

Ecological Report for the Environmental Assessment for Expanding Capabilities at the Power Grid Test Bed at Idaho National Laboratory

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1. INTRODUCTION

The National Environmental Policy Act of 1969 (NEPA) (42 United States Code [USC] § 4321 et seq.) requires Federal agencies to consider the environmental consequences of proposed actions before decisions are made. To comply with NEPA, the U.S. Department of Energy (DOE) follows the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500-1508) and DOE's NEPA implementing procedures (10 CFR 1021). The purpose of an Environmental Assessment (EA) is to give Federal decision makers evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or issue a Finding of No Significant Impact (FONSI). In this EA, DOE evaluates constructing and operating a 16.5-mile 138-kilovolt (kV) overhead powerline (OHL) from the Central Facilities Area (CFA) to the Materials and Fuels Complex (MFC) at the Power Grid Test Bed (PGTB) on the Idaho National Laboratory (INL) Site.

The proposed OHL connects to the Scoville Substation at CFA, routes through the Critical Infrastructure Test Range Complex (CITRC) area to the CITRC Substation and ends near MFC. The new OHL supplies a reconfigurable 138-kV transmission line for electrical testing, creates an interconnected grid, and allows simultaneous testing of loads, power generation, and storage. The proposed route follows the established 138-kV OHL and powerline access road when possible. The proposal enlarges the Scoville Substation yard to enable connecting the proposed OHL to the INL Site power grid. The proposed action also installs fiber optic cable along the full length of the new OHL with termination points at various locations.

This EA (1) describes the baseline environmental conditions at the proposed powerline location; (2) analyzes the potential environmental effects from constructing, operating, and maintaining a new powerline and expanding testing activities at PGTB; and (3) compares the effects of the proposed action to the no action alternative. In addition, the EA supplies DOE environmental information to develop project controls that minimize or avoid adverse effects to the integrity of the human environment and natural ecosystems if DOE decides to construct and operate the new OHL. The goal of NEPA and this EA is to enable DOE decision making based on an understanding of environmental consequences.

1.1 Background

INL operates and maintains 61 miles of 65 megawatt, 138-kV-rated electrical power transmission, which supplies seven main substations, each feeding a separate facility complex within the 890-square mile INL Site. Three commercial utilities own power distribution infrastructure on the INL Site. INL operates the INL grid independent from commercial utilities through the primary substation and command and control center. Government and industry research, develop, demonstrate, and validate modern grid technologies, including the smart grid, using the PGTB, which offers a full-scale utility test bed.

CITRC supports critical infrastructure research and testing. CITRC includes a configurable and controllable substation and 13.8-kV distribution network. The CITRC infrastructure includes four smart grid user locations on a distribution mesh that can operate alone or in concert to support larger mesh operations at any of the multiple test voltage levels. The mesh distribution system was completed in 2017 and added about 7.41 miles of powerlines to the PGTB. The PGTB equips user locations for easy connection to the multi-voltage mesh distribution network(s) and supplies each location with patchable fiber-optic communications cable interconnections (through a combination of single-mode and multi-mode fiber). In addition, each user location allows easy connection to 13.8-kV power to supply a separate source of non-interrupted power (i.e., separate from the multi-voltage test mesh circuits) to support test operations. Fiber optic cables route to a centralized command and control shelter via patchable

panels, allowing reconfigurable interconnection of fiber communications between any combination of user locations and between the user locations and command shelter.

The PGTB utilizes the CFA Scoville Substation, the CITRC Substation, OHLs from CFA to MFC, the distribution mesh grid within CITRC, and multiple test pads along the OHLs. Test pads are located at the Army Reactor Area, CITRC substation, Intermediate Measurement Location (IML), MFC, Obsidian, and four test pads within the CITRC distribution mesh grid. These test pad locations are shown in Figure 1.

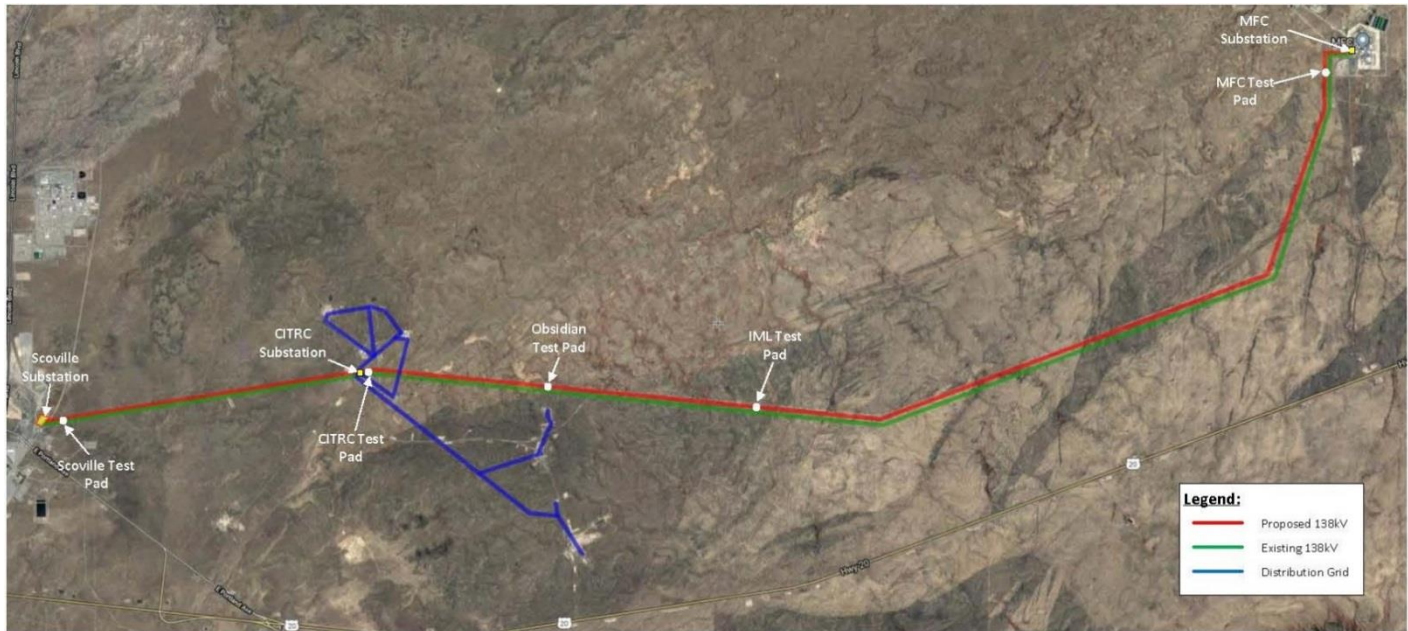


Figure 1. Configuration of PGTB at the INL Site.

Graveled test pads vary in size from about 14,000 to about 73,000 ft². Test pads furnish areas to place test equipment (e.g., transformers, circuit breakers, switches, etc.). Some testing connects multiple test pads using distribution infrastructure. Test pads also serve as parking areas for personnel performing set-up and testing.

Typical test scenarios include the following:

- Integrating new and old systems
- Automatic restoration and self-healing
- Distributed generation
- Demand response
- Micro-grid.

INL manages roads at the desert site according to a road priority system that applies to all roads within the administrative boundaries of the INL Site. INL assigns a priority, from 1 to 4, to designate use and maintenance allowed for each priority designation. The definitions of each priority are as follows:

- Priority 1: Emergency evacuation roads and security roads; graveled and graded routinely.
- Priority 2: Project access roads that are maintained as passable; occasional graveling and spot grading is permitted.
- Priority 3: Wildland fire access road that is maintained as passable; grading is not permitted.
- Priority 4: Two-track roads that are only visible due to sporadic use; no maintenance is permitted.

The Multipurpose Haul Road (hereafter referred to as the “Haul Road”) and T-25 powerline access road comprise the main travel routes between CITRC and MFC. INL manages the Haul Road as a Priority 2 road, with special use conditions that only allow access for maintenance and transferring research fuel, spent fuel, special nuclear materials, and test or experiment materials between MFC and other areas of the INL Site. The *Environmental Assessment for the Multipurpose Haul Road Within the Idaho National Laboratory Site and Finding of No Significant Impact (FONSI)* (DOE/EA-1772, 2010) evaluated the environmental impacts of constructing and using the Haul Road for the purposes listed above.

The T-25 road serves as the main transportation route between CITRC and MFC for PGTB due to Haul Road use limitations. T-25 has a Priority 3 designation throughout this area. INL limits maintenance on T-25 to dumping and compacting gravel in low spots created by seasonal moisture. INL currently prohibits blading and grading on T-25 from CFA to MFC.

1.2 Purpose and Need for Action

Modern power grid infrastructure faces diverse challenges. To enable reliable and economic operation of the nation’s power grid, new technologies, methods, and devices need to be developed and validated. INL expertise in integrating cybersecurity, industrial control systems, wireless communications, and electric power grid technologies enables research, development, testing, and deployment of unique technologies and methodologies that contribute to advancing the reliability, resilience, and security of the national power grid and critical infrastructure.

The purpose of the proposed action is to support current and anticipated future demand at the INL PGTB for operational testing and research using actual grid infrastructure with configurable transmission and distribution systems. At the same time, the PGTB needs to isolate power-related research and development (R&D) projects from the INL Site power grid to maintain reliable power to operating site facilities such as the Advanced Test Reactor Complex and MFC.

The proposed action enhances PGTB capabilities by dedicating a reconfigurable 138-kV transmission line for testing, creating a multi-utility interconnected grid, and allowing simultaneous testing of loads, generation, and storage to support developing, validating, and implementing smart-grid technologies. Expanding the PGTB enables full-scale testing of evolving grid distribution systems, technologies, and components and minimizes potential outages on the normal Site power supply during power grid infrastructure testing.

2. DESCRIPTION OF THE PROPOSED ACTION

The CEQ regulations in 40 CFR 1508.9(b) require that an EA include a brief discussion of alternatives to a proposed action. This section describes the proposed action, the no action alternative, and alternatives considered but eliminated from further analysis.

DOE Idaho Operations Office (DOE-ID) considered action alternatives for meeting the needs of a growing customer base and the need to offer new and relevant capabilities to confront changing threats to national security. For the action alternatives to be feasible, they must accomplish the following:

- Allocate support infrastructure to support current and anticipated growth at the PGTB
- Maintain reliable power supply to INL facilities during PGTB R&D tests
- Support R&D to advance unique technologies and methodologies that improve reliability, resilience, and security of the national power grid and critical infrastructure
- Evaluate new and evolving threats to the power grid.

2.1 *Proposed Action*

The proposed action constructs a reconfigurable 138-kV electrical transmission line for the PGTB to create a multi-utility interconnected grid for simultaneous testing of loads, generation, and storage. The proposed 138-kV OHL is about 16.5 miles long and connects to the Scoville Substation at CFA, routes through the CITRC area, and ends at MFC. The new OHL minimizes outages to the normal electrical power supply to the CITRC area created by testing.

Proposed activities (1) construct the powerline using heavy equipment, laydown areas for staging equipment and initial pole assembly, and new test locations on the existing OHL; (2) expand existing test pads to accommodate parking areas and defensible space; and (3) expand the CITRC substation to allow new power infrastructure tie-ins. Post-construction activities involve powerline testing activities on the new OHL, routine and emergency maintenance, and access road upgrades. These activities have the potential to impact about 983 acres at the INL Site (Holmer, Henrikson, & Olson, 2019).

Figure 2 depicts the route of the proposed OHL.



Figure 2. Proposed new OHL route for the PGTB.

The proposed action expands the Scoville substation yard and constructs new test pads. Construction requires clearing and grubbing vegetation, backfilling with pit-run gravel, installing ground grids, placing substation gravel base, and installing fencing. It also includes enlarging established test pads, installing fiber optic cable on the new poles, and locating equipment laydown areas and construction parking areas in disturbed areas or as close as possible to disturbed areas and the construction work. Appendix A shows previously disturbed areas preferred for locating parking and laydown areas.

The old and new powerlines both support testing activities; the new OHL also supplies power to INL facilities. Future testing on the new and reconfigured test pads includes installing equipment such as diesel generators, 138/13.8-kV transformers, SF₆ gas-filled circuit breakers, switchgear, load banks, instrumentation, and battery trailers at test locations on a temporary basis. The temporary arrangement allows user reconfiguration for different test scenarios.

The proposed PGTB expansion upgrades the T-25 road to a Priority 2 road to allow road grading and improved infrastructure on the road to address seasonal hazards that inhibit travel and authorizes additional Haul Road uses not considered in the Haul Road EA (DOE/EA-1772, 2010), including transporting materials for constructing the new OHL. The proposed action

allows INL to transport materials posing a safety hazard to Highway 20 users on the Haul Road if the use does not interfere with transferring research fuel, spent fuel, special nuclear materials, and test or experiment materials between MFC and other areas of the INL Site. The proposed action does not authorize use of the Haul Road for personal or government passenger vehicle travel between sites or for mere convenience. Examples of expanded uses of the Haul Road include transporting large items such as transformers, sensitive R&D equipment where other INL Site roads are too rough, materials and equipment for constructing the new OHL, and explosives for security purposes; transferring large cranes to the National Security Test Range (NSTR) north of MFC; and transporting decommissioning and demolition waste from MFC to the CFA landfill or excess yard.

Expanding the types of use authorized for the Haul Road considers factors such as road safety, roadway capacity, and other logistical issues to determine the realistic need to use the Haul Road rather than Highway 20 or the T-25 road. The proposed action does not include the use of the haul road for personal or government passenger vehicle travel between sites, maintenance or construction of powerlines, or for mere convenience. Examples of authorized uses of the haul road under the proposed action include transporting large items such as transformers, sensitive research and development equipment where other INL Site roads are too rough, explosives for security purposes; transferring large cranes to the NSTR north of MFC; and transporting waste from MFC, including trailers and modular facilities, to the CFA landfill or excess yard. Other activities that require access to the area crossed by the Haul Road, which are currently restricted to using the T-25 road such as powerline maintenance, will continue to be restricted to using T-25 and not the Haul Road.

All shipments would be made in accordance with applicable regulations and operational controls identified in DOE/EA-1772 (2010) including weight, weather, speed, and time-of-day restrictions. The Haul Road EA analyzed the potential environmental impacts from a total of 18,960 shipments (an average of 474 shipments per year) of spent fuel, special nuclear material, research fuel, test or experiment materials, and specific types of waste. The analysis was based on the number of shipments and the radiological profile of shipments. The proposed action does not include radiological shipments that were not analyzed in DOE/EA-1772.

The transportation of non-nuclear shipments was not specifically analyzed in the Haul Road EA but was discussed briefly in Appendix B (page B-16) of DOE/EA-1772. Although the Haul Road EA did not analyze the impacts of non-nuclear shipments using the haul road, it noted such use could be incorporated in other NEPA reviews. Table 1 in the Haul Road EA estimated 18,960 haul road shipments (an average of 474 shipments per year), not exceeding 80,000 lbs. would occur from 2010 to 2050 (the road has a design capacity for a 100,000-lb gross vehicle weight, double-droop, three-axle trailer with a 6-inch ground clearance). DOE noted the number of shipments analyzed in the Haul Road EA only projected DOE transportation needs as anticipated in 2010 and the number of shipments was expected to grow.

The Haul Road EA implemented operational controls to minimize the environmental impacts to biological resources from haul road use. The proposed action complies with the operational controls such as restricting the road for official use only (as determined and approved by the INL Sitewide Facility & Operations manager), implementing weed control, seasonal or time-of-day restrictions, speed limits, cultural resource awareness training, etc. Nuclear material transfers

would continue to receive priority use of the Haul Road.

Since operation of the Haul Road began in 2012, less than 300 transportation events have occurred on the road, which is fewer than the 474 shipments estimated in the Haul Road EA to occur every year until about 2050. Adding additional uses per year would not result in a substantial increase in the estimated number of annual or total shipments and would not result in a substantial change in the environmental impacts analyzed in the Haul Road EA (DOE/EA-1772, 2010).

2.2 INL Site Natural Resource Management Objectives

Under DOE Order 430.1B (Real Property Asset Management, February 2008), “Land-use plans should be tailored based on local site condition and must consider the National Environmental Policy Act, site planning and asset management, LTS plans, institutional control plans, stakeholder public participation, economic development under community reuse organizations, privatization of assets, environmental law, cultural asset management, historic preservation, and natural resource management.”

Further, DOE along with thirteen other Federal agencies signed a Memorandum of Understanding (MOU) to Foster the Ecosystem Approach (December 15, 1995). As stated in the MOU, “An ecosystem is an interconnected community of living things, including humans, and the physical environment within they interact. The ecosystem approach is a method for sustaining or restoring ecological systems and their functions and values. It is goal driven, and it is based on a collaboratively developed vision of desired future conditions that integrates ecological, economic, and social factors. It is applied within a geographic framework defined primarily by ecological boundaries. The goal of the ecosystem approach is to restore and sustain the health, productivity, and biological diversity of ecosystems and the overall quality of life through a natural resource management approach that is fully integrated with social and economic goals”.

The Federal Government should provide leadership in and cooperate with activities that foster the ecosystem approach to natural resource management, protection, and assistance. Federal agencies should ensure that they utilize their authorities in a way that facilitates, and does not pose barriers to, the ecosystem approach. Consistent with their assigned missions, Federal agencies should administer their programs in a manner that is sensitive to the needs and rights of landowners, local communities, and the public, and should work with them to achieve common goals.

The INL Site represents one of the largest remnants of undeveloped, ungrazed sagebrush steppe ecosystem in the Intermountain West (INL 2016). This ecosystem has been listed as critically endangered with less than two percent remaining (Noss et al. 1995, Saab and Rich 1997). The INL Site is also home to the Idaho National Environmental Research Park (NERP). The NERP is an outdoor laboratory for evaluating the environmental consequences of energy use and development as well as strategies to mitigate these effects. A portion of the INL Site has been designated as the Sagebrush Steppe Ecosystem Reserve that has a mission of conducting research on and preserving sagebrush steppe.

In 2007, DOE began working with the U.S. Fish and Wildlife Service (USFWS) to establish a Candidate Conservation Agreement (CCA) for the protection of Greater sage-grouse (*Centrocercus urophasianus*) on the INL Site (DOE-ID & USFWS, 2014). At that time, the sage-grouse had been considered multiple times for listing under the Endangered Species Act (ESA), and DOE-ID was concerned that an ESA listing would jeopardize its ability to carry out its mission expeditiously. In 2010, the sage-grouse was listed as a Candidate species, meaning it warranted ESA protection, but a lack of FWS resources precluded the listing to occur at that time. In 2014, DOE-ID completed and DOE-ID and the USFWS signed the sage-grouse CCA. The purpose of the CCA was to identify actions that DOE-ID would implement to minimize threats to sage-grouse on the INL Site. Having an agreement in place provided a high level of certainty for DOE-ID, because if the sage-grouse became listed, the CCA could easily be converted into a Biological Opinion—a required document for any INL Site activities that might harm or disturb sage-grouse. In 2015, the USFWS reversed its previous decision, finding that sage-grouse no longer warranted protection under the ESA. However, DOE has continued to work with the USFWS recently completed a Conference Opinion based on the CCA (a Conference Opinion is the equivalent of a Biological Opinion, but for non-listed species). Because of DOE's proactivity in signing the CCA, it has had and continues to have a large measure of certainty and flexibility as it pursues its mission, while fulfilling its stewardship to preserve the ecological resources at the INL Site.

Several environmental factors/resources at the INL Site need to be considered during planning because of the potential for impacts to these resources from project construction and other actions. The types of factors considered include: regional considerations such as population, land uses, and socioeconomic conditions; sitewide area infrastructure such as transportation routes, power distribution systems, communication systems, utility systems, and other land uses; resources such as soils, water resources, biota, and cultural resources; and natural hazards at the INL Site such as wildland fire, seismic hazards, and floods (INL 2016).

As stated in the Idaho National Laboratory Comprehensive Land Use and Environmental Stewardship Report (INL 2016), several considerations form the basis for current INL Site land use planning assumptions. These include prior land use planning assumptions from the original Comprehensive and Facility Land Use Plan, public input from the INL Site Environmental Management Citizens Advisory Board and the Environmental Management Site-Specific Advisory Board, and incorporation of DOE and the INL Site management team's strategic vision for the INL Site. The following planning assumptions are based on planning assumptions developed in the original Comprehensive and Facility Land Use Plan:

- INL will achieve its vision of becoming the preeminent nuclear research, development, and demonstration laboratory, a major center for national security technology development and demonstration, and remain a multi-program national laboratory.
- The INL Site and its associated 889 mi² (2,303 km²) will remain under federal government management and control through at least the year 2095.
- Portions of the INL Site will remain under federal government management and control in perpetuity.
- The DOE-EM footprint will be reduced at the INL Site as the DOE-EM cleanup mission continues to completion in the year 2035.

- New buildings will be constructed to provide state-of-the-art research capabilities that are necessary to fulfill the INL Site mission.
- New building construction may include structures in existing facility areas and construction of new facility areas.
- To the extent practical, new building construction will be encouraged in existing facility areas (i.e., the Research and Education Campus [REC] in Idaho Falls and the Advanced Test Reactor [ATR] Complex and the Materials and Fuels Complex [MFC] at the INL Site) to take advantage of existing infrastructure.
- Construction of new facility areas should occur in the identified core infrastructure areas.
- As the INL Site implements its mission, R&D advancements will result in obsolescence of existing buildings.
- As contaminated facility areas become obsolete, environmental remediation, decommissioning, and decontamination will be required.
- The environmental remediation, decommissioning, and decontamination process will be completed in accordance with the existing regulatory structure.
- The federal government will authorize and appropriate sufficient funds to provide adequate controls (i.e., institutional controls or engineered barriers) for areas that pose a significant health or safety risk to the public and workers until the risk diminishes to an acceptable level for the intended purpose.
- Regional economic development is closely related to the activities of the INL Site. The significance of the INL's Site influence on the region depends on the diversity and strength of the regional economy.
- Cooperative partnerships between the public and private sectors may be developed to support modernization and expansion of the INL Site R&D facilities.
- In accordance with DOE Order 144.1, Administrative Change 1, "Department of Energy American Indian Tribal Government Interactions and Policy," DOE recognizes that a trust relationship exists between federally recognized tribes and DOE. DOE will consult with tribal governments to ensure that tribal rights and concerns are considered prior to DOE taking actions, making decisions, or implementing programs that may affect the tribes.
- No residential development will occur within INL Site boundaries, although potential development may occur in Idaho Falls.
- Grazing will be allowed to continue the INL Site in designated areas.
- DOE-ID has a Candidate Conservation Agreement with the U.S. Fish and Wildlife Service (USFWS) to protect greater sage-grouse and its habitats on the INL Site.
- To protect human health and the environment, INL Site operations, including onsite disposal, will remain in full compliance with applicable environmental laws, regulations, and other requirements.

2.3 General Effects of Linear Features

Because the PGTB and associated facilities will utilize T-25 on a section that is not already heavily traveled (CITRC to MFC), an upgrade to T-25 will be required as part of the EA. Additionally, T-25 parallels DOE's Haul Road, but the Haul Road is only open to approved shipments and is not available for this project. In addition to having two roads next to each other, there is an existing power line between them and this PGTB will add a second line plus the road(s) used to install and maintain this line. These additions increase the cumulative effects of roads, and fragmentation in general. The impacts of linear features on terrestrial ecosystems, such as the sagebrush steppe on the INL Site, include direct habitat loss; facilitated invasion of weeds, pests, and pathogens, many of which are exotic (alien); and a variety of edge effects. Roads themselves essentially preempt wildlife habitat. Construction or improvement of linear features also kills animals and plants directly and may limit long-term site productivity by exposing low nutrient subsoils, reducing soil water holding capacity, and compacting surface materials (Noss 1996).

Construction projects that are primarily linear, especially power lines and roads, can have far reaching impact on species that are affected by fragmentation. Roads can significantly affect abiotic processes in ecosystems. Roads can cause changes to soil structure, aridity, erosion, and hydrology. Road construction often results in an increase in surface water flows that can lead to erosion of soil surfaces (Harr et al. 1975, Jones et al. 2000, Jones and Grant 1996). Power line projects present modifications to natural habitat that can affect ecological communities and wildlife species in a variety of ways. In addition to ground disturbing effects associated with general linear projects (such as roads or pipelines), the most obvious modifications associated with power lines are structural changes to the environment through the erection of vertical structures and associated hardware and conductors in habitats (such as sagebrush steppe and grasslands) with little or no natural vertical structure (Knight and Kawashima 1993).

Some wildlife species populations may be opportunistically benefitted by the addition of novel anthropogenic vertical structures while other species populations may be adversely affected. Benefits may include increased nesting, roosting, perching and hunting opportunities in areas naturally devoid of tall vegetation or nesting substrates, common in both construction areas and road sides. However, habitat "enhancements" for hunting avian species may increase predation pressure on terrestrial prey species populations, such as small mammals, reptiles, shrub-obligate passerines and upland game birds. Avian use of power line corridors associated benefits are well-studied (APLIC 2006). Birds are often used as indicators of ecological health due to the prominence of population records. Many studies have linked declines in bird populations to habitat fragmentation caused by roads (Keyser et al 1997, Jones et al. 2000, Boren et al 1999).

In addition, power lines may present a number of direct and indirect impacts to wildlife species (Bevanger 1994). Many avian species run the risk of collision with structures, guy wires or conductors if avian-safe methods are not employed (APLIC 2006; Janss 2000; Savereno et al 1996). Guy wires may present a source of direct impacts for birds flying close to the ground such as nesting passerines and upland game birds. At certain voltages (generally less than 69 kilovolts), energized power lines can present a significant electrocution risk to avian species populations (APLIC 2006; Janss, G.F.E. and M. Ferrer. 2001; Sergio et al 2005). Powerlines can present aerial partitions of habitat for avian species resulting in altered movements, isolation

from resources and increased fragmentation (APLIC 2006). Changes to the visual character of environments and other attributes of power lines may result in habitat avoidance by some open country avian species (Kohl et al 2019).

Similar to the effects of power lines, Trombulak and Frisell (2000) identified seven general effects of roads. Some of these include modified animal behavior, such as altered reproductive rates and displacement, changes in physical geography, such as changes in surface runoff, erosion and sedimentation which effect aquatic and terrestrial animals, changes in populations due to direct kills, the spread of exotic species and increases in human ecological impacts. Some species thrive in disturbed areas, although these species are most often weedy and/or nonnative. These species can invade the surrounding areas over time if they are not managed.

Effects of roads can be immediate and localized or long-term and geographically widespread. Noise from vehicles has been shown to disturb wildlife, leading to relocation of wildlife populations (U.S. EPA 1971). While elk and deer can adapt fairly well to busy highways, roads with continuous, slow moving traffic caused displacement and changes in range use (Burbridge and Neff 1976, Gruell et al. 1976, Edge and Marcum 1991). While larger animals tend to be displaced by roads, smaller animals tend to suffer different effects. Because smaller animals are less noticeable and slower-moving, direct kills from motorized vehicles are extremely common. In addition, even small roads block movement of small animals and populations are more easily cut off from each other (herpetofauna- DeMaynadier and Hunter 2000, DeMaynadier and Hunter 1995; small rodents- Oxley, et al. 1974, Wilkins 1982). Roads spread noxious weeds, which displace native forage. Construction practices consume land so there is less range for animals to use and also fragment habitat by breaking it up into smaller and smaller units of secure habitat (Thomson et al 2005). Changes in soil compaction, composition and soil flora and fauna have been shown to contribute to the alteration of plant communities alongside roads (Angold 1997, Sharifi et al. 1999, Adams et al. 1982).

2.4 Survey Methods

Survey methods cover both vegetation and wildlife. The sensitive species and wildlife surveys were more opportunistic while the plant community data was done by systematically selecting plot locations across the entire project area.

Surveys were focused to the areas of expected disturbance with some additional buffer. We generally surveyed each area for signs of wildlife, invasive species, and sensitive plants. Areas with appropriate potential habitat were searched with greater detail. The plant community surveys occurred systematically every 100 meters in areas in and adjacent to the new line and test pads. A total of 159 points were surveyed for vegetation classification. All vegetation plot locations are shown on Figure 3. However, for the purposes of analysis, only 137 vegetation points were used as the remainder were part of a section of line that was changed (November resurvey). In addition to the vegetation classification locations, there were ten points mapped for noxious weed species, 33 points for a breeding bird survey, and 102 points marked for various wildlife locations.

We also conducted an analysis of all available ecological data from previous, unrelated projects for the general area all the way from MFC to CFA. These analyses were guided by

reviewing aerial photos, topographic maps and previously collected data to determine areas that might contain habitat for sensitive species and/or wildlife.

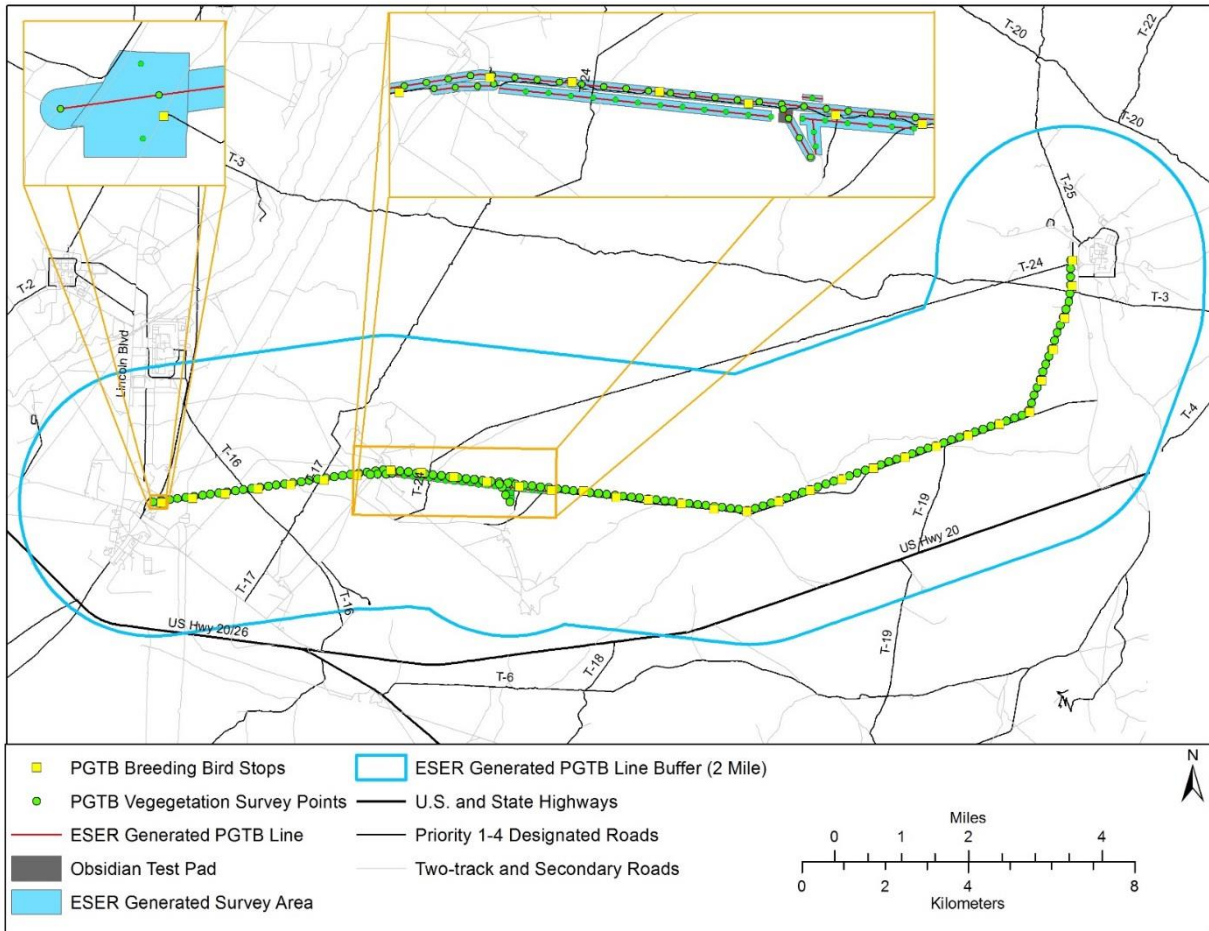


Figure 3. Survey locations for the PGTB, including proposed line, line buffer, substation expansions, and test pad. Vegetation class sample points and project-specific breeding bird survey stops are included on this map.

3. AFFECTED ENVIRONMENT

3.1 Plant Communities

Approximately 50% of the plant communities along the PGTB have been burned in four wildland fires that occurred between 1995 and 2010 and some locations have burned multiple times. Plant community composition in the burned portion of the project area reflects wildland fire activity, where recovering plant communities are generally dominated by green rabbitbrush (*Chrysothamnus viscidiflorus*) and perennial grasses and forbs. The remaining 50% of the PGTB is in sagebrush-dominated plant communities. Both burned and unburned plant communities do reflect some prior soil disturbance associated with a buried cable and adjacent roads.

Resprouting shrubs, primarily green rabbitbrush, are abundant in the plant communities recovering from wildland fire. In some locations where soils are relatively deep and fine, extensive stands of dense, short-statured green rabbitbrush shrubs have developed. Both native herbaceous species and non-native weeds are sparse throughout these stands. Other burned areas have a greater abundance of native grasses and forbs; squirreltail (*Elymus elemoides*) and Sandberg's bluegrass (*Poa secunda*) are generally the most abundant grasses across the project area. Taller-statured grasses like basin wildrye (*Leymus cinereus*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Indian ricegrass (*Achnatherum hymenoides*) may be locally abundant as well. Most post-fire plant communities lack sagebrush. They are generally in fair ecological condition; though they often have an abundant and diverse herbaceous stratum, non-native annuals like cheatgrass (*Bromus tectorum*) and Russian thistle (*Salsola kali*) can range from abundant to dominant in localized patches and often occupy shallow rocky soils on basalt outcroppings. These areas represent a moderately degraded ecological condition.

Sagebrush communities within the project area are characterized by a shrub overstory with an understory of grasses and forbs. The shrub overstory is generally a mix of big sagebrush (*Artemisia tridentata*) and green rabbitbrush. The understory may be dominated by native perennial grasses, introduced annual grasses and forbs, or some combination of the two. The most abundant understory grasses and forbs in sagebrush communities are the same as those listed above in the communities recovering from wildland fire. Within the PGTB, the ecological condition of sagebrush communities ranges from good to moderately degraded.

The most recent vegetation classification for the INL Site was completed in 2008 (Shive et al. 2011). Multivariate classification models were used to identify and define plant communities in accordance with the Federal Geographic Data Committee (FGDC) National Vegetation Classification Standard (NVCS; FGDC 2008). A total of 26 plant communities were identified across the INL Site and a dichotomous key to those communities was developed to facilitate plant community characterization for future assessments, like this one. The dichotomous key was used to sample plant communities throughout the project area in July of 2018. In October, approximately 4 km of the proposed line were moved, so those sections were resurveyed in November of 2018. Sample locations are shown in Figure 3.

A total of twelve plant communities were identified on the proposed PGTB in 2016 (Table 1). Those plant communities have been described in Shive et al. 2011 and descriptions are included in Appendix A.

Table 1. Vegetation classes documented on the proposed project area. Class numbers reflect multivariate classifications (see Shive et al. 2011). Class names are consistent with NVCS nomenclature (FGDC 2008) and the species composition criteria defining each class are consistent with those provided in the NVC (NatureServe 2010), though INL Site classes don't always crosswalk directly with NVC classes.

Class #	Scientific Class Name	Colloquial Class Name
2	<i>Artemisia tridentata</i> Shrubland	Big Sagebrush Shrubland
4a	<i>Chrysothamnus viscidiflorus</i> Shrubland	Green Rabbitbrush Shrubland
4b	<i>Chrysothamnus viscidiflorus/Pseudoroegneria spicata</i> Shrub Herbaceous Vegetation	Green Rabbitbrush/Bluebunch Wheatgrass Shrub Herbaceous Vegetation
6	<i>Artemisia tridentata</i> ssp. <i>tridentata</i> Shrubland	Basin Big Sagebrush Shrubland
7	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> Shrubland	Wyoming Big Sagebrush Shrubland
8	<i>Chrysothamnus viscidiflorus/Alyssum desertorum</i> Herbaceous Vegetation	Green Rabbitbrush/Desert Alyssum Shrub Herbaceous Vegetation
10	<i>Agropyron cristatum (Agropyron desertorum)</i> Semi-natural Herbaceous Vegetation	Crested Wheatgrass Semi-natural Herbaceous Vegetation
11ab	<i>Pseudoroegneria spicata – Poa secunda</i> Herbaceous Vegetation	Bluebunch Wheatgrass - Sandberg Bluegrass
13	<i>Bromus tectorum</i> Semi-natural Herbaceous Vegetation	Cheatgrass Semi-natural Herbaceous Vegetation
14	<i>Leymus cinereus</i> Herbaceous Vegetation	Great Basin Wildrye Herbaceous Vegetation
16a	<i>Poa secunda</i> Herbaceous Vegetation	Sandberg Bluegrass Herbaceous Vegetation
17a	<i>Sisymbrium altissimum – Bromus tectorum</i> Semi-natural Herbaceous Vegetation	Tall Tumblemustard - Cheatgrass Semi-natural Herbaceous Vegetation

The most frequently occurring plant community across the proposed project location was keyed to a big sagebrush vegetation class (Table 2). All three big sagebrush classes accounted for about 47% of the 137 locations sampled. Plant communities dominated by herbaceous species represented about 34% of sample locations, and the majority of those plant communities keyed to non-native vegetation classes that were dominated by either crested wheatgrass (*Agropyron cristatum*) or cheatgrass. About 19% of sampled locations occurred in vegetation classes characterized by green rabbitbrush dominance. Of the sample locations keyed to a green rabbitbrush class, the majority had native understories. Figure 4 shows the distribution of vegetation classes throughout the PGTB.

Table 2. Vegetation class distribution across the PGTB. Class numbers reflect multivariate classifications (see Shive et al. 2011). Class names are consistent with NVCS nomenclature (FGDC 2008). Frequency is the percentage of the sample plots of each vegetation class within the project area.

Class #	Class Colloquial Name	Frequency (%)
2	Big Sagebrush Shrubland	55
10	Crested Wheatgrass Semi-natural Herbaceous Vegetation	29
4a	Green Rabbitbrush Shrubland	15
13	Cheatgrass Semi-natural Herbaceous Vegetation	12
7	Wyoming Big Sagebrush Shrubland	7
8	Green Rabbitbrush/Desert Alyssum Shrub Herbaceous Vegetation	7
4b	Green Rabbitbrush/Bluebunch Wheatgrass Shrub Herbaceous Vegetation	4
6	Basin Big Sagebrush Shrubland	3
17a	Tall Tumblemustard - Cheatgrass Semi-natural Herbaceous Vegetation	2
14	Great Basin Wildrye Herbaceous Vegetation	1
11ab	Bluebunch Wheatgrass - Sandberg Bluegrass	1
16a	Sandberg Bluegrass Herbaceous Vegetation	1

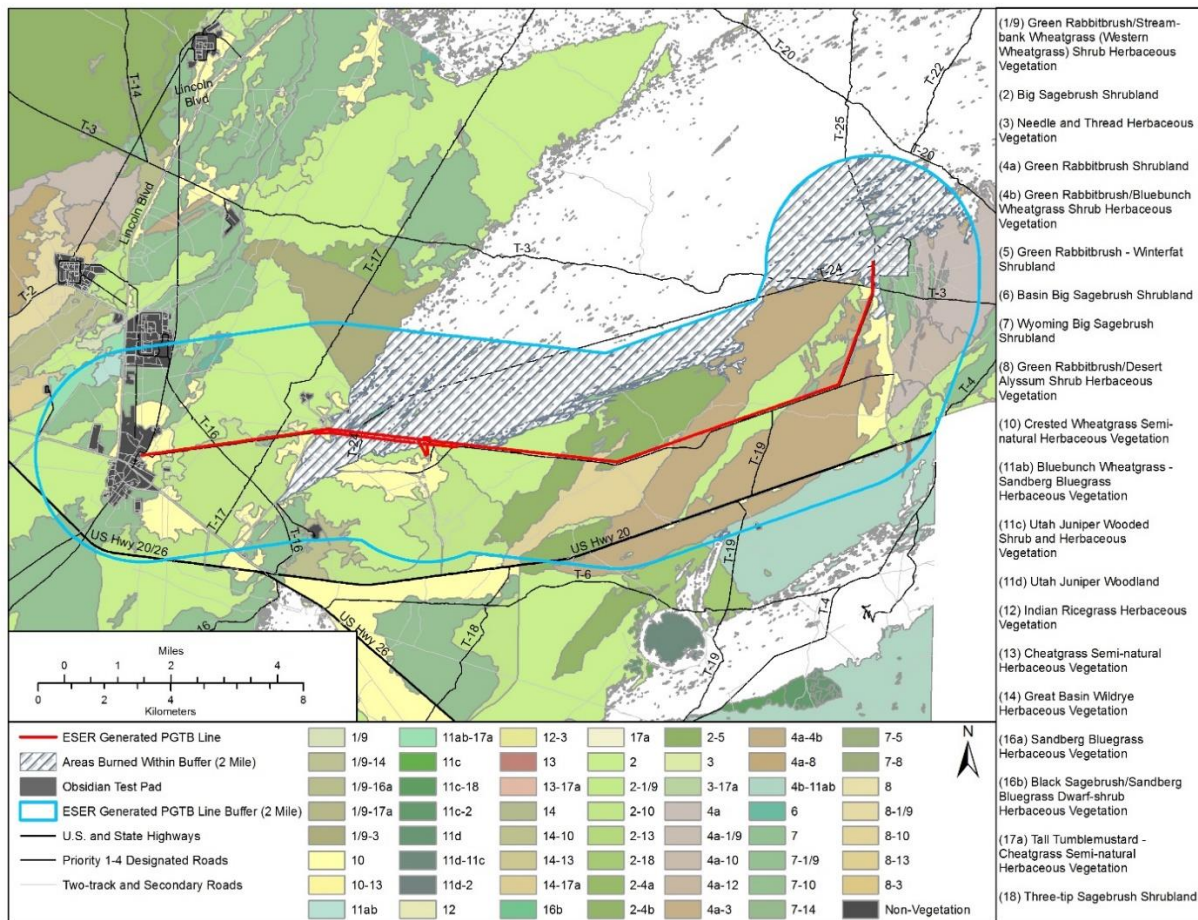


Figure 4. INL Site vegetation class distribution (from Shive et al. 2011) across the PGTB.

3.2 Conservation Status

Most vegetation classes represented in the NVC have been assigned global conservation status rankings, or “G” ranks. These rankings are used to describe the conservation status, including rarity and risk of loss, for each vegetation class listed in the NVC. The “G” designation for each class is ranked on a 1 to 5 scale denoting its current status (Table 3), ranging from secure to critically imperiled.

Table 3. Standardized conservation status ranks summarized from NatureServe (2016).

Rank	Definition
G1	Critically Imperiled
G2	Imperiled
G3	Vulnerable
G4	Apparently Secure
G5	Secure
GNR	Not Yet Ranked

The INL Site vegetation classes do not always crosswalk directly to NVC classes in a one-to-one relationship so, the conservation status of the NVC classes cannot be directly applied to the INL Site vegetation classes. In most cases, more than one NVC Association-level class can be crosswalked to an INL Site vegetation class. Therefore, the combined conservation status ranks of crosswalked NVC classes should be interpreted as the best indication of the conservation status of an INL Site vegetation class. The INL Site vegetation classes documented on the proposed project site and their crosswalked NVC Association-level classes can be found in Table 4.

Table 4. Cross walk of vegetation classes on the PGTB with NVC Association-level classes and their Conservation Status Ranks. Class numbers reflect multivariate classifications (see Shive et al. 2011). Class names are consistent with NVCS nomenclature (FGDC 2008).

Class #	Colloquial Class Name	Related NVC Associations	Database Code	Conservation Rank
2	Big Sagebrush Shrubland	Basin Big Sagebrush Shrubland	CEGL000991	G5
		Basin Big Sagebrush / Indian Ricegrass Shrubland	CEGL001006	G4
		Basin Big Sagebrush / Green Rabbitbrush / Sandberg Bluegrass Shrubland	CEGL000999	G5
		Basin Big Sagebrush / Squirreltail Shrubland	CEGL001001	G5
4a	Green Rabbitbrush Shrubland	Yellow Rabbitbrush / Needle-and-Thread Shrubland	CEGL002799	GNR
		Yellow Rabbitbrush Talus Shrubland	CEGL002347	GNR
4b	Green Rabbitbrush/Bluebunch Wheatgrass Shrub Herbaceous Vegetation	Bluebunch Wheatgrass - Western Wheatgrass Herbaceous Vegetation	CEGL001675	G4
		Bluebunch Wheatgrass Herbaceous Vegetation	CEGL001660	G2
		Basin Big Sagebrush - Spiny Hopsage Shrubland	CEGL001004	G5
6	Basin Big Sagebrush Shrubland	Basin Big Sagebrush - Spiny Hopsage Shrubland	CEGL001004	G5
		Basin Big Sagebrush / Needle-and-Thread Shrubland	CEGL001004	G5

Class #	Colloquial Class Name	Related NVC Associations	Database Code	Conservation Rank
		Basin Big Sagebrush / Great Basin Wildrye Shrubland	CEGL001016	G2
		Basin Big Sagebrush / Western Wheatgrass - (Streambank Wheatgrass) Shrubland	CEGL001017	G3
7	Wyoming Big Sagebrush Shrubland	Wyoming Big Sagebrush / Indian Ricegrass Shrubland	CEGL001046	G5
		Wyoming Big Sagebrush / Squirreltail Shrubland	CEGL001043	G4
		Wyoming Big Sagebrush / Needle-and-Thread Shrubland	CEGL001051	G2
		Wyoming Big Sagebrush / Sandberg Bluegrass Shrubland	CEGL001049	G4
		Wyoming Big Sagebrush / Sparse Understory Shrubland	CEGL002768	GNR
		Wyoming Big Sagebrush / Mixed Grasses Shrub Herbaceous Vegetation	CEGL001534	G5
		Wyoming Big Sagebrush / Western Wheatgrass Shrub Herbaceous Vegetation	CEGL001047	G4
8	Green Rabbitbrush/Desert Alyssum Shrub Herbaceous Vegetation	Yellow Rabbitbrush / Needle-and-Thread Shrubland	CEGL002799	GNR
10	Crested Wheatgrass Semi-natural Herbaceous Vegetation	N/A	N/A	N/A
11ab	Bluebunch Wheatgrass - Sandberg Bluegrass	Bluebunch Wheatgrass - Sandberg Bluegrass Herbaceous Vegetation	CEGL001677	G4
		Bluebunch Wheatgrass Herbaceous Vegetation	CEGL001660	G2
13	Cheatgrass Semi-natural Herbaceous Vegetation	N/A	N/A	N/A
14	Great Basin Wildrye Herbaceous Vegetation	Great Basin Wildrye Herbaceous Vegetation	CEGL001479	G2
		Great Basin Wildrye - Western Wheatgrass Herbaceous Vegetation	CEGL001483	G3
16a	Sandberg Bluegrass Herbaceous Vegetation	Sandberg Bluegrass Herbaceous Vegetation	CEGL001657	G4
17a	Tall Tumblemustard - Cheatgrass Semi-natural Herbaceous Vegetation	N/A	N/A	N/A

Vulnerable and imperiled vegetation classes, or plant communities, are often associated with either unique soils and landforms, or are particularly sensitive to stressors that lead to degradation. Poorly-drained playas that historically supported basin wildrye stands occur throughout the proposed PGTB. These plant communities are of greater conservation concern, with rankings that range from vulnerable to imperiled, because they are limited in distribution and are often degraded due to shifts in hydrologic regime. Plant communities characterized by an abundance of bluebunch wheatgrass tend to occur in the southeastern extent of the PGTB.

Conservation rankings for bluebunch wheatgrass communities range from apparently secure to imperiled. Though these communities were once widespread, their distribution has become limited due to the sensitivity of bluebunch wheatgrass to overgrazing (see NVC for additional information).

3.3 Soils

The soils in the area of the PGTB are generally described as shallow to deep (<20" to >60"), moderately coarse-textured soils on basalt plains. Olson et al (1995) mapped the soils across the project area primarily as either Bereniceton-Acet (BAR) or Malm-Bondfarm-Matheson (MBM) associations. These complexes of soils include a number of soil mapping units (Figure 5). For the purposes of this EA, only the soils directly affected by the project footprint will be discussed here: Coffee-Nargon-Atom complex (2 to 12 percent slopes), Malm-Bondfarm-Matheson complex (2 to 8 percent slopes), Grassy Butte sand (2 to 20 percent slopes), Menan silt loam (0 to 2 percent slopes), and Typic Camborthids-Typic Calciorthids. Coffee-Nargon-Atom makes up the majority of the project footprint, at roughly 63%, while Malm-Bondfarm-Matheson is 21%, Grassy Butte sand is 9%, Menan silt loam is 6%, and Typic Camborthids-Typic Calciorthids is less than 2%.

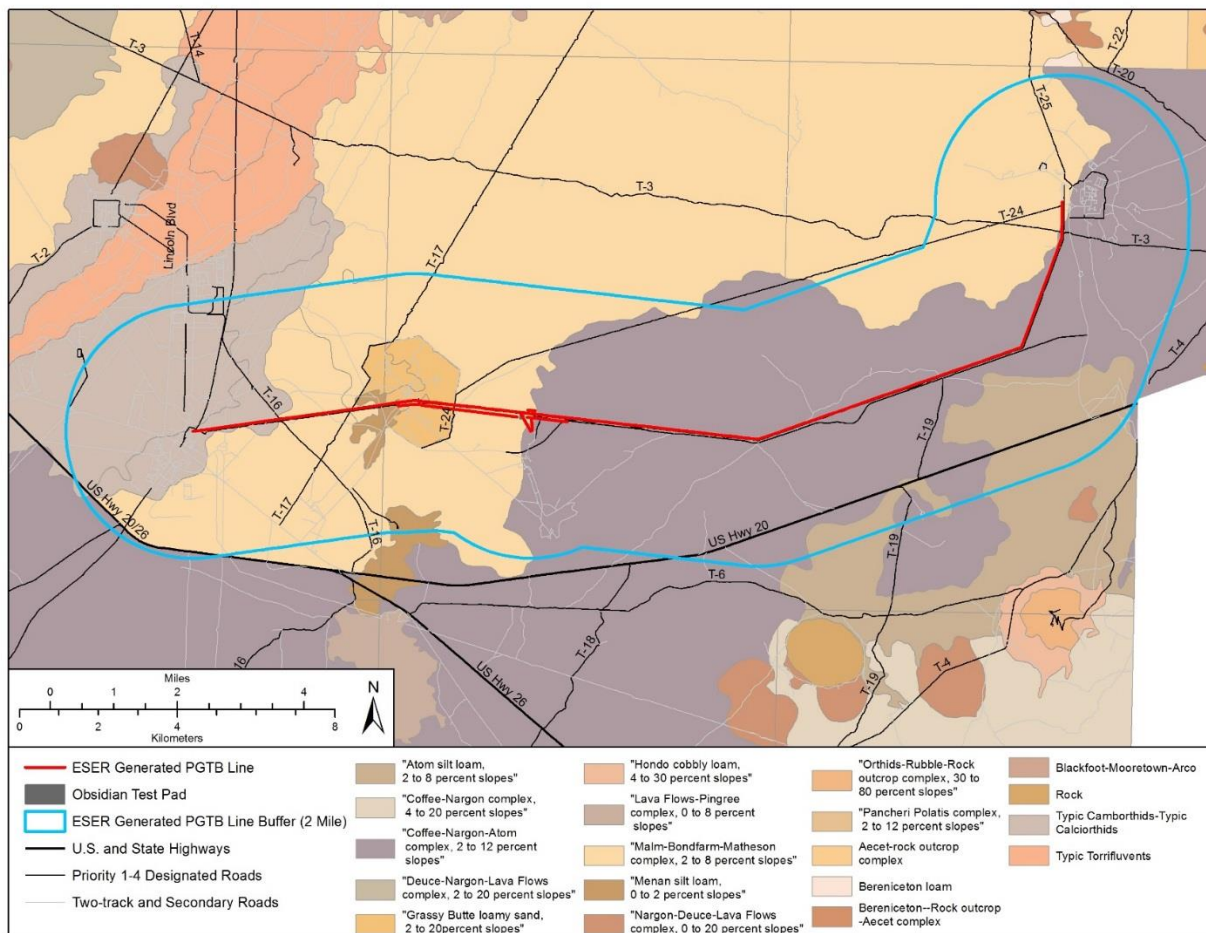


Figure 5. Map of soil classes associated with the PGTB.

The Coffee-Nargon-Atom complex, 2 to 12 percent slopes, is described as a moderate to very deep, typically well drained soil that formed in alluvium from loess that are deposited on basalt. The typical profile is a combination of silt or clay loam to bedrock. This soil is typically found at elevations between 4500 feet and 5500 feet and receive an average of 10 inches (25.4 cm) of precipitation over a year. These soils are moderately extensive throughout southeast Idaho and are dominated by sagebrush (Olsen, et al, 1995).

The Malm-Bondfarm-Matheson complex is typical for basalt plains with elevations ranging from 4700 to 5500 feet. They are moderately to well drained sandy loam over bedrock. This soil complex has a high hazard of soil blowing (wind erosion). The 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 Land Capability Class VIIe and have very severe limitations that make them unsuitable for cultivation due to erosion. This becomes an important consideration for restoration or long-term erosion control measures.

In reference to this project, Grassy Butte sand seems to be confined to the CITRC area. This soil is excessively well drained with a very high hazard of soil blowing and impaired trafficability. Reseeding this soil is extremely difficult.

The Menan silt loam is the soil typically seen in low-lying, flat, playa type areas at the INL Site. These areas are prone to minor seasonal flooding. They are fairly deep and are usually a combination of silt loam and silty clay loam that is fairly resistant to erosion.

The very minor Typic Camborthids-Typic Calciorthids are deep well-drained coarse loamy sands associated with the Big Lost River alluvial plains.

3.4 Invasive and Non-Native Species

A total of eleven Idaho Noxious Weeds have been identified on the INL 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 PGTB include cheatgrass, Russian thistle (*Salsola kali*), halogeton (*Halogeton glomeratus*), tumble mustard and crested wheatgrass.

Of the eleven noxious weeds found on the INL Site, only musk thistle (*Carduus nutans*) and Canada thistle (*Cirsium arvense*) were documented (10 times) in the PGTB (Figure 6). Musk thistle and Canada thistle are both very common noxious weeds on the INL Site. Canada thistle is extremely difficult to control in that it reproduces from both seed and rootstock (Sheley and Petroff 1999). Musk thistle is more readily controlled as it only reproduces from seed, but may require persistent management. However, in areas with abundant elk, musk thistle is rarely a long-term issue as elk eat the mature flowers before they go to seed and spread. Both species were primarily found interspersed along T-25 from MFC to the junction of T-25 and Haul Road, west of CITRC.

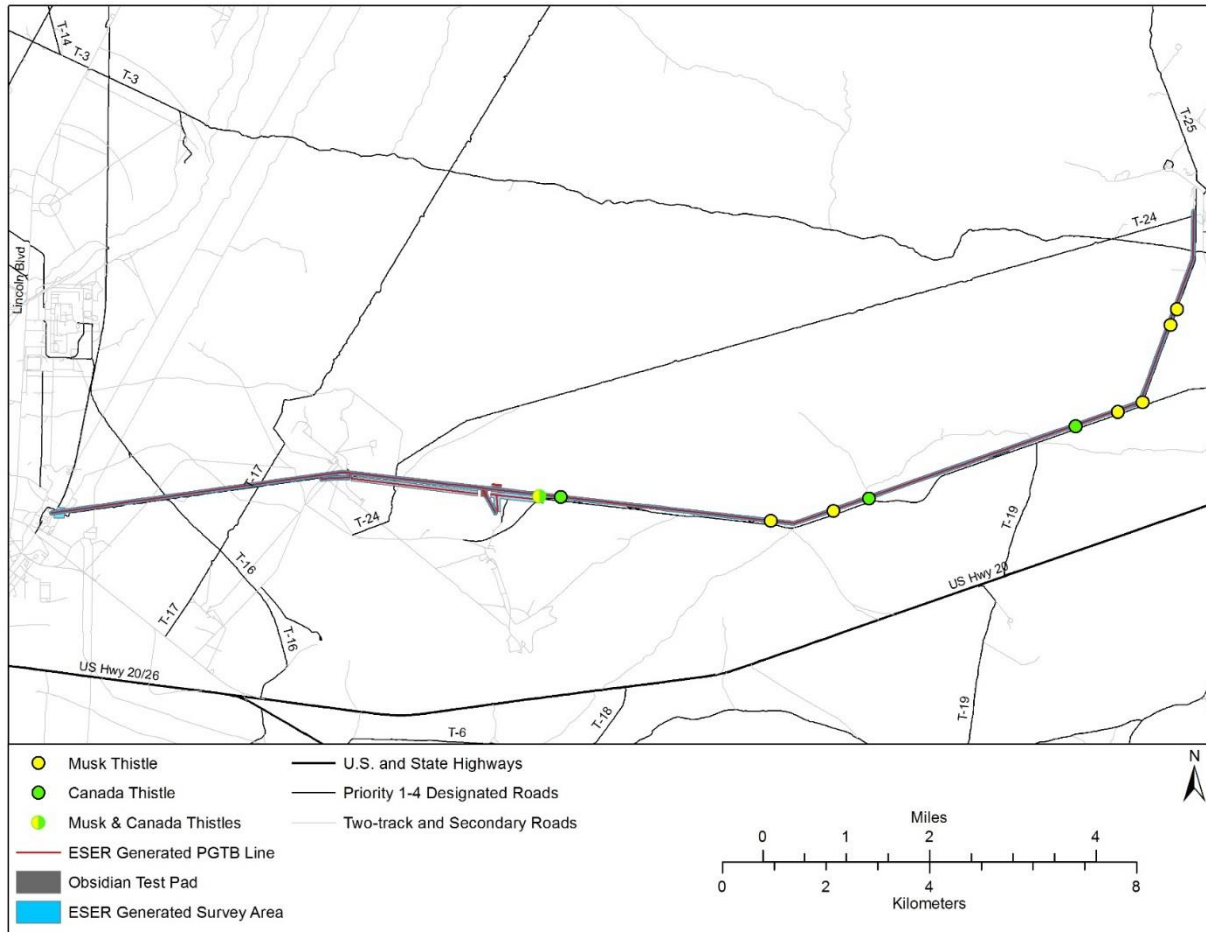


Figure 6. Noxious weed observations in the PGTB.

Non-native species also present a challenge in disturbed areas. They establish very quickly and successfully compete with the native species. Cheatgrass is present to dominant in most of the vegetation survey plots. Halogeton is present on many of the survey points, although never dominant. These non-native annual species are very quick to colonize any new disturbance and are very difficult to eradicate once they are present. Most non-native annuals produce large amounts of seed every year and the seeds remain viable for long periods of time.

3.5 Sensitive Plant Species

The most recent INL Site sensitive plant species report (Forman 2015) was used as a basis for determining which special status plant species have the potential to occur on the PGTB. A species was considered to be rare or sensitive if it had a global or state conservation status ranking of “3” or less. NatureServe maintains an extensive database of species-specific information and it assigns each species an applicable global or “G” rank, and state or “S” rank. The “G” and “S” designation for each species is ranked on a 1 to 5 scale denoting its current status (Table 5), ranging from secure to extinct. Occasionally a species will receive a range of ranks (e.g. G2G3).

Table 5. Standardized conservation status ranks summarized from NatureServe (2018).

Rank	Definition
X	Presumed Extinct – Species not located despite extensive searches.
H	Possibly Extinct – Known from only historical occurrences, but with the possibility of rediscovery.
1	Critically Imperiled – At very high risk of extinction due to extreme rarity and/or very steep population declines.
2	Imperiled – At high risk of extinction due to very restricted range, very few populations, or population declines.
3	Vulnerable – At moderate risk of extinction due to restricted range, relatively few populations, or recent and widespread population declines.
4	Apparently Secure – Uncommon but not rare; some cause for long-term concern due to population declines or other factors.
5	Secure – Common; widespread and abundant.
NA	Not Applicable – Generally refers to non-natives.
NR	Not Ranked – Generally occurs when not enough information is available.

Five species were identified as having the potential to occur in the survey area, based primarily on habitat requirements of the sensitive species and the availability of such habitat on and around the PGTB (Table 6). All five species have been previously documented to occur on the INL Site. One species, Middle Butte bladderpod, is narrowly endemic and the only documented occurrences of this species are on the INL Site. Because the known population of this species is so localized, it has not yet been ranked by NatureServe, but the small population size and narrow range would likely lead to a G1 ranking.

Table 6. Special status plant species with the potential for occurrence on the proposed project site. Information is summarized from Forman 2015 and NatureServe 2018. Species nomenclature follows the National PLANTS Database (USDA – NRCS 2015).

Scientific Name	Common Name	G Rank	S Rank	Habitat
<i>Astragalus gilviflorus</i>	plains milkvetch	G5	S2	Sagebrush communities on barren knolls and stony hilltops
<i>Cuscuta denticulata</i>	desert dodder	G4G5	S1	Grows on shrubs in dry sandy, gravelly, and rocky soils
<i>Eriogonum hookeri</i>	Hooker's buckwheat	G5	S1	Sandy soils in sagebrush and juniper communities
<i>Lesquerella obdeltata</i>	Middle Butte bladderpod	G1G3	SNR	Small playas with clayey soils.
<i>Phacelia inconspicua</i>	hidden phacelia	G2	S1	North-facing slopes with sagebrush in sandy soils

Surveys were completed for all five species in the PGTB in July of 2018. Several of the sensitive species with potential habitat on or around the project area are most accurately identified while in seed, making July an optimal phenological window for surveys. Approximately 4km of proposed power line were moved in October and it was too late in the season to resurvey for sensitive species in that part of the project area.

No sensitive plant species were observed during the surveys conducted in July. It should be noted, however, that all five species are either annuals or short-lived perennials and local population persistence is annually variable, populations may more detectable in some years than others, so survey results from 2018 may not reflect population distribution in other years. It is possible for

any of these species to occur anywhere in the PGTB, with appropriate habitat, during any given year.

3.6 Ethnobotany

Several species of ethnobotanical importance are known to occur on and around the PGTB. A list of species thought to be of historical importance to local tribes was compiled from *Plant Communities, Ethnoecology, and Flora of the Idaho National Engineering Laboratory* by Anderson et al. (1996). The list includes those species documented to have been used by “indigenous groups of the eastern Snake River Plain,” (Anderson et al. 1996). As plant community and sensitive plant surveys were completed, species from the list of ethnobotanical importance were noted throughout the project area (Table 7). Many of the species are abundant and widespread throughout the area and across much of the rest of the INL Site as well.

Table 7. Species of ethnobotanical significance occurring in or around the PGTB noted during vegetation surveys in August of 2019. Species nomenclature follows the National PLANTS Database (USDA – NRCS 2016). Species uses are from Anderson et al. 1996.

Scientific Name	Common Name	Uses
<i>Achnatherum hymenoides</i>	Indian ricegrass	food
<i>Allium textile</i>	textile onion	food, medicine, flavoring, dye
<i>Artemisia tridentate</i>	big sagebrush	food, medicine, cordage, clothing, shelter, fuel, dye
<i>Bromus techorum</i>	cheatgrass	food
<i>Carex douglasii</i>	Douglas' sedge	food, medicine
<i>Chaenactis douglasii</i>	Douglas' dustymaiden	food, medicine
<i>Chenopodium fremontii</i>	Fremont's goosefoot	food
<i>Chenopodium leptophyllum</i>	narrowleaf goosefoot	food
<i>Chrysothamnus viscidiflorus</i>	green rabbitbrush	medicine, gum
<i>Crepis acuminata</i>	tapertip hawksbeard	food
<i>Delphinium andersonii</i>	Anderson's larkspur	medicine, dye
<i>Descurainia pinnata</i>	western tansymustart	food, medicine
<i>Descurainia sophia</i>	herb sophia	food, medicine
<i>Ericameria nauseosus</i>	rubber rabbitbrush	medicine, gum
<i>Elymus elymoides</i>	bottlebrush squirreltail	food
<i>Elymus lanceolatus</i>	streambank wheatgrass	food
<i>Eriogonum ovalifolium</i>	cushion buckwheat	medicine
<i>Erigeron pumilus</i>	shaggy fleabane	medicine, arrow tip poison
<i>Gutierrezia sarothrae</i>	broom snakeweed	medicine
<i>Hesperostipa comate</i>	needle-and-threads	food
<i>Lappula occidentalis</i>	flatspine stickseed	food
<i>Lactuca serriola</i>	prickly lettuce	food, medicine
<i>Leyms cineris</i>	basin wildrye	food, manufacture
<i>Lomatium dissectum</i>	fernleaf biscuitroot	food, medicine
<i>Lomatium foeniculaceum</i>	desert biscuitroot	food, medicine
<i>Lygodesmia grandiflora</i>	largeflower skeletonplant	food, gum
<i>Mentzelia albicaulis</i>	whitestern blazingstar	food
<i>Oenothera caespitosa</i>	tufted evening-primrose	food, medicine
<i>Opuntia polyacantha</i>	pricklypear	food
<i>Phacelia hastate</i>	silverleaf phacelia	food
<i>Pleiocanthus spinosus</i>	Thorn skeletonweed	food, gum
<i>Poa secunda</i>	sandberg bluegrass	food, medicine
<i>Pteryxia terebinthina</i>	turpentine wavewing	food
<i>Rumex venosus</i>	veiny dock	food, medicine

Scientific Name	Common Name	Uses
<i>Salsola kali</i>	Russian thistle	food
<i>Sisymbrium altissimum</i>	tall tumbled mustard	food
<i>Sphaeralcea munroana</i>	white-stemmed globe-mallow	food, medicine, manufacture
<i>Taraxacum officinale</i>	common dandelion	food, medicine
<i>Tragopogon dubius</i>	yellow salsify	food, medicine

3.7 Wildlife Use

For more than 40 years, scientists on the INL Site have collected data on wildlife and conducted wildlife research. A total of 219 vertebrate species have been recorded on the INL Site (Reynolds et al. 1986). Many of these species are directly associated with sagebrush steppe habitat or are considered shrub-obligates. Various fires have transformed habitats from predominantly sagebrush to extensively grassland habitats with isolated and widely scattered sagebrush patches and individual plants. This habitat change has altered wildlife communities and wildlife use across roughly half of the project area. Where once sagebrush-associated species such as the pygmy rabbit (*Brachylagus idahoensis*), sage sparrow (*Artemisospiza nevadensis*), and Brewer’s sparrow (*Spizella breweri*) occurred, now species that thrive in grasslands such as elk (*Cervus elaphus*), mountain cottontail (*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 habitats outside burned areas and thus may occasionally occur in adjacent grasslands (Figure 7).

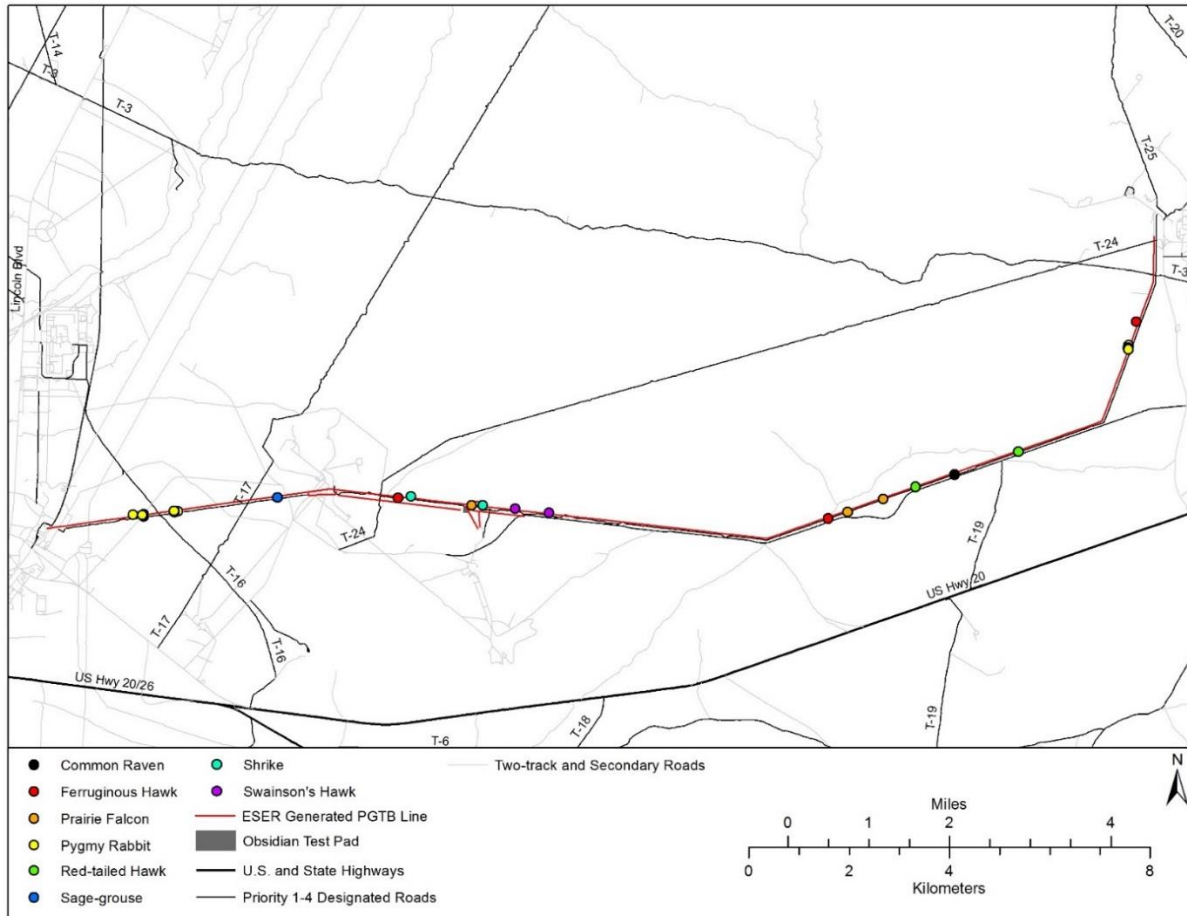


Figure 7. Observation locations of notable wildlife and/or sign during PGTB survey.

Wildlife communities that occur in the PGTB include habitat generalists and those species common to disturbed areas and habitats recovering from fire. Resident species include small and medium sized mammals [e.g. bushy-tailed woodrat (*Neotoma cinerea*), black-tail jackrabbit (*Lepus californicus*), mountain cottontail, badger (*Taxidea taxus*)], and reptiles [sagebrush lizard (*Sceloporus graciosus*), short-horned lizard (*Phrynosoma douglasii*), western rattlesnake (*Crotalus viridis*), and gopher snake (*Pituophis catenifer*)]. These species have small home ranges, limited mobility, or a social structure that restricts movement.

During this survey, the northern sagebrush lizard (*Sceloporus graciosus graciosus*) was the only reptile species observed, however it would not be uncommon to see rattlesnakes and gopher snakes in the area. Great Basin rattlesnakes are listed as protected non-game wildlife by the State of Idaho (Idaho CDC 2006). Great Basin rattlesnakes require winter habitats that allow them to go underground to depths below the frost line. On the INL Site these habitats are typically associated with volcanic features such as craters, cones, and lava tubes. Although no rattlesnakes were seen during the wildlife surveys, there is one known snake hibernacula (Rattlesnake Cave), which is the third largest western rattlesnake hibernacula on the INL Site, within the larger buffer area and portions of the PGTB are likely used for seasonal snake migration. No evidence of additional hibernation sites were identified during surveys. Two species considered uncommon

on the INL Site, leopard lizards (*Gambelia wislizenii*) and desert striped whipsnakes (*Masticophis taeniatus*) have only been found in this general area of the INL Site (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 (IDFG 2005).

In many desert ecosystems, small mammals create a prey base for larger predators. During surveys, several species of small mammals or their sign were observed along the project area. These include: black-tailed jackrabbit, mountain cottontail, Townsend’s ground squirrel (*Spermophilus townsendii*), bushy-tailed woodrat, 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 species 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*) and bobcats (*Lynx rufus*) using the area.

Pygmy rabbits, their burrow systems, and sign were located within the survey area (40 meters on either side of the proposed line). Pygmy rabbit burrow systems also provide habitat for burrowing owls, although no burrowing owls were seen during the survey.

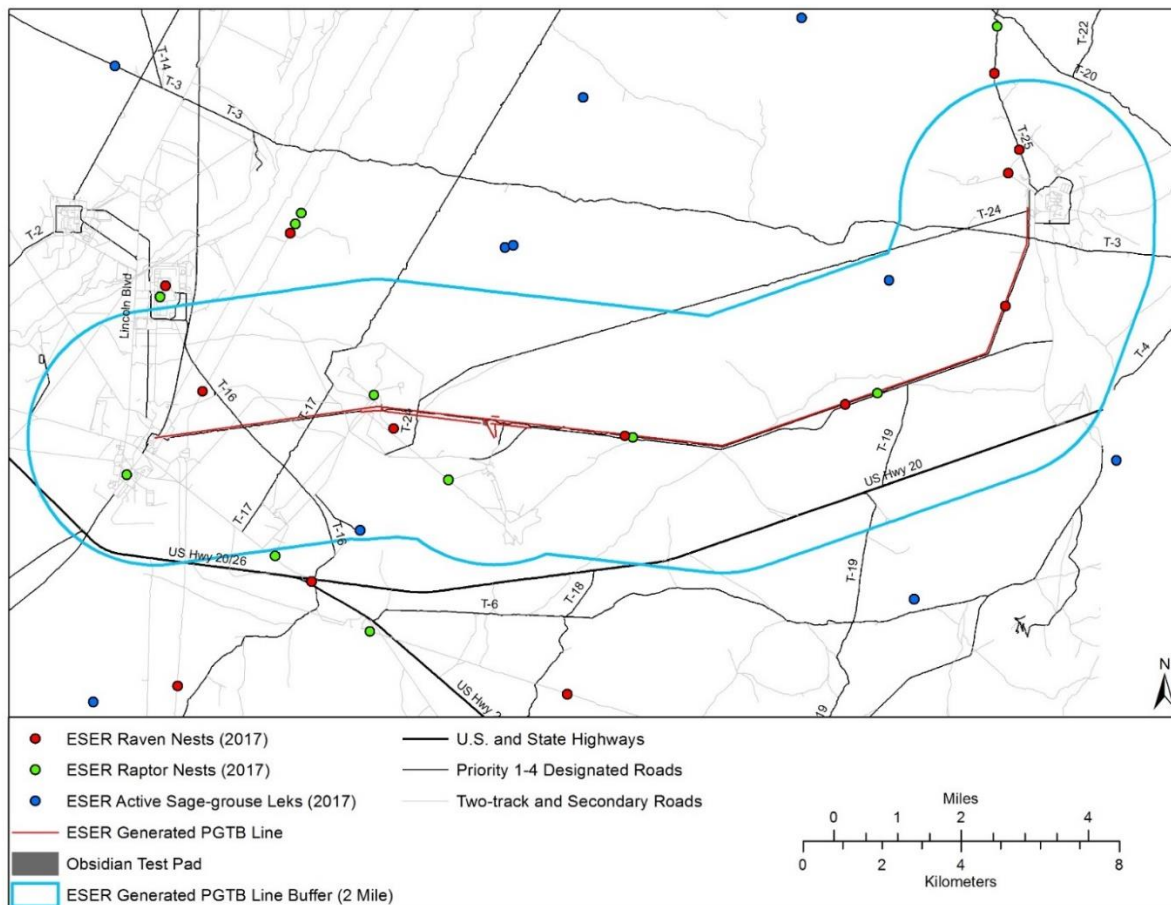


Figure 8. Compiled baseline raptor, raven, and sage-grouse data.

Species that use the area in a transitory manner are in search of prey or forage, areas to reproduce, shelter from the elements or are moving between seasonal use habitats. Bird species observed using the area include sage sparrow, Brewer's sparrow, horned lark, western meadowlark (*Sturnella neglecta*), sage thrasher (*Oreoscoptes montanus*), mourning dove (*Zenaida macroura*), loggerhead shrike (*Lanius ludovicianus*), common nighthawk (*Chordeiles minor*), red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk, Swainson's hawk (*Buteo swainsoni*), northern harrier (*Circus cyaneus*), prairie falcon, and common raven (*Corvus corax*). The majority of bird species on the INL Site are protected under the Migratory Bird Treaty Act. At least one raptor nest was observed during surveys, 3 raven nests, as well as numerous passerine nests located in sagebrush. Ferruginous hawks are particularly sensitive to disturbance; six individuals were documented during the breeding bird survey and several were documented again during the intensive wildlife survey. ESER keeps track of nesting raptors, ravens, and sage-grouse leks on the INL Site to support CCA monitoring tasks (Figure 8). Lek surveys conducted since 2014 indicate the presence of sage-grouse in the area (Figure 9).

Big game species utilize most of the INL Site, including the proposed PGTB area. Surveys indicate that both elk and pronghorn (*Antilocapra americana*) frequent the project area. Big game surveys conducted winter and summer until 2012 indicated that all big game species use the area throughout the year. Elk and pronghorn have benefited from fires due to the increased grass and herbaceous vegetation in grassland habitats. Research conducted on the INL Site (Comer 2000) found that elk used the general area for calving purposes. Also, pronghorn have been observed using the area for fawning. The INL Site 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 Site. Large herds numbering more than 130 individuals have been observed using the area during different times of the year.

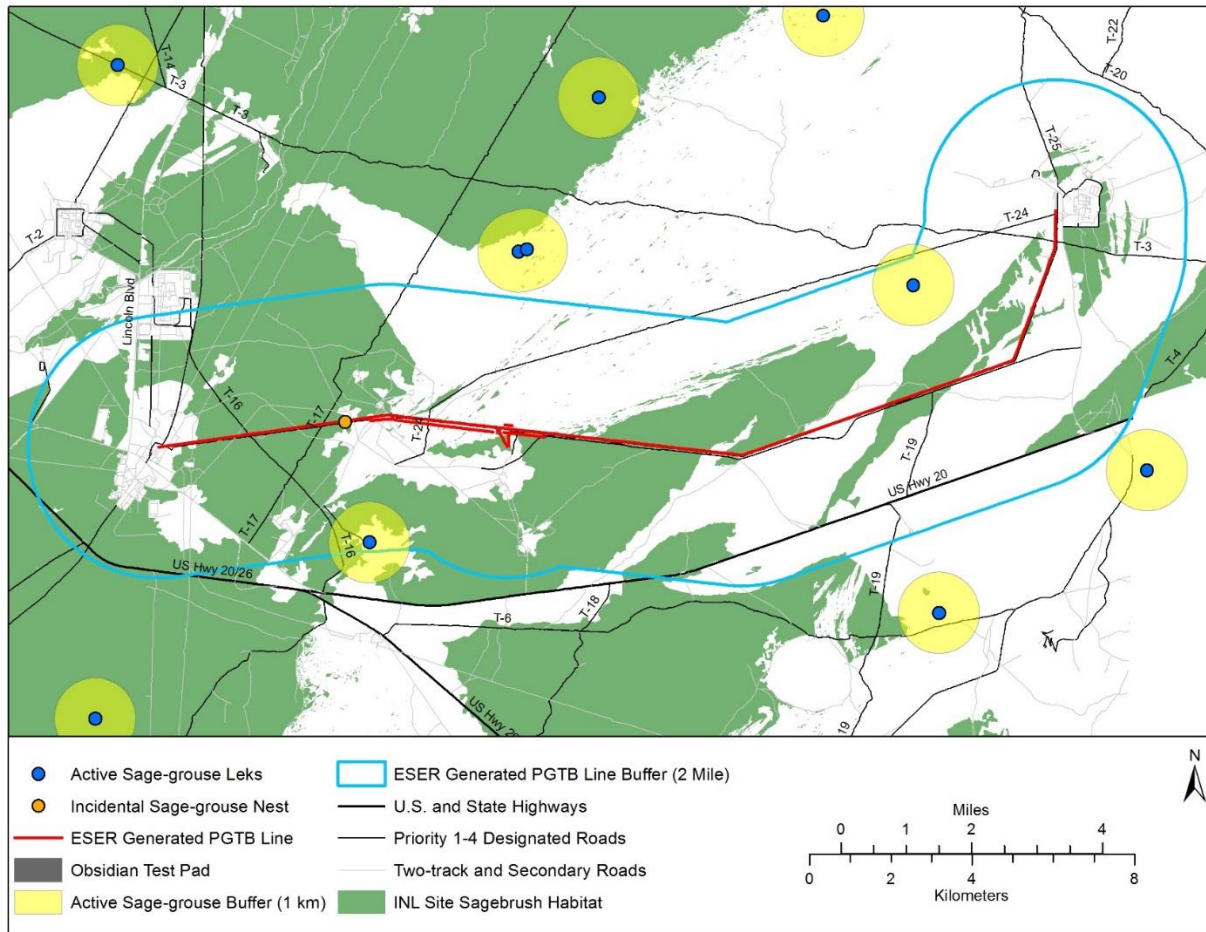


Figure 9. Sage-grouse leks with buffers and sagebrush habitat around proposed project location.

The U.S. Fish and Wildlife Service recently released a finding that sage-grouse warrant protection under the Endangered Species Act, but are precluded due to other listing priorities (DOI-FWS 2010). As a result, DOE developed cooperative agreements with state and federal resources agencies and prepared a Candidate Conservation Agreement (CCA). Breeding habitats, primarily leks, have become a focal point for managing this species. Lyon (2000) estimated the average nest distances to the nearest lek varies from 0.6-3.9 mi (1.0 to 6.3 km) but may be as great as 12.5 mi (20 km). The INL Site greater sage-grouse CCA committed DOE to protecting sagebrush habitat within 0.6 mi (1 km) of known leks (Figure 9) and established a sage-grouse conservation area (SGCA) outside the core development area of the INL Site to protect nesting, brood rearing, and wintering habitat (DOE and USFWS 2014). In addition to sage-grouse, there are several other species that are considered sensitive that are found on the INL Site. Those species are listed in Table 8.

Table 8. Sensitive wildlife species found on the INL Site.

Common Name	Scientific Name	SGCN Tier*	Global (G) Rank	State (S) Rank
Great Basin spadefoot toad	<i>Spea intermontana</i>	N/A	G5	S4
Western Rattlesnake**	<i>Crotalus oreganus</i>	N/A	G5	S4
Long-nosed leopard lizard**	<i>Crotaphytus wislizenii</i>	N/A	G5	S4
Greater sage-grouse**	<i>Centrocercus urophasianus</i>	1	G3G4	S3
Ferruginous hawk**	<i>Buteo regalis</i>	2	G4	S3B
Golden eagle**	<i>Aquila chrysaetos</i>	2	G5	S3
Long-billed curlew**	<i>Numenius americanus</i>	2	G5	S2B
Franklin's gull**	<i>Leucophaeus pipixcan</i>	3	G4G5	S3B
Burrowing owl**	<i>Athene cunicularia</i>	2	G4	S2B
Short-eared owl**	<i>Asio flammeus</i>	3	G5	S3
Common nighthawk**	<i>Chordeiles minor</i>	3	G5	S4B
Sage Thrasher**	<i>Oreoscoptes montanus</i>	2	G5	S3B
Sagebrush Sparrow**	<i>Artemisiospiza nevadensis</i>	2	G5	S3B
Grasshopper Sparrow**	<i>Ammodramus savannarum</i>	3	G5	S3B
Pygmy Rabbit**	<i>Brachylagus idahoensis</i>	2	G4	S3
Townsend's Big-eared Bat**	<i>Corynorhinus townsendii</i>	3	G3G4	S3
Silver-haired Bat**	<i>Lasionycteris noctivagans</i>	2	G4	S3
Hoary Bat**	<i>Lasiurus cinereus</i>	2	G4	S3
Western Small-footed Myotis**	<i>Myotis ciliolabrum</i>	3	G4G5	S3
Little Brown Myotis**	<i>Myotis lucifugus</i>	3	G3	S3

*SGCN Tiers

- Tier 1 Tier 1 SGCN are highest priority species for the State Wildlife Action Plan and represent species with the most critical conservation needs, i.e., an early-warning list of taxa that may be heading toward the need for ESA listing.
- Tier 2 Tier 2 SGCN are secondary in priority and represent species with high conservation needs—that is, species with longer-term vulnerabilities or patterns suggesting management intervention is needed but not necessarily facing imminent extinction or having the highest management profile.
- Tier 3 Tier 3 SGCN include a suite of species that do not meet the above tier criteria, yet still have conservation needs. In general, these species are relatively more common, but commonness is not the sole criterion and often these species have either declining trends range wide or are lacking in information.

**These wildlife species have either been detected in the Proposed Project study area or have the potential to occur in the Proposed Project development area as transients or residents.

The INL Site provides abundant high-quality hibernation, summer roosting and foraging habitat for eleven bat species. Some of the highest densities of some sensitive bat species [e.g. Townsend’s big-eared bat (*Corynorhinus townsendii*) and western small-footed myotis (*Myotis ciliolabrum*)] occur on the INL Site and surrounding Big Desert. The importance of the INL Site for regional bat populations has been recognized for decades; bat species at the INL Site have been studied since the early 1980s.

Bat acoustic surveys were not conducted specifically for this project but seasonal (April to November) bat monitoring stations have been located at MFC and CITRC since 2012. Each detector is mounted on an existing chain-link fence. Microphones are placed at an average (\pm SD) height of 3.1 m (\pm 0.07 m, range = 3.0 to 3.2 m) above the ground. There is an AnaBat unit at MFC between the facility and near the wastewater ponds bats can be detected transiting between ponds and potential roosting areas (trees and buildings at MFC). At CITRC, the AnaBat unit is on the existing chain-link fence near potential roosting areas (trees and buildings). The units are oriented to maximize detection near the area of interest at each site while trying to avoid recording near-surface noise and confounding echoes. Detectors are programmed to monitor from sunset to sunrise each evening.

A complete list of species observed during the PGTB surveys can be found in Appendix B.

3.8 Ecological Monitoring and the National Environmental Research Park

The INL Site is home to a wide array of ecological monitoring programs and projects. It 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 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 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 NERP provides 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 NERP are to develop methods for assessing the environmental impact of energy development activities, to develop methods for predicting and mitigating those impacts. The NERP achieves these objectives by facilitating use of this outdoor laboratory by university and government researchers. Several research and monitoring projects have study sites in the vicinity of the PGTB (Figure 10).

In addition to the NERP activities described above, additional DOE-sponsored ecological monitoring is conducted near the PGTB (Figure 10). Three Breeding Bird Survey routes on the INL Site are in the vicinity of the PGTB. Each route is contained the facilities that book end this project, MFC and CFA, as well as one in the middle at CITRC. There are also two remote routes within the buffer area, T-4 and T-17. These routes are surveyed during June each year. For the purposes of this EA, an additional BBS was added specifically to capture the species found along the PGTB and those results are in Table 9.

Table 9. Breeding bird survey results for the proposed location of the PGTB.

Survey Route: Raghorn Powerline		
Survey Date: June 29, 2018		
Species	Abundance	Percentage
Horned Lark	60	31.75
Sagebrush Sparrow	23	12.17
Sage Thrasher	23	12.17
Brewer's Sparrow	22	11.64
Red-tailed Hawk	14	7.41
Common Raven	13	6.88
Western Meadowlark	12	6.35
Ferruginous Hawk	6	3.17
Common Nighthawk	4	2.12
Loggerhead Shrike	4	2.12
Swainson's Hawk	4	2.12
Mourning Dove	2	1.06
Northern Harrier	1	0.53
Prairie Falcon	1	0.53
Total Individuals		
	189	
Total Species		
	14	

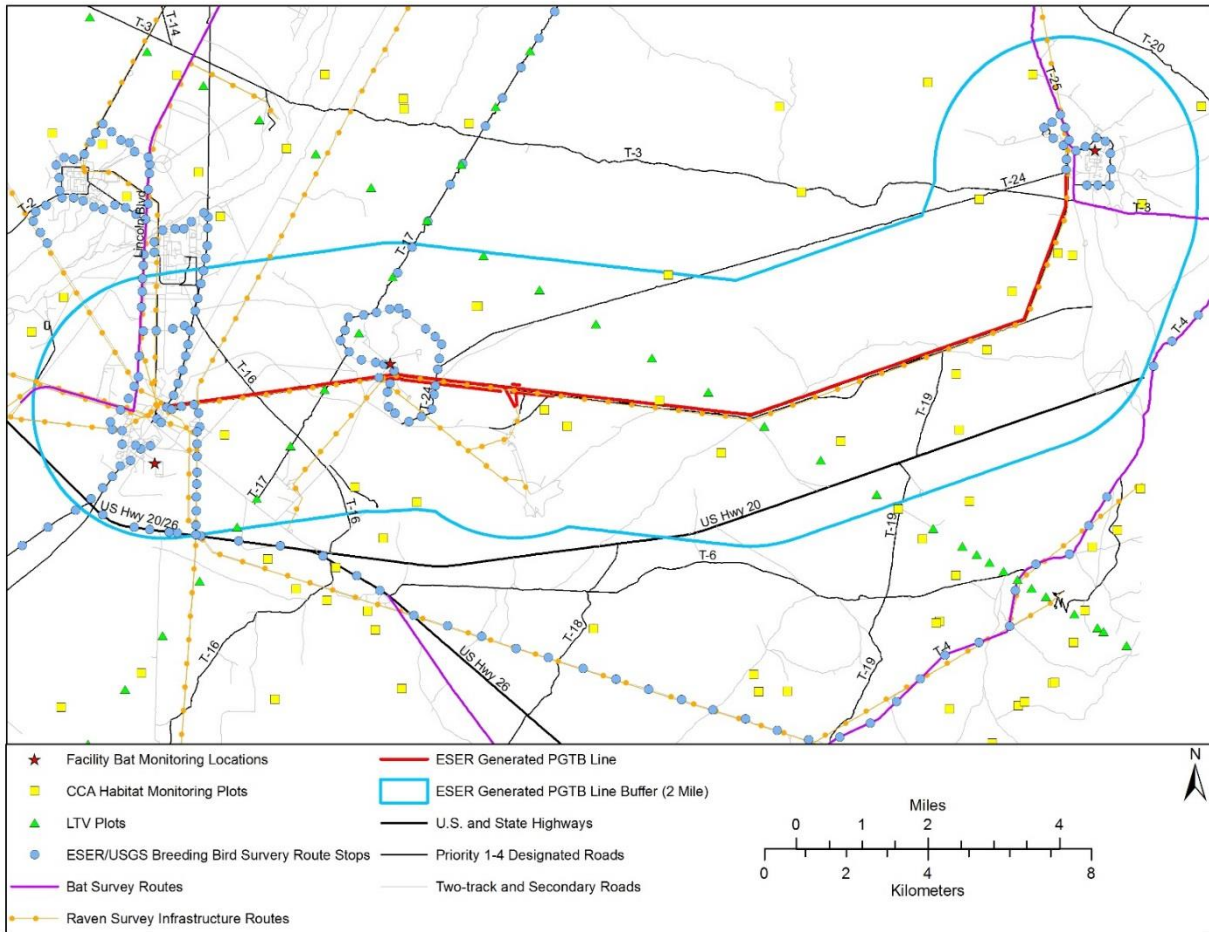


Figure 10. Ecological research, monitoring plots, and other study areas in the vicinity of the project area. Continued access to these locations is necessary to maintain ecological monitoring commitments to DOE.

Surveys for large mammals, primarily elk, pronghorn and mule deer are infrequent. In the most recent survey, 58 cow elk were radio-collared during the winters of 2010, 2011 and 2012 for real time movement information associated with resident populations (Long 2013). In addition, radio collar surveys of coyotes have been done on the INL Site in this area in the past, although not within 15 years.

Recently a number of emerging threats have dramatically affected bat populations nationwide. These threats include White-nose Syndrome which is a fatal disease of hibernating bats that has resulted in catastrophic losses of bat populations in the eastern United States and Canada and is spreading west. Declines have led to a number of petitions for listing of several bat species under the Endangered Species Act (ESA), including bats that occur on the INL Site. The disease has not been detected in Idaho yet, but was detected in Washington State in 2016 and in South Dakota and Wyoming in 2018. Because of population declines, potential for ESA listings, and resulting management direction from both DoD and DOE, the INL Site began a comprehensive monitoring and WNS surveillance program in 2012 and developed a Bat Protection Plan (INL 2018). The monitoring program is based on acoustic monitors that record the echolocation calls of active bats at all facilities and major caves; biennial winter counts of hibernating bats,

surveillance for signs of White-nose infection, and submission of bat carcasses found at facilities for radiological testing.

The Long-Term Vegetation Transects (LTV) were established in the 1950's 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. The plots were last surveyed in 2016. Both lines of the LTV cross the PGTB. Data from the LTV have been the basis for major milestones in understanding practical and theoretical ecology of sagebrush steppe. At the INL Site, the LTV continues to be used extensively to support National Environmental Policy Act (NEPA) processes, guide land management recommendations, develop site-specific revegetation guidelines, and for conservation management planning (Forman 2018).

As part of the Candidate Conservation Agreement (CCA) between the DOE and the F&WS, sagebrush habitat condition assessments are done to support a long-term monitoring plan to address conservation efforts for sage-grouse on the INL Site. Assessments require annual monitoring to collect necessary information from 225 permanent habitat sampling plots located throughout the INL Site. These plots provide data that allows biologist to characterize broad-scale trends in habitat condition as well as to identify annual changes in condition to recovering habitats from landscape scale disturbances. Plot data are evaluated, summarized, and reported each year to interpret annual sagebrush habitat condition based on site-specific local standards and to analyze trends in vegetation through time allowing for characterization of compositional changes of habitat quality. Accurately describing current habitat condition allows for meaningful interpretations of data and fills site-specific knowledge gaps from which to make adaptive management decisions (DOE-ID & USFWS 2014). There are a number of these plots located within the PGTB.

4. ENVIRONMENTAL CONSEQUENCES AND MITIGATIVE MEASURES

4.1 *Vegetation*

Soil disturbance will result in the direct loss of vegetation. Fragmentation of plant communities and reduction to the habitat value of those communities is also a direct environmental consequence of soil disturbance. Indirectly, soil disturbance increases the risk of invasion by non-native weeds and may act as a vector for introducing those weeds into adjacent undisturbed plant communities. Regular traffic and mowing, even in areas not proposed for blading, may also lead to the eventual loss of native plant communities and/or invasion of weedy non-natives.

The most at-risk soils in the PGTB are the low-lying playas where Great Basin wildrye can be found. These soils are usually very fine and are highly susceptible to wind erosion and invasion from non-native species, which is what was documented during the ecological surveys of the area. The direct loss of these plant communities can be mitigated to the extent possible by reducing soil disturbance as much as feasible while still accomplishing project missions. Restricting unnecessary off-road traffic and repetitive mowing will also reduce the direct loss and indirect increase in invasion by weedy annuals on and around the project site. Revegetation of areas that have been disturbed once, but where ongoing disturbance is not critical (ex., leach field) to project missions, will reduce impacts of soil disturbance and risk of invasion. Weed control is also recommended as a mitigate measure, especially on and adjacent to areas where soil disturbance and vegetation removal is recurring.

All methods of direct or indirect vegetation removal and disturbance, cause the reduction of habitat in the PGTB. This is a greater issue in good condition sagebrush habitat. In the CCA, a general “no net loss” of sagebrush goal has been implemented across the INL Site, not just inside the SGCA. The approximate area for potential impact is undetermined. To mitigate the loss of sagebrush, the PGTB would have to consider planting an equal amount of sagebrush seedlings in an area that would be beneficial habitat to sage-grouse in a different location. In addition, all roads and disturbance are vectors for the spread of undesirable species. Weed control will be necessary around both perimeter roads as well as any other disturbed areas.

4.2 *Sensitive Plant Species*

There were no sensitive plants observed along the PGTB corridor, though appropriate habitat for some sensitive plant species occurs in the area. Soil disturbance associated with line building and driving along the line during construction will disturb this habitat directly and will increase the risk of weed invasion in the project area. Weeds compete directly with native plants and lower the habitat value for potentially occurring sensitive species.

4.3 *Ethnobotany*

Most of the species of ethnobotanical importance documented along the PGTB are common across the INL Site. The impacts of the proposed activities would likely be greater on less common species than they would be on abundant species. Removing several individuals from large populations will not greatly affect the species persistence. It will, however, affect the potential use of an area for harvesting seeds or vegetative structures. Because the soil disturbance

and risk of non-native species invasion will impact populations of species of ethnobotanical concern, the most effective mitigative measure to protect those populations is to minimize the amount of soil disturbed. Potential impacts to populations of plant species of ethnobotanical concern may also be mitigated through revegetation of areas impacted by soil disturbance.

4.4 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 PGTB, direct soil disturbance is undetermined. However, assuming a maximum impact to the buffer suggested for placing poles, and assuming a new road for pole maintenance, it is possible that soil disturbance across the 16.5 miles of new line could be a substantial number of acres.

Soil disturbance should also be anticipated due to vehicle traffic to and on the PGTB. This is due to the limited trafficability attributed to most of the soils described above (Olson et al. 1995). Limiting the amount of traffic on the construction site and restricting traffic to the PGTB 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 areas.
- Limiting the amount of traffic allowed access to, and on, the project site.
- Limiting re-grading of soil to the areas that will be maintained as sterile or otherwise free of vegetation.

Limit travel areas that are secondary to the PGTB such as line maintenance work. Because of the high hazard for wind erosion in these soils, a plan should be developed and implemented to provide some sort of cover on all areas with disturbed soil. Fugitive dust and blowing sand can be expected otherwise and cause potential off-site impacts downwind of disturbed areas.

Much of the proposed route for the new road segments passes through highly erodible soils. It is likely that these portions of the project area will erode and down-cut under certain types of precipitation events such as that associated with significant thunderstorms and rain-on-snow events. It is advisable to expect instances of needed road repair such as gravel or grading.

4.5 Invasive and Non-Native Species

Soil disturbance is a primary contributor to the spread of invasive plants. Invasive and non-native plants are present on much of T-25, as well as around the edges of the existing pads and laydown areas, and could be spread by mowing, blading, and any other means used to remove the vegetation to support construction of the new facilities. Seed dispersal may be minimized in a number of ways. First seed dispersal may be minimized by disturbing as little area as possible along the road/powerline corridors and on the pads, whether that disturbance is mowing, blading, etc. Second, the timing is critical to seed dispersion. Most invasive and non-native species produce large numbers of seed. If the disturbance does not occur during peak seed dispersal, it

will help reduce the number of viable seeds on the ground. This will limit spread of weeds 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. Given the proposed schedule for activity to begin in summer, the probability for seed dispersal onto the PGTB is high, as is the likelihood of off-site transport of weed seeds.

A plan should be developed and implemented to prevent weed invasions on new disturbance areas. See PLN-611 (*Sitewide Noxious Weed Management*) and ICP/EXT-04-00654 (*Balance of INL Cleanup Integrated Weed Management Plan*) for guidance.

4.6 Wildlife Impacts and Mitigation

During establishment of the project facility, environmental analysis identified sources of potential direct and indirect impacts to wildlife including:

1. Permanent and temporary loss of habitat and associated wildlife species resulting from construction-related ground disturbance and vegetation clearing,
2. Displacement or nest abandonment of certain wildlife species resulting from operation-related activities at the cleared area (e.g. equipment, materials, and procedures testing and explosive detonations),
3. Fragmentation of remaining habitats resulting from project developments (i.e. line, test pads and access/construction roads), increased fire frequency, and weed invasion,
4. Increased disturbance and direct mortality risk to wildlife resulting from increased motor vehicle activity along the road between MFC and CFA,
5. And increased direct human disturbance to wildlife resulting from increased interactions between wildlife and project personnel.
6. All new powerline structures should be APLIC compliant to reduce the risk of raptor collision and electrocution.
7. To achieve compliance with the sage-grouse CCA, utility structures should be engineered to minimize the opportunity for perching and nesting by ravens or raptors.

With the incorporation of institutional controls and other best management practices, potential impacts to wildlife are minimized or avoided to the extent practical without jeopardizing mission effectiveness. Measures implemented as part of the PGTB can avoid and lessen the potential impacts on wildlife and include, but are not limited to, seasonal timing of construction to avoid critical times for wildlife and minimize wildland fire risk, reduced speed limits on access roads, wildlife exclusion fencing, managing potential wildlife attractants such as disturbed soils and trash, weed management planning, keeping work areas neat, warning signs (to alert personnel as to the presence of wildlife), reflectors, ultrasonic warning whistles on vehicles, and worker awareness programs. For wildlife, impacts would be considered significant if they resulted in loss of individuals of protected or sensitive species or loss of local populations of wildlife through high levels of direct mortality or diminished survivorship. However, no such impacts were identified.

Construction activities and increased permanent infrastructure (test pads and substation expansion) would result in increased ground disturbance and habitat loss within the analyzed boundaries of the line. New access roads for the line, the line itself, and improvements to T-25 would increase linear features, weed species penetration and fragmentation of wildlife habitat. However, the new line would be located within 80 feet of a long established 138 kV transmission line and close to the existing T-25 road; limiting the increased fragmentation as the line is already associated with an existing line and limited new access would be required for construction and maintenance. No significant impacts from the new powerline are expected. Consistent implementation of previously identified measures and controls should minimize and avoid potential impacts to wildlife species in the PGTB.

Greater sage-grouse – Although the recent burns resulted in a significant long-term impact on nesting habitat site wide, sage-grouse still occupy areas of dominant sagebrush in the PGTB. There are two leks within the PGTB buffer area and many more just outside the buffer. Sage-grouse utilize the area all throughout the central region of the INL Site and increased use of the area by the PGTB may disrupt breeding/brood rearing/foraging sage-grouse. Time-of-day and seasonal restrictions will need to continue to be implemented.

Ferruginous hawk – Ferruginous hawks are highly sensitive to human-induced disturbance during incubation (Bechard and Schmutz 1995) and nest abandonment from human disturbance has been documented in several areas (e.g., Fitzner et al 1977, Smith and Murphy 1973, Smith and Murphy 1978). In Idaho, White and Thurow (1985) found a significant difference in nest desertion between nests with created disturbance designed to simulate human activities and control, undisturbed nests. The Bureau of Land Management has documented nest abandonment after a single visit by researchers and consider nest abandonment a potentially "severe population limiting factor" (Snow 1974). Based on habitat requirements for this species, the presence of nests, and documentation during the BBS, the potential exists for them to occur in the PGTB area. Increased human activity in spring has the potential to displace nesting ferruginous hawks. These impacts can be minimized by temporal avoidance (controlling human activity and construction activities during the nesting period if ferruginous hawks are confirmed nesting). Surveys for nesting ferruginous hawks should be conducted late May to early June to determine nesting activity.

Elk and pronghorn – The PGTB is in an area used by ungulates (pronghorn, mule deer, and elk) and construction activities have the potential to impact these species due to habitat fragmentation, human disturbance, and construction noises/activities. The general elk hunt for unit 63 (which includes 0.8 km (0.5 mi) within the INL Site boundary) occurs from August 1 through December 31. A controlled hunt for pronghorn occurs from September 25 through October 24. The hunting season causes increased movement of game but is not likely to affect the PGTB construction activities. In the event of conflict, impacts can be minimized through close coordination with Idaho Department of Fish and Game.

General breeding seasons - The PGTB area provides important breeding habitat for many species during the spring. Avoiding these sensitive times is a means of minimizing potential impacts to breeding populations. The following are times when specific animals are breeding, nesting, or birthing.

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

The Migratory Bird Treaty Act protects migratory birds, their nests and eggs. If any activity having the potential to disturb nests, 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 or work limits placed if nests are discovered.

Fragmentation effects may be both direct and indirect. The physical presence of powerlines and roads and other disturbances in the landscape creates new habitat edges, alters hydrological dynamics, and disrupts other ecosystem processes and habitats. In addition, infrastructure and traffic impose dispersal barriers to most non-flying terrestrial animals. The various biotic and abiotic factors operate in a synergetic way across several scales, and cause an overall loss and isolation of wildlife habitat (Seiler 2001).

Although suitable habitat for sage-grouse occurs in the vicinity of the PGTB, minimal direct impacts to sage-grouse are anticipated due to the limited amount of disturbance planned in the areas with habitat and the distance from known leks to development areas. Construction of test pads and the new line would result in a loss of sagebrush habitat (DOE and USFWS 2014). Although the PGTB is outside of the SGCA; with the CCA, DOE committed to no net loss of sagebrush habitat and avoiding constructing new infrastructure unless there are no feasible alternatives for accomplishing its mission objectives. As stated in the CCA:

“New infrastructure development outside of a facility footprint will be designed, sited, and constructed to avoid or minimize adverse impacts to sage-grouse or its habitats.” BMPs that apply to the proposed line include (pp. 54-55):

- a. Avoid fragmenting contiguous tracts of sagebrush habitat...
- b. Where practical, co-locate new infrastructure with existing infrastructure...
- c. Areas dominated by non-native grasses and other exotic species are preferred sites...
- d. May consider putting anti-perch devices on the top of fence posts if that is going to provide a hunting perch for raptors and ravens.

4.7 Habitat Fragmentation

Habitat fragmentation leads to increasing edge effects, resulting in loss of species diversity, alterations in natural disturbance regimes, and alterations in ecosystem functioning (Caling and Adams 1999). Habitat fragments differ from original habitat in two important ways: 1) fragments have a greater amount of edge for the area of habitat, and 2) the center of each fragment is closer

to the edge (Primack 1998). Some of the more important edge effects include microclimate changes in light, temperature, wind, humidity, decreased soil moisture, and incidence of fire (Shelhas and Greenberg 1996; Laurance and Bierregaard 1997; Reed et al. 1996). Each of these edge effects can have a significant impact upon the vitality and composition of species in the fragment and increased wind, lower humidity, and higher temperatures make fires more likely (Primack 1998).

Fragmentation affects animal populations in a variety of additional ways, including decreased species diversity and lower densities of some species in the resulting smaller patches (Reed et al. 1996). Some species of animals refuse to cross barriers as wide as a road. For these species, a road or fire line (or fence) effectively cuts the population in half. A network of roads or fire lines fragments the population even further (Noss 1996). For example, fragmentation of sagebrush communities poses a threat to populations of pygmy rabbits (*Brachylagus idahoensis*) because dispersal potential is limited (Weiss and Verts 1984).

Linear features, such as roads, power lines, and fences, have the potential to fragment plant populations through the spread of invasive animals, insects and plants. Many of the weedy plants that dominate and disperse along roadsides are exotics. In some cases, these species, such as cheatgrass, spread from roadsides into adjacent native communities (Noss 1996). Exotic species disrupt natural ecosystem processes and the species that depend on them. Exotic plants have been shown to replace native under story vegetation, inhibit seed regeneration, and change soil nutrient cycling. Some weeds can cause higher erosion rates or change fire regimes.

Studies concerning roads and their influence on habitat fragmentation offer sufficient reason for adopting a precautionary stance toward road issues (Brittingham and Temple 1983). Roads precipitate fragmentation by dissecting previously large habitats into smaller ones. As the density of roads in landscapes increases, these effects increase as well. Even though roads occupy a small fraction of the landscape in terms of land area, their influence extends far beyond their immediate boundaries (Reed et al. 1996).

4.8 Ecological Monitoring and NERP Research Activities

There is the potential for impact to other research and monitoring activities in the vicinity of the PGTB. 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, Sage-Grouse Surveys, and other data collection activities related to NERP.

4.9 Cumulative Impacts

Historically, cumulative impacts have not been addressed in INL Site NEPA documents. However, NEPA indicates these impacts should be considered and there is extensive literature

discussing the potential short-term and long-term impacts of road building. In addition to the direct impacts from the road upgrades, the existence of a new line would likely increase the need for infrastructure and will encourage future development, thus creating additional cumulative impacts.

While NEPA does not explicitly mention indirect and cumulative impacts, NEPA makes it the responsibility of the Federal government to "include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on the environmental impact of the proposed action [and] adverse environmental effects which cannot be avoided should the proposal be implemented." [42 U.S.C. 4332(C)].

The Council of Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA [40 CFR 1500-1508] clarify the requirements by defining direct effects, indirect effects, and cumulative effects.

- **Direct Effects.** Those effects caused by the action and occurring at the same time and place. [40 CFR 1508.8].
- **Indirect Effects.** Those effects caused by the action and occurring later in time or farther removed in distance, but still reasonably foreseeable. Indirect effects may include effects related to induced changes in the pattern of land use and related effects on air and water and other natural systems, including ecosystems. [40 CFR 1508.8].
- **Cumulative Impacts.** Those impacts on the environment, which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. [40 CFR 1508.7].

It is reasonable to expect that the construction of an additional powerline along T-25 from CFA to MFC and the upgrade of T-25 proposed in this project will result in increased future activities along that road. These activities will continue to bring new disturbances along the road, strengthening the impacts of that road on habitat fragmentation and loss. It is also reasonable to expect more habitat loss and fragmentation by construction of new facilities along the route.

As stated previously, the resources to develop a quantitative assessment of cumulative impacts to ecological resources are not yet available at the INL Site. However, as new developments occur on the INL Site, as good condition sagebrush steppe habitat and populations of sagebrush obligate species continue to decline all across the West, and as the risk of being required to manage for those species continues to increase, it will become increasingly more important that cumulative impacts on the INL Site be quantified. Being able to quantify cumulative impacts and plan INL Site developments to minimize those impacts will reduce the likelihood of impacts to the INL Site mission due to requirements for conservation management of ecological resources.

4.10 Mitigation Strategy

Throughout this report, a number of mitigative actions have been suggested. The following list summarizes those suggested actions.

- Limit the size of areas where vegetation will be removed and soil disturbed.
- Limit increased risk of wildland fire.
- Provide ground cover on all areas soil has been disturbed.
- Restore and revegetate impacted areas.
- Implement a weed management plan.
- Re-align new road to limit soil erosion due to runoff.
- Set speed limits on access roads.
- Set time-of-day and seasonal restrictions as necessary.
- Annual surveys for nesting birds, especially ferruginous hawks and burrowing owls.
- APLIC compliant lines.
- Minimize raven roosting.

4.11 Effects on INL Site Natural Resource Management Objectives

To summarize the evaluation of consequences of the proposed activity on ecological resources, we have analyzed the impact of the action on each of the INL Site natural resource management objectives. To do this, we prepared a narrative synthesis of the data collected in the field surveys related to each of the resources as described above and of information regarding the status of those resources on the INL Site collected as part of other research or monitoring programs as they relate to the natural resource management objectives.

Under DOE Order 430.1B (Real Property Asset Management, February 2008), “Land-use plans should be tailored based on local site condition and must consider the National Environmental Policy Act, site planning and asset management, LTS plans, institutional control plans, stakeholder public participation, economic development under community reuse organizations, privatization of assets, environmental law, cultural asset management, historic preservation, and natural resource management.” "

Further, DOE along with thirteen other Federal agencies signed a Memorandum of Understanding (MOU) to Foster the Ecosystem Approach (December 15, 1995). As stated in the MOU, "An ecosystem is an interconnected community of living things, including humans, and the physical environment within they interact. The ecosystem approach is a method for sustaining or restoring ecological systems and their functions and values. It is goal driven, and it is based on a collaboratively developed vision of desired future conditions that integrates ecological, economic, and social factors. It is applied within a geographic framework defined primarily by ecological boundaries. The goal of the ecosystem approach is to restore and sustain the health, productivity, and biological diversity of ecosystems and the overall quality of life

through a natural resource management approach that is fully integrated with social and economic goals.

The Federal Government should provide leadership in and cooperate with activities that foster the ecosystem approach to natural resource management, protection, and assistance. Federal agencies should ensure that they utilize their authorities in a way that facilitates, and does not pose barriers to, the ecosystem approach. Consistent with their assigned missions, Federal agencies should administer their programs in a manner that is sensitive to the needs and rights of landowners, local communities, and the public, and should work with them to achieve common goals.

The INL Site represents one of the largest remnants of undeveloped, ungrazed sagebrush steppe ecosystem in the Intermountain West (INL 2016). This ecosystem has been listed as critically endangered with less than two percent remaining (Noss et al. 1995, Saab and Rich 1997). The INL Site is also home to the Idaho National Environmental Research Park (NERP). The NERP is an outdoor laboratory for evaluating the environmental consequences of energy use and development as well as strategies to mitigate these effects. A portion of the INL Site has been designated as the Sagebrush Steppe Ecosystem Reserve that has a mission of conducting research on and preserving sagebrush steppe. In addition, the DOE and the USFWS established a Candidate Conservation Agreement (CCA) for the protection of Greater sage-grouse (*Centrocercus urophasianus*) on the INL Site. Although sage-grouse is no longer warranted protection under the ESA, DOE has continued to work with the USFWS recently completed a Conference Opinion based on the CCA (a Conference Opinion is the equivalent of a Biological Opinion, but for non-listed species). Because of DOE's proactivity in signing the CCA, it has had and continues to have a large measure of certainty and flexibility as it pursues its mission, while fulfilling its stewardship to preserve the ecological resources at the INL Site.

A number of environmental factors/resources at the INL Site need to be considered during planning because of the potential for impacts to these resources from actions that may result from planning. The types of factors that are considered include the following: regional considerations such as population, land uses, and socioeconomic conditions; sitewide area infrastructure such as transportation routes, power distribution systems, communication systems, utility systems, and other land uses; resources such as soils, water resources, biota, and cultural resources; and natural hazards at the INL Site such as wildland fire, seismic hazards, and floods (INL 2016).

As stated in the Idaho National Laboratory Comprehensive Land Use and Environmental Stewardship Report (INL 2016), several considerations form the basis for current INL Site land use planning assumptions. These include prior land use planning assumptions from the original Comprehensive and Facility Land Use Plan, public input from the INL Site Environmental Management Citizens Advisory Board and the Environmental Management Site-Specific Advisory Board, and incorporation of DOE and the INL Site management team's strategic vision for the INL Site. The following planning assumptions are based on planning assumptions developed in the original Comprehensive and Facility Land Use Plan:

- INL will achieve its vision of becoming the preeminent nuclear research, development, and demonstration laboratory, a major center for national security technology development and demonstration, and remain a multi-program national laboratory.
- The INL Site and its associated 2,303 km² (889 mi²) will remain under federal government management and control through at least the year 2095.
- Portions of the INL Site will remain under federal government management and control in perpetuity.
- The DOE-EM footprint will be reduced at the INL Site as the DOE-EM cleanup mission continues to completion in the year 2035.
- New buildings will be constructed to provide state-of-the-art research capabilities that are necessary to fulfill the INL Site mission.
- New building construction may include structures in existing facility areas and construction of new facility areas.
- To the extent practical, new building construction will be encouraged in existing facility areas (i.e., the Research and Education Campus [REC] in Idaho Falls and the Advanced Test Reactor [ATR] Complex and the Materials and Fuels Complex [MFC] at the INL Site) to take advantage of existing infrastructure.
- Construction of new facility areas should occur in the identified core infrastructure areas.
- As the INL Site implements its mission, R&D advancements will result in obsolescence of existing buildings.
- As contaminated facility areas become obsolete, environmental remediation, decommissioning, and decontamination will be required.
- The environmental remediation, decommissioning, and decontamination process will be completed in accordance with the existing regulatory structure.
- The federal government will authorize and appropriate sufficient funds to provide adequate controls (i.e., institutional controls or engineered barriers) for areas that pose a significant health or safety risk to the public and workers until the risk diminishes to an acceptable level for the intended purpose.
- Regional economic development is closely related to the activities of the INL Site. The significance of the INL's Site influence on the region depends on the diversity and strength of the regional economy.
- Cooperative partnerships between the public and private sectors may be developed to support modernization and expansion of the INL Site R&D facilities.
- In accordance with DOE Order 144.1, Administrative Change 1, "Department of Energy American Indian Tribal Government Interactions and Policy," DOE recognizes that a trust relationship exists between federally recognized tribes and DOE. DOE will consult with tribal governments to ensure that tribal rights and concerns are considered prior to DOE taking actions, making decisions, or implementing programs that may affect the tribes.
- No residential development will occur within INL Site boundaries, although potential development may occur in Idaho Falls.

- Grazing will be allowed to continue on the INL Site in designated areas.
- DOE-ID has a Candidate Conservation Agreement with the U.S. Fish and Wildlife Service (USFWS) to protect greater sage-grouse and its habitats on the INL Site.
- To protect human health and the environment, INL Site operations, including onsite disposal, will remain in full compliance with applicable environmental laws, regulations, and other requirements.

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6. GLOSSARY TERMS

Detectability:	The ability to discover the existence or presence of something.
Ethnobotany:	The study of plants as they pertain to an indigenous culture.
Ethnoecology:	The study of the natural environment as it pertains to an indigenous culture.
Habitat fragmentation:	A splitting of contiguous areas into smaller and increasingly dispersed fragments.
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.
Non-game species:	Animals which are not normally hunted, fished, or trapped.
Roost:	A place on which birds rest or sleep.
Sagebrush obligate species:	A species that is only able to exist or survive in sagebrush habitat.
Sympatric:	Species or other taxa with ranges that overlap.
Transitory:	Existing or lasting only a short time; short-lived or temporary.
Wilding:	Individual plants that are removed from nearby natural communities and immediately transplanted onto a disturbed site.

Appendix A: Plant Community Descriptions

Big Sagebrush Shrubland: This broadly defined big sagebrush class is characterized by an open to moderately dense shrub layer. It occurs where Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and Basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) intermix at a very fine spatial scale. This vegetation class also represents plant communities where big sagebrush is not readily identifiable at the subspecies level due to phenotypic variability in response to edaphic factors or possible hybridization. Green rabbitbrush (*Chrysothamnus viscidiflorus*) is almost always present across this community type, although cover is usually relatively low. Other shrubs occur sporadically, generally with low frequency and sparse cover. Plains pricklypear (*Opuntia polyacantha*) and shadscale saltbush (*Atriplex confertifolia*) are a few of the more commonly occurring species. The herbaceous stratum of this plant community is typically sparse to moderate in terms of cover. Species composition of native grasses may be quite variable from one stand to another; however, bottlebrush squirreltail (*Elymus elymoides*), Sandberg bluegrass (*Poa secunda*), streambank wheatgrass (*Elymus lanceolatus*), and Indian ricegrass (*Achnatherum hymenoides*) are among the most abundant grass species. Forbs present on more diverse sites may include: Hood's phlox (*Phlox hoodii*), *Chenopodium* spp., *Eriogonum* spp., and western tansymustard (*Descurainia pinnata*). Cover from exotic species ranges from absent to moderate, the most abundant of which are cheatgrass (*Bromus tectorum*), crested wheatgrass (*Agropyron cristatum*), and desert alyssum (*Alyssum desertorum*).

Green Rabbitbrush Shrubland: Shrublands in this vegetation class are characterized by a moderate to dense shrub layer dominated by green rabbitbrush (*Chrysothamnus viscidiflorus*). Other short shrubs may be present but generally contribute little cover to the shrub stratum. Additional species may include big sagebrush ssp. (*Artemisia tridentata*), plains pricklypear (*Opuntia polyacantha*), shadscale saltbush (*Atriplex confertifolia*), and gray horsebrush (*Tetradymia canescens*). Compared to other green rabbitbrush shrubland classes at the INL Site, the herbaceous layer of this class is generally sparse in terms of cover, and it ranges from being moderately diverse to relatively depauperate in terms of species composition. Graminoids which occur in the sparse herbaceous stratum with the greatest constancy include Indian ricegrass (*Achnatherum hymenoides*) and bottlebrush squirreltail (*Elymus elymoides*). Needle and thread (*Hesperostipa comata*), streambank wheatgrass (*Elymus lanceolatus*), and Sandberg bluegrass (*Poa secunda*) may also occur in the herbaceous layer, but the presence and abundance of these species may be quite variable from one stand to another. When present, cheatgrass (*Bromus tectorum*) and crested wheatgrass (*Agropyron cristatum*) may contribute sparse to moderate cover in the herbaceous understory. Forbs may be diverse in communities represented by this vegetation class, but they typically contribute very little cover and species composition is highly variable from one stand to another. Native forbs may include: Narrowleaf goosefoot (*Chenopodium leptophyllum*), Hood's phlox (*Phlox hoodii*), tapertip hawksbeard (*Crepis acuminata*), cryptanthas (*Cryptantha* spp.), and flaxleaf plainsmustard (*Schoenocrambe linifolia*). Nonnative forbs, such as desert alyssum (*Alyssum desertorum*) have become abundant in some stands.

Green Rabbitbrush/Bluebunch Wheatgrass Shrub Herbaceous Vegetation: The (4b) Green Rabbitbrush/Bluebunch Wheatgrass Shrub Herbaceous Vegetation class generally exhibits a moderately open shrub canopy with an abundant medium-tall herbaceous layer. Green rabbitbrush (*Chrysothamnus viscidiflorus*) dominates the shrub stratum and other shrubs like Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and gray horsebrush

(*Tetradymia canescens*) occur sporadically. Bluebunch wheatgrass (*Pseudoroegneria spicata*) strongly dominates the herbaceous stratum. The herbaceous layer also often contains the graminoids bottlebrush squirreltail (*Elymus elymoides*) and Sandberg bluegrass (*Poa secunda*), and may contain streambank wheatgrass (*Elymus lanceolatus*) and Indian ricegrass (*Achnatherum hymenoides*), but these species generally contribute very little total cover. Forbs are diverse and highly variable in stands of this vegetation type. Hood's phlox (*Phlox hoodii*) occurs with the greatest constancy and is often moderately abundant. This community often occurs in areas relatively unaffected by persistent disturbance, like overgrazing by livestock, and stands are rarely weedy. Stands of this vegetation type are generally supported by loamy soils with a moderate depth to bedrock. Neither very coarse nor very fine soils are conducive to the dominance or co-dominance of bluebunch wheatgrass in the plant community. This community is not found in the slightly lower elevation areas near the center of the INL Site. Instead it tends to occur on the rolling upland topography found at the higher elevations around the periphery, especially to the south and west. The slightly higher elevations around the periphery of the INL Site likely experience more precipitation and have higher soil moisture holding capacity as bluebunch wheatgrass is rare where soils are very coarse.

Basin Big Sagebrush Shrubland: This vegetation class describes basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) dominated communities where the shrub canopy is moderate to dense. Green rabbitbrush (*Chrysothamnus viscidiflorus*) also occurs with high constancy in the canopy of this shrubland community, and ranges from sparse to nearly co-dominant. Additional shrub species typically occur as scattered individuals and may include other sagebrush species (*Artemisia* spp.), gray rabbitbrush (*Ericameria nauseosa*), shadscale saltbush (*Atriplex confertifolia*), gray horsebrush (*Tetradymia canescens*), and/or plains pricklypear (*Opuntia polyacantha*). The herbaceous layer occurs with sparse to moderate cover and common native graminoids include: bottlebrush squirreltail (*Elymus elymoides*), Sandberg bluegrass (*Poa secunda*), and Indian ricegrass (*Achnatherum hymenoides*). Dominant understory graminoids differ among stands included in this vegetation class. Native forbs are sparse with respect to total cover, but this functional group may have high species richness, though species composition can be quite variable from one stand to another. Non-native species cover is often higher in the understory of this vegetation class when compared to other big sagebrush vegetation classes. Cheatgrass (*Bromus tectorum*) and desert alyssum (*Alyssum desertorum*) are often present and even abundant in some stands. Basin big sagebrush stands often occur in areas with some topographic relief like basalt flows, dune areas, and associated with drainage channels. On the INL Site, the distribution of basin big sagebrush is tightly constrained by soil depth and it typically dominates limited areas having deep soils. Soils supporting this vegetation type include moderately well- to well-drained substrates ranging from moderate to coarse in texture.

Wyoming Big Sagebrush Shrubland: This big sagebrush shrubland class is broadly defined as it occurs on the INL Site. The shrub canopy may range from open to dense and is dominated by Wyoming big sagebrush (*Artemisia tridentata*) ssp. *wyomingensis*. Green rabbitbrush (*Chrysothamnus viscidiflorus*) is almost always present and may co-dominate stands. Other shrubs, such as additional sagebrush species (*Artemisia* spp.), shadscale saltbush (*Atriplex confertifolia*), winterfat (*Krascheninnikovia lanata*) and plains pricklypear (*Opuntia polyacantha*) may also occur with some abundance in the shrub and/or dwarf shrub stratum. The herbaceous layer of this vegetation class can be quite variable from one stand to another, ranging

from sparse to moderate in terms of cover. Bottlebrush squirreltail (*Elymus elymoides*) and Sandberg bluegrass (*Poa secunda*) dominate the sparse understory of many stands. In locations where the herbaceous layer has slightly higher cover, other important native graminoids may include; Indian ricegrass (*Achnatherum hymenoides*), bluebunch wheatgrass (*Pseudoroegneria spicata*), needle and thread (*Hesperostipa comata*), and Great Basin wildrye (*Leymus cinereus*). Forbs are generally sparse in terms of cover, but are diverse and species composition varies greatly from site to site. Some common species include: cushion buckwheat (*Eriogonum ovalifolium*), silvery lupine (*Lupinus argenteus*), Cryptantha spp., scarlet globemallow (*Sphaeralcea munroana*), and Hood's phlox (*Phlox hoodii*). Introduced species like cheatgrass (*Bromus tectorum*) may be common in disturbed stands and crested wheatgrass (*Agropyron cristatum*) is common along roadsides and in other areas where it has been planted.

Green Rabbitbrush/Desert Alyssum Shrub Herbaceous Vegetation: This vegetation class represents plant communities where the shrub stratum is dominated by green rabbitbrush (*Chrysothamnus viscidiflorus*), but the herbaceous understory is dominated by non-native annuals. The canopy of the shrub layer ranges from open to moderately dense. Few other shrub species are common in this plant community, but big sagebrush (*Artemisia* spp.) individuals may occur sporadically. The herbaceous layer is generally very diverse and substantial in terms of species composition and relative cover. Desert alyssum (*Alyssum desertorum*) is usually the dominant herbaceous species; however, several non-native annual species may be abundant or even dominate localized stands. Additional non-native species may include: cheatgrass (*Bromus tectorum*), saltlover (*Halogeton glomeratus*), Russian thistle (*Salsola kali*), tall tumbled mustard (*Sisymbrium altissimum*), and herb sophia (*Descurainia sophia*). Native herbaceous species are common in this vegetation type but even combined they contribute less than half of the total herbaceous cover. Native bunchgrasses such as needle and thread (*Hesperostipa comata*), Indian ricegrass (*Achnatherum hymenoides*), bottlebrush squirreltail (*Elymus elymoides*), and Sandberg bluegrass (*Poa secunda*) are almost always present but never highly abundant. Associated native forbs generally contribute very little cover but may include: narrowleaf goosefoot (*Chenopodium leptophyllum*), tapertip hawkbeard (*Crepis acuminata*), *Cryptantha* spp., western tansymustard (*Descurainia pinnata*), shaggy fleabane (*Erigeron pumilus*), Hood's phlox (*Phlox hoodii*), hoary tansyaster (*Machaeranthera canescens*), and flaxleaf plainsmustard (*Schoenocrambe linifolia*).

Crested Wheatgrass Semi-natural Herbaceous Vegetation: This vegetation class is characterized by a moderate to dense herbaceous layer which is strongly dominated by crested wheatgrass (*Agropyron cristatum*). Crested wheatgrass is a perennial bunchgrass from the plains of Siberia and it is often considered to be a naturalized species. On the INL Site it forms nearly monotypic stands with very little species diversity. Other non-native herbaceous species may occur in this community as well, especially in areas with soil disturbance, but they generally contribute very little total cover. Native species, which may be present sporadically with very low cover values, include shrubs, particularly green rabbitbrush (*Chrysothamnus viscidiflorus*), and grasses such as Indian ricegrass (*Achnatherum hymenoides*), Sandberg bluegrass (*Poa secunda*), and bottlebrush squirreltail (*Elymus elymoides*).

Cheatgrass Semi-natural Herbaceous Vegetation: Cheatgrass (*Bromus tectorum*), an introduced, annual grass species dominates this vegetation class. Total vegetation cover is highly variable from one stand to another. Native species persist in some stands; however, cover and diversity are typically low, and component native species composition can be quite variable

depending on the plant community that was present prior to the conversion to an introduced herbaceous species. Native shrubs may occur sporadically with low cover values. Green rabbitbrush (*Chrysothamnus viscidiflorus*), big sagebrush (*Artemisia tridentata* spp.) and gray rabbitbrush (*Ericameria nauseosa*) are the most constant native shrubs in this class. Sandberg bluegrass (*Poa secunda*) and bottlebrush squirreltail (*Elymus elymoides*) are the most frequently occurring and abundant native grasses in this community type, although many other native grass species may occur with sparse cover as well. Several native perennial and annual forb species may also occur infrequently in stands of this type. Introduced annual forbs such as tall tumbled mustard (*Sisymbrium altissimum*), herb sophia (*Descurainia sophia*), and desert alyssum (*Alyssum desertorum*) often occur with substantial abundance in this vegetation type.

Great Basin Wildrye Herbaceous Vegetation: The physiognomy of this vegetation class is that of a tall, moderately dense grassland which is dominated by Great Basin wildrye (*Leymus cinereus*). Great Basin wildrye occurs in large, relatively evenly-spaced clumps. Other species may be found in interspaces between the clumps or around the periphery of dense stands. Scattered shrubs may be present but total shrub cover is sparse. Basin big sagebrush (*Artemisia tridentata* spp. *tridentata*) and green rabbitbrush (*Chrysothamnus viscidiflorus*) have the highest constancy in stands of this type. Additional grass species may also occur sporadically at lower cover values and component graminoids may include: Indian ricegrass (*Achnatherum hymenoides*), bottlebrush squirreltail (*Elymus elymoides*), and cheatgrass (*Bromus tectorum*). Forb cover is generally sparse in communities of this type and species composition can be quite variable from one stand to another.

Sandberg Bluegrass Herbaceous Vegetation: This vegetation class is characterized by the dominance of Sandberg bluegrass (*Poa secunda*), a short statured native, perennial bunchgrass. The absolute cover of the herbaceous layer may range from sparse to moderately dense. Stands with low total cover values are generally depauperate. Plant communities which are represented by this class and exhibit higher total vegetative cover values also tend to be somewhat more diverse. Shrubs like green rabbitbrush (*Chrysothamnus viscidiflorus*), gray horsebrush (*Tetradymia canescens*), sickle saltbush (*Atriplex falcata*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), and winterfat (*Krascheninnikovia lanata*) may occur sporadically but with sparse cover. Additional graminoids in the herbaceous layer may include: Indian ricegrass (*Achnatherum hymenoides*), needle and thread (*Hesperostipa comata*), streambank wheatgrass (*Elymus lanceolatus*), bottlebrush squirreltail (*Elymus elymoides*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and western wheatgrass (*Pascopyrum smithii*). Many of these grasses occur with relatively high constancy but low to moderate cover values. Forb cover may range from sparse to moderate, and species composition is variable. The most common native forb is whitestem blazingstar (*Mentzelia albicaulis*). The non-native forbs tall tumbled mustard (*Sisymbrium altissimum*), desert alyssum (*Alyssum desertorum*) and cheatgrass (*Bromus tectorum*) may also be common in some stands.

Bluebunch Wheatgrass – Sandberg Bluegrass Herbaceous Vegetation: This herbaceous vegetation class is characterized by the dominance of native bunchgrasses. Total vegetative cover in plant communities of this type is generally moderate to high. Bluebunch wheatgrass (*Pseudoroegneria spicata*) dominates or co-dominates the plant community and Sandberg bluegrass (*Poa secunda*) is usually present with substantial cover. Additional native bunchgrasses like Indian ricegrass (*Achnatherum hymenoides*) and bottlebrush squirreltail

(*Elymus elymoides*) also occur frequently in this vegetation type. Green rabbitbrush (*Chrysothamnus viscidiflorus*) is typically present with high constancy and sparse to low cover values. Additional shrubs or dwarf shrubs occur infrequently and contribute little to total cover values. Other shrub species may include: black sagebrush (*Artemisia nova*), Wyoming big sagebrush (*Artemisia tridentata* spp. *wyomingensis*), gray horsebrush (*Tetradymia canescens*), low sagebrush (*Artemisia arbuscula*), and three-tip sagebrush (*Artemisia tripartita*). Native forbs are common in plant communities represented by this vegetation class and the most abundant species include: Hood's phlox (*Phlox hoodii*), tapertip hawksbeard (*Crepis acuminata*), western tansymustard (*Descurainia pinnata*), and Franklin's sandwort (*Arenaria franklinii*). Non-natives like cheatgrass (*Bromus tectorum*), salsify (*Tragopogon dubious*), and tall tumbledustard (*Sisymbrium altissimum*) may be common in disturbed stands. Stands of this vegetation type are generally supported by loamy soils with a moderate depth to bedrock. Neither very coarse nor very fine soils are conducive to the dominance or co-dominance of bluebunch wheatgrass in the plant community. This community is not found in the slightly lower elevation areas near the center of the INL Site. Instead, it tends to occur on the rolling upland topography found at the higher elevations around the periphery, especially to the south and west. The slightly higher elevations around the periphery of the INL Site likely experience more precipitation and have higher soil moisture holding capacity as bluebunch wheatgrass is rare where soils are very coarse. This class is often associated with post-fire burn scars.

Tall Tumbledustard – Cheatgrass Semi-natural Herbaceous Vegetation: This herbaceous plant community is characterized by the dominance of introduced, annual species. Stands are dominated by tall tumbledustard (*Sisymbrium altissimum*), a forb. Cheatgrass (*Bromus tectorum*), an annual grass, ranges in importance from abundant to co-dominant. Other non-native species such as herb sophia (*Descurainia sophia*) and saltlover (*Halogeton glomeratus*) may be locally abundant as well. Total vegetation cover ranges from 10% to 70%, and less than half is from native species. Native species occur in many stands of this vegetation type; however, cover and diversity are typically low, and component native species can be quite variable depending on the plant community which was present prior to the conversion to introduced species. Native shrubs, specifically green rabbitbrush (*Chrysothamnus viscidiflorus*), may occur sporadically with low abundance values. Streambank wheatgrass (*Elymus lanceolatus*) is the most frequently occurring and abundant native grass, although Indian ricegrass (*Achnatherum hymenoides*) and needle and thread (*Hesperostipa comata*) are common as well. Several native forb species may also occur with sparse cover values and variable species composition across stands of this vegetation type. Whitestem blazingstar (*Mentzelia albicaulis*), an annual, is present with the greatest constancy.

This class often occurs on or near sites that have been disturbed. It can occur across a wide range of environmental conditions in semi-arid environments but is likely to be found in low-lying areas which have fine soil textures and experience occasional seasonal flooding. On the INL Site this class tends to be associated with playas, especially those in proximity to anthropogenic disturbance.

Appendix B: Comprehensive list of wildlife species seen during the PGTB surveys.

Observational data from surveys conducted within 80-meter buffer (except where noted) around the PGTB. The following species, or (evidence of the following species) were documented:

Birds (all observed visually)

- Sage thrasher
- Sagebrush sparrow
- Sage-grouse (old nest)
- Brewer's sparrow
- Red-tailed hawk
- Ferruginous hawk
- Swainson's hawk
- Prairie falcon
- Loggerhead shrike
- Common nighthawk
- Mourning dove
- Northern harrier
- Horned lark
- Western meadowlark

Mammals

- Badger (burrows and excavations)
- Voles
- Elk (scat, tracks, and 14 animals seen ~250–300 m south of the existing power line)
- Pygmy rabbit (scat, burrows, and one live animal)
- Cottontail rabbit (scat, live animals, skulls)
- Black-tailed jackrabbit (scat)
- Chipmunks (live animals)
- Pronghorn (1 live animal, scat, tracks)
- Coyote (scat)
- Dead deer mouse
- Ground squirrel (live animal)

Reptiles

- Sagebrush lizard