STOLLER-ESER-85

Ecological Review for an Environmental Assessment for the Two Dynamic Tests for Protective Elements and Vehicles Project DOE/EA-1537

Environmental Surveillance, Education and Research Program
ESER
S. M. Stoller Corp.

STOLLER-ESER-85

Ecological Review for an Environmental Assessment for the Two Dynamic Tests for Protective Elements and Vehicles Project DOE/EA-1537

August 4, 2005

R.D. Blew
A.D. Forman
J.R. Hafla
D.K. Halford
M.R. Jackson
S.Vilord

Prepared by:
S. M. Stoller Corporation
Environmental Surveillance,
Education and Research Program
1780 First Street
Idaho Falls, ID 83401

Table of Contents

List of Figures

List of Tables

Affected Environment

Soils

The soils in the area of the proposed test site are generally described as sands over basalt. Olson et al (1995) mapped the soils at the test area as the Grassy Butte-Rock Outcrop Complex. This complex of soils includes a number of soil mapping units. Grassy Butte very stony loamy sand makes up about 30 % and the Rock Outcrop makes up about 20% of the area in this soil complex. These two soil mapping units are not present within the 450-ft radius area around the test site. The remaining 50 % of this soil complex is made up of about equal parts of Grassy Butte 10 – 40 inches deep to bedrock, Grassy Butte 40 – 60 inches deep to bedrock, Matheson loamy sand, Bondfarm sandy loam, and Grassy Butte loamy sand. The Bondfarm sandy loam is a shallow soil and not likely present at the proposed test site. The soil at the test site is most likely the Grassy Butte series.

Characteristics common between the Grassy Butte soils and the Matheson loamy sand include: 1) very deep, well drained to somewhat excessively drained sands, 2) sands are wind deposited, 3) the soils are calcareous throughout their depth and have a lime accumulation beginning at 10 to 19 inches deep, and 4) the hazard of soil blowing (wind erosion) is very high.

The very high hazard of soil blowing imparts certain limitations to use of these soils (Olson et al, 1995). They are not suited to mechanical rangeland management treatments including seeding. These soils are classified as Capability Class VIIe (Very severe limitations that make them unsuitable for cultivation due to erosion). Crop seedings require replanting of close grown crops every 1 to 4 years in the Matheson soil and on the Grassy Butte soil, one-half of the area may require replanting each year. Also, these soils have impaired trafficability (the capability of the terrain to bear traffic).

Plant Communities

Two distinct vegetation community types occur around the proposed test area. One plant community type occurs on basalt outcroppings and in the shallow soils on ridges immediately adjacent to those outcroppings. The second plant community type occurs in the deep well-drained sandy soils in the basins and bowls around the basalt outcroppings. The vegetation communities of the proposed test area are characteristic of excellent condition sagebrush steppe subsequent to wildland fire. The communities are dominated by native perennial grasses with abundant native perennial and annual forbs. Some resprouting shrubs are also present within the vegetation communities. Data from a recent fire ecology study in the area indicate that the cover and density of native grasses and forbs are similar to other burns of the same age and are similar to cover and density of those species in unburned areas on the same soil type (R.D. Blew unpublished data). Table 1 includes species density data for a fire recovery plot located south of and adjacent to the 450 ft. area.

Table 1. Plant densities (number of individuals per m^2) measured nearby in 2003.

Native	
Shrubs	
Chrysothamnus viscidiflorus	0.3
Opuntia polyacantha	0.2
Perennial Graminoids	
Achnatherum hymenoides	1
Carex douglasii	14
Elymus lanceolatus	9.7
Hesperostipa comata	10.3

Poa secunda	3.2
Perennial Forbs	
Crepis acuminata	0.1
Iva axillaris	0.8
Psoralidium lanceolatum	0.5
Sphaeralcea munroana	0.1
Annual Forbs	
Chenopodium leptophyllum	0.4
Descurainia pinnata	0.7
Introduced	
Annual Forbs	
Salsola kali	0.2

Native perennial grasses that dominate the plant community on the ridges adjacent to basalt outcroppings include needle-and-thread grass (*Hesperostipa comata*), and Indian ricegrass (*Achnatherum hymenoides*). Sandberg bluegrass (*Poa secunda*) and bottlebrush squirreltail (*Elymus elymoides*) are also present in shallow soils on the ridges. Common perennial forbs on the basalt outcropping and on the adjacent ridges include; ballhead ipomopsis (*Ipomopsis congesta*), turpentine wavewing (*Pteryxia terebinthina*), and cushion buckwheat (*Eriogonum ovalifolium*). Native annual forbs common in this community type include nodding buckwheat (*Eriogonum cernuum*), flatspine stickseed (*Lappula occidentalis*), and Pinyon Desert cryptantha (*Cryptantha scoparia*). Broom snakeweed (*Gutierrez sarothrae*) and dwarf goldenbush (*Ericameria nana*) are abundant shrubs on outcroppings in this vegetation community, and green rabbitbrush (*Chrysothamnus viscidiflorus*) and gray horsebrush (*Tetradymia canescens*) are resprouting shrubs that occasionally occur along the ridges. Two species of non-native, weedy species, cheatgrass (*Bromus tectorum*) and musk thistle (*Carduus nutans*) also occur on the basalt outcroppings; cheatgrass can become quite abundant on some outcroppings.

The deep, sandy soils of the basins and bowls are dominated by needle-and-thread grass, and thickspike wheatgrass (*Elymus lanceolatus*). Patches of Douglas' sedge (*Carex douglasii*) also occur occasionally throughout this community type. This plant community has a very high diversity of native perennial forbs. Abundant perennial forb species include; painted milkvetch (*Astragalus ceramicus*), Geyer's milkvetch (*Astragalus geyeri*), lemon scurfpea (*Psoralidium lanceolatum*), sand dock (*Rumex venosus*), fernleaf biscuitroot (*Lomatium dissectum*), thorn skeletonweed (*Stephanomeria spinosa*), pale evening primrose (*Oenothera pallida*), and tapertip hawksbeard (*Crepis acuminata*). However, many additional forb species occur regularly and may be locally abundant. Introduced species are relatively rare in this plant community and occur only occasionally. Introduced species include Russian thistle (*Salsola kali*) and desert alyssum (*Alyssum desertorum*). An extensive, but not exhaustive, species list including species from both community types can be seen in Table 2. A complete species table cannot be generated because plant senescence during the late growing season in which the surveys were completed makes identification of many plant species impossible.

Table 2. Plant species list for the test area. Data were collected in 2003 and 2005.

Current Scientific Name	Common Name	Family	Nativity	Duration	Growth Habit
Achnatherum hymenoides	Indian ricegrass	Poaceae	Native	Perennial	Graminoid
Agropyron cristatum	crested wheatgrass	Poaceae	Introduced	Perennial	Graminoid
Alyssum desertorum	desert alyssum	Brassicaceae	Introduced	Annual	Forb
Arenaria franklinii	Franklin's sandwort	Caryophyllaceae	Native	Perennial	Forb
Artemisia tridentata ssp. *tridentata*	basin big sagebrush	Asteraceae	Native	Perennial	Shrub

Current Scientific Name	Common Name	Family	Nativity	Duration	Growth Habit
Astragalus ceramicus	painted milvetch	Fabaceae	Native	Perennial	Forb
Astragalus geyeri	Geyer's milkvetch	Fabaceae	Native	Annual	Forb
Astragalus lentiginosus	freckled milkvetch	Fabaceae	Native	Perennial	Forb
Bromus tectorum	cheatgrass	Poaceae	Introduced	Annual	Graminoid
Calochortus bruneaunis	Bruneau mariposa lily	Liliaceae	Native	Perennial	Forb
Carduus nutans	musk thistle	Asteraceae	Introduced	Perennial	Forb
Carex douglasii	Douglas' sedge	Cyperaceae	Native	Perennial	Graminoid
Chenopodium leptophyllum	narrowleaf goosefoot	Chenopodiaceae	Native	Annual	Forb
Chrysothamnus viscidiflorus	green rabbitbrush	Asteraceae	Native	Perennial	Shrub
Crepis acuminata	tapertip hawksbeard	Asteraceae	Native	Perennial	Forb
Cryptantha scoparia	desert cryptantha	Boraginaceae	Native	Annual	Forb
Delphinium andersonii	Anderson's larkspur	Ranunculaceae	Native	Perennial	Forb
Descurainia pinnata	western tansymustard	Brassicaceae	Native	Annual	Forb
Elymus elymoides	bottlebrush squirreltail	Poaceae	Native	Perennial	Graminoid
Elymus lanceolatus	streambank wheatgrass	Poaceae	Native	Perennial	Graminoid
Ericameria nana	dwarf goldebush	Asteraceae	Native	Perennial	Shrub
Ericameria nauseosus	rubber rabbitbrush	Asteraceae	Native	Perennial	Shrub
Eriogonum cernuum	nodding buckwheat	Polygonaceae	Native	Annual	Forb
Eriogonum microthecum	slender buckwheat	Polygonaceae	Native	Perennial	Shrub
Eriogonum ovalifolium	cushion buckwheat	Polygonaceae	Native	Perennial	Forb
Gayophytum diffusum	spreading groundsmoke	Onagraceae	Native	Annual	Forb
Gutierrezia sarothrae	broom snakeweed	Asteraceae	Native	Perennial	Shrub
Hesperostipa comata	needle and thread grass	Poaceae	Native	Perennial	Graminoid
Ipomopsis congesta	ballhead ipomopsis	Polemoniaceae	Native	Perennial	Forb
Iva axillaris	povertyweed	Asteraceae	Native	Perennial	Forb
Lappula occidentalis	flatspine stickseed	Boraginaceae	Native	Annual	Forb
Leptodactylon pungens	prickly phlox	Polemoniaceae	Native	Perennial	Shrub
Leymus cinerus	basin wildrye	Poaceae	Native	Perennial	Graminoid
Lomatium dissectum	fernleaf biscuitroot	Apiaceae	Native	Perennial	Forb
Lygodesmia grandiflora	largeflower skeletonplant	Asteraceae	Native	Perennial	Forb
Machaeranthera canescens	hoary aster	Asteraceae	Native	Perennial	Forb
Mentzelia albicaulis	whitestem blazingstar	Loasaceae	Native	Annual	Forb
Oenothera pallida	pale evening-primrose	Onagraceae	Native	Perennial	Forb
Opuntia polyacantha	pricklypear	Cactaceae	Native	Perennial	Shrub
Phacelia hastata	silverleaf phacelia	Hydrophyllaceae	Native	Perennial	Forb
Poa secunda	Sandberg bluegrass	Poaceae	Native	Perennial	Graminoid
Pteryxia terebinthina	turpentine wavewing	Apiaceae	Native	Perennial	Forb
Rumex venosus	wild begonia	Polygonaceae	Native	Perennial	Forb
Salsola kali	Russian thistle	Chenopodiaceae	Introduced	Annual	Forb
Sisymbrium altissimum	tall tumblemustard	Brassicaceae	Introduced	Annual	Forb
Sphaeralcea munroana	white-stemmed globe-mallow	Malvaceae	Native	Perennial	Forb
Stanleya viridiflora	green princesplume	Brassicaceae	Native	Perennial	Forb
Stephanomeria spinosa	thorn skeletonweed	Asteraceae	Native	Perennial	Forb
Tetradymia canescens	spineless horsebrush	Asteraceae	Native	Perennial	Shrub
Thelypodium laciniatum	cutleaf thelypody	Brassicaceae	Native	Biennial	Forb
Tragopogon dubius	yellow salsify	Asteraceae	Introduced	Biennial	Forb

Invasive and Non-Native Species

A total of eleven Idaho Noxious weeds have been identified on the INL. Of those, only musk thistle (*Carduus nutans*) presently occurs on or near the proposed test site. In a literature survey, Pyke (1999) identified 46 exotic species that are weeds capable of invading sagebrush steppe ecosystems, with as many as 20 of these classed as highly invasive and competitive. Other significant non-native and/or invasive plants found on or near the proposed test site include cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola kali*), halogeton (*Halogeton glomeratus*), tumble mustard (*Sysimbrium altissimum*) and crested wheatgrass (*Agropyron cristatum, A. desertorum, A. sibericum*).

Within the 450-ft radius zone around the test area there are two areas of concern with regard to invasive and non-native species (Figure 1). There is an area covering approximately 19,000 ft^2 in the northeast quadrant of the 450-ft radius area about 260 ft from the center of the test area. This area is a dune with a high density of Russian thistle and cheatgrass. There are native species present on this dune as well. There is an area covering approximately 35,000 ft^2 in the northern part of the 450-ft radius area about 230 ft from center of the test area. This area has a high density of crested wheatgrass mixed with native species. There are also some large outcrops dominated by cheatgrass about 1000 ft to the southwest of the test area.

The potential for these invasive plants to increase on the project site is a significant threat to the integrity of the native plant community at this location. Research has shown that this species typically increases in areas of soil disturbance throughout this region (Pellant, 1996).

Sensitive Plant Species

A list of sensitive plant species that potentially occur within the area affected by the test blast was compiled using data from the Idaho CDC (2005). All sensitive species known to occur in Butte, Custer, Jefferson, Bonneville and Bingham counties were considered. Species with habitat requirements similar to the conditions occurring in and around the test area were included in the table. Sensitive species that were not included in the table were discounted because the habitat around the test area was not suitable due to topography, soils, or climate. Table 3 lists sensitive plant species for which suitable habitat is present on or around the test area.

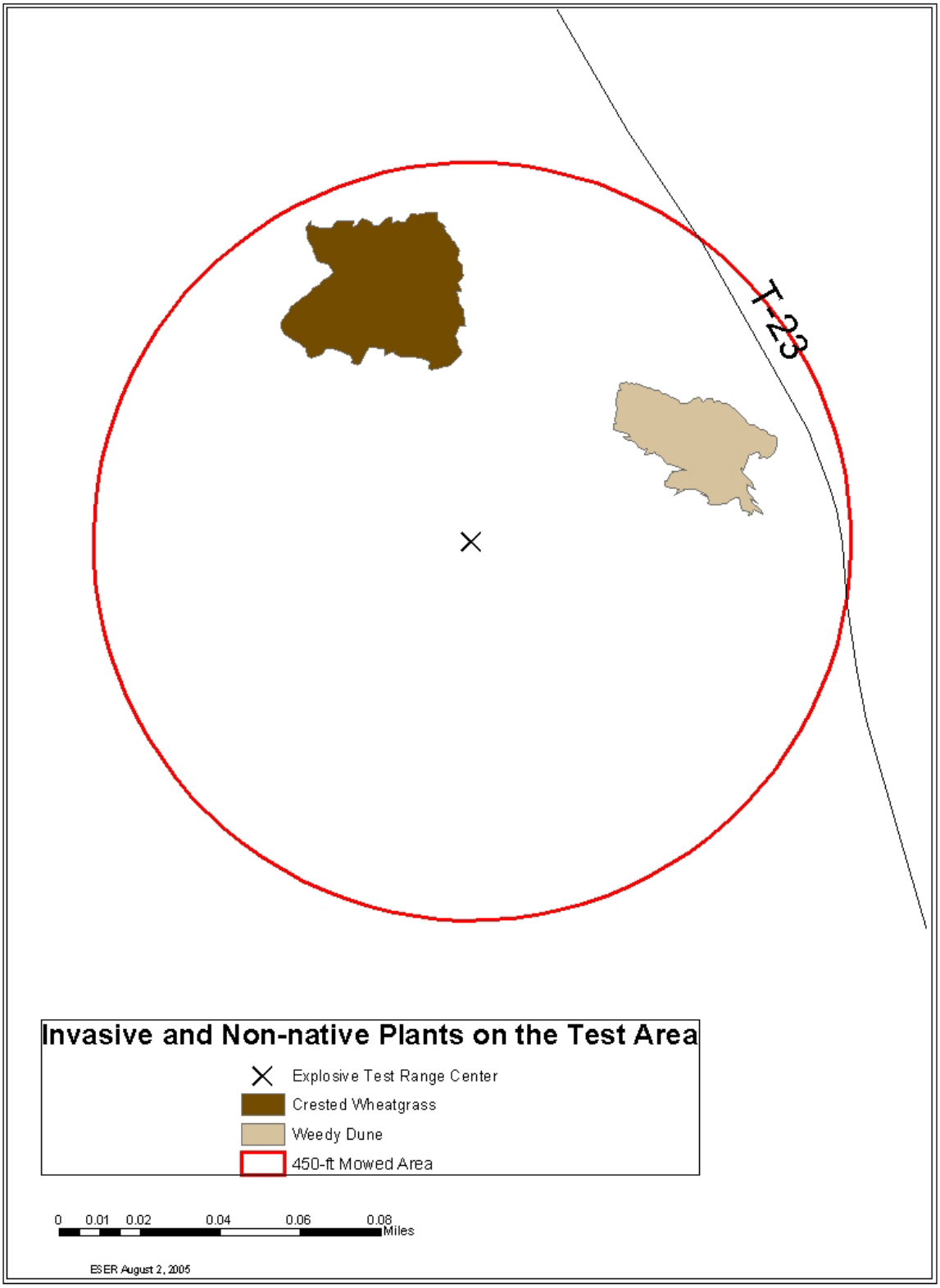

Figure 1. Areas within the 450-ft radius area around the test area center with invasive or non-native plant species.

Table 3. Sensitive species potentially occurring on or around the test area and appropriate State of Idaho, U.S. Forest Service Region 4, and/or Bureau of Land Management Ranking.

Scientific Name	Common Name	State	USFS Reg. 4	BLM
Allenrolfea occidentalis	iodinebush	1		
Astragalus aquilonius	Lemhi milkvetch	GP3	S	TYPE 2
Astragalus oniciformis	Picabo milkvetch	GP3		TYPE 3
Catapyrenium congestum	earth lichen			S
Ipomopsis polycladon	spreading gilia	2		TYPE 3
Silene scaposa var. *lobata*	Lost River silene	M		

None of the species considered to potentially occur on or around the test area were confirmed to be present. However, the surveys were conducted late in the growing season; therefore, it would have been difficult to identify some of the species that senesce by early summer such as spreading gilia (*Ipomopsis polycladon*) and Lost River silene (*Silene scaposa* var. *lobata*).

Wildlife Use

A total of 219 vertebrate species have been recorded on the INL (Reynolds et al. 1986). After the fire that occurred during 1999 in the proposed project area, the habitat changed from a dominant sagebrush ecosystem to dominant grassland system which contained a scattering of sagebrush plants and lava outcroppings. This changed how wildlife utilizes the immediate area. Although species such as the pygmy rabbit (*Brachylagus idahoensis*), sage sparrow (*Amphispiza bilineata*), and Brewer's sparrow (*Spizella breweri*), which are basically dependent upon sagebrush, species that thrive in grasslands such as elk (*Cervus elaphus*), cottontail rabbits (*Sylvilagus nuttallii*), horned larks (*Eremophila alpestris*), and vesper sparrows (*Pooecetes gramineus*), predominate. Sagebrush dependent species, such as the sage grouse, continue to flourish in the surrounding sagebrush areas and may occur in these adjacent grasslands.

Species that permanently reside in the proposed project area include small and medium sized mammals (e.g. bushy-tailed woodrat (*Neotoma cinerea*), Ord's kangaroo rat (*Dipodomys ordii*), black-tail jackrabbit (*Lepus californicus*), cottontail rabbit, and reptiles. These species have small home ranges, limited mobility, or a social structure that restricts movement.

The western rattlesnake (*Crotalus viridis*), gopher snake (*Pituophis catenifer*), northern sagebrush lizard (*Sceloporus graciosus graciosus*), short-horned lizard (*Phrynosoma douglasii*) were observed using rocky outcroppings that surround the proposed project area. The presence of rattlesnakes and gopher snakes suggests that a snake hibernacula (wintering area) is present in general area. An unverified sighting of a western whiptail lizard (*Cnemidophorus tigris*) was documented during our field survey. This species has never been documented on the INL, and further investigation into this sighting should occur. Two species considered uncommon on the INL, leopard lizards (*Gambelia wislizenii*) and desert striped whipsnakes (*Masticophis taeniatus*) have only been found in this general area of the INL (Linder and Sehman 1978)

and were not observed during our survey. All Idaho reptiles and amphibians (except bullfrog) are classified as protected non-game species. This designation is held at the state level to help protect populations (Idaho CDC 2005).

Several species of small mammals were observed using the proposed project area. These include, black-tailed jackrabbit, cottontail, Townsend's ground squirrel (*Spermophilus townsendii*), Bushy-tailed woodrat, Ord's kangaroo rat, deer mouse (*Peromyscus maniculatus*), and montane vole (*Microtus montanus*). Although these species are not listed on any sensitive list, they do provide a food resource for many that are such as prairie falcon (*Falco mexicanus*), ferruginous hawk (*Buteo regalis*), bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*). These small mammal species also provide a major prey base for coyotes (*Canis latrans*) using the proposed project area.

Many species use the proposed project area in a transitory manner. Species that use the area in this manner are in search of prey or forage, areas to reproduce, or shelter from the elements. All bird and big game species use the area in this manner. Although sage grouse primarily use sagebrush dominated areas, droppings observed in the surveyed area suggest that they occur the area. Other birds observed using the area for breeding include horned lark, western meadowlark (*Sturnella neglecta*), vesper sparrow, loggerhead shrike (*Lanius ludovicianus*), grasshopper sparrow (*Ammodramus savannarum*), rock wren (*Salpinctes obsoletus*), nighthawk (*Chordeiles minor*), red-tailed hawk (*Buteo jamiacensis*), ferruginous hawk, prairie falcon, and common raven (*Corvus corax*). Although a ferruginous hawk nest was located within 2 miles of the proposed area it does not appear to have been used during the recent breeding season. This does not restrict nesting activity in future years, by ferruginous hawks or other species that might utilize the nest. Bald eagles have been observed using the general area during the winter and golden eagles have been observed using the area throughout the year.

Both elk and pronghorn (*Antilocapra americana*) have been observed during annual surveys using the proposed area throughout the year (Figure 2.). Elk and pronghorn benefit from fires due to the increased herbaceous vegetation production. A research study conducted on the INL (Comer 2000) found that elk used the general area that includes the proposed test area for calving purposes. Also, pronghorn have been observed using the area for fawning. The INL provides critical winter range for both elk and pronghorn with numbers reaching 1,000 and >3,000, respectively. It is estimated that more than 100 elk and approximately 500 pronghorn summer on the INL. Large herds numbering more than 130 individuals have been observed using the proposed project area during different times of the year.

Even though nocturnal species such as bats are difficult to locate during daytime surveys, past studies (Haymond 1998) indicate bats use the INL throughout the year. The western small-footed myotis (*Myotis ciliolabrum*) is considered the most abundant bat on the INL during the spring and summer roosting in sagebrush, junipers, buildings, and rocky outcroppings. Townsend's big eared bat (*Corynorhinus townsendii*), a BLM sensitive species (BLM 2003) has been documented roosting in caves and lava tubes throughout the INL (Earl and Morris 1995) as recently as 2003 (Earl 2003). However, we did not find or document any such lava tubes within a two mile radius of the project area.

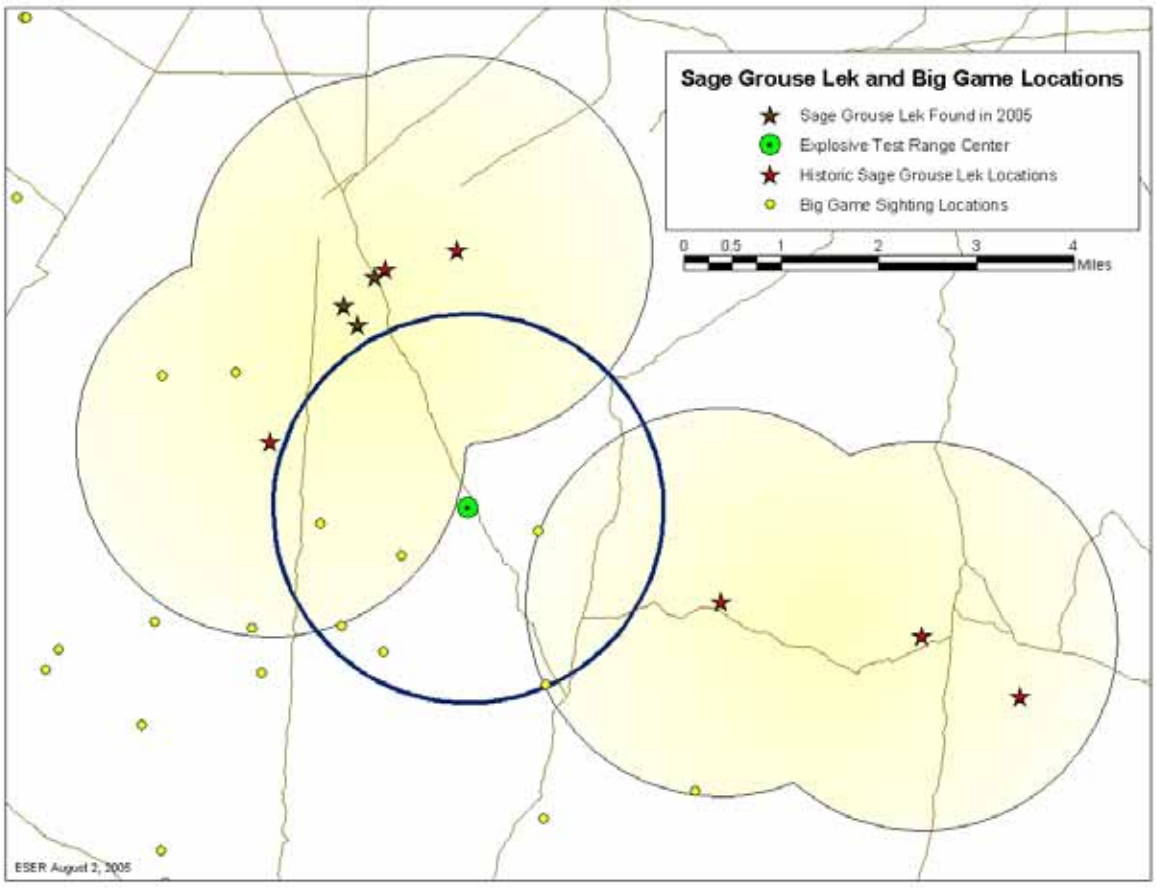

Figure 2. Locations of active and historic sage grouse leks within a two-mile buffer zone indicated as critical breeding range (Connelly et al. 2000). Pronghorn and elk locations located during 2004 and 2005 winter and summer surveys.

National Environmental Research Park

The INL is also the site of the Idaho National Environmental Research Park (NERP). The NERP program was established by Congress in the early 1970s. The Idaho NERP was chartered in 1975. The National Environmental Research Parks are actually field laboratories set aside for ecological research, for study of the environmental impacts of energy developments, and for informing the public of the environmental and land-use options open to them. According to the NERP Charter, those goals have been articulated in the National Environmental Policy Act, the (NEPA), the Energy Reorganization Act, the Department of Energy Organization Act, and the Non-nuclear Energy Research and Development Act. The public's concern about environmental quality was translated through NEPA into environmental goals and the NERPs provide a land resource for the research needed to achieve those goals. The NERP Charter allows that while execution of the program missions of DOE sites must be ensured, ongoing environmental research projects and protected natural areas must be given careful consideration in any site-use decisions.

The primary objectives for research on the NERPs are to develop methods for assessing the environmental impact of energy development activities, to develop methods for predicting those impacts, and to develop methods for mitigating those impacts. The NERP achieves these objectives by facilitating use of this outdoor laboratory by university and government researchers. At least three NERP projects have research sites in the vicinity of the proposed project site (Figure 3).

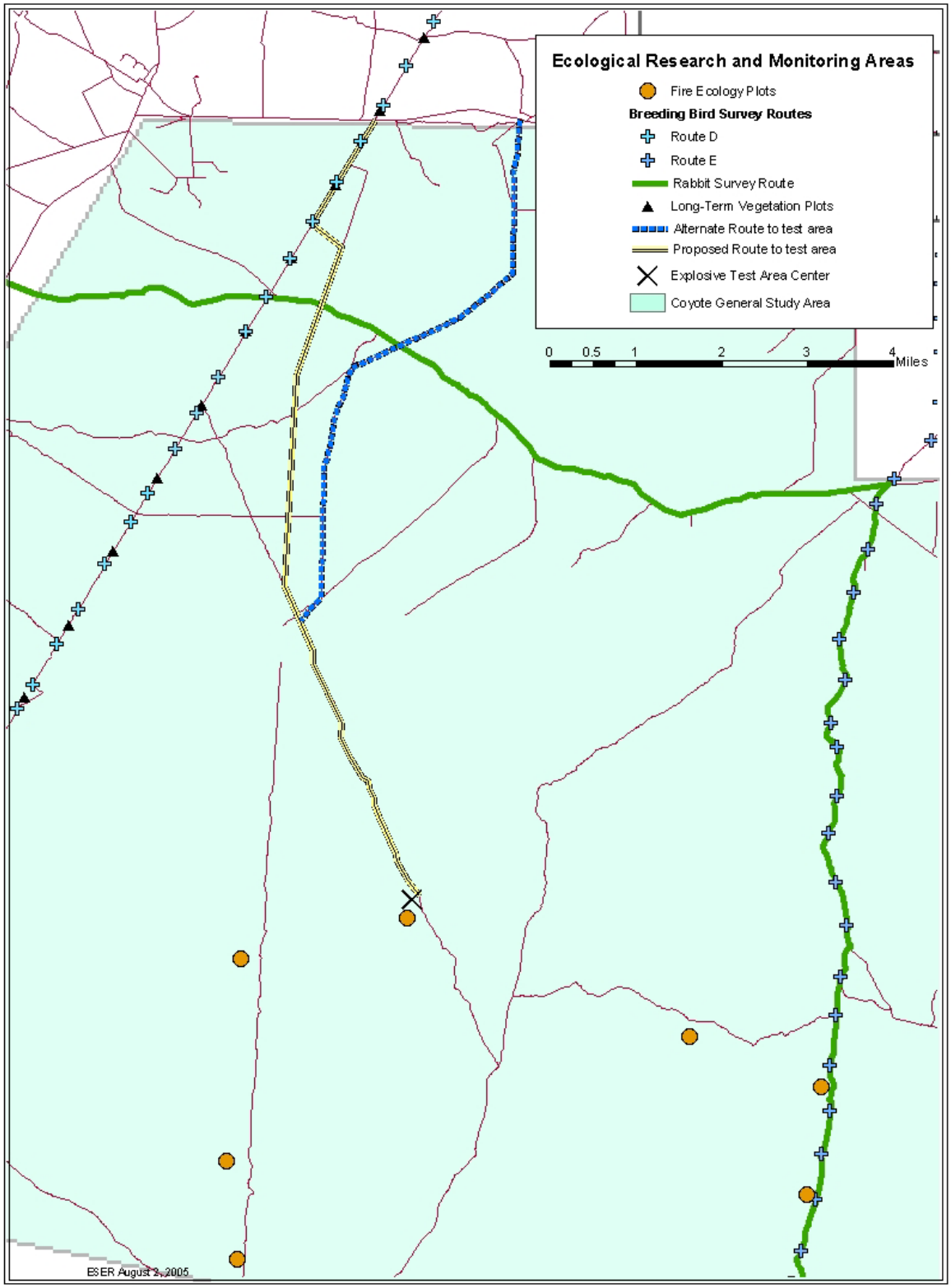

Figure 3. Ecological research and monitoring sites near the proposed test area.

The Long-Term Vegetation Transects (LTV) were established in 1950 and have been read on a regular basis since then. The data from these transects represents one of the longest rangeland vegetation databases in the western U.S. These plots are surveyed on a five-year schedule. The plots are scheduled to be surveyed in 2006. Some of the LTV plots are adjacent to T-17, a proposed route into the proposed test site.

A recent research project studying vegetation recovery following wildland fire established plots near the proposed test area. The plot is established with the expectation of being used as a long-term monitoring plot for assessing vegetation recovery following fire.

In 2004, researchers from Utah State University initiated a research project to study fine-scale movement patterns of coyotes. As part of this study, 30 adult coyotes were fitted with VHF telemetry radio collars. Some of these animals were also fitted with collars that record GPS locations. The home range of some of these animals includes the proposed test site.

In addition to the NERP activities described above, additional DOE-sponsored ecological monitoring is conducted near the proposed test site (Figure 3). Two of the five USGS Breeding Bird Survey routes on the INL are on the eastern portion of the site. One route follows T-17 and the other is on T-4. These routes are surveyed during June.

Surveys for large mammals, primarily elk, pronghorn and mule deer (*Odocoileus hemionus)* are conducted in January and July each year. These surveys are conducted using fixed-wing aircraft flying 500 feet above the ground. The surveys are conducted on north-south transects one-half mile apart and cover the proposed test area.

The Rabbit Survey transect is in the eastern portion of the INL. This transect begins at Lincoln Blvd. on T-9, goes east on T-9 to the intersection with T-4 and then south to Highway 20. This survey is conducted during the last week of May after sunset.

Environmental Consequences and Mitigative Measures

Soils

Soil disturbance will result in a direct loss of native vegetation and will provide opportunities for invasive and other non-native plants to become established. In the proposed project, soil would be disturbed in an area approximately 60 feet in radius and 4-6 feet deep after each test. The explosion would cause soils to form in a lip around the 60-foot crater. At the conclusion of both tests, proposed project personnel would clean the area of ordnance and debris. After the first test, the lip would be leveled in preparation of the test in the summer of 2006. At the conclusion of the second test, the location would be filled and re-graded to the slope that currently exists. Sand from another location may be required.

Soil disturbance should also be anticipated due to vehicle traffic to and on the proposed test site. This is due to the limited trafficability attributed to these particular soil types (Olson et al. 1995). These soils, and the potential for impact by vehicles, exist at the proposed test area and along a substantial portion of the route to the proposed site (Figure 4). Limiting the amount of traffic to the project site and on the project site itself will reduce the size of the area of disturbed soil.

Planning and site preparation that minimizes soil disturbance will limit the impacts to soil and vegetation, and greatly reduce the efforts required for revegetation and weed management. Management practices that should be used include:

- Designation of roadways, parking and laydown areas and restricting traffic to those designated areas.
- Limiting the amount of traffic allowed access to, and on, the project site.
- Limiting re-grading of soil to the crater itself.
- Closing the project site to traffic when the project is complete.

Vegetation

An area of approximately 450 feet in radius from the center of the test location would be mowed to reduce the possibility of starting a wildland fire. Mowing, especially during the dormant season, should have little if any direct impact on the native vegetation present at the proposed site. This assumes that care is taken to not disturb soil while mowing the proposed site. Direct loss of native plants is expected in the 60-ft radius area due to soil disturbance associated with the blast. Likewise, direct loss of vegetation will result from soil disturbance associated with traffic on and near the test site and on the road leading to the test area. This loss might be mitigated through revegetation of the disturbed areas.

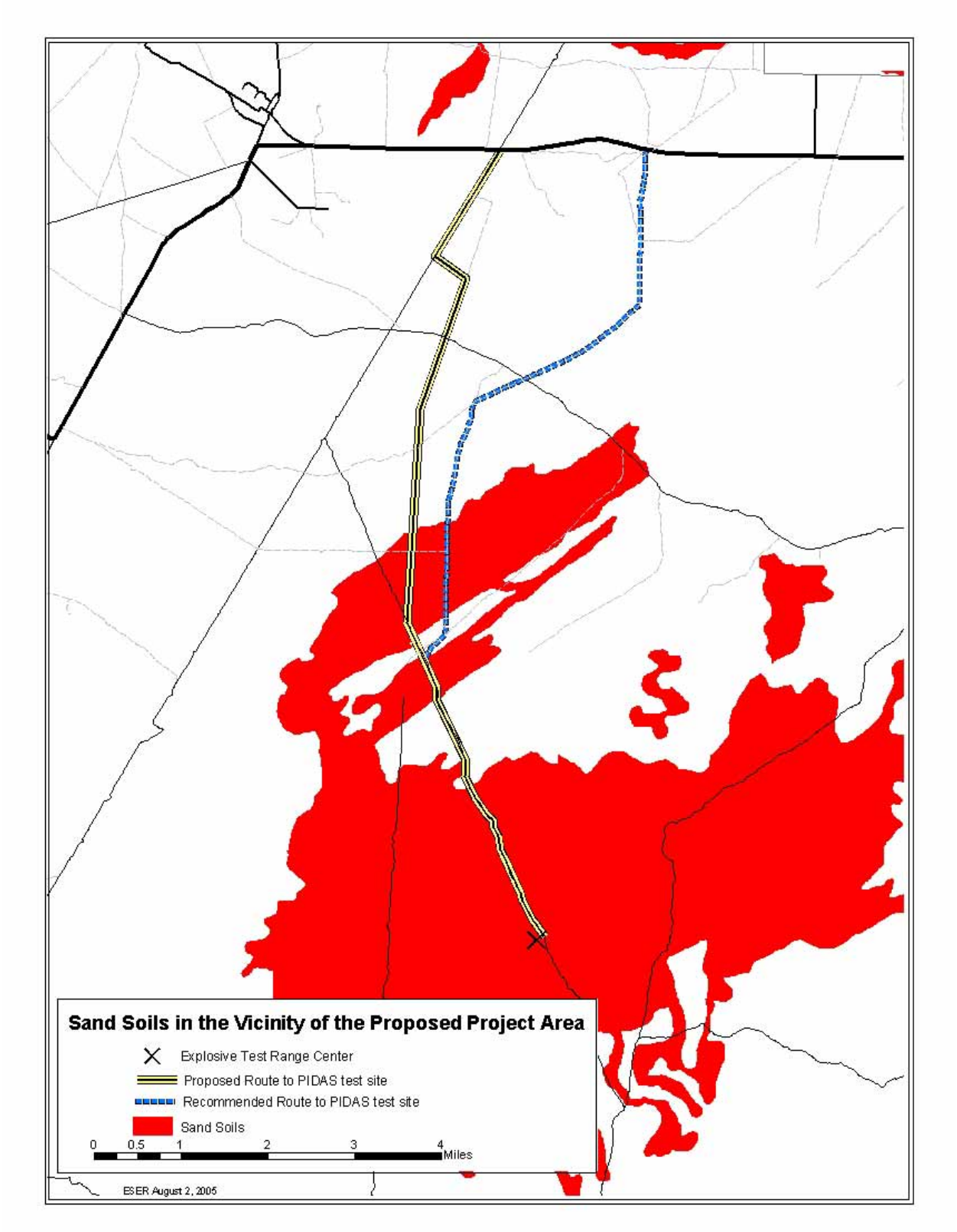

Figure 4. Soils on and near the proposed test area and the roads to the test area that are at risk to damage from vehicle traffic.

Revegetation and Weed Management Plan

Revegetation of all areas with soil disturbance and loss of native vegetation will be accomplished based on the guidelines of Anderson and Shumar (1989) and Twitchell (2001). The revegetation target for this project should be to achieve 70 % of the cover and of the species present in the surrounding undisturbed native plant community.

Because of the soil properties at the test area, the range of possible methods for revegetation is severely limited. The primary concerns are the very high risk for wind erosion and the low water holding capacity. These factors make revegetation on the proposed test area extremely difficult and the potential for success is unknown.

Normally at the INL a Truax or similar drill is recommended for planting. Seeds of native plants must be planted very shallow, generally one-quarter inch deep. Because of the risk for wind erosion at the test area, it is highly likely that these seeds will be blown out before they have a chance to germinate. Broadcast and hydroseeding place seed directly on the soil surface and would provide even less protection for seed. As Olson et al (1995) reports, the Grassy Butte soils are not suited to range seeding and crop plantings will require reseeding half of the area each year. Because of these limitations, seeding on the test area cannot be recommended.

The only other possible method provided by Anderson and Shumar (1989) is by transplanting. This could be done using container-grown stock, bare-root stock or wildings. Transplanted mature plants are hardier and may produce seed in the first growing season if they receive enough water and are not heavily grazed. Many local growers who are specialized in native plants will produce them in any form desired if the seed is market available or collectable at the test area. Transplanting wildlings that are already established and mature may yield a better chance of restoration for the test area and may be the most economical (Shumar and Anderson 1987). Another advantage of planting wildlings is that the vertical structure of the mature plant acts as a wind break reducing the risk of wind erosion and increasing the soil stability of the site. The best source for wildings would be the surrounding undisturbed native plant community. Shumar and Anderson (1987) indicate that this can be done without causing undue damage to the source community. Transplanted wildlings could include bunch grasses, forbs, and shrubs. However, Shumar and Anderson (1987) did not conduct their studies in sand soils and, therefore the potential for success at the test area is unknown.

Because the test area is in a grazing allotment, it is expected that livestock will have access to the general area of the test site. Livestock must be kept out of the areas undergoing revegetation. This will likely require construction of a fence.

It is recommended that an experienced revegetation contractor be used for this work. It is possible that an experienced revegetation contractor may have additional methods available other than those described here that may be more effective. A warranty should be part of any contract for this work.

A vital component for long term success in revegetation is monitoring, maintenance and weed management. Areas that are devoid of vegetation often times become a safe harbor for noxious weeds. Most weeds are opportunistic and will colonize a disturbed area much faster that the native species. If these plants are not detected and managed, they can threaten revegetation success). Long-term monitoring and maintenance is important because no revegetated area will in reach the 70% surrounding cover goal in the first growing season. The test area should be visited at least annually, early in the spring, in order to do maintenance as necessary and continue until revegetation goals have been met. Monitoring will continue on a yearly basis until the vegetation reaches the required 70% cover guidelines.

Monitoring will also continue as long as there are noxious weeds present on the test area or until the populations have been eradicated.

Invasive Species

Soil disturbance is a primary contributor to the spread of invasive plants. Invasive and non-native plants are present on the 450-ft radius area and could be spread by mowing. The two areas of invasive and non-native plants described in the Affected Environment section should be treated in one of two ways. First, it would be best to avoid disturbing these areas and not mow them. Second, if it is deemed necessary to mow areas with invasive or non-native species (see Fig. 1), they should be mowed after the rest of the area has been mowed. This will limit spreading their seeds into areas presently not infested. Failure to limit seed dispersal from these areas will likely increase the level of effort necessary for revegetation and weed management.

Wildlife Impacts and Mitigation

The impact of the proposed action would result in 1) unavoidable loss of ground-dwelling wildlife species and associated habitat, 2) displacement of certain wildlife species from the cleared area, and 3) an increase in the potential for collisions between wildlife and motor vehicles (we anticipate this impact to be minimal due to the slow travel speeds required on the roads to test area). However ground-dwelling species are generally very common so adverse impacts on those populations is not anticipated.

Noise affects wildlife differently from humans and the effects of noise on wildlife vary from serious to nonexistent in different species and situations (Larkin 1996). The potential exists for the initial blast to temporarily displace wildlife from the area. However, these impacts should be minimal and will not harm local wildlife populations.

Greater sage grouse – Although the 1999 burn resulted in a significant long-term impact on nesting habitat, sage grouse still occupy areas of dominant sagebrush adjacent to the proposed test site during winter and spring (Figure 2.). It is likely they use the proposed test site in a transitory manner year round. The ancillary disturbances associated with the proposed action over the planned 18 month period have the potential to temporarily displace sage grouse during winter and spring. Winter and spring are critical survival and reproductive periods, respectively, for sage grouse. Potential impacts of the proposed action on sage grouse that use the area can be minimized by maintaining vehicular speeds of less than 15 mph on all access roads to the test area and conducting activities outside of the critical winter and spring seasons.

Ferruginous hawk – The nestlings fledge generally during the last week of June or the first week of July. After fledging, the young hawks continue to center their activity around the nest and develop their aerial skills to the point that they can successfully reach their wintering grounds (Woffinden and Murphy 1983). Based on habitat requirements for this species and the presence of an inactive nest, the potential exists for them to occur in the project area. The initial blast in addition to the influx of humans to the area in summer or early fall would create the potential for displacing late nesting ferruginous hawks. If displacement of incubating or young-rearing ferruginous hawks from nests resulted in nest abandonment or in loss of eggs or nestling birds, it would constitute a significant short-term impact. These impacts can be minimized by eliminating human activity and blasting during the nesting period if ferruginous hawks are confirmed nesting. Raptor surveys should be conducted during June to determine nesting activity.

Elk – The general elk hunt for unit 63 (which includes ½ mile within the INL boundary) occurs from August 1 through December 31 and coincides with the initial test. The hunting season causes increased movement of elk resulting in increased potential for vehicular collisions. To avoid vehicular collisions with this species, particularly during this period, speed limits need to remain less than 15 mph on all

access roads. There is also the potential of these animals moving onto surrounding agricultural areas as a result of noise and human activity. These impacts can be minimized through close coordination with Idaho Department of Fish and Game.

Breeding Seasons - The proposed project area provides important breeding habitat to many species during the spring, thus seasonal restrictions should be imposed in order to prevent any detrimental effects to breeding populations. The following are times when specific animals are breeding, nesting, or birthing.

- Sage Grouse - February 15 - June 30
- Passerines - April 15 - June 30 (a few nest until Sept 1)
- Raptors - February 1 - July 1
- Snakes - August - September
- Pygmy rabbits - February - July

The Migratory Bird Treaty Act protects migratory birds, their nests and eggs. If any activity, including mowing, is to occur between March 1 and September 1, a nesting bird survey will need to be conducted before the activity begins. Work could be delayed if nests are discovered.

Speed Limits - Wildlife strikes by vehicles are a frequent occurrence on many roads. Mortality can be greatly reduced by reducing speeds (<15 mph) and awareness of the presence of any animal that might frequent the area. If a wild animal is observed in the road, vehicles should stop and wait until the animal leaves the road, encourage it to move on by driving forward SLOWLY, or stop and take measures to safely move the animal from the road.

Ecological Monitoring and NERP Research Activities

There is the potential for impact to other research and monitoring activities in the vicinity of the proposed project site. This includes ongoing ecological monitoring and research conducted by the ESER Program and academic researchers. The potential for impact may be in the form of direct damage to plots, alteration of natural animal behaviors being investigated, and/or potential loss of access to the area for data collection.

Most of these potential impacts can be avoided by implementing a few administrative controls. Travel should be strictly limited to the designated areas. Project managers should coordinate their activities with ESER personnel to avoid conflicts with long-term scheduled monitoring activities such as the Breeding Bird Survey, Long-Term Vegetation Survey, Rabbit Survey, Big Game Surveys, Sage Grouse Surveys and other data collection activities.

For some large-scale projects studying animal behavior or movement patterns such as the coyote project previously described, there is a potential for impacts. Utah State University researchers conducting the coyote project have indicated that conducting only two tests at the proposed site will likely have little impact on their research program. However, they also indicated that development of a long-term or permanent test site for similar activities in this area would likely cause them to move their research program somewhere other than the Idaho NERP (Mike Jaeger, Utah State University, pers. comm.).

There is the potential for ESER field workers to be in or near the area at the time of the proposed explosives activities. Recent experience with notification of field workers about explosives activity on the INL has been found to be deficient. ESER personnel brought this to the attention of the Idaho Occupational Safety and Health Council June 15, 2005. This potential for risk can be reduced by utilizing the INL Field Worker Notification process prior to each blast.

References

Anderson, J.E. and M. L. Shumar. 1989. Guidelines for revegetation of disturbed sites on the Idaho Nation Engineering Laboratory. DOE/ID-12114. Idaho National Engineering Laboratory, U.S. Department of Energy Idaho Field Office, Idaho Falls, ID. 36pp.

Bureau of Land Management. 2003. Sensitive Species List, Instruction Memorandum No. ID-2003-057, Idaho State Office, Boise, ID.

Comer, M. J. 2000. Elk population characteristics and habitat use in southeastern Idaho. MS Thesis. University of Idaho, Moscow, ID. 47pp.

Earl, S. 2003. West Rattlesnake Cave Survey Report. E-mail to Sue Vilord, January 16, 2004 .

Earl, S., and R. C. Morris. 1995. A survey of 14 caves on the Idaho National Engineering Laboratory. ESRF-006 58pp.

Haymond, S. 1998. Summer Habitat Use by three vespertilionid bats in sagebrush-steppe in Southeastern Idaho. Thesis. Brigham Young University, Provo, UT. 31pp.

Idaho CDC. 2005. Idaho Conservation Data Center, Idaho Department of Fish and Game. http://fishandgame.idaho.gov/cms/tech/CDC/. Accessed on August 1, 2005.

Larkin, R.P. 1996. *Effects of military noise on wildlife: a literature review*. Center for Wildlife Ecology. Illinois Natural History Survey. 607 E. Peabody Drive, Champaign, Illinois 61820.

Linder, A. D., and R. W. Sehman. 1978. The herpetofauna of the Idaho National Engineering Laboratory Site. Journal of the Idaho Academy of Science 13:47-50.

Olson, G. L., D. J. Jeppsen, and R. D. Lee. 1995. The status of soil mapping for the Idaho National Engineering Laboratory. INEL-95/0051. Lockheed Idaho Technologies Co., Idaho Falls, Idaho.

Pellant,M. 1996. Cheatgrass: the invader that won the west. Unpublished report. On file with: U.S. Department of Agriculture, Forest Service; U.S. Department of Interior, Bureau of Land Management; Interior Columbia Basin Ecosystem Management Project, 112 E. Poplar, Walla Walla, WA 99362.

Pyke, D.A. 1999. Invasive Exotic Plants in Sagebrush Ecosystems of the Intermountain West. In Proceedings: Sagebrush Steppe Ecosystems Symposium. Bureau of Land Management Publication No. BLM/ID/PT-001001+1150, Boise, Idaho, USA.

Reynolds, T. D., J. W. Connelly, D. K. Halford, and W. J. Arthur. 1986. Vertebrate Fauna of the Idaho National Environmental Research Park. Great Basin Naturalist 46(3): 513-527.

Shumar, M.L. and J.E. Anderson. 1989. Transplanting wildings in small revegetation projects. Arid Soil Research and Rehabilitation 1:253-256.

Twitchell, R.L, 2001. Memorandum of January 31, 2001. Subject: Notes on the use of "Guidelines for Revegetation of Disturbed Sites on the Idhao National Engineering Laboratory" (DOE/ID-12114), June 1999.

Woffinden, N.D. and J.R. Murphy. 1983. Ferruginous hawk postfledging activities. North American Bird Bander. Vol. 8(3): pp. 94-96.

Glossary Terms

Fledgling - A young bird that has recently acquired its flight feathers.

Herbaceous vegetation - Relating to or characteristic of an herb as distinguished from a woody plant.

Hibernacula - A protective structure in which an organism remains dormant for the winter.

Home range - The geographic area to which an organism normally confines its activity.

Lek - An area where male grouse congregate for breeding purposes.

Nocturnal - Most active at night.

Non-game species - Animals which are not normally hunted, fished, or trapped.

Transitory - Existing or lasting only a short time; short-lived or temporary