STOLLER-ESER-108

Sensitive Animal Species Inventory on the INL Sagebrush Steppe Ecosystem Reserve

Final Report
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Introduction

The Sagebrush Steppe Ecosystem Reserve (SSER) was designated by Secretary of Energy Bill Richardson in 1999. The Proclamation of the Reserve noted that *"The Sagebrush Steppe Ecosystem across its entire range was listed as a critically endangered ecosystem by the National Biological Service in 1995, having experienced greater than a 98% decline since European Settlement…Conservation management in this area is intended to maintain the current plant community and provide the opportunity for study of an undisturbed sagebrush steppe ecosystem..."*.

The SSER covers approximately 115 square miles located in the northwest corner of the Idaho National Laboratory (INL) (Figure 1). The SSER contains a diversity of vegetation communities that is fairly representative of communities found across the INL.

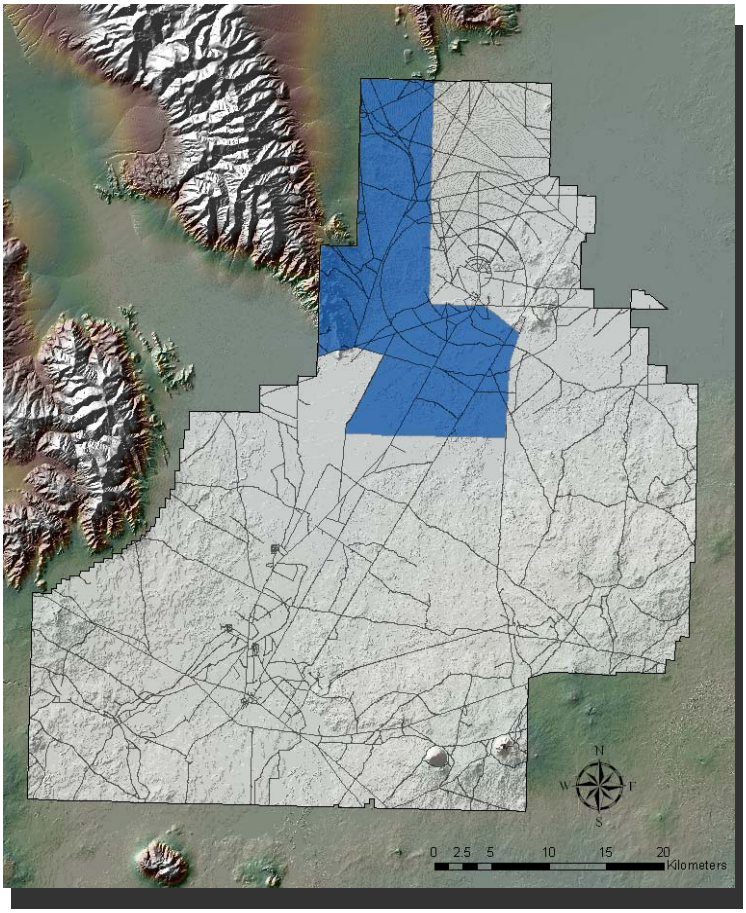

Figure 1. The Sagebrush Steppe Ecosystem Reserve study area (shown in blue) on the Idaho National Laboratory.

The SSER Final Management Plan (2004) identified four management goals which are used as a framework to facilitate long-term health of this unique ecosystem.

Management Goal 1 *Maintain and protect existing high quality biological, cultural and tribal resources.*

Management Goal 2 *Provide for long-term resource management, plan implementation and development of educational opportunities.*

Management Goal 3 *Restore degraded ecological resources.*

Management Goal 4 *Facilitate and manage scientific research.*

The first objective listed under Management Goal 1 is to *"Establish a baseline of resource data to identify and prioritize immediate needs for management adjustment"*, and this report only addresses this specific objective.

The goal of this project is to conduct an inventory survey for selected sensitive animal species across the SSER. This report describes the field survey methods developed for sensitive animal species and the corresponding results from the 2007 surveys. These data will help provide some preliminary baseline information across the SSER identified under Management Goal 1.

The quarterly update of the U.S. Fish and Wildlife Service Threatened and Endangered Species List (SL 06-0293; March 1, 2006) identified pygmy rabbits (*Brachylagus idahoensis*), sage grouse (*Centrocercus urophasianus*), bald eagles (*Haliaeetus leucocephalus*), ferruginous hawks (*Buteo regalis*), burrowing owls (*Athene cunicularia*), bats, long-billed curlew (*Numenius americanus*) and gray wolf (*Canis lupus*) as listed or species of interest on the INL. This report discusses results for pygmy rabbits, sage-grouse, bald eagles, and ferruginous hawks. Burrowing owls, bats, long-billed curlew and gray wolf species surveys were not conducted.

A. Pygmy Rabbit

Pygmy rabbits are considered a sagebrush obligate species and rely directly on sagebrush steppe habitat for survival. Given the degradation or direct loss of healthy sagebrush steppe across the western U.S., this species' persistence may eventually become threatened by habitat loss. No formal surveys for pygmy rabbits had been completed across the SSER and documenting current presence and distribution can assist with land management decisions and help to understand future changes in the pygmy rabbit population.

Survey Methods

Sampling Plot Selection

The goal of this survey was to stratify potential habitat by vegetation community types that represent a range of importance for pygmy rabbit occurrence, and proportionally divide up sampling effort by potential rabbit use. Since pygmy rabbits rely on sagebrush habitat, vegetation communities dominated by sagebrush were expected to provide more suitable habitat than communities dominated by other vegetation. The survey methods described below have been adapted from the current pygmy rabbit sampling being conducted for the INL Conservation Management Plan (CMP).

We used a digital version of the McBride vegetation map of the SSER (McBride et al. 1978). The plant community polygon boundaries were maintained from the original map, but the vegetation classes were updated by Forman et al. (2003) to reflect more recent plant community classifications described in Anderson et al. (1996). The vegetation community polygons were used to develop the sampling strategy for this survey using a Geographic Information System (GIS) (Figure 2a). Each vegetation polygon was assigned a categorical ranking of High, Medium, or Low based on the anticipated use of these habitats by pygmy rabbits (Table 1). A grid of 400 x 400 m cell size was created and overlaid onto the ranked vegetation community polygons (Figure 2b). Each grid cell represents a potential sampling plot included in the random selection process. The Juniper Woodland polygon was manually divided by selecting regions with greater topographic relief from aerial photography collected in 2004. The higher elevation Juniper Woodlands was assigned to the Low Use habitat class while the lower elevation area was assigned to the Medium Use habitat class.

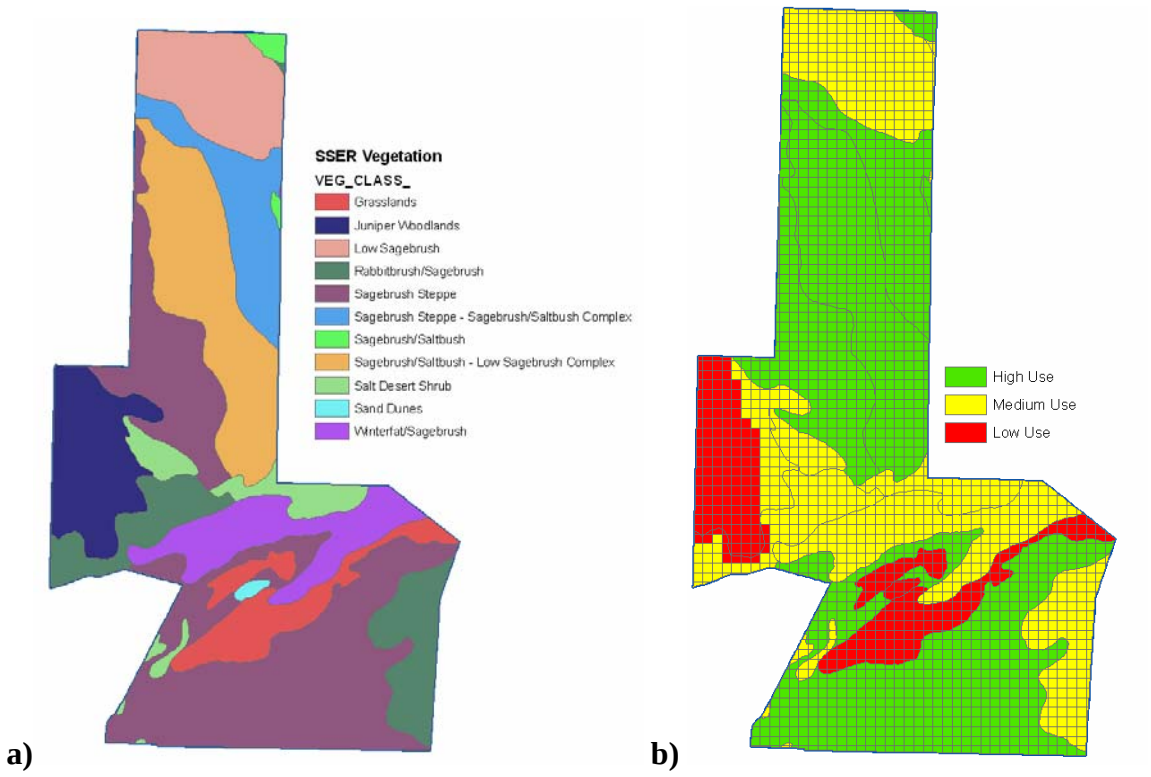

Figure 2. a) Vegetation community map of the Sagebrush Steppe Ecosystem Reserve. b) Assigned habitat use rankings for the vegetation community polygons with the 400 m sampling grid cells overlaid.

For logistical considerations, we wanted to eliminate the possibility of selecting remote plots that would be time consuming to access. So we buffered all roads (Highways and T-roads) in the SSER by one kilometer and removed the plots that fell outside of this area. A total of 60 sampling plots were randomly selected from the remaining grid while constraining the selection to 60% (36 plots) from the High class, 30 % (18 plots) from the Medium class, and 10% (6 plots) from the Low class (Figure 3). Following the initial random plot selection process, any plot that intersected State Highways were removed and new plots were reselected, while plots that

intersected T-roads were maintained. Selected plots that intersected the boundary between vegetation community polygons were also removed to ensure the entire plot area falls within a single vegetation community polygon.

Table 1. The Sagebrush Steppe Ecosystem Reserve vegetation community habitat use designations.

Modified McBride Vegetation Communities	Habitat Use
Grasslands	Low
Juniper Woodlands (High Elevation)	Low
Juniper Woodlands (Low Elevation)	Medium
Low Sagebrush	Medium
Rabbitbrush/Sagebrush	Medium
Sagebrush Steppe	High
Sagebrush Steppe-Sagebrush/Saltbush Complex	High
Sagebrush/Saltbush	High
Sagebrush/Saltbush- Low Sagebrush Complex	High
Salt Desert Shrub	Medium
Sand Dunes	Low
Winterfat/Sagebrush	Medium

Field Surveys

The surveys were conducted from January 2007 to March 2007. We visited each sampling plot and established the starting and ending coordinates for all line transects within each plot. Each plot contained 8 transects spaced 50 m apart. The first transect was offset from the plot corner by 25 m and each successive transect started 50 m from the last. Each field biologist used a Global Positioning System (GPS) receiver to identify the transect start location and the center line. Each transect can be consider a habitat-guided transect because the field biologist has the liberty to diverge from the centerline (up to 25 m off the centerline axis) to search the most likely potential habitat. Taller sagebrush species, such as basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), and localized mounds of varying soil texture have been found to promote pygmy rabbit presence on the southern half of the INL. Therefore, these types of habitat features were the focus of our ground surveys and the field biologist would tend to direct observations toward these areas when they were present.

Identifying pygmy rabbit presence usually relies on locating active burrows and pellets (i.e., scat) rather than seeing actual rabbits. Pygmy rabbits can be active at any time of the day, but are commonly most active around dusk and dawn and inside burrow systems during the day. Therefore field surveys may not provide reliable estimates of population size or the number of individuals present within a study area. To confidently estimate population size more sophisticated survey techniques, such as motion-sensing cameras, would need to be incorporated into the sampling design. This level of survey effort was not the goal of this study, but could be considered for future studies requiring more detailed population information.

The presence of snow cover greatly increases the detectability of pygmy rabbits because the network of tracks aids in the burrow search process. The tracks left in snow can also definitively

identify pygmy rabbits from other rabbit species present in the area (i.e., cottontails and jackrabbits). We collected GPS coordinates at all locations where pygmy rabbit burrows were found within sampling plots. Any pygmy rabbit tracks discovered while in transit to sampling plots were followed to identify burrow locations, and GPS coordinates were collected at all incidental pygmy rabbit burrows encountered.

At each sampling plot a number of field data was collected. General information such as cloud cover, air temperature, and wind speed were recorded at each plot. The presence of snow was noted for each plot as well as the presence of any other animal species observed in the sampling plot. In any plot where burrows or pellets were observed an Index Code was assigned to indicate the relative age of these features (Table 2). Whenever active pellets (i.e., pellets that are fresh) were observed (Index Number 1), a second index was recorded to indicate the abundance (Table 2). For example, if a burrow system was found to be active it received a Burrow Index Code of 1. If the pellets around the same burrow were fresh and 30 were counted, the location was assigned a Pellet Index Code of 1 and then assigned #1 Pellet Index of 2. The #1 Pellet Index was only recorded when active pellets were observed.

Table 2. Field data index codes used to describe the activity associated with burrows or pellets as well as the number of active pellets present at a burrow.

Index Code	# 1 Pellet Index
1 = Active	0 = None
2 = Recent	1 = 1-25
3 = Old	2 = 26-100
4 = Very Old	3 = >100

Results

We located a total of 16 pygmy rabbit burrow systems (15 active) during our survey (Table 3). The 16 burrow systems were located within five sampling plots representing 8% of the total plots surveyed (Figure 3). All burrow systems occurred in High habitat use plots representing 14% of the total High habitat use plots sampled. We also identified six burrow systems (5 active) through incidental observations (Table 4). The incidental observations occurred in sampling plots ranked as High or Medium habitat use, and no signs of pygmy rabbits were observed in any Low habitat use areas.

Conclusions

Pygmy rabbit burrow distribution appears to be clumped in specific areas that contain the environmental characteristics to support pygmy rabbit presence. When an active burrow was found, there was a greater likelihood of finding other active burrows in the local vicinity. Since our plot selection process took a stratified random approach, in some cases we only surveyed a single plot in a region that could likely support more rabbits. This is particularly true of the sampling plot located in the southwest corner of the SSER east of T-20 (Plot 8). We found multiple burrow systems within this plot as well as incidental burrow systems near this plot. Since this was the only plot surveyed in this region of the SSER, an expanded survey may yield additional information on the local abundance and distribution in this area. There are many more

locations across the SSER that were not sampled during this survey and contain habitat ranked High. The next step to delineate a more detailed distribution is to conduct additional surveys across a broader extent in proximity to known pygmy rabbit presence.

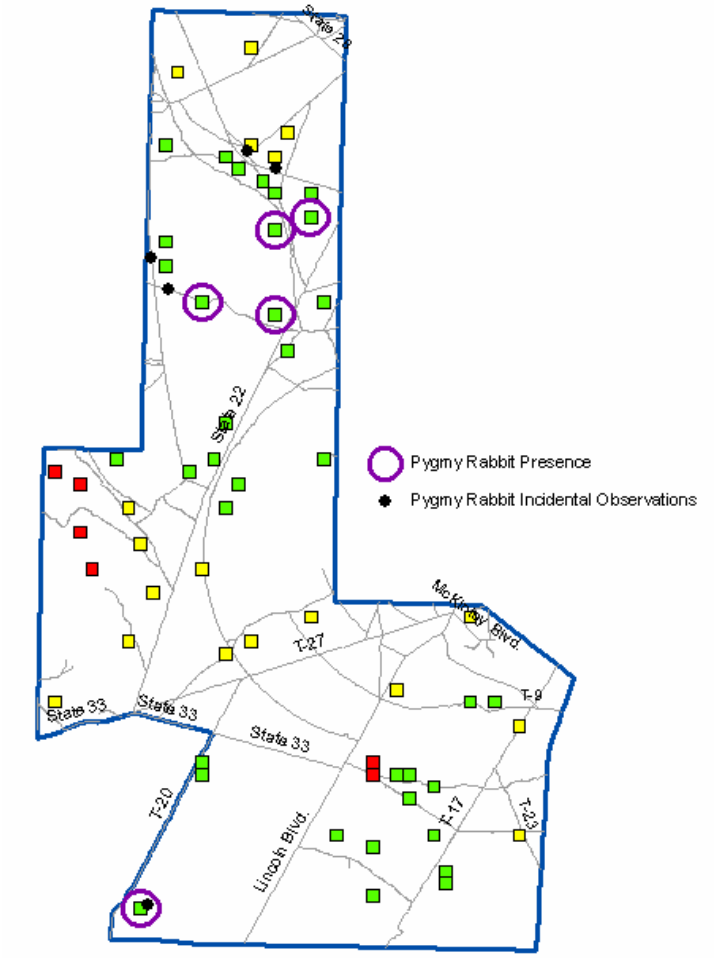

Figure 3. Distribution map of the randomly selected pygmy rabbit sampling plots on the Sagebrush Steppe Ecosystem Reserve. The colored plots indicate the assigned High (green), Medium (yellow), or Low (red) use category. Sampling plots with pygmy rabbits present are circled, and the distribution of incidental observations is displayed.

Table 3. Pygmy rabbit burrow survey data. The two coordinate locations highlighted in gray were estimated using GIS due to GPS error in the field. The records marked with an asterisk denote very little snow presence. Refer to Index Codes in Table 2. GPS coordinates are reported in the North American Datum 1927 and UTM Zone 12 projection.

Plot	Date	Snow	Burrows	Burrow Index	Pellet Index	#1 Pellets	Track Index	Northing	Easting
8	2/2/2007	Yes*	1	2	1	3	No	4845555	352816
8	2/2/2007	Yes*	2	1	1	3	Yes	4845520	352836
8	2/2/2007	Yes*	2	1	1	2	No	4845352	352844
8	2/2/2007	Yes*	1	1	1	1	No	4845335	352865
8	2/2/2007	Yes*	1	1	1	1	Yes	4845297	352863
8	2/2/2007	Yes*	2	1	1	1	Yes	4845245	352880
8	2/2/2007	Yes*	3	1	1	3	Yes	4845255	352860
38	2/22/2007	No	1	1	1	3	No	4868228	358080
19	2/28/2007	Yes	1	1	1	1	Yes	4865354	354657
19	2/28/2007	Yes	1	1	1	1	Yes	4865312	354646
19	2/28/2007	Yes	2	1	1	2	Yes	4865285	354607
31	3/2/2007	Yes	1	1	1	1	Yes	4865192	356995
31	3/2/2007	Yes	1	1	1	1	Yes	4865213	356966
32	3/2/2007	Yes	1	1	1	1	Yes	4867752	356886
32	3/2/2007	Yes	2	1	1	1	Yes	4867807	356926
32	3/2/2007	Yes	1	1	1	1	Yes	4867793	356893

Table 4. Incidental pygmy rabbit burrow observations outside of sampling plot boundaries. GPS coordinates are reported in the North American Datum 1927 and UTM Zone 12 projection.

Burrows	Burrow Index	Pellet Index	#1 Pellets	Track Index	Northing	Easting
2	2	2	n/a	No	4845555	352912
4	1	1	1	Yes	4845542	352921
2	1	1	3	No	4869836	357120
2	1	1	1	No	4870431	356216
1	1	1	1	Yes	4866899	353032
2	1	1	1	Yes	4865836	353593

B. Sage-grouse Leks

Greater sage-grouse were once a candidate for federal Threatened and Endangered status by the U.S. Fish and Wildlife Service, but after extended review were denied listing in 2005. Sage-grouse remain a species of concern and continue to be threatened by the loss or conversion of sagebrush steppe habitat across the western U.S.

Every spring sage-grouse males congregate at locations called leks. At leks, the birds give off calls and "dance" around displaying to attract females for breeding. Lek attendance of both male and female birds is monitored throughout the western U.S. each year to document changes in population status. There are two formal survey routes established on the southern half of the INL, and the data collected during these surveys contribute to the statewide database maintained by the Idaho Department of Fish & Game.

There have been sage-grouse lek locations documented and studied in the Birch Creek drainage area of the SSER, and sage-grouse are known to use this are for seasonal habitat requirements (Connelly et al. 1988). For most of the SSER, no formal surveys for sage-grouse leks have been conducted and the distribution and abundance of currently active leks are unknown. Without knowledge of lek distribution within the SSER, future management decisions could be compromised if these important resources are neglected.

Survey Methods

Aerial Surveys

We conducted aerial surveys along systematic transects covering the entire area of the SSER. Survey transects were spaced 400 m apart and the length of each varied depending on the region of the SSER (Figure 4). The transects were flown in a Cessna 182 single-engine airplane at an approximate altitude of 100 ft above ground on April 4 and April 11, 2007. The surveys started soon after sunrise in an attempt to observe leks when birds are most actively displaying and daily attendance of males peaks. Two observers visually scanned the ground from opposite sides of the plane to locate sage-grouse leks. A GPS point coordinate was collected over all potential lek locations where birds were observed. Following the aerial surveys, ground surveys were conducted to verify and document lek location and bird attendance.

Results

We only observed a single male sage-grouse in the northwest corner of the SSER during the aerial surveys (Northing- 4874990, Easting- 353187) (Figure 4). The point location was visited on the ground on April 26, but no birds were observed during the ground survey. Overall the sage-grouse leks survey yielded little new information regarding the distribution of leks across the SSER.

Conclusions

Anecdotal observations made during the formal lek count surveys on the southern portion of the INL suggest that sage-grouse are wary of raptors circling overhead or in the vicinity of a lek. The behavioral response of birds when a raptor approaches a lek is to stop displaying and many birds seek shelter to hide. Since we know leks exist in the historical Birch Creek drainage, it seems possible that sage-grouse interpret the low altitude airplane as a potential predator or disturbance that causes them to stop activity. Future lek reconnaissance surveys may consider ground-based methods where less disturbance is generated.

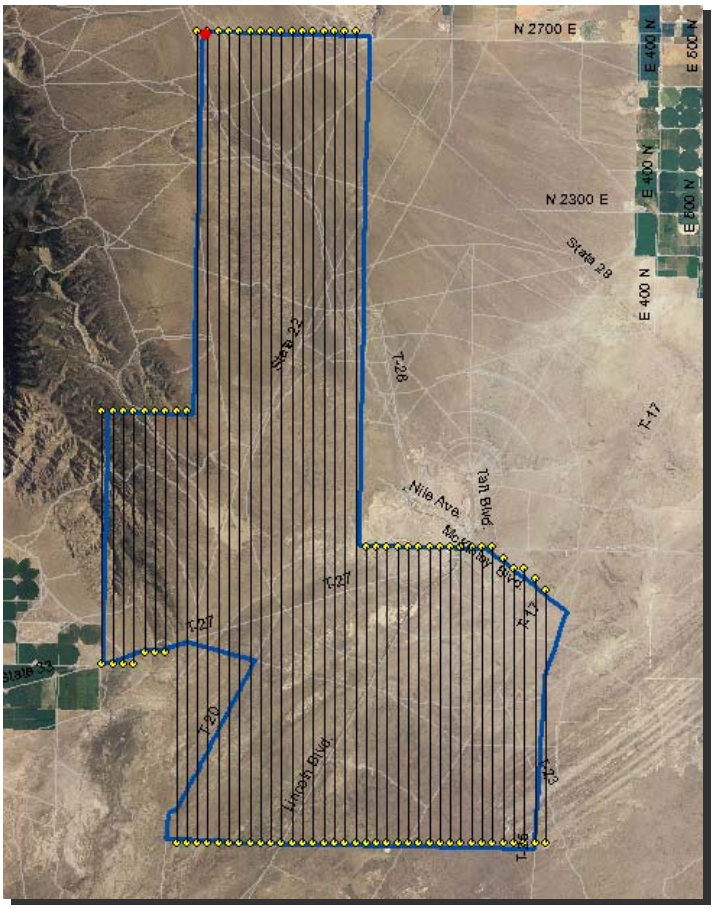

Figure 4. Sage-grouse lek aerial survey transects flown across the SSER in April 2007. The single male sage-grouse observed during the aerial transects is plotted (red point).

C. Bald Eagle

Bald eagles have been declared an endangered species since 1967 by a law that predated the Endangered Species Act of 1973. In 1995 the U.S. Fish and Wildlife Service upgraded the status of the bald eagle from 'endangered' to 'threatened' in the lower 48 states. On June 28, 2007 bald eagles were officially removed from the endangered list, but will still maintain federal protection status.

The Bald and Golden Eagle Protection Act (more simply referred to as the Eagle Act) will be the primary law protecting Bald Eagles following the delisting process. The Eagle Act prohibits any form of disturbance to eagles and effectively provides the same protection to both species.

Survey Methods

We developed a road driving survey route which attempted to maximize the distance driven near power lines. Raptors tend to rely on vertical structures for perch locations while hunting for prey. We focused on conducting our surveys in areas where perch locations were available and

the likelihood of observing eagles is highest. In addition to man-made vertical structures (e.g., power line poles), we also wanted to include natural features like the juniper trees (*Juniperus osteosperma*) and rocky cliffs around Kyle Canyon as well as the decadent cottonwood trees along the historical Birch Creek drainage.

An initial survey route was selected using available GIS data layers of highways, T-roads and known power lines. Four surveys were completed on December 28 2006, February 1 2007, March 19 2007, and April 12 2007. Following the first survey some minor modifications were made to remove excess driving miles. All of the remaining surveys followed the same route (Figure 5). Two observers participated in each survey using binoculars and a spotting scope to assist in bird identification. While driving the survey route, we collected GPS coordinates for all bald eagles and golden eagles (*Aquila chrysaetos*) as well as any sensitive raptor species (ferruginous hawks).

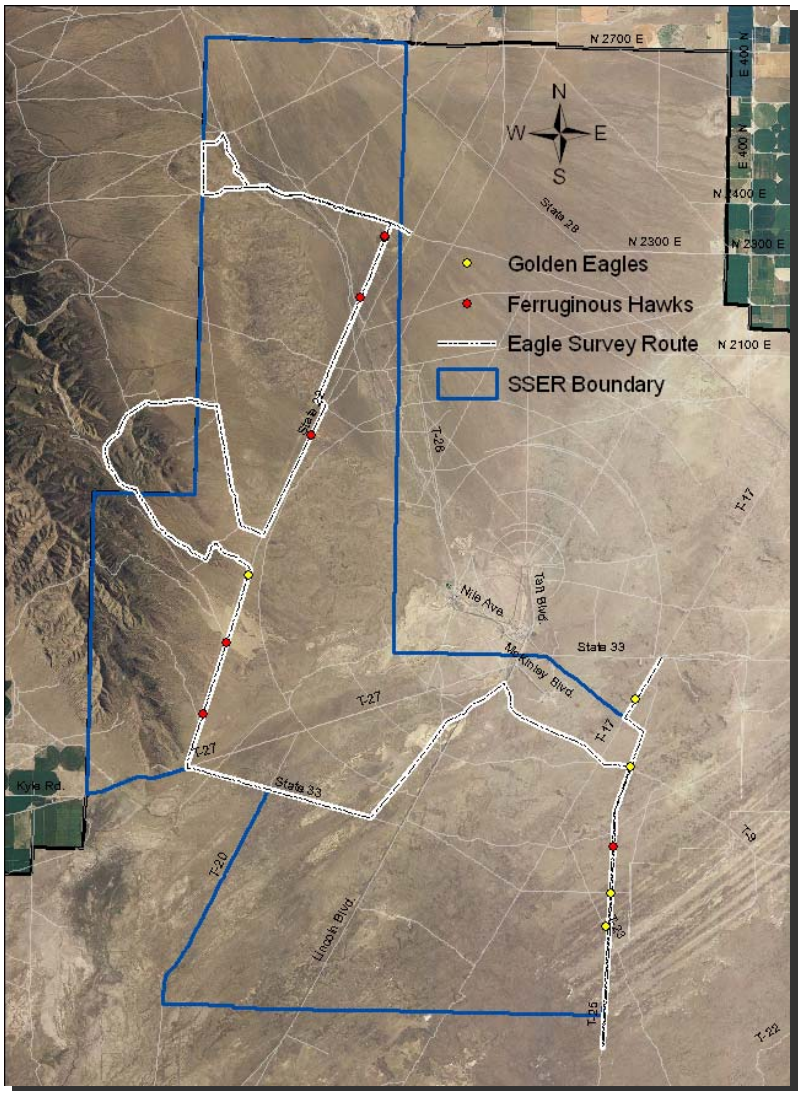

Figure 5. Bald eagle driving survey route across the Sagebrush Steppe Ecosystem Reserve showing observations made during all four surveys.

Results

No bald eagles were observed during the four driving surveys. We did observe a total of seven golden eagles during the surveys (Table 5). The majority of golden eagle sightings occurred along the power line adjacent to T-25 on the southeastern boundary of the SSER. It is likely that the same individual(s) were counted during successive surveys because observations were repeatedly made in the same general areas. We also documented ferruginous hawks while searching for bald eagles, and these data are reported in Section D.

Table 5. Eagle survey visual observations and location descriptions. GPS coordinates are reported in the North American Datum 1927 and UTM Zone 12 projection.

Date	Northing	Easting	Location	Species
12/28/2006	4846637	365825	West of T-25 power line road	Juvenile Golden Eagle
2/1/2007	4847880	365911	Perched on T-25 power line	Adult Golden Eagle
3/19/2007	4854041	366697	North of T-25 power line road	Juvenile Golden Eagle
3/19/2007	4851922	366527	Perched on a power line along T-25	Juvenile Golden Eagle
3/19/2007	4857995	354420	Perched on power line	Adult Golden Eagle
4/12/2007	4851915	366560	Perched on power line near T-9 junction	Adult Golden Eagle
4/12/2007	4847915	365914	Perched on power line	Adult Golden Eagle

Conclusions

The Environmental Surveillance, Education and Research (ESER) Program participates in the nationwide USGS mid-winter eagle count survey conducted this year on January 5, 2007. These standardized survey routes include State Highways 22, 28, and 33 on the INL including portions of the SSER. No bald eagles were observed during this year's mid-winter eagle count surveys. In previous years, the USGS mid-winter eagle surveys have yielded bald eagles on the INL, and this may have been a year of low abundance by bald eagles. The ESER Program also participates in the nationwide USGS Breeding Bird Surveys (BBS). This year was the first documented case of a bald eagle sighting during the spring BBS surveys, and the observation was made east of Test Area North not far from the SSER boundary. Although no bald eagles were observed during the SSER surveys, it is likely that bald eagles may be present during some years. There have not been any documented bald eagles nesting on the SSER.

D. Ferruginous Hawk

Ferruginous hawks are on the USFWS species of concern list and have been observed nesting on the INL in the past. Nesting ferruginous hawks are sensitive to disturbance and are known to abandon nests when threatened by nearby activity. This makes ground based surveys difficult because we do not want to disturb the birds in the process of documenting distribution and nest success.

Methods

Aerial Surveys

The goal of the aerial surveys was to identify previously built nests that could be potentially used during this breeding season. Following the aerial sage-grouse lek surveys on April 4, 2007 we spent an hour flying at low altitudes over the Juniper woodlands on the western border of the SSER. We visually searched juniper trees, rocky outcrops, and cliff bands around Kyle Canyon for old nesting locations not yet occupied. We also identified large nests built on power lines and collected GPS coordinates at all potential nesting sites. Incidental nest observations were contributed by Wildlife Conservation Society field workers, and nest locations identified during the bald eagle surveys were also recorded for further surveys.

All nest locations were surveyed from the ground June 19, 2007 to determine ferruginous hawk presence and nest success. We used binoculars to inspect the nests and avoided getting too close and disturbing the birds.

Results

No nests in or on natural features were found during the aerial surveys, but two large nests were identified on power line poles on the western edge of the SSER (Table 6). Both of these nests (Sites 1 and 2) had no birds occupying them during the ground visit in June and were not used for breeding. All other nest locations contained ferruginous hawk nestlings. We observed one juvenile and both adult ferruginous hawks present at Sites Number 3 and 4. Site Number 5 was the only nest found in natural habitat and not on man-made structures. There was a single adult perched on the power line adjacent to Site Number 5, and a single juvenile was observed on the nest (Figure 6).

Table 6. Ferruginous hawk nest survey sites. Site numbers were arbitrarily assigned for reference in the Results section. GPS coordinates are reported in the North American Datum 1927 and UTM Zone 12 projection.

Location	Site Number	Northing	Easting
Nest on power line	1	4847711	351938
Nest on power line	2	4849587	352148
Nest platform adjacent to Richard's Butte	3	4865461	354707
Nest platform to the east of State Highway 22	4	4868671	358595
Nest in Juniper tree adjacent to power line road	5	4853621	352891

During the bald eagle road driving surveys (Section C) we documented nine ferruginous hawks on or near power line poles (Table 7). Ferruginous hawks were only observed during the last two bald eagle surveys (in March and early April) and were not present during the winter months when the bald eagle surveys began.

Conclusions

The nest success rate appears high for ferruginous hawks on the SSER, and all nests where a pair of hawks were present produced offspring. There is another nest location near the Kyle Canyon junction road where ferruginous hawks have nested in the past but was not utilized this year. Given the large area of juniper woodlands and rocky outcrops around the Kyle Canyon area, there is potential for many more nesting sites. Even though the aerial surveys were flown at low altitudes, the flight speed was fast making it difficult to closely search trees for nests. Future surveys may benefit from ground based visual searches to locate nests. We observed adult hawks in the general areas where they nested early in the spring. It may be advantageous to identify regions where adult hawks are spending time to help narrow down where additional nests are located.

Table 7. Ferruginous hawk observation data collected during the bald eagle road driving surveys. GPS coordinates are reported in the North American Datum 1927 and UTM Zone 12 projection.

Date	Northing	Easting	Location	Species
3/19/2007	4853608	353000	Perched on power line	Ferruginous Hawk
3/19/2007	4855859	353732	Perched on power line	Ferruginous Hawk
3/19/2007	4862421	356415	Perched on power line	Ferruginous Hawk
3/19/2007	4866806	357977	Perched on power line	Ferruginous Hawk
3/19/2007	4868704	358745	Near nesting platform	2 Ferruginous Hawks
4/12/2007	4849364	366003	Perched on power line	2 Ferruginous Hawks
4/12/2007	4868744	358762	Near nesting platform	Ferruginous Hawk

Figure 6. Ferruginous hawk nestling on nest in juniper tree (Site Number 5).

Survey Summary and Recommendations for Future Surveys

This report represents the first formal surveys on the SSER for sensitive species. Table 8 provides summary information regarding the survey results, current population status (based on these survey data and previous field data), and potential human-induced impacts that could pose a threat to each species.

The sampling timeframe was limited to only a few surveys and more thorough repeat surveys may provide additional information. Further pygmy rabbit field sampling should consider conducting additional sampling in the local areas where they are present. Increasing survey intensity in these areas may yield additional burrow systems and expand the known distribution. Based on the results from the sage-grouse lek aerial survey, this approach may not be the most effective method to identify new lek locations. Future surveys should consider ground based methods to listen for males calling during the breeding season. There are not many alternative survey methods for bald eagles which would improve upon these surveys. The best method is to visually search areas were they would expectedly be seen, and this primarily includes perch locations such as power lines. Bald eagles are commonly spotted incidentally and encouraging INL employees to report observations may produce useful information missed during field surveys. Further surveys for ferruginous hawk nests may consider more ground-based reconnaissance rather than aerial surveys.

Table 8. Sensitive species survey summary and management considerations.

Species	Survey Results	Current Status*	Anthropogenic Threats
Pygmy Rabbit	Present in small populations	Stable	Increased grazing activities; Increased road use; Construction or development
Sage-grouse	Small localized presence	Unknown	Increased grazing activities; Increased road use; Construction or development
Bald Eagle	Incidental presence	Stable	Removal of perch locations
Ferruginous Hawks	Nesting pairs present	Stable	Removal of perch locations; Disturbance around nesting locations

* Represents speculated population status based on these surveys and previous ESER surveys on or near the SSER

There are a few species of concern that we did not survey this year, and we recommend future surveys for these species when funds become available. Burrowing owls have been identified on other parts of the INL and additional surveys on the SSER would complement the sampling being conducted for the CMP. During the breeding season, hooting surveys for a couple hours following sunrise would be adequate to detect presence and distribution across the SSER. Bats are common throughout much of the INL and are also being surveyed for the CMP. We would recommend visiting winter hibernacula across the SSER after identifying potential locations such as caves or mine shafts. During the spring and summer months bat presence and use of the SSER could be determined using a device that detects bat echolocation signals. Long-billed curlews are commonly observed during the annual BBS near the SSER and incidental sightings have occurred in the Big Lost River sinks area. Visual observation surveys could be conducted during

the breeding season within high probability habitat (e.g. agricultural areas and wetlands). The range and distribution of gray wolf in Idaho has been continually expanding since the reintroduction, and confirmed observations have been made not far from the INL. There have been unconfirmed sighting of gray wolves on or adjacent to the INL, and future surveys could provide the information needed to confirm the presence or absence of this species on the SSER. Since many wolf packs contain individuals with radio collars, locations supplied by state or regional wolf biologists could indicate wolf presence on the SSER. Other methods such as howling and track surveys could also be conducted in high probability habitat areas.

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