing isolation, habitat islands were less likely to be recolonized by species such as the grasshopper

mouse, sagebrush vole and least chipmunk (habitat specialists). Habitat specialists in isolated habitat islands are also more likely to be extirpated.

The lack of ground squirrels captured in 2006 was likely due to two factors. First, trapping was initiated in mid-June. The majority of ground squirrels in the planning area reduce their activity starting in late May to early June. They enter aestivation or hibernation in June through July even at the higher elevations (Jenkins and Eshelman 1984, Rickart 1987, Bartels and Thompson 1993). Only the white-tailed antelope ground squirrel is known to be active year round (Belk and Smith 1991). Second other researchers studying ground squirrels in southern Idaho used Tomahawk traps rather than Sherman live-traps, placed the trap directly adjacent to active burrow entrances, and usually pre-baited before trapping (Van Horne et al. 1997, Steenhof et al. 2006) to improve trapping efficiency. The Sherman live traps used in this study had solid sides, unlike the Tomahawk traps used by Van Horne et al. (1997) and Steenhof et al. (2006) which are constructed of rigid wire mesh.

The extent of habitat loss/conversion and fragmentation is a concern for the distribution and continued existence of several special status species within the Jarbidge field area, particularly those that use or depend upon sagebrush steppe habitat as well as other sagebrush obligates. Annual grassland and non-native wheatgrass seeding provide limited value as habitat for several Idaho BLM sensitive species such as pygmy rabbit, greater sage-grouse, sage sparrow, Brewer's sparrow, and loggerhead shrike, as well as a number of other sagebrush dependent wildlife species (least chipmunk, sagebrush vole, sagebrush lizard and other species). Additionally, trapping data indicate that annual grassland and non-native seedings support lower numbers of rodents. The impacts of the shift in rodent species on predator populations including raptors are unknown at this time. The shift from shrub steppe habitat to more grassland in the Snake River Birds of Prey National Conservation Area may responsible in part for local declines in prairie falcons (Steenhof 1998) and golden eagles.

Ground Squirrel Inventory

A visual presence/absence inventory in the spring of 2007 indicated at least 3 species of ground squirrel species (white-tailed antelope, Belding, Piute) are present in the planning area. Piute ground squirrels were found at 47% of the random sites inventoried. Golden-mantled ground squirrel species have also been confirmed in the Jarbidge Foothills, but this area was not part of the 2007 inventory. However, a golden-mantled grounds squirrel was noted in a rocky area near China Mountain in September 2007. Presence-absence surveys did not attempt to determine Piute ground squirrel populations or burrow densities. Consistent with the scientific literature Piute and Belding ground squirrels were much less active by mid June and were largely not seen by late July.

Ecological Function

Prior to 2007 a substantial amount (over 500,000 acres) of the planning area had burned and is either non-native perennial grassland or annual grassland. The fires has not only reduced the amount of sagebrush steppe habitat, but has fragmented the remaining shrub steppe habitat. In July 2007 a nearly 600,000 acre fire impacted over 300,000 acres of remaining sagebrush steppe.

The conversion of shrub steppe habitat to non-native grassland may not only impact the prey base for raptors and other predators, but may also disrupt other habitat/ecologic functions and wildlife energetics. In Arizona, research has indicated that changes in rodent community composition can influence plant community structure and make plant communities less stable (Valone and Schutzenhofer 2007). Ryel et al. (2003) documented big sagebrush's role in actively transporting precipitation deeper into the soil for later use. The large grassland areas with relatively low numbers of small mammals may adversely affect ecosystem function by reducing soil aeration provided by burrowing rodents. Additionally, lower populations of rodents may contribute to an additional build up of fine fuels.

Reduced levels of prey may also contribute to somewhat lower predator levels and influence raptor reproduction (Steenhof et al. 2006). For some small mammals, such as ground squirrels, their populations are more stable in sagebrush steppe compared to annual grasslands, particularly during drought cycles (Van Horne et al. 1997). The lack or limited amount of sticks from shrubs following fire may also influence nesting by ferruginous hawks and other bird species. A number of historical ferruginous hawk ground nests in the northwestern portion of the Field Office are no longer active. This area has burned several times since the mid 1970's, continually reducing or eliminating sagebrush islands. Raptors attempting to nest in the area now have less nesting material available and have to carry sticks for several miles. Nesting ferruginous hawks may also lose nest material to other large birds attempting to nest in the area. The extent that competition for nesting material between ravens, red-tailed hawks, Swainson's hawks, and golden eagles affects overall nesting success is unknown. Additionally, the raptors may also have to spend more time foraging or forage farther from nesting areas for small mammals and other prey.

VEGETATION

Vegetation Cover

Grass cover varied among the habitats sampled. Perennial grass cover guidelines for sage-grouse habitat (Connelly et al. 2000) are 15% for arid sites and 10-25% for mesic sites. Non-native annual grasses were most abundant in the annual grassland, crested wheatgrass seeding, black greasewood, and the two sagebrush habitats classified as having an annual understory. The canyon land site also had a high amount of cheatgrass, due in part to historical trailing and a more recent wild fire. Sites where non-native grasses were most abundant also usually had a fairly high amount of non-native annual forbs. Sites dominated by cheatgrass usually had a low amount of native perennial grass cover.

In general, the higher elevation habitats had more grass cover than the lower elevation sites, with the exception of the low sagebrush high elevation site. This site was on a windswept ridge with stony soils (>30%, Table 10), which reduced the area available for rooted plants. Therefore limited grass cover would be expected for this site. Both the black sagebrush and salt desert shrub habitats also had relatively low amounts of grass cover (<13% native perennial grass cover). These sites are generally considered to have naturally limited productivity and the calcareous soils in both areas had a substantial amount of rock on the surface (>30%, Table 10). Low sagebrush, mountain big sagebrush, mountain shrub, and Wyoming big sagebrush habitats all met or exceeded the sage-grouse grass cover guidelines (23% - 44%) (Table 10).

Native forb cover in upland habitats varied from 0% cover (black greasewood site) to over 14% cover (mountain mahogany Table 10). Riparian zones typically had more native forb cover. Sage-grouse preferred forb cover varied from 0.6% low sagebrush/low elevation site to over 3% (black sagebrush habitat Table 10), and usually approached 2%. Connelly et al. (2000) recommends 3% desirable native forbs for xeric (drier) upland habitats. However, our data were more consistent with findings (e.g. 4% or less for perennial native forbs) in portions of eastern Oregon and northern Nevada in similar habitats (Davies et al. 2006). Because vegetation sampling occurred from mid July through September some early flowering native perennial forbs may have been missed, such as biscuit-root and prairie star. Non-native forb cover was generally greater in areas with cheatgrass dominating in the understory.

Shrub cover varied substantially between habitats sampled as was to be expected. Non-native perennial grassland and annual grassland both generally lacked big sagebrush. This was expected since big sagebrush is not adapted to wild fire (Howard, 1999) and does not resprout after burning. Big sagebrush was also limited at the wet meadow site as expected, and is typically not found in wetland habitats due to elevated water tables. At the native shrub areas sampled big sagebrush cover was found within the normal range of variability for the mountain big sagebrush, mountain shrub, Wyoming big sagebrush/tall grass, and Wyoming big sagebrush/short grass habitats. When all shrub cover was considered the sampled sites are within the sage-grouse guidelines (10 to 25%) (Connelly et al. 2000). The low and black sagebrush habitats also had the appropriate amount of shrub cover for the sites and would have met sage-grouse guidelines (Connelly et al. 2000). At the landscape scale the in excess of 54% of shrub steppe habitat in the JFO has been converted to grassland.

In addition to cover, shrubs provide the physical structure for a number of nesting birds such as loggerhead shrike, gray flycatcher, sage thrasher, green-tailed towhee, sage sparrow, Brewer's sparrow and sage-grouse. Because of its more rigid nature big sagebrush can more easily support nests compared to rabbitbrush.

Vegetation Height

A number of factors influence grass height. Bunchgrass height varies substantially by species and the presence or absence of seed stalks. Grasses such as Sandberg bluegrass are generally short in stature, usually less than 14 inches including the seed stalks. Other bunchgrasses such as bluebunch wheatgrass routinely may exceed 20 inches. Bunchgrasses typically grow in discrete clumps and the majority of their above ground biomass (leaves) is in the lower portion of the plant. Environmental factors that influence grass height include precipitation and temperature during the growing season. During drier years grasses such as Sandberg bluegrass, Thurber needlegrass, and bluebunch wheatgrass, typically produce fewer and shorter seed stalks than during wetter years. The intensity and timing of grazing the previous year, as well as grazing by wildlife and livestock during the current year can also influence grass height. Grass heights were not re-measured following livestock grazing to determine changes in height.

Grass height influences sage grouse nesting success (Connelly et al. 2000) and provides security and thermal cover for a number of small mammals. At the time (June into August) the grass height data were collected, it was at or exceeded recommendations in the sage-grouse guidelines (7 inches) at sites with taller grass species (Connelly et al. 2000). Because the sites were not

measured following livestock grazing, it is not known to what level grazing reduced herbaceous cover height and suitability for nesting sage-grouse. Sites dominated with Sandberg bluegrass may not have been providing the recommended residual herbaceous vegetation height.

Wyoming and mountain big sagebrush heights were generally within the range (12 to 31 inches) recommended by Connelly et al. (2000) for sage grouse in the habitats with big sagebrush. The average heights at low sagebrush and black sagebrush sites were a little below the sage-grouse guideline for sagebrush habitats (12 inches), however, in these habitats sage-grouse tend to select taller shrubs (Klott et al. 1993). Low and black sagebrush are naturally shorter in height than big sagebrush. Additionally, there were some Wyoming and mountain big sagebrush patches present in the sites and adjacent to the sites.

Shrub height is dependent upon species and age of the plants. Low sagebrush (Steinberg 2002) and black sagebrush (McMurray 1986) are naturally short, frequently less than 18 inches in height. Other shrubs such as Wyoming big sagebrush and antelope bitterbrush can exceed 24 and 36 inches in height respectively (Howard 1999, Zlatnik 1999). Our data on shrub height is similar to the values reported. Serviceberry, chokecherry, and mountain mahogany may exceed 10 feet in height.

Invasive species

A concern is the amount of invasive non-native annual grasses found in some habitats including black greasewood/annual grass, basin big sagebrush/annual grass, and Wyoming big sagebrush/annual grass, and canyon land sites. These sites have the potential of being rapidly converted to non-native annual grasslands following a fire. Once converted to non-native grassland the sites have much lower value as habitat for a variety of wildlife species, including rodents.

The percent cover of non-native annual forbs in areas with black sagebrush and several other habitats, are a concern. Species such as tumbleweed, tumble mustard, and bur buttercup have limited value as forage for wildlife, and compete with more desirable native annual, biennial, and perennial forb seedlings for space, water, and nutrients. As both tumbleweeds and tumble mustards accumulate in draws and along fences (Figure 12), they increase the fuel load and form barriers to big game movements. Additionally, tumbleweed and tumble mustard accumulate in patches of sagebrush (Figure 13) releasing seed into the native areas. As the litter accumulates over time, it can alter the amount of light that reaches the underlying vegetation and soil.

Woodlands

The aspen stand sampled appeared to have adequate recruitment in younger age class suckers to maintain the stand (average 526 trees less than 1 inch in diameter in.01/ac plots). There was also a mix of older age classes based upon the diameters in the aspen stand. In the cottonwood riparian zones the large number of Rocky Mountain juniper and few young (<1 inch diameter) cottonwood or aspen trees are a concern long-term. Periodic flooding creates environmental conditions for cottonwood to establish from seed. The data suggest that junipers are invading the cottonwood stand and over time may convert the cottonwood community to a juniper dominated riparian zone. Locally (portions of Buck and Deep Creeks and East Fork of Jarbidge River),

Figure 12. Two-three year accumulation of weeds making fence impassable to big game.

Figure 13. Exotic annuals primarily tumble mustard and tumbleweed, collecting in a native shrub steppe island adjacent to a wild fire that burned the previous year.

undisturbed, closed canopy juniper-dominated riparian zones typically have a thick moss layer and generally lack an herbaceous and shrub understory. The shrubs and herbaceous vegetation present are usually limited to the edge of the channel or gaps in the tree canopy. In order to maintain a diverse cottonwood/aspen riparian zone, junipers should be thinned periodically. The mountain mahogany stand shows evidence of recruitment for long term maintenance of the woodland site.

Plant Species Diversity

Plant species diversity index, as expected, was greater at sites with more water or precipitation (riparian zones, aspen stands, and mountain mahogany habitats). Moisture is one of the components that influence plant diversity (Barbour et al. 1980). Plant diversity at the dune land site was lowest. This was likely related to soils (sands) as well as limited precipitation. Species diversity alone does not give a good representation of ecological system function (Hair 1980). Diversity indices are not necessarily indicative of over all plant community health, particularly when invasive non-native species are present and relatively abundant. In annual grassland and non-native perennial grass seedings, the species diversity was based primarily on non-native plant species including invasive annuals.

Big Game Winter Range

Browse on the winter range was generally considered all available and moderately hedged. Moderate hedging is usually expected on big game winter range. Young browse plants were noted at most sites and would be expected to replace the decadent browse plants over time. The form class on some four-wing saltbush, as well as use on chokecherry and serviceberry is a potential long term concern. However, if flowering and seed production are impaired, this would reduce recruitment of these species. About 15% of the big game winter range was categorized as annual grassland, non-native perennial grass seeding, or rabbitbrush plant communities. At this time, these habitats are of limited value to wintering big game in part due to the lack of desirable browse. Over time, if browse re-establishes, the areas will provide younger age class shrubs to maintain a mosaic of browse age classes.

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Appendices

Copies of blank data forms for amphibians, reptiles (visual & trapping) birds, mammal trapping, vegetation

Amphibian Visual Observation Form

Date_____ Stream Name _____ page _____ of _____
Habitat Type _____ Observer(s) _____
UTM: Start Easting _____ Northing _____ Time Start _____
Stop Easting _____ Northing _____ Time Stop _____
Legal: T_____ N, R_____ E, Sec._____ ¼, ¼, ¼, _____, ¼ ¼ _____, ¼_____
Weather _____ Wind _____
Temperature _____ Elevation _____ County_____

Ref #	Species	Number Observed	Species Age class	Still water (type if present)	Overstory Canopy Cover (trees & willows)	Emergent/ aquatic Vegetation	Basking areas	Bank stability	Residual herbaceous height

Comments: _____
_____
_____
_____

Take photographs general site of all areas where adults, metamorphs, tadpoles, or egg masses are found.

Age Class: (adult, metamorph, tadpole, egg mass)
Dominant overstory: (aspen, willow, dogwood, sedge, grass, other)
Still water types: (beaver ponds, stock ponds, oxbows, stream pool, canal, other), if present list type and note if pond is stable in comments
Overstory canopy cover: densiometer reading from both sides of stream/pond
Emergent/aquatic vegetation: (sedges, rushes, bur-reed, pond weed, duck weed, arrowhead, etc.) if present list in comments
Basking habitat: [when present note the types (logs, rocks, mudflats, shore) and estimate percent]
Bank stability: (note if banks are vertical, sloughing, well vegetated with deep rooted species, or trampled)
In comments: note if fish are present, livestock are currently present, etc.

Weather Conditions

Precipitation

Sky condition codes and definitions	
0	Clear – Few Clouds (<25%)
1	Partly Cloudy (25-70%)
2	Cloudy (broken) or overcast (70-100%)
3	Rain
4	Fog/smoke/dust
5	Snow

Wind

Beaufort Wind scale codes and indicators		
Code	Wind Speed	Indicators
0	< 1	Smoke (or dust) rises vertically
1	1 - 3	Wind direction shown by smoke/dust drift
2	4 - 7	Wind felt on face, leaves rustle
3	8 - 12	Leaves, small twigs in constant motion
4	13 - 18	Raises dust, small branches move
5	19 - 24	Small trees in leaf sway

Reptile Visual Encounter Survey Form

Date_____ Plot Reference # _____ page _____ of _____
Habitat Type _____ Observer(s)_____
UTM: Easting _____ Northing _____
Legal location: T_____ N, R_____ E, Sec._____ ¼, ¼, ¼, _____, ¼ ¼ _____, ¼_____
Weather _____ Wind _____ Season _____
Temperature _____ Elevation _____ County_____

Transect	Species	Time	Detection Type	Substrate	Captured (Y/N)	SV length	Comments

Detection type: auditory, visual, under cover
Substrate (may include by log/stick, under rock, bare ground, under shrub, etc.)
SV = Snout vent length for reptiles captured,
In the Comments section, note behavior (sunning, in shade, etc.), anything about the physical appearance that is distinctive or unusual (coarse texture skin, unusual color, pupil shape, missing tail, has prey item in mouth, etc.).

Weather Codes

Sky condition codes and definitions	
0	Clear – Few Clouds (<25%)
1	Partly Cloudy (25-70%)
2	Cloudy (broken) or overcast (70-100%)
3	Rain
4	Fog/smoke/dust
5	Snow

Wind Codes

Beaufort Wind scale codes and indicators		
Code	Wind Speed	Indicators
0	< 1	Smoke (or dust) rises vertically
1	1 - 3	Wind direction shown by smoke/dust drift
2	4 - 7	Wind felt on face, leaves rustle
3	8 - 12	Leaves, small twigs in constant motion
4	13 - 18	Raises dust, small branches move
5	19 - 24	Small trees in leaf sway

Reptile Trapping Survey Form

Date_____ Plot Reference # _____ page _____ of _____
Observer(s)_____ Habitat Type _____
UTM: Easting _____ Northing _____ Base Azimuth _____
Weather _____ Wind _____
Temperature _____ Elevation _____ County _____

Trap #	Species	SV Length (mm)	Total length (mm)	Comments (regarding animal)

General Comments:_____
_____
_____
_____

Trap #. Pit fall trap is always #4, the funnel trap on the base azimuth is #1, and remaining two funnel traps are numbered clockwise from the base
SV length (snout to vent length measured in mm)
General comments (note trap condition, drift fence condition, the presence of non-target species in the trap, etc.)

Breeding Bird Point Counts

Date_____ (M/D/Y) Observer Name _____
Temp. _____ ^{O}F Plot Ref. # _____ Visit # _____
Start Time _____ Wind (rating) _____ Weather Condition Code _____
Stop Time _____ Habitat Type _____

*Tally the number of individuals using dot tally method, the write total in SUM column

	0-3 minutes				3-5 minutes				5-10 minutes			
	< 100 m		> 100 m		< 100 m		> 100 m		< 100 m		> 100 m	
Species	Tally	Sum	Tally	Sum	Tally	Sum	Tally	Sum	Tally	Sum	Tally	Sum

Incidental sightings: (species, number, where, when)_____
_____
_____
_____
_____
_____

Other Comments: _____
_____
_____
_____
_____
_____

Wind Codes

Beaufort Wind scale codes and indicators		
Code	Wind Speed	Indicators
0	< 1	Smoke (or dust) rises vertically
1	1 - 3	Wind direction shown by smoke/dust drift
2	4 - 7	Wind felt on face, leaves rustle
3	8 - 12	Leaves, small twigs in constant motion
4	13 - 18	Raises dust, small branches move
5	19 - 24	Small trees in leaf sway

Weather Codes

Sky condition codes and definitions	
0	Clear – Few Clouds (<25%)
1	Partly Cloudy (25-70%)
2	Cloudy (broken) or overcast (70-100%)
3	Rain
4	Fog/smoke/dust
5	Snow

Small Mammal Trapping Form

Date_____ Plot Reference # _____ page _____ of _____

Observer(s)_____ Habitat Type _____ UTM East _____ North _____

Time _____ Weather _____ County _____ Elevation _____

Season_____ Base Azimuth _____

Trap #	Trap Size	Species	Sex	Age Class	Breeding Status	Recapture (Y/N)	Weight (gm)	Total Length (mm)	Tail length (mm)	Hind foot (mm)

Age class categories (juvenile, subadult, adult); **Breeding status categories** (non-breeding, enlarged testes, lactating, pregnant),

Weather Codes

Sky condition codes and definitions	
0	Clear – Few Clouds (<25%)
1	Partly Cloudy (25-70%)
2	Cloudy (broken) or overcast (70-100%)
3	Rain
4	Fog/smoke/dust
5	Snow

Wind Codes

Beaufort Wind scale codes and indicators		
Code	Wind Speed	Indicators
0	< 1	Smoke (or dust) rises vertically
1	1 - 3	Wind direction shown by smoke/dust drift
2	4 - 7	Wind felt on face, leaves rustle
3	8 - 12	Leaves, small twigs in constant motion
4	13 - 18	Raises dust, small branches move
5	19 - 24	Small trees in leaf sway

Comments: (Note any unusual things (heavy dew, damaged traps, etc.)_____

_____

_____

_____

_____

Line Point Transect Vegetation Data Form

Date:	Examiner(s):
Habitat Type:	Site #

UTM E_____ N_____

Pts	Top Layer Hits		Lower Canopies				Pts	Top Layer Hits		Lower Canopies				Data Summary totals
			Layer 2 Hits		Layer 3 Hits					Layer 2 Hits		Layer 3 Hits		
	Species	Ht	Species	Ht	Species	Ht		Species	Ht	Species	Ht	Species	Ht	
1							41							Bare Ground
2							42							
3							43							Rock
4							44							
5							45							Bio Crust
6							46							
7							47							Lit. Ground
8							48							
9							49							Litter Stand
10							50							
11							51							Shrub Hits
12							52							Sage
13							53							Other
14							54							
15							55							Shrub Height
16							56							
17							57							
18							58							
19							59							Exo An Grass
20							60							
21							61							Exo Per Grass
22							62							
23							63							Nat Per Grass
24							64							
25							65							Exo An Forb
26							66							
27							67							An Nat Forb
28							68							
29							69							Exo Per Forb
30							70							
31							71							Nat Per Forb
32							72							
33							73							Nox Weed
34							74							
35							75							Av Sage Ht
36							76							
37							77							Av Grass Ht
38							78							
39							79							Av Forb Ht
40							80							

Comments _____