PLANT AND WILDLIFE SURVEYS AND COVER TYPE MAPPING OF THE WELLS HYDROELECTRIC PROJECT 230 kV TRANSMISSION CORRIDOR
(Transmission Line Wildlife and Botanical Study)

WELLS HYDROELECTRIC PROJECT

FERC NO. 2149

FINAL REPORT
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LIST OF ACRONYMS AND ABBREVIATIONS

CFR	U.S. Code of Federal Regulations
COE	U.S. Army Corps of Engineers
CRP	Conservation Reserve Program
ESA	Endangered Species Act
EMF	electromagnetic field
FERC	Federal Energy Regulatory Commission
FWS	U.S. Fish and Wildlife Service
GIS	geographic information system
GMU	game management unit
GPS	global positioning system
ILP	Integrated Licensing Process
ISR	Initial Study Report
kV	kilovolt
kW	kilowatt
msl	mean sea level
NOI	Notice of Intent
NWCB	Washington State Noxious Weed Control Board
PAD	Pre-Application Document
PHS	Priority Habitats and Species
PSP	Proposed Study Plan
PUD	Public Utility District
RM	river mile
RSP	Revised Study Plan
RTE	rare, threatened, and endangered
RWG	Resource Work Group
WAC	Washington Administrative Code
WDNR	Washington State Department of Natural Resources
WNHP	Washington Natural Heritage Program
WDFW	Washington Department of Fish and Wildlife

ABSTRACT

The current Wells Hydroelectric Project (Wells Project) operating license will expire on May 31, 2012. The Public Utility District No. 1 of Douglas County (Douglas PUD) owns and operates the Wells Project and is using the Integrated Licensing Process (ILP) promulgated by the Federal Energy Regulatory Commission (FERC).

In 2008, Douglas PUD conducted surveys for botanical and wildlife resources within the Wells Project transmission line corridor. The overall goal of these surveys was to provide information needed to guide land management decisions, avoid damage to valuable habitat during future transmission corridor management activities, and minimize the spread of invasive weeds. The study provides baseline data on plants and animals found within or adjacent to the corridor and information on the presence and habitat associations of rare, threatened, and endangered (RTE) plant and animal species in the corridor.

Surveys in the transmission line corridor targeted RTE plants, invasive plant species, birds, mammals, and reptiles. Field surveys were also conducted to identify and classify the specific vegetation cover types in the transmission line corridor. Additional data were collected to document (1) nesting by raptors and corvids, (2) use by sharp-tailed grouse (*Tympanuchus phasianellus*) and greater sage-grouse (*Centrocercus urophasianus*), and (3) evidence of avian collisions with the transmission line and associated structures in the study area.

One occurrence of an RTE plant species [Thompson's clover (*Trifolium thompsonii*), a State-listed threatened species] was observed and mapped within the transmission line corridor during botanical field surveys. Invasive plant surveys mapped and documented 9 potential occurrences of two Class B Designate weed species, Dalmatian toadflax (*Linaria dalmatica* ssp. *dalmatica*) and spotted knapweed (*Centaurea stoebe*). Dalmatian toadflax is a Class B Designate in Douglas County south of Township 25N and west of Range 25E only. Dalmatian toadflax occurrences north of Township 25N were noted, but not mapped because the species is not a Class B Designate in that area. Occurrences of other Class B (non-designate) and Class C weed species were also noted, but not mapped.

Cover types were grouped into 13 mapping categories based on previously mapped geographic information system (GIS) data and field observations. The most common cover type was Active Agriculture, covering more than half the transmission line corridor. Shrub-Steppe was the most common native vegetation cover type, mapped on 30 percent of the corridor.

Biologists documented the presence of 103 bird species in the study area. Based on an analysis of relative abundance (number of birds observed per 5-minute visit within 115 feet of the 50 point count stations), the most common species in the study area was the American robin (*Turdus migratorius*). Other commonly detected species (in descending order of relative abundance) were Brewer's sparrow (*Spizella breweri*), spotted towhee (*Pipilo maculatus*), dark-eyed junco *(Junco hyemalis)*, and mountain chickadee (*Poecile gambeli*). The greatest number of species was detected where the dominant cover type was Shrub-Steppe (this is most the common native vegetation cover type in the study area and therefore received the greatest survey effort), closely followed by Cleared Conifer and Riparian.

Two avian RTE bird species were documented in the study area. These were sage thrasher (*Oreoscoptes montanus*) and golden eagle (*Aquila chrysaetos*), both State candidate species. One additional RTE species was observed where the transmission line crosses the Columba River below Wells Dam, this being the American white pelican (*Pelecanus erythrorhynchus*), a State endangered species.

Eleven nests of raptors or corvids were detected within or adjacent to the study area, including four on Douglas County PUD transmission towers. Three bird carcasses were found during focused surveys, and three other carcasses were found incidentally to other survey efforts. No direct evidence of collision was noted from these six carcasses.

Reptile species observed included pygmy short-horned lizard (*Phrynosoma douglasii*), western skink (*Eumeces skiltonianus*), racer (*Coluber constrictor*), western terrestrial garter snake (*Thamnophis elegans*), and western rattlesnake (*Crotalus viridis*). Mammals that were documented through sign or direct observation included mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), bobcat (*Felis rufus*), cougar (*Puma concolor*), striped skunk (*Mephitis mephitis*), long-tailed weasel (*Mustela frenata*), America badger (*Taxidea taxus*), porcupine (*Erethizon dorsatum*), northern pocket gopher (*Thomomys talpoides*), bushy-tailed woodrat (*Neotoma cinerea*), yellow-bellied marmot (*Marmota flaviventris*), and Douglas' squirrel (*Tamiasciurus douglasii*). Additional observations indicated the presence of chipmunks (*Tamias* spp., yellow-pine and/or least) and voles (species unknown).

1.0 INTRODUCTION

1.1 General Description of the Wells Hydroelectric Project

The Wells Hydroelectric Project (Wells Project) is located at river mile (RM) 515.6 on the Columbia River, in the State of Washington (Figure 1.1-1). Wells Dam is located approximately 30 river miles downstream from the Chief Joseph Hydroelectric Project, owned and operated by the United States Army Corps of Engineers (COE); and 42 miles upstream from the Rocky Reach Hydroelectric Project, owned and operated by Public Utility District No. 1 of Chelan County (Chelan PUD). Two 230 kilovolt (kV) transmission lines connect Wells Dam with the Douglas switchyard next to Rocky Reach Dam. The nearest town is Pateros, Washington, which is located approximately 8 miles upstream from the Wells Dam.

The Wells Project is the chief generating resource for Public Utility District No. 1 of Douglas County (Douglas PUD). It includes ten generating units with a nameplate rating of 774,300 kW and a peaking capacity of approximately 840,000 kW. The design of the Wells Project is unique in that the generating units, spillways, switchyard, and fish passage facilities were combined into a single structure referred to as the hydrocombine. Fish passage facilities reside on both sides of the hydrocombine, which is 1,130 feet long, 168 feet wide, with a top of dam elevation of 795 feet above mean seal level (msl).

The Wells Project includes two 230 kV single-circuit transmission lines. Each of the 230 kV transmission lines is capable of transmitting the entire output of the Wells Project. The lines run 41 miles in length from the switchyard atop the hydrocombine to the Douglas Switchyard operated by Douglas PUD (Figure 1.1-1). The lines run parallel to each other on 45-85 foot steel towers along a common 235-foot wide right-of-way. Each phase has two parallel (bundled) conductors, 1 ¼ inches diameter, suspended 96 inches to 105 inches below the bridge and approximately 24 feet between phases. The first and last mile of transmission lines have shield (ground) wires 3/8 inch diameter located 18 to 22 feet above the conductors. The shield wires protect the transmission line from lightning strikes. Elevations along the transmission line corridor range from 720 feet above msl at Carpenter Island to approximately 4,200 feet at Badger Mountain.

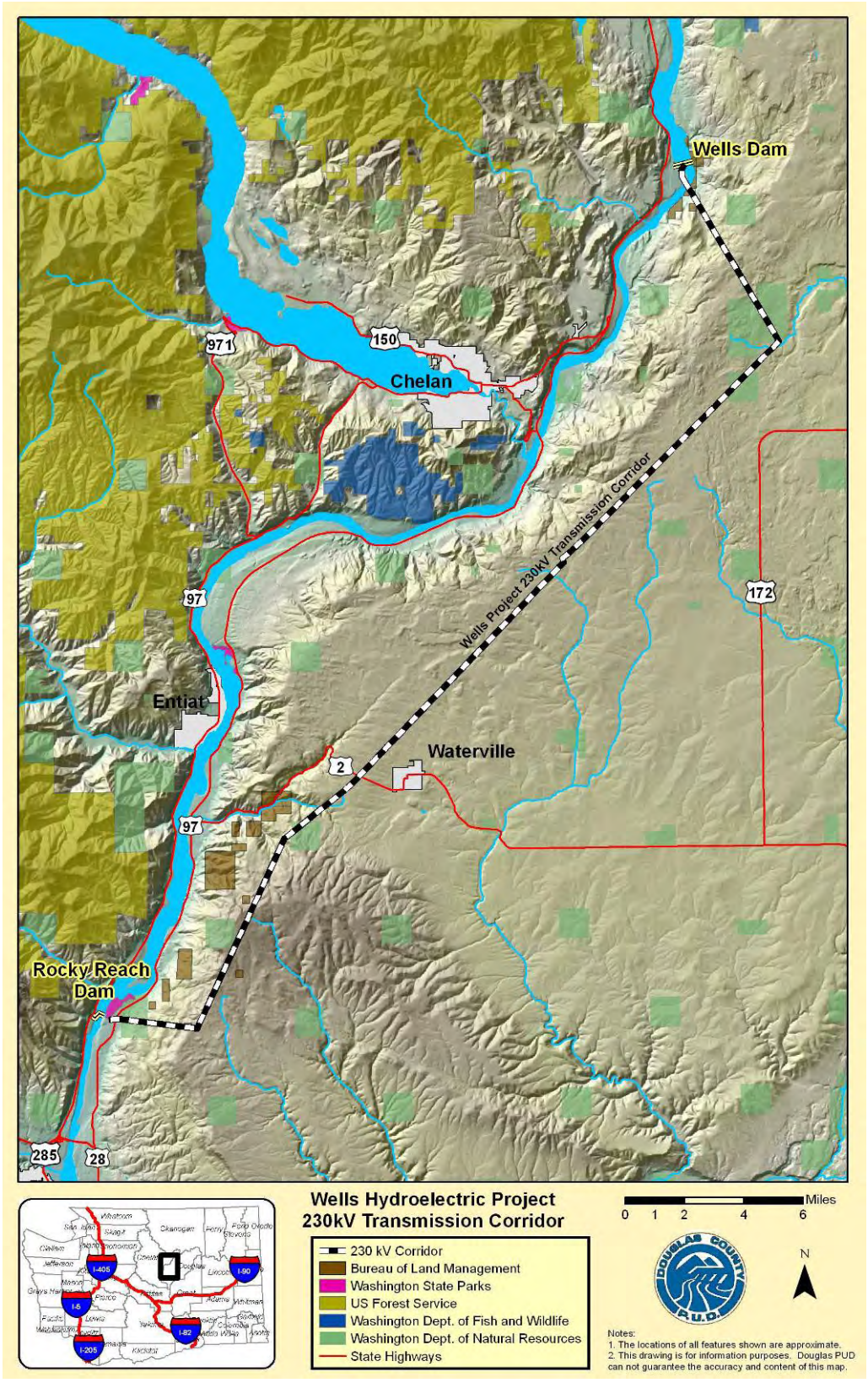

Figure 1.1-1 Location Map – Wells Dam 230 kV Transmission Line Corridor

1.2 Relicensing Process

The current Wells Project license will expire on May 31, 2012. Douglas PUD is using the Integrated Licensing Process (ILP) promulgated by the Federal Energy Regulatory Commission (FERC) Order 2002 (18 CFR Part 5). Stakeholders, including representatives from state and federal agencies, tribes, local governments, non-governmental organizations and the general public have participated in the Wells Project ILP from a very early stage to identify information needs related to the relicensing of the Wells Project.

In August 2005, Douglas PUD initiated a series of Resource Work Group (RWG) meetings with stakeholders regarding the upcoming relicensing of the Wells Project. This voluntary effort was initiated to provide stakeholders with information about the Wells Project, to identify resource issues, and to develop preliminary study plans prior to filing the Notice of Intent (NOI) and Pre-Application Document (PAD). The RWGs were formed to discuss issues related to the Wells Project and its operations, identify information needs, and develop agreed-upon study plans.

The primary goals of the RWGs were to identify resource issues and potential study needs in advance of Douglas PUD filing the NOI and PAD. Through 35 meetings, each RWG cooperatively developed a list of Issue Statements, Issue Determination Statements, and Agreed-Upon Study Plans. An Issue Statement is an agreed-upon definition of a resource issue raised by a stakeholder. An Issue Determination Statement reflects the RWGs' efforts to apply the FERC's seven study criteria to mutually determine the applicability of each individual Issue Statement. Agreed-Upon Study Plans are the finished products of the informal RWG process.

Douglas PUD submitted the NOI and PAD to the FERC on December 1, 2006. The PAD included the RWGs' 12 Agreed-Upon Study Plans. The filing of these documents initiated the relicensing process for the Wells Project under the FERC's regulations governing the ILP.

On May 16, 2007, Douglas PUD submitted a Proposed Study Plan (PSP) Document. The PSP Document consisted of the Applicant's Proposed Study Plans, Responses to Stakeholder Study Requests, and a schedule for conducting the Study Plan Meeting. The ILP-required Study Plan Meeting was conducted on June 14, 2007. The purpose of the Study Plan Meeting was to provide stakeholders with an opportunity to review and comment on Douglas PUD's PSP Document, to review and answer questions related to stakeholder study requests, and to attempt to resolve any outstanding issues with respect to the PSP Document.

On September 14, 2007, Douglas PUD submitted a Revised Study Plan (RSP) Document. The RSP Document consisted of a summary of each of Douglas PUD's RSPs and a response to stakeholder comments on the PSP Document.

On October 11, 2007, the FERC issued its Study Plan Determination based on its review of the RSP Document and comments from stakeholders. The FERC's Study Plan Determination required Douglas PUD to complete 10 of the 12 studies included in its RSP Document. Douglas PUD has opted to complete all 12 studies to better prepare for the 401 Water Quality Certification process conducted by the Washington State Department of Ecology and to fulfill its

commitment to the RWGs who collaboratively developed the 12 Agreed-Upon Study Plans with Douglas PUD. On October 15, 2008, Douglas PUD filed with the FERC the ISR Document that contained final reports for eight of the 12 studies and contained interim progress reports for four of the 12 studies. The ISR Document included results from all ten of the studies required by the FERC in the October 11, 2007 Study Plan Determination. The ISR Document also included results from two studies voluntarily conducted by Douglas PUD for the reasons stated above. On November 24, 2008, Douglas PUD filed a letter correcting a water temperature figure within the original ISR Document. On December 2, 2008, Douglas PUD filed the final Traditional Cultural Property Study for the Wells Project, which was prepared by the Confederated Tribes of the Colville Reservation under a contract with Douglas PUD.

The deadline for stakeholder comment on the ISR Document was December 15, 2008 pursuant to the approved Process Plan and Schedule for the Wells Project. Comments were filed by the City of Pateros on November 7, 2008 and by the City of Brewster on December 5, 2008.

On January 14, 2009, Douglas PUD filed a letter containing its responses to the comments from the cities on the ISR Document and proposing revisions to the schedule for the Wells ILP. On February 4, 2009, the FERC issued a determination on the requests for modification to the Wells Study Plan and on Douglas PUD's proposed revisions to the schedule. The FERC concluded that there was no need to modify the Wells Study Plan. The FERC also approved Douglas PUD's proposed modifications to the Wells ILP schedule. This proposed modification consisted of advancing the schedule for the Updated Study Report Meeting.

This document is the final report for the Transmission Line Wildlife and Botanical Study conducted under the Wells Study Plan. There were no variances from the FERC approved Study Plan for the Transmission Line Wildlife and Botanical Study.

2.0 STUDY GOALS AND OBJECTIVES

The overall goal of the botanical and wildlife surveys along the Wells Project transmission lines was to provide information needed to guide land management decisions, avoid damage to valuable habitat during future transmission corridor management activities, and minimize the spread of invasive weeds. The study provides baseline data on birds found near the corridor and information on the presence of rare, threatened, and endangered (RTE) plant and animal species. In addition, this study provides the information needed to meet the FERC requirements for the Wells ILP.

RTE species for this study were defined as species:

- Federally listed as threatened, endangered, proposed or candidate under the Endangered Species Act (ESA);
- State listed as threatened or endangered;
- State listed as candidate (wildlife only);
- State listed as sensitive (plants only); or
- State listed as Review List 1 (plants only).

2.1 Botanical Resources

The primary objectives of the botanical study were to:

- Identify and document any RTE plant species in the study area;
- Identify and document any invasive plant species in the study area;
- Identify and classify the specific vegetation cover types in the study area;
- Generate detailed information on the species composition and classification of these plant communities and their structures; and
- Create a detailed geographic information system (GIS) cover type map of the study area showing the locations of these plant communities and their distribution and areas of coverage; also note the locations of habitats of special concern or unique areas observed.

2.2 Wildlife Resources

The primary objectives of the wildlife study were to:

- Identify and document the location of all RTE bird, mammal, and reptile species that use the study area;
- Describe the habitat features used by RTE bird, mammal, and reptile species observed within the corridor;
- Document the presence of other bird, mammal, and reptile species in the study area;
- Assess the relative abundance of birds using the study area;
- Document nesting by raptors (e.g., hawks, falcons) and corvids (e.g., crows, ravens) within the study area;
- Document sharp-tailed grouse (*Tympanuchus phasianellus*) and greater sage-grouse (*Centrocercus urophasianus*) use within the study area; and
- Document any evidence under the transmission line of avian collisions with the transmission line or structures.

3.0 STUDY AREA

Figure 1.1-1 depicts the two 230 kV transmission lines that connect Wells Dam with the Douglas switchyard next to Rocky Reach Dam. The transmission lines occupy a 235-foot-wide corridor that is 41 miles (65.6 km) long. The lines run parallel to each other on 45- to 85-foot steel towers within the common right-of-way. The transmission lines originate at Wells Dam and cross the Columbia River from Carpenter Island in Chelan County to Douglas County. The corridor runs southeast to the Boulder Park area, then turn southwest across agricultural fields, past the town of Waterville and over Badger Mountain. The corridor descends the west slope of Badger Mountain and ends at Douglas Switchyard. The study area for botanical and wildlife resources is the 235-foot-wide transmission line corridor, excluding all actively cultivated fields.

4.0 BACKGROUND AND EXISTING INFORMATION

4.1 Botanical Resources

The U.S. Fish and Wildlife Service (FWS) maintains a list of all plants that are listed or proposed for listing as threatened or endangered under the ESA. In addition to the federal list, the Washington State Department of Natural Resources (WDNR) Natural Heritage Program (WNHP) maintains a database of the known locations of federally listed and proposed, as well as state listed threatened, endangered, sensitive, and Review List 1 plants in Washington. These state-listed species are not afforded statutory protection in Washington. Historical rare plant information is also available at both Washington State University and University of Washington. Invasive plant species potentially occurring in the study transmission line corridor are available from the Washington State Noxious Weed Control Board (NWCB) and Washington State Extension Service.

4.2 Wildlife Resources

FWS maintains a list of all wildlife listed or proposed as threatened or endangered under the ESA. The Washington Department of Fish and Wildlife (WDFW) maintains a list of all proposed or state-listed wildlife species under WAC 232-12-297. WDFW also maintains a list of RTE species and a database with locations of all records. Johnson and Cassidy (1997) also provide species range information for all mammals that may be found in the transmission line corridor.

4.3 Transmission Corridor Maintenance

Douglas PUD conducts an ongoing maintenance program on the 230 kV transmission corridor. Maintenance activities include noxious weed control at transmission corridor structures and along access roads in the spring and fall. Target weed species are primarily diffuse knapweed (*Centaurea diffusa*) and Dalmatian toadflax (*Linaria dalmatica*). Transline® herbicide is applied in the spring as a contact herbicide with a limited residual and is also used for spot applications in the fall. Transline® is used because it has minimal impacts on native grass species and sagebrush shrub species. Douglas PUD releases the biological control insect *Calophasia lunula* to control Dalmatian toadflax. Weedar-64® and Curtail® are also used to control broadleaf weeds.

The maintenance program also includes an overall inspection for damaged roads or structures. Tower structures are inspected on foot or using four-wheeled all-terrain vehicles (ATVs) with low-pressure tires. At the request of land owners, maintenance roads were not constructed across approximately 25 miles of wheat fields, on the Waterville Plateau, when the transmission lines were built. Existing roads require periodic maintenance if there is damage to the road from storms or rock falls or if the road requires grading for repairs to the 230 kV lines.

4.4 Avian Interactions With Transmission Lines

Negative avian interactions with transmission lines primarily involve either electrocution, or collisions of flying birds with lines, towers and associated infrastructure.

Electrocutions occur when birds are large enough to span the distance between conductors or between an energized component and a ground. Bald and golden eagles (*Haliaeetus leucocephalus* and *Aquila chrysaetos*) are the largest birds occurring in the vicinity of the Wells 230 kV transmission line.

To protect eagles from electrocution, a minimum of 60 inches (152 cm) separation between energized parts is required (APLIC, 2006). The Wells 230 kV transmission lines were constructed to meet the National Electric Safety Code (NESC) conductor clearances. The Wells 230 kV transmission line significantly exceeds the minimum eagle separation recommendation, with a phase-to-ground separation of 8 feet (2.4 m) and horizontal separation of 24 feet (7.3 m) between phases. The phase-to-phase separation exceeds the maximum wing span for an adult female eagle of 8 feet (2.4 m) (APLIC, 2006). The use of suspension insulators further contributes to the safety margin for eagles by suspending the conductor under the tower bridge, preventing wing tip to wing tip contact between the phase and ground.

Factors that influence collision risk can be divided into three categories: (1) those related to avian species' characteristics, (2) those related to the environment, and (3) those related to the configuration and location of lines. Species-related factors include habitat use, body size, flight behavior, age, sex, and flocking behavior. For example, heavy-bodied, less agile birds or birds within large flocks may lack the ability to quickly negotiate obstacles, making them more likely to collide with overhead lines. Likewise, birds distracted by territorial, hunting, or courtship activities may collide with lines. Environmental factors influencing collision risk include the effects of weather and time of day on line visibility, surrounding land use practices that may attract birds and human activities that may flush birds into lines. Line-related factors influencing collision risk include the configuration and location of the line and line placement with respect to other structures or topographic features. Collisions are more likely to occur with the smaller-diameter overhead static wire, which may be less visible than the wires used to transmit electricity (Chelan PUD, 2005; APLIC and USFWS, 2005).

Birds can exist near power lines in many situations without significant risk of collisions; the critical factor is the frequency with which birds in flight must cross a power line (APLIC, 1994). Most of the 230 kV transmission line is oriented in a north-to-south direction parallel to the Columbia River. The orientation of the lines is therefore less conducive to collisions for birds following the primary geographic feature, the Columbia River valley, except where it is near Cornehl Lake and the Columbia River (see Figure 1.1-1). Where the transmission line crosses the Columbia River downstream of Wells Dam, the presence of marker balls on the lines, and the dam itself, may both reduce potential for collisions. The most vulnerable raptors are young birds during their first migration in the fall (APLIC, 1994). Fall migrating raptors use the North Cascades flyway, taking advantage of the lift from thermal and wind-caused updraft ridges in the Cascade Range foothills of Chelan County (Smith and Neal, 2007). Compared to Chelan County raptor migration concentration points, which are well known among local birders and

professional biologists, no similar concentrations are noted for western Douglas County, despite relatively open habitat, high road densities, and proximity to the primary highway transportation routes of the Columbia River Valley (B. Patterson, personal communication).

4.5 Terrestrial Resource Work Group

As part of the relicensing process for the Wells Project, Douglas PUD established a Terrestrial RWG, which began meeting informally in November 2005. This voluntary effort was initiated to provide stakeholders with information about the Wells Project, to collaboratively identify potential resource issues related to Project operations and relevant to relicensing, and to develop preliminary study plans to be included in the Wells Pre-Application Document (PAD) (DCPUD, 2006).

Through a series of meetings, the Terrestrial RWG collaboratively developed a list of Issue Statements, Issue Determination Statements, and Agreed-Upon Study Plans. An Issue Statement is an agreed-upon definition of a resource issue raised by a stakeholder. An Issue Determination Statement reflects the RWG's efforts to review the existing project information and to determine whether an issue matches with the FERC's seven criteria and would be useful in making future relicensing decisions. Agreed-Upon Study Plans are the finished products of the informal RWG process.

Based upon these meetings and discussions, the Terrestrial RWG proposed that Douglas PUD conduct a study to collect baseline botanical information for the existing 230 kV transmission line running from Wells Dam to Douglas Switchyard.

The proposed study was intended to fill data gaps in local knowledge of botanical resources, including RTE and invasive plant species. This study also provides information on bird species presence, determines whether bird collision is a problem, and provides information on the possible use of the transmission corridor by sharp-tailed or sage-grouse. The study also provides information on Washington ground squirrel (*Spermophilus washingtoni*) and striped whipsnake (*Masticophis taeniatus*), both RTE species, which have ranges that overlap with the study area.

Additional data are not needed for the analysis of potential electrocution of birds using the 230 kV line for perch and nest sites. Insulators suspend each conductor 8 or more feet from each lattice tower structure and approximately 24 feet between phases. The 230 kV transmission line exceeds the phase to phase and phase to ground separation of 60 inches recommended by the Avian Power Line Interaction Committee (APLIC, 2006) for the protection of raptors found in the vicinity of the transmission line corridor.

The Issue Statement and Issue Determination Statement listed below were included in the PAD (section number included) filed with the FERC on December 1, 2006:

4.5.1 Issue Statement (PAD Section 6.2.3.2)

Presence of the transmission lines could kill or injure birds, and the presence of the transmission towers could affect wildlife behavior and use of adjacent habitat.

4.5.2 Issue Determination Statement (PAD Section 6.2.3.2)

The Wells Project license includes two 230 kV single-circuit transmission lines. The lines run 41 miles in length from the switchyard at Wells Dam to the Douglas Switchyard operated by Douglas PUD. The lines run parallel to each other on 45-85 foot steel towers along a common 235-foot-wide corridor.

The transmission lines and towers could have impacts on wildlife, including bird collisions and raptor nesting. Baseline studies have not been completed to assess these potential impacts. Wildlife and botanical species inventories have not been completed along the transmission corridor.

The RWG agrees that a study is needed during the two-year ILP study period and is proposing to complete baseline wildlife and RTE inventories along the transmission corridor. In addition to documenting baseline conditions, this study would be used to document presence (whether raptors, corvids, and prairie grouse are found within or adjacent to the transmission corridor). A literature review will also be completed to specifically identify potential effects on raptors and prairie grouse.

4.5.3 Issue Statement (PAD Section 6.2.3.3)

Maintenance of the transmission corridor could affect wildlife and/or botanical species (e.g., weed control and road maintenance).

4.5.4 Issue Determination Statement (PAD Section 6.2.3.3)

The Wells Project license includes two 230 kV single-circuit transmission lines. The lines run 41 miles in length from the switchyard at Wells Dam to the Douglas Switchyard operated by Douglas PUD. The lines run parallel to each other on 45-85 foot steel towers along a common 235-foot-wide corridor.

Maintenance activities along the transmission corridor could have an impact on wildlife and botanical resources. Wildlife and botanical species inventories have not been completed along the transmission corridor.

The RWG agreed that a study is needed during the two-year ILP study period and proposed to complete baseline wildlife, botanical and RTE inventories along the transmission corridor.

There is some existing information on botanical and avian resources in the study area as described below.

4.6 Project Nexus

The two Wells 230 kV transmission lines were included in the FERC order issuing the Wells Project license (issued: July 12, 1962). Exhibit K maps of the transmission line corridor transmitted copies of as-built Exhibits J and K showing the route of the transmission line of the

Wells Project 2149. The FERC approved the Exhibit J and K drawings and amended the license by order (issued: January 5, 1979).

The results from this study will be used for Section 7 consultation under the ESA, to guide ongoing maintenance of the transmission corridor, to prevent adverse affects on RTE plants or wildlife, to help guide future corridor management activities, and to determine whether additional measures are needed to reduce bird collisions or the spread of noxious weeds.

5.0 METHODOLOGY

The following subsections describe the methods that were employed to gather, document, and analyze information regarding botanical and wildlife resources in the study area. A scientific collection permit was obtained from WDFW before initiating any wildlife surveys. The WDFW Priority Habitats and Species (PHS) database was queried for records of RTE wildlife species occurrence in the project vicinity, and the FWS Endangered, Threatened, Proposed, and Candidate Species List for Douglas County was reviewed. The WNHP was also queried for information about RTE plant species (Appendix A).

5.1 Botanical Resources

This section summarizes the methods for the RTE plant and invasive species surveys and for field-verifying the GIS-based cover type mapping. For discussion purposes, the study area was divided into four zones for botanical resources: North, Badger, Ag Land, and South (Figure 5.1-1).

5.1.1 RTE Plant Surveys

RTE plant surveys were conducted in a manner meeting WNHP guidelines for survey efforts. The RTE plant surveys included the following tasks: (1) pre-field review; (2) field surveys; and (3) documentation and mapping of results. Each task is described below.

5.1.1.1 Pre-field Review

The pre-field review task consists of developing a "target" list of RTE plant species to guide field surveys. The pre-field review task was initiated by reviewing the FWS Endangered, Threatened, Proposed, and Candidate Species List for Douglas County, and sending a letter to WNHP requesting the latest information on RTE plant species known to occur or potentially occurring in or near the Wells Project transmission line study area. The target list of RTE species potentially occurring in the study area was developed based on input from FWS and WNHP, as well as information from the rare plant surveys conducted for the nearby Rocky Reach Hydroelectric Project (Calypso Consulting, 2000), the Wells Hydroelectric Project (EDAW, 2006a), and the Withrow Wind Generation Pilot Project (Tetra Tech FW and Northwest Wildlife Consultants, 2004). Information on habitat requirements, such as elevation, soils, and associated vegetation communities, was used to refine the list to those species most likely to be found in or near the study area. This information was also used to identify the habitats to be surveyed, with an emphasis on those that support RTE species with federal or state

status as threatened or endangered. Prior to beginning field surveys, project botanists reviewed the morphological characteristics of target RTE plant species to develop a search image, which improves detection and recognition abilities.

Based on information provided by the WNHP, FWS (see Appendix A), and rare plant surveys conducted for nearby projects (Calypso Consulting, 2000; EDAW, 2006a; Tetra Tech FW and Northwest Wildlife Consultants, 2004), a target list of 51 potentially occurring RTE plant species was complied for the study area (Appendix B). Of these, only one species, Ute ladies' tresses (*Spiranthes diluvialis*), is federally listed as threatened; there are no federal endangered species known or suspected to occur in or near the study area. Ute ladies' tresses is also state-listed as endangered by the WNHP; there are 18 other state-listed threatened or endangered plant species potentially occurring in the study area, as well as one species that is potentially extirpated in Washington. There are an additional 31 plant species potentially occurring in the study area that are state-listed as sensitive or under review for possible state listing (see Appendix B).

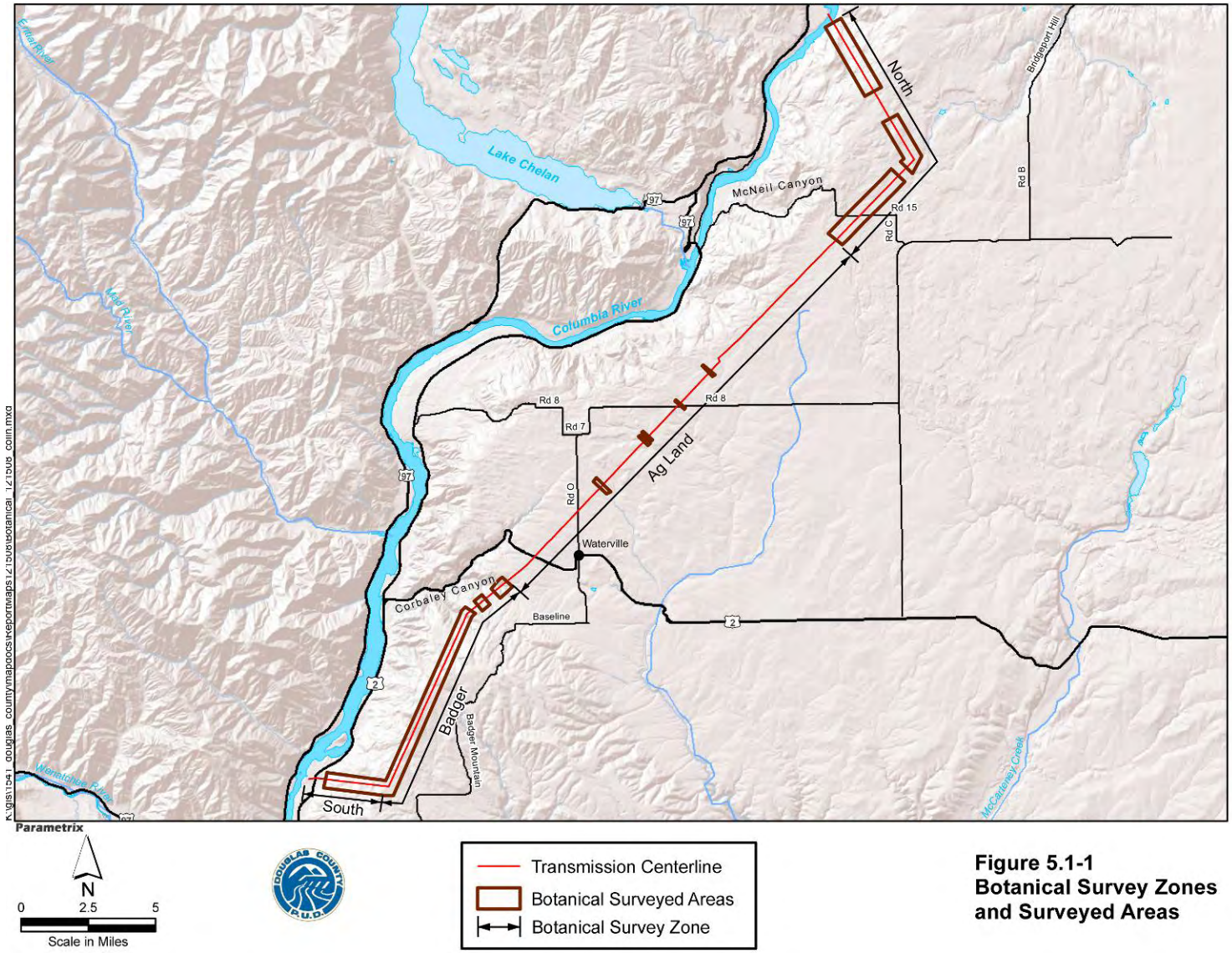

Figure 5.1-1 Botanical Survey Zones and Surveyed Areas

5.1.1.2 Field Surveys

Surveys for RTE plants involved visually searching suitable habitat in the transmission line corridor. RTE plant surveys were conducted on foot using a random meander approach described in Nelson (1985). Surveys were conducted by botanists experienced in conducting RTE plant surveys.

The habitat requirements of RTE species were used to refine survey efforts. Habitats with a high probability of supporting one or more RTE plants received thorough coverage. Habitats with a lower likelihood of supporting these species were surveyed less intensively. Actively cultivated fields and other habitats that did not appear suitable for any RTE species were not surveyed. RTE species were recorded and mapped when encountered, and their habitats were described.

The timing of RTE plant surveys is critical to the success and validity of the survey. The number of surveys to be conducted in 2008 was determined by the blooming period of each RTE plant species. Surveys were conducted during May 5–8, June 9–12 July 8–11, 2008, and September 2–5, 2008.

5.1.1.3 Documentation and Mapping

RTE plants were identified in the field using the Flora of the Pacific Northwest (Hitchcock and Cronquist, 1973) and the Field Guide to Selected Rare Plants of Washington (WNHP, 2005). A variety of sources were utilized to verify tentative species identification, including plant descriptions from the Field Guide to Selected Rare Plants of Washington (WNHP, 2005), other floras, and published papers.

WNHP sighting forms were completed for each RTE plant population found in the transmission line corridor. Data collected includes population size and area, phenology (e.g., flowering period), habitat, slope, aspect, elevation, soils, and associated species. Factors affecting survival of RTE species (e.g., deer browse, disturbance) were noted as applicable. The population locations were plotted on survey maps, and Global Positioning System (GPS) coordinates were collected to verify the mapped location and downloaded into an ArcView GIS. Photographs were taken of the RTE plants and habitats. Population size for RTE species was visually estimated (for large populations) or counted (for small populations).

5.1.2 Invasive Species Surveys

The invasive plant species surveys included the following tasks: (1) pre-field review, (2) field surveys, and (3) documentation and mapping of results. Each task is described below.

5.1.2.1 Pre-field Review

Invasive species surveys were focused on plants listed in Washington State as Class A and Class B Designate noxious weeds by the NWCB. Class A weeds are non-native species whose distribution in Washington State is still limited; eradication of all Class A weeds is required by state law. Class B weeds are non-native species whose distribution is limited to portions of

Washington State. Because of differences in distribution, treatment of Class B weeds varies between regions of the state. In regions where a Class B weed is not yet widespread, prevention of new infestations is required; in these areas, the weed is a "Class B Designate," meaning it is designated for control by state law. The Wells Project is within Noxious Weed Regions 3 and 6 (NWCB, 2008). As part of the pre-field planning, the State's lists of Class A and Class B Designate species were reviewed to develop an understanding of the invasive plants potentially occurring in the study area (Appendix C). Botanists also reviewed the morphological characteristics of Class A and B weeds potentially occurring in the study area to develop a search image, which improves detection and recognition abilities.

5.1.2.2 Field Surveys

Surveys for invasive plant species were conducted in the transmission line corridor in conjunction with RTE plant surveys and field verification of the vegetation cover type mapping. Since many invasive species mature later in the growing season, most of the invasive plant species survey effort was focused in early June, early July, and early September, when these species were easiest to see and identify.

5.1.2.3 Documentation and Mapping

Infestations of invasive species were marked on project maps, and GPS coordinates were collected to verify the mapped locations. Each infestation was identified as a point on a field map and digitized into ArcView GIS. Infestations were mapped as accurately as possible. Area estimates are provided in the GIS attribute data for infestations that were assessed in the field. Data gathered for each infestation includes the estimated total number of plants and the aerial cover and density, as developed by the North American Weed Management Association (NAWMA, 2003): trace (T = < 1%), low (L = 1%–5%), moderate (M = 5.1%–25%), and high (H = 25.1%–100%). Class B (non-designate) and Class C noxious weeds were noted if observed in the study area, but were not mapped.

5.1.3 Cover Type Mapping

The vegetation cover type mapping study involved three phases of work: Phase 1 identified general cover types in the transmission line corridor through photo interpretation, Phase 2 identified general cover types through field verification, and Phase 3 was the production of the final cover type map.

Douglas PUD received digital color aerial photography of Douglas County from the Natural Resources Conservation Service. The color digital orthophotos have a pixel resolution of one meter. Using these digital orthophotos, general vegetation types were delineated by "heads-up" digitizing in ArcView GIS, which is an in-office process that involves manually delineating cover type polygons onto aerial orthophotos by tracing a mouse pointer over features displayed on a computer monitor. Both vegetation types and land use classifications were assigned.

The cover type classification system was developed by Douglas PUD and was derived from systems developed by Daubenmire (1970) for upland vegetation in eastern Washington and

Cowardin et al. (1979) for wetlands. The classification system also included descriptors for areas where land use has obviously modified the landscape via agriculture, urban, residential, or industrial developments, etc.

ArcView GIS was used to generate field maps containing the color orthophotography and the cover type polygons. Preliminary maps of vegetation cover types were verified in the field by a botanist while conducting the RTE and invasive plant surveys. Field verification involved checking a subset of the boundaries of the cover type polygons, confirming or correcting the assigned cover type classification, and reassigning correct classifications as needed. Corrections to the boundaries and cover type designations were made directly on field copies of the maps and digitized into ArcView GIS.

Additional data were collected during the field verification to describe the characteristics of each mapped cover type, including species composition, stand structure, habitat quality and land use. Information collected includes:

- Plant species composition, including the dominant and more prominent associated species in each vegetation layer (tree, shrub, and herbaceous layers).
- Structural data, including estimates of average heights and areal cover of each vegetation layer.
- Predominant land use(s) associated with each cover type.
- Rare, unique, and particularly high-quality vegetation/habitat.

5.2 Wildlife Resources

Pursuant to the study goals and objectives for wildlife resources, surveys conducted in the Wells Project transmission line study area focused on birds, mammals, and reptiles. The Agreed-Upon Study Plan for wildlife does not include any survey requirements for amphibians; incidental observations of amphibians were recorded to provide a more complete list of the wildlife species present in the study area. During all surveys, special emphasis was made to document the presence of and habitat use by RTE species. A list of RTE wildlife species identified as potentially occurring in the study area is provided in Appendix D.

5.2.1 Avian Surveys

Surveys conducted for avian species included point-transect surveys as well as surveys designed specifically to document use of the study area by prairie grouse, evidence of nesting by raptors and corvids, and evidence of avian collisions with the transmission line and associated structures. Point count surveys (Ralph et al., 1995) were conducted to assess avian use of study area habitats. In addition to formal surveys, avian species observed incidental to other field studies were recorded and included in a comprehensive wildlife species database compiled for the project.

- The general methodology for avian field studies was designed to meet the following specific objectives:

- Identify and document the location of any federal and state RTE avian species that use the study area.
- Describe the habitat features used by RTE avian species observed within the corridor.
- Document the presence of other avian species and provide relative abundance data for birds using the study area.
- Document raptor and corvid nesting and sharp-tailed and greater sage-grouse use within the study area.
- Document any evidence under the transmission line of avian collisions.

The subsections below describe specific methodology for each component of avian field studies conducted in 2008.

5.2.1.1 Pre-field Planning

Before conducting avian surveys, biologists reviewed available data and conducted reconnaissance within the study area to determine the extent of available habitat and to identify suitable locations for the establishment of avian point count survey stations. The specific intent was to establish point count stations to sample a comparable amount of each cover type proportional to its representation in the study area. Biologists also obtained a checklist of birds for Douglas County (http://www.wabirder.com/county_map.html) and reviewed the songs, calls, and visual characteristics of species with the potential to occur in the study area. All biologists conducting the avian surveys had expertise in auditory as well as visual identification of birds.

At the time of pre-field planning, Douglas PUD identified six major cover classes within the study area: Grassland, Open Conifer, Riparian, Shrub-Steppe, Talus, and formerly cultivated lands currently enrolled in the Conservation Reserve Program (CRP; this cover type is called Inactive Agriculture in subsequent analyses of habitat associations). Additional cover classes included actively cultivated fields and various barren and disturbed sites (e.g., highways, gravel roads, orchards). During the course of the field surveys, this cover type mapping was updated; several new types were identified and some revisions were made to previous determinations based on field observations. Analyses in this report are based on the revised cover type data layer that was developed through this process. For the wildlife analyses, the Cleared Conifer and Cleared Open Conifer were grouped into a single cover type (Cleared Conifer).

Of approximately 1,117 acres of land area within the 41-mile transmission line corridor, nearly 600 acres (52 percent) consists of actively cultivated agricultural lands and was thus excluded from the study area (Table 5.2-1). Fifty point count stations were established within six segments of the transmission line corridor (Figure 5.2-1), with the proportional distribution of individual stations approximately equivalent to the distribution of cover types. For example, the largest proportion of the study area was mapped as the Shrub-Steppe cover type; therefore, the greatest number of stations (29 of 50) was established in areas classified as Shrub-Steppe. The avian point-transect survey segments correspond with the botany survey zones as follows: the North botany survey zone includes the Wells and Mud Springs segments; the Badger botany survey zone includes the Corbaley, Badger North, and Badger South segments; and the South botany survey zone corresponds to the Rocky survey segment.

Table 5.2-1 Distribution of Cover Types and Point Count Stations in the Wells Project Transmission Line Study Area

Cover Type	Acres in Corridor	Percent of Study Area	Number of Point Count Stations	Percent of Point Count Stations
Active Agriculture	583	N/A	1	2
Cleared Conifer	51	10	7	14
Conifer	13	2	1	2
Grass [1]	25	5	3	6
Inactive Agriculture [2]	66	12	5	10
Other [3]	23	4	0	0
Riparian	11	2	3	6
Shrub-Steppe [1]	341	64	29	58
Talus	3	1	1	2
Total	***1,117***	***100***	***50***	***100***

[1] Note that several stations classified as Grass or Shrub-Steppe during breeding season surveys were affected by the Badger Mountain Fire and were reclassified as Grass–Burned or Shrub-Steppe–Burned for the fall season surveys. The total amount of area burned within the transmission line corridor was not calculated; therefore, values in this table reflect conditions during breeding season surveys.
[2] Includes CRP parcels.
[3] Includes highways, gravel roads, orchards, and other non-vegetated or atypical cover types.

The placement of point count stations was constrained by practical and logistical considerations. For example, individual stations were at least 820 feet apart to avoid double-counting individual birds. At the same time, stations had to be placed in survey segments that would permit a single biologist to conduct surveys at all stations in a segment during one morning, while walking between stations. In addition, the patchy and/or limited distribution of some habitat types required that some stations be placed in specific locations. Logistical constraints and the configuration of some habitat types (e.g., narrow riparian corridors) resulted in the placement of some stations in areas with more than one cover type nearby.

Each station was assigned a single cover class based on the cover type that covered the greatest proportion of the 115-foot (35-meter) radius that defined the survey plot. For example, if 51 percent of the area within the survey plot consisted of Shrub-Steppe habitat and 49 percent consisted of Riparian habitat, the station would be assigned to the Shrub-Steppe class. It should be noted that in July 2008, after spring surveys were complete but before fall surveys began, several stations in the Rocky survey segment were affected by the Badger Mountain Fire. As a result, the dominant cover type in these plots changed between the two sets of surveys.

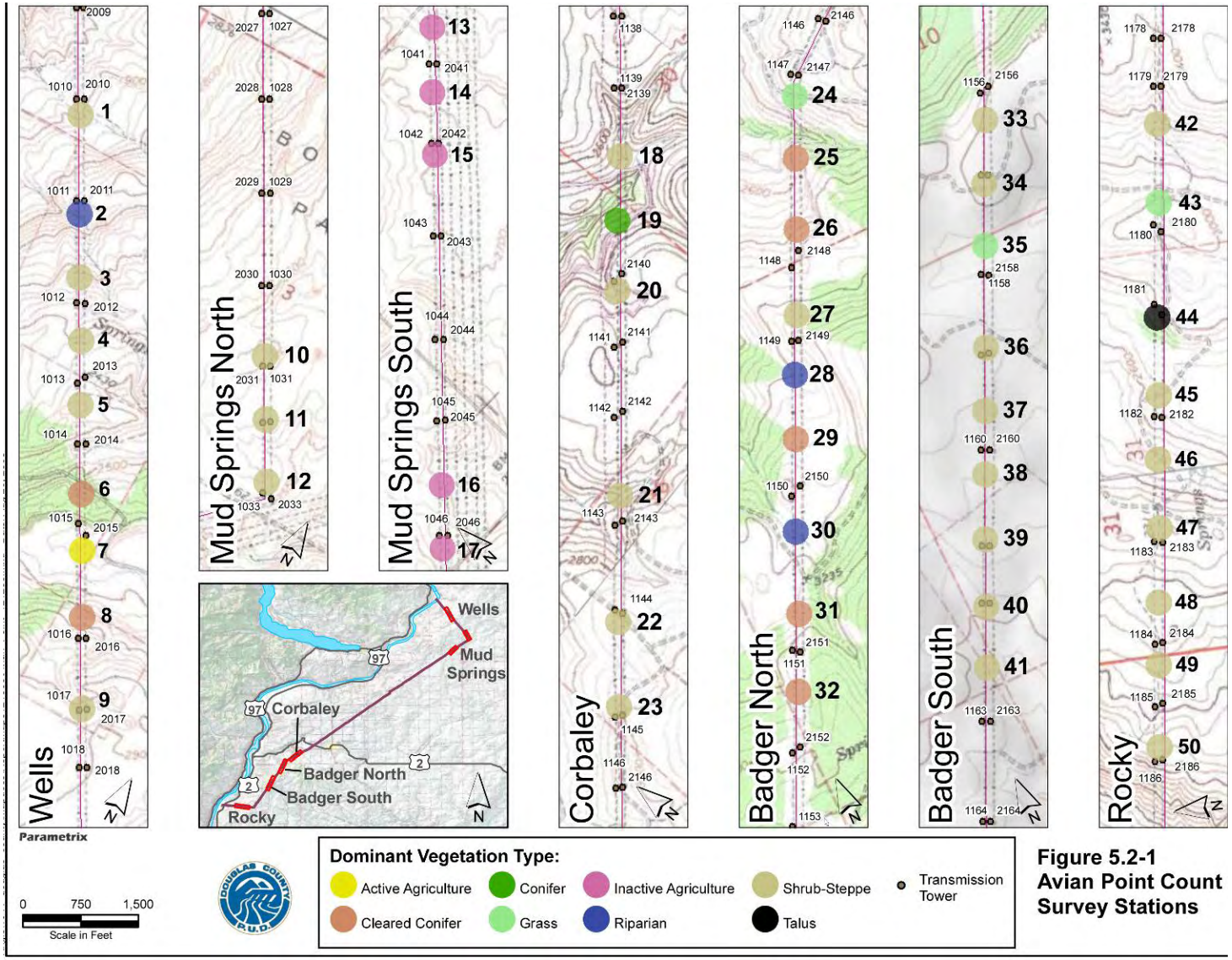

Figure 5.2-1 Avian Point Count Survey Stations

For the surveys to document evidence of transmission line collisions, Douglas PUD identified two areas where birds have a higher probability of colliding with the transmission lines. The basis for this determination included cover types, topographic maps, local knowledge of bird behavior, and biological and line-related factors influencing collision risk. The two identified areas were both near the northern end of the transmission line corridor: the portion of the line near Cornehl Lake, and where the 230 kV transmission line crosses the Columbia River. Consequently, surveys for dead birds were conducted along a 1-mile stretch of the corridor in the Boulder Park area (approximately 2 miles west of Cornehl Lake) and along a 0.5-mile stretch immediately east of the river crossing (Figure 5.2-2).

5.2.1.2 Field Surveys

Four different types of field surveys were conducted to gather data on bird species using various habitat types in the vicinity of the Wells Project transmission line corridor: (1) point-transect surveys, (2) prairie grouse surveys, (3) raptor and corvid nesting surveys, and (4) avian collision surveys. The methods implemented for each of these survey types are described in greater detail below.

Point-Transect Surveys

Assessing avian use during the breeding season involved the use of point count stations (Bibby et al., 1992; Ralph et al., 1995) and transects (Leukering et al., 2000; Altman and Bart, 2001). The use of this combination of monitoring methods follows the recommendation of Altman and Bart, (2001). Point-transect surveys are considered an effective method for gathering data on the occurrence and relative abundance of species with a high degree of ecological variability, including those that (1) occur in habitats that are not well monitored, (2) are too rare or erratic to be sampled effectively by other means, or (3) have life history patterns that are not conducive to other standard methodologies (e.g., inconspicuous, colonial, nocturnal, low densities).

A combination of point count stations and transects distributed throughout the study area was sampled to maximize the probability of detecting the less common species as well as collecting adequate data on all species. This approach is termed a point-transect method (Altman and Bart, 2001) and involves conducting standard 5-minute point count surveys at stations (Bibby et al., 1992; Ralph et al., 1995) and recording all detections of special species while walking routes between point count stations (Altman and Bart, 2001).

Point count stations were located along the transmission corridor centerline and were at least 820 feet (250 meters) apart to avoid double-counting individual birds. The location of each station was recorded using a GPS receiver. Each station marked the center of a 115-foot-radius (35 m) plot, which served as the basis for all calculations of relative abundance. The plot radius was fixed at 115 feet so that each survey plot would fit within the 235-foot-wide transmission line corridor.

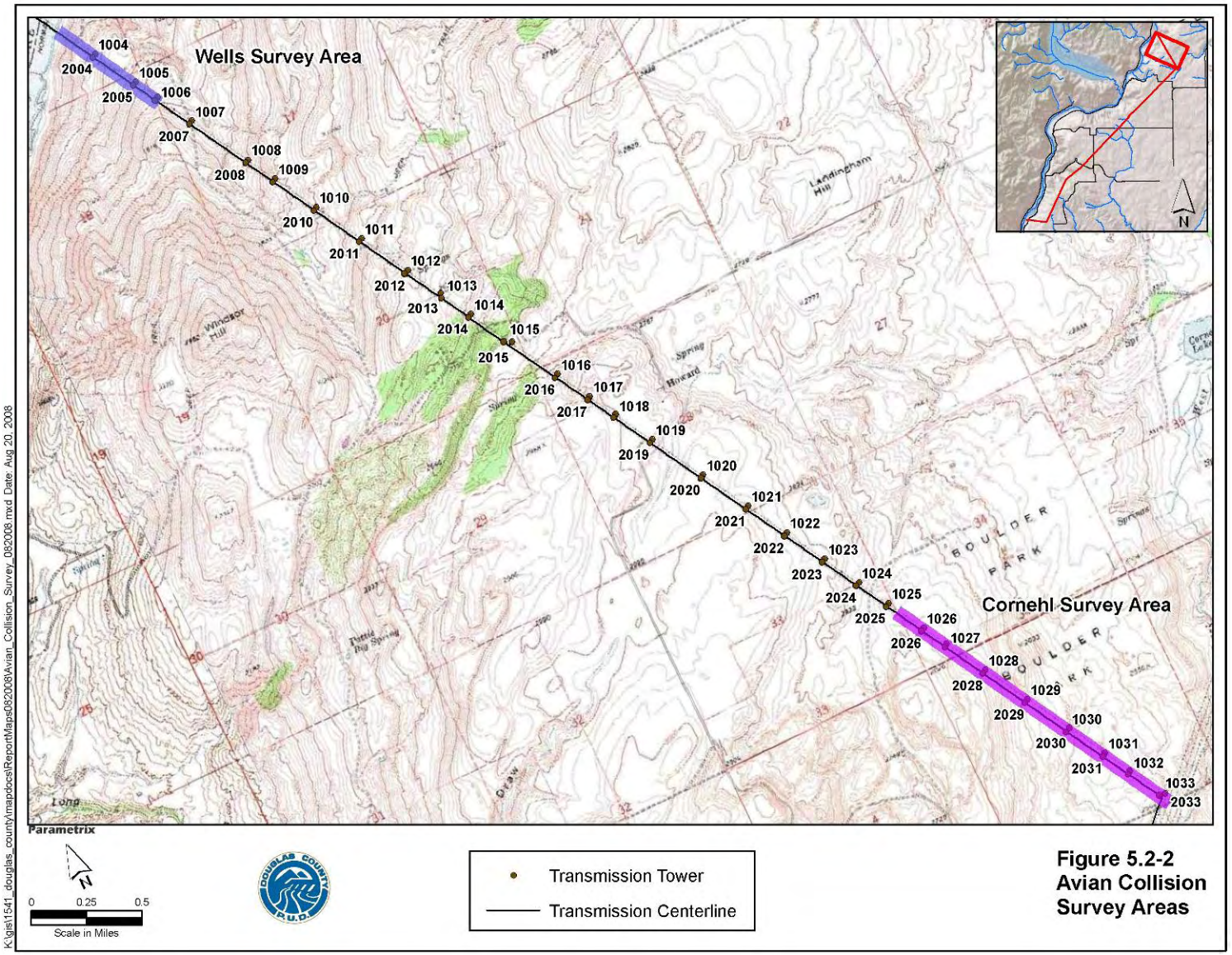

Figure 5.2-2 Avian Collision Survey Areas

Breeding season surveys were conducted four times from early May through late June, which is considered the peak of breeding season in north-central Washington. Four point count surveys were conducted at each of the 50 stations, for a total of 200 point count surveys. Each point count station was surveyed once by a biologist during each of the four survey periods: May 6–8, May 19–22, June 4–6, and June 17–19, 2008. All surveys during the breeding season started no more than 15 minutes before sunrise and were completed within 4 hours after sunrise.

Fall season surveys were conducted during four survey periods: September 3-5, September 24-26, September 30-October 2, and October 14-16, 2008. Four point count surveys were conducted at all but two of the 50 stations, for a total of 198 point count surveys. Surveys at two stations could not be completed on October 2 because heavy rain affected bird activity and detectability. All surveys during the fall season were completed before noon (standard time).

Each point count survey station visit lasted five minutes (following a settling period of at least one minute), during which a biologist tallied the number of birds of each species observed in the station vicinity. Biologists also identified and documented birds observed while walking between stations during the survey period. For each detection, biologists recorded the species, sex, age, detection type (auditory or visual), habitat type, whether the bird was using habitat or flying over, and whether the bird was first observed (a) within the survey plot, (b) outside the plot but within the 235-foot-wide transmission line corridor, or (c) outside of the corridor.

Observations of birds outside the corridor were generally limited to those up to 200 feet beyond the corridor edge. Data were recorded on a field form (Appendix E) and entered into a database in Microsoft Excel. Birds were recorded based on their location at time of first detection and were not double-counted. Observations recorded between stations emphasized special-status (e.g., RTE) species and those that had not yet been detected in a particular area or during a particular survey period. Data were also recorded to gather information on likely nesting or foraging behaviors.

Prairie Grouse Surveys

Wildlife biologists and botanists performing field surveys were trained to differentiate field sign (individuals, scat, tracks, and feathers) from sage-grouse and sharp-tailed grouse, and to understand the seasonal differences and estimate the age of scat encountered. In addition to recording incidental observations during all other field work, biologists conducted formal field surveys to detect grouse presence in late winter, when snowmelt had occurred to a sufficient extent to allow lekking behavior (i.e., breeding displays) to take place. Two additional surveys were conducted after the breeding season, in September. Grouse transects were placed randomly within large continuous blocks of native habitat in the study area along the transmission line corridor (Figure 5.2-3). Biologists walked transects looking for evidence of use by sage-grouse or sharp-tailed grouse. All evidence of use by grouse and other similar birds was recorded, including observations of dusky grouse (*Dendragapus obscurus*), chukar (*Alectoris chukar*), gray (Hungarian) partridge (*Perdix perdix*), ring-necked pheasant (*Phasianus colchicus*), and California quail (*Callipepla californica*). Locations of grouse observations were recorded with a GPS receiver, and relevant data were entered on a field form (Appendix E). All data were stored in a database and mapped using ArcView GIS.

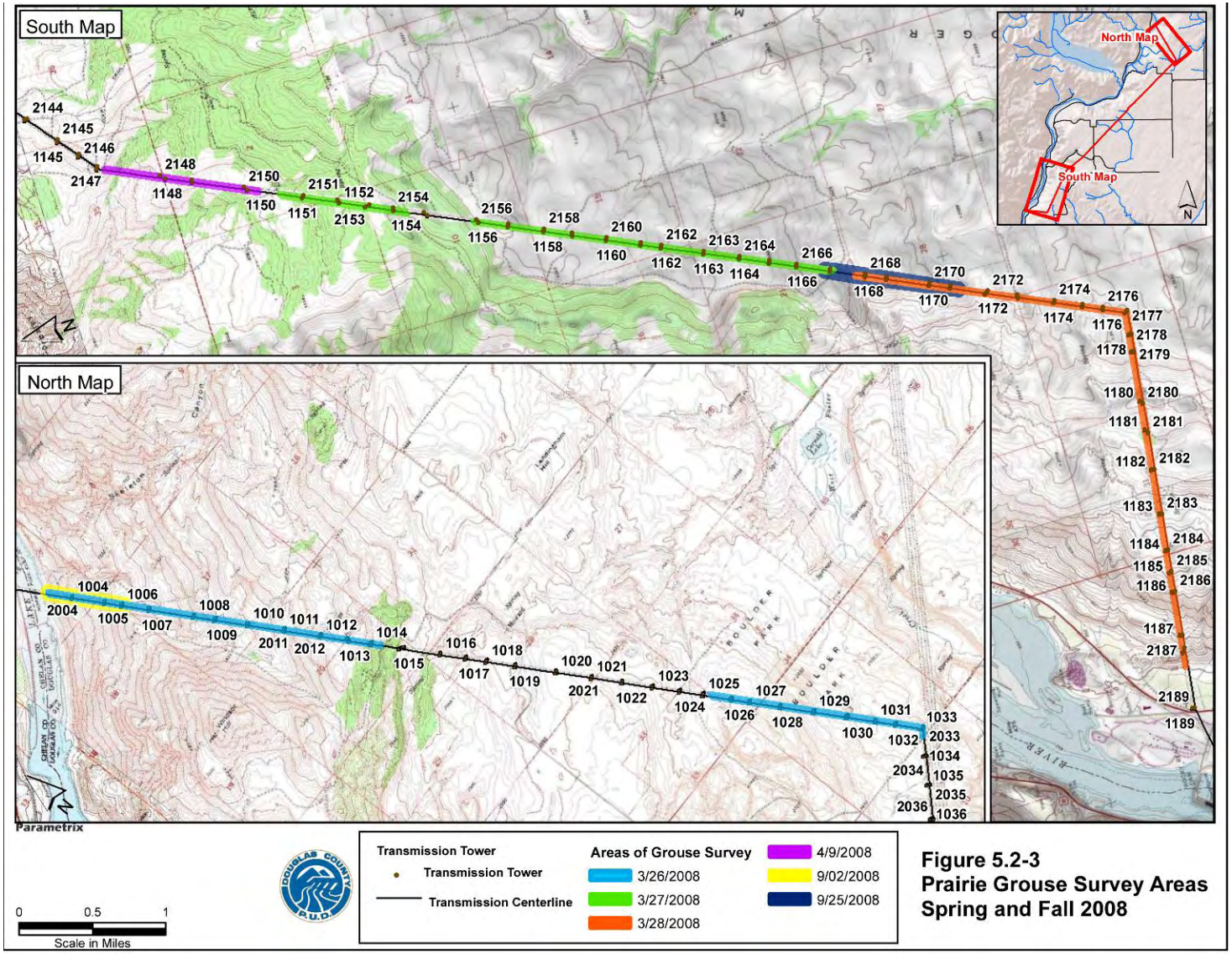

Figure 5.2-3 Prairie Grouse Survey Areas, Spring and Fall 2008

Raptor and Corvid Nest Surveys

In the course of all field survey work, biologists examined the transmission line and towers for any signs of nesting or other use by raptors and corvids. Towers were scanned with binoculars and the area underneath was searched for pellets or accumulations of whitewash. Observations were recorded on a field form (Appendix E). Additional information about the presence of nests on transmission towers was provided by Douglas PUD staff that performed maintenance inspections of the corridor.

In addition to these ground-based survey efforts, the entire transmission line corridor was surveyed from the air on May 21, 2008, between approximately 8:30 am and 1:00 pm. Two biologists conducted the survey from an Enstrom 480 helicopter owned by Central Valley Helicopter, Inc. of Ellensburg, Washington, and operated by a pilot experienced in wildlife surveys. The helicopter provided excellent horizontal, downward, and overhead visibility through the bubble, two sets of chin windows, and large overhead windows. One biologist occupied the front seat and the other was in a rear seat.

The helicopter traveled at an altitude of approximately 200 feet above the ground, which allowed spotting of nests and birds. General flight speed along the transmission line corridor was between 25 and 50 miles per hour, but when woodlands, riparian areas, isolated trees, large rock outcroppings, or abandoned or seldom used human structures (e.g., homesteads, barns, grain silos, and windmills) were encountered, the pilot slowly circled the site to allow close inspection for nests.

When raptors, corvids, or potential nest sites were detected, the helicopter hovered at a height that minimized disturbance but provided an opportunity to confirm species, nest material, nest height above ground, occupancy, activity/status, and condition, and to obtain accurate GPS location coordinates. Species determination was possible only if adults were present. Photos were taken of significant observations using a digital camera.

Avian Collision Surveys

The process of collecting avian collision data consisted of two components: (1) a focused survey of two segments determined likely to have waterfowl and water birds flying through, and (2) observations of avian carcasses incidental to all other wildlife and botanical studies along the entire corridor. The focused surveys occurred along a 1.5-mile segment of the corridor near Cornehl Lake and a 0.5-mile segment of the corridor east of the river crossing at Wells Dam. Additional survey effort was devoted to the immediate vicinity of the Wells Fish Hatchery on the west side of the river.

In the vicinity of Cornehl Lake and the Columbia River crossing, biologists conducted pedestrian surveys of the entire transmission line corridor five times between late March and mid-May and an additional five times in September and October. During each of these two time periods, the interval between visits ranged from 6 to 21 days. During each visit, a group of two or three biologists walked parallel, meandering routes, covering one-half the width of the transmission line corridor in one direction and the other half on the way back to their starting point.

For any avian carcasses or body parts that were found, including concentrations of feathers, surveyors recorded the following information (to the extent possible, depending on the condition of the carcass) on datasheets (Appendix E): species, sex, age, physical condition, signs of trauma, probable cause of death, and GPS location. All carcasses and feather piles found were photographed before being disturbed for closer examination. Fresh carcasses were examined for signs of trauma (fresh blood, open wounds), electrocution (burned flesh or feathers), starvation (emaciated muscles), or predation (signs of plucking and/or feeding). Older carcasses were searched for broken bones or other signs of skeletal trauma.

5.2.1.3 Analysis and Documentation

All data were entered into and stored in a database. All bird detections during the 2008 field surveys were entered into an Excel spreadsheet database that included all data from the point-transect surveys, as well as incidental observations. Analysis of avian data involved calculation of species richness and species relative abundance (number per station per survey period) for each of the cover types identified in the study area. ArcView GIS was used to develop report maps that display survey locations and significant findings.

Data analysis included the following:

- Developing a habitat-species matrix showing the distribution of avian species detected across habitat types.
- Summarizing the total number of detections for each species by habitat. In the results section (Section 6.2.1.1), data are presented in two ways: (1) for all detections based on the habitat in which each bird was actually observed; and (2) by plot (in-plot detections), which may include several habitats but is defined by the dominant habitat type.
- Relative abundance was calculated as the number of birds of each species detected per survey, with stratification by primary plot habitat type.

5.2.1.4 Avian T-line Interaction Literature Review

A literature review was conducted to identify potential effects of the 230 kV transmission lines and towers on raptors and prairie grouse. Refereed journal articles and gray literature were reviewed. The literature review serves as an update to the report that was prepared in 2006 (EDAW 2006b). The literature review, in Microsoft Access database format, is on file at the Douglas PUD office in East Wenatchee.

5.2.2 Mammal Surveys

The methods used for mammal field studies were designed to meet the following specific objectives:

- Identify and document the location of any federal and state RTE mammal species that use the study area.
- Describe the habitat features used by RTE mammals observed within the corridor.

- Document the presence of other mammal species in the study area.

The subsections below describe the methods for mammal field studies conducted to date.

5.2.2.1 Pre-field Planning

A literature review identified 49 mammal species with ranges that overlap or occur near the Wells Project transmission line study area. Six of these are RTE species of particular interest, including Merriam's shrew (*Sorex merriami*), Townsend's big-eared bat (*Corynorhinus townsendii*), black-tailed jackrabbit (*Lepus californicus*), white-tailed jackrabbit (*L. townsendii*), pygmy rabbit (*Brachylagus idahoensis*), and Washington ground squirrel (Appendix D). A list of mammal species that may occur in the study area is included as Appendix F. Before conducting the field surveys, biologists reviewed field guides, WDFW PHS maps and database records, and other existing information related to species identification, distribution, and habitat requirements. This information helped focus the survey effort for mammal species.

5.2.2.2 Field Surveys

Mammals using the study area were documented incidentally to all field surveys by recording visual observations or sign, including scat, tracks, or vocalizations. An incidental sighting form was used to record all observations of RTE mammals, along with the habitat characteristics of sighting locations (Appendix E).

5.2.2.3 Analysis and Documentation

The presence of mammals in the survey area was summarized based on identification of animals or sign during field surveys. Results are presented in Section 6.2.

5.2.3 Reptile Surveys

The methods used for reptile field studies were designed to meet the following specific objectives:

- Identify and document the location of any federal and state RTE reptile species that use the study area.
- Describe the habitat features used by RTE reptiles observed within the corridor.
- Document the presence of other reptile species in the study area.

The subsections below describe the methods for reptile field studies conducted during 2008.

5.2.3.1 Pre-field Planning

A literature review identified the following 12 reptile species with ranges that overlap or occur near the Wells Project transmission line study area:

- Painted turtle (*Chrysemys picta*)

- Pygmy short-horned lizard (*Phrynosoma douglassii*)
- Sagebrush lizard (*Sceloporus graciosus*)
- Western fence lizard (*Sceloporus occidentalis*)
- Western skink (*Eumeces skiltonianus*)
- Rubber boa (*Charina bottae*)
- Racer (*Coluber constrictor*)
- Striped whipsnake
- Night snake (*Hypsiglena torquata*)
- Gopher snake (*Pituophis melanoleucus*)
- Western terrestrial garter snake (*Thamnophis elegans*)
- Common garter snake (*Thamnophis sirtalis*)
- Western rattlesnake (*Crotalus viridis*)

Two of these (sagebrush lizard and striped whipsnake) are RTE species (Appendix D). Before conducting the field surveys, biologists reviewed field guides, WDFW PHS maps and database records, the Washington State Amphibian and Reptile Atlas (WDNR website), and other existing information related to species identification, distribution, and habitat requirements. This information helped focus the survey effort for reptile species.

5.2.3.2 Field Surveys

Biologists conducted focused reptile surveys during May and June to maximize the probability of suitable weather conditions (warm and dry) for detecting these species. Surveys were conducted in representative native habitat within the study area. Focused visual encounter surveys took place at avian point count stations. These area-constrained surveys were conducted during the afternoon hours after the completion of avian surveys. During the reptile surveys, biologists examined ground vegetation and looked under cover objects (e.g., logs and large rocks) throughout the 115-foot-radius plot and recorded all observations of reptiles. All cover objects were returned to their original position to avoid degradation of habitat. All observations of RTE reptiles were recorded and habitat characteristics were identified. Data collected during the area-constrained surveys were recorded on datasheets (Appendix E). Biologists also recorded all incidental observations of reptiles encountered during other field surveys.

5.2.3.3 Analysis and Documentation

The relative abundance of reptiles was summarized based on survey effort (person-hours) and by site, with results presented in Section 6.2.

6.0 RESULTS

6.1 Botanical Resources

This section presents the results of the RTE plant and invasive species surveys in the study area and summarizes the cover types mapped in the transmission line corridor[1]. The areas where botanical surveys occurred are depicted in Figure 5.1-1. Approximately 18 miles of the transmission line corridor were surveyed.

6.1.1 RTE Plant Inventory

Field surveys for RTE plants were conducted four times over the 2008 growing season: May 5–8, June 9–12, July 8–11, and September 2–5, 2008. These surveys documented one occurrence of one RTE plant in the study area (Thompson's clover [*Trifolium thompsonii*]). The location and distribution of this species within the transmission corridor are shown on the map in Appendix G; information on this species is summarized below.

Thompson's clover (*Trifolium thompsonii*)

Legal Status Federal: Species of Concern
State: Threatened

Thompson's clover was the only rare plant observed in the study area. This species is endemic to southeastern Chelan County and southwestern Douglas County (WNHP, 2005). Generally, this species is known to occur northward from Wenatchee for approximately 20 miles. Populations are primarily located west of the Columbia River, with some to the east from ridge tops to canyon bottoms. Thompson's clover occurs in a variety of habitats and topographic positions ranging from open conifer forest to grassland and from steep slopes to flat benches. Commonly associated species include ponderosa pine (Pinus ponderosa), bluebunch wheatgrass (Pseudoroegneria spicata), big sagebrush (Artemisia tridentata), stiff sagebrush (Artemisia rigida), and serviceberry (Amelanchier alnifolia). Known populations occur from 140 feet to 3,760 feet elevation. Research suggests that Thompson's clover appears to achieve optimum stand conditions on sites where periodic grass-shrub eliminating fires occur (Scherer et al., 1997).

The identified occurrence covers over 11 acres within the study area and extends outside of the transmission line corridor. The transmission line access road crosses through the population, but does not appear to be a threat as many individual plants were observed on the road. Habitat is shrub-steppe, located mid-slope on the hills east of the Columbia River, where the landscape has undulating topography with gentle ridges and shallow draws. Elevation ranges between 2,275 and 2,675 feet. Associated species at this site include big sagebrush, bluebunch wheatgrass, crested wheatgrass (*Agropyron cristatum),* and silky lupine (*Lupinus sericeus*).

[1] The study area for RTE plants and invasive species excludes actively cultivated areas, whereas the cover type mapping includes all areas within the transmission line corridor.

6.1.2 Invasive Species Inventory

The 2008 list of Class A and Class B Designate weed species in Washington is provided in Appendix C (NWCB, 2008). There are 35 weed species listed as Class A in the state and 65 Class B Designate weeds for Regions 3 and 6 combined, 59 of which may occur in the study area. Region 3 includes all or portions of Douglas, Chelan, and Okanogan counties, and Region 6 includes all or portions of Douglas, Chelan, Kittitas, Grant, Yakima, and Adams counties. Some of these weeds occur primarily in habitats not found in the study area. The Class A and Class B Designate species were the primary focus of the invasive species inventory because, if these species are found, the NWCB requires control or management measures to be implemented. However, observations of widespread and abundant Class B (non-designate) and Class C weeds are also discussed below to provide a more complete inventory of invasive species in the Wells Project transmission line study area.

Field surveys for invasive plants were conducted four times over the 2008 growing season: May 5–8, June 9–12, July 8–11, and September 2–5, 2008. No Class A weed species were identified in the study area. However, 9 occurrences of two Class B Designate weed species (Dalmatian toadflax[2] [*Linaria dalmatica* ssp. *dalmatica*] and spotted knapweed [*Centaurea stoebe*]) were recorded and mapped (see maps in Appendix H).

In addition, two Class B (non-designate) weed species [Dalmatian toadflax and diffuse knapweed (*Centaurea diffusa*)] and three Class C weed species [field bindweed (*Convolvulus arvensis*), Canada thistle (*Cirsium arvense*), and bull thistle (*Cirsium vulgare*)] were also observed during field work. Control efforts for Class B weeds are not mandated by the state. Information on each of the Class B Designate, Class B, and Class C weed species is summarized below.

6.1.2.1 Class B Designate Weeds

Dalmatian toadflax *(Linaria dalmatica*)
Dalmatian toadflax is a Class B Designate in Douglas County south of Township 25N and west of Range 25E (approximately 4 miles north of Waterville, to the southern terminus of the study area). Dalmatian toadflax is a short-lived perennial plant native to the Dalmatian coast of Europe and nearby countries. It grows primarily in upland grass and shrub land communities and was first found in eastern Washington in the 1920s. The species spreads by horizontal, creeping roots and by seed. Mature Dalmatian toadflax plants are strongly competitive, particularly with shallow-rooted perennials and winter annuals. Because of its competitive ability, Dalmatian toadflax is a concern in pastures and rangelands, as well as in natural areas, where it may out-compete more desirable, native species (NWCB, 2008).

Two occurrences of Dalmatian toadflax were mapped in the study area (Appendix H). This Class B Designate species covers approximately 0.3 acre within the corridor. Additional occurrences were observed in the portion of the study area where Dalmatian toadflax is not designated for control north of Township 25N and west of Range 25E.

[2] Dalmatian toadflax is designated for control in that portion of the study area south of Township 25N and west of 25E only.

Spotted knapweed (*Centaurea stoebe*)
Spotted knapweed is a biennial or short-lived perennial with a deep taproot. This species first forms rosettes, then bolts, flowers, and goes to seed. Spotted knapweed may remain in the rosette life stage for one to several years behaving as an annual, biennial, or short-lived perennial, bolting in its first, second, or third or later summer, respectively. Initial invasions of this weed are highly correlated to disturbance (e.g., roads, agricultural activities, fire) (Mauer et al., 2006). Spotted knapweed is a very aggressive species that can infest large areas quickly, and is commonly found in dry meadows, pastures, rocky areas, gravel mines, roadsides, railroads, airports, vacant lots, hayfields, forest clearings, and on the sandy or gravelly floodplains of streams and rivers (NWCB, 2008).

Spotted knapweed occurrences were observed and mapped at 7 locations in the study area, primarily in shrub-steppe habitat (see Appendix H). This Class B Designate species covers approximately 25.6 acres within the corridor.

6.1.2.2 Class B Weeds

Diffuse knapweed (Centaurea diffusa)
Diffuse knapweed is a Class B non-designate weed. Diffuse knapweed is (typically) a biennial with a deep taproot. Similar to spotted knapweed, this species first forms rosettes, then bolts, flowers, and goes to seed. Diffuse knapweed may remain in the rosette life stage for one to several years behaving as an annual, biennial or short-lived perennial, bolting in its first, second, or third or later summer, respectively. It is very aggressive, forming dense colonies in agricultural settings, over-grazed rangelands, along riverbanks, and roadsides as well as any number of other disturbed habitats (Carpenter and Murray, 2005). It is one of the most widespread rangeland weeds in the western United States (Carpenter and Murray, 2005).

Diffuse knapweed occurs throughout the study area, primarily in shrub-steppe habitat.

6.1.2.3 Class C Weeds

Canada thistle (Cirsium arvense)
Canada thistle is a strongly rhizomatous perennial herb that forms dense clonal populations. This species spreads primarily by vegetative means (rhizomes), and secondarily by seed (Nuzzo, 2008). Canada thistle is found in almost every plant community disturbed by humans, and is common to roadsides, railway embankments, lawns, gardens, abandoned fields, sand dunes, agricultural fields, margins of forests, and waterways (NWCB, 2008).

Few populations of Canada thistle were observed, primarily in shrub-steppe habitat.

Bull thistle (Cirsium vulgare)
Bull thistle is a stout, spiny biennial that reproduces only from seed. It commonly occupies rangeland, agricultural land, roadsides, and a multitude of native areas that have been disturbed. Native to Europe, western Asia, and North Africa, bull thistle was introduced to North America and is now common throughout the Pacific States, and is the most common and widespread

pasture and rangeland thistle in western North America (Zouhar 2002). In the study area, one small occurrence of bull thistle was observed in shrub-steppe habitat near a riparian area.

Field bindweed (Convolvulus arvensis)
Field bindweed is a persistent, prostrate, perennial vine that spreads by rhizome and seed (Lyons, 2008). It has stems that can twine and form dense tangled mats and extensive roots that can penetrate deeply into the soil. Field bindweed occurs in a wide range of habitats: orchards, vineyards, roadsides, ditch banks, cropland, stream banks, and lakeshores.

Field bindweed was most commonly found on roads or roadsides, with few populations identified along the study area.

6.1.3 Cover Type Mapping

Twenty-three cover types were identified and grouped into 13 different categories: Active Agriculture, Cleared Conifer, Cleared Open Conifer, Conifer, Grass, Inactive Agriculture, Open Conifer, Riparian, Shrub-Steppe, Talus, Wetland–PEM, Wetland–PFO, and Other (includes borrow pit, county road asphalt, county road gravel, disturbed, eroded, farm yard, gravel, gravel road, highway, industrial, orchard) (Appendix I). The Inactive Agriculture cover type includes formerly cultivated fields where nonagricultural vegetation types have been allowed to grow. CRP parcels are a good example of the Inactive Agriculture cover type. It is important to note that portions of the southern end of the transmission line corridor were burned during the Badger Mountain Fire in July 2008 (Figures 6.1-1 and 6.1-2). Cover types that establish in post-fire conditions may be different from those mapped and observed in the field during pre-fire conditions. Vegetation in these areas was surveyed in September and documented along with pre-fire observations.

The total area of the Wells Project transmission line corridor is approximately 1,117 acres (Table 6.1-1). The most common cover type is Active Agriculture, covering over half the transmission line corridor. Shrub-Steppe is the dominant native vegetation type, mapped on 30 percent of the corridor. Details on each of these cover types are discussed below. A comprehensive plant species list is provided in Appendix J.

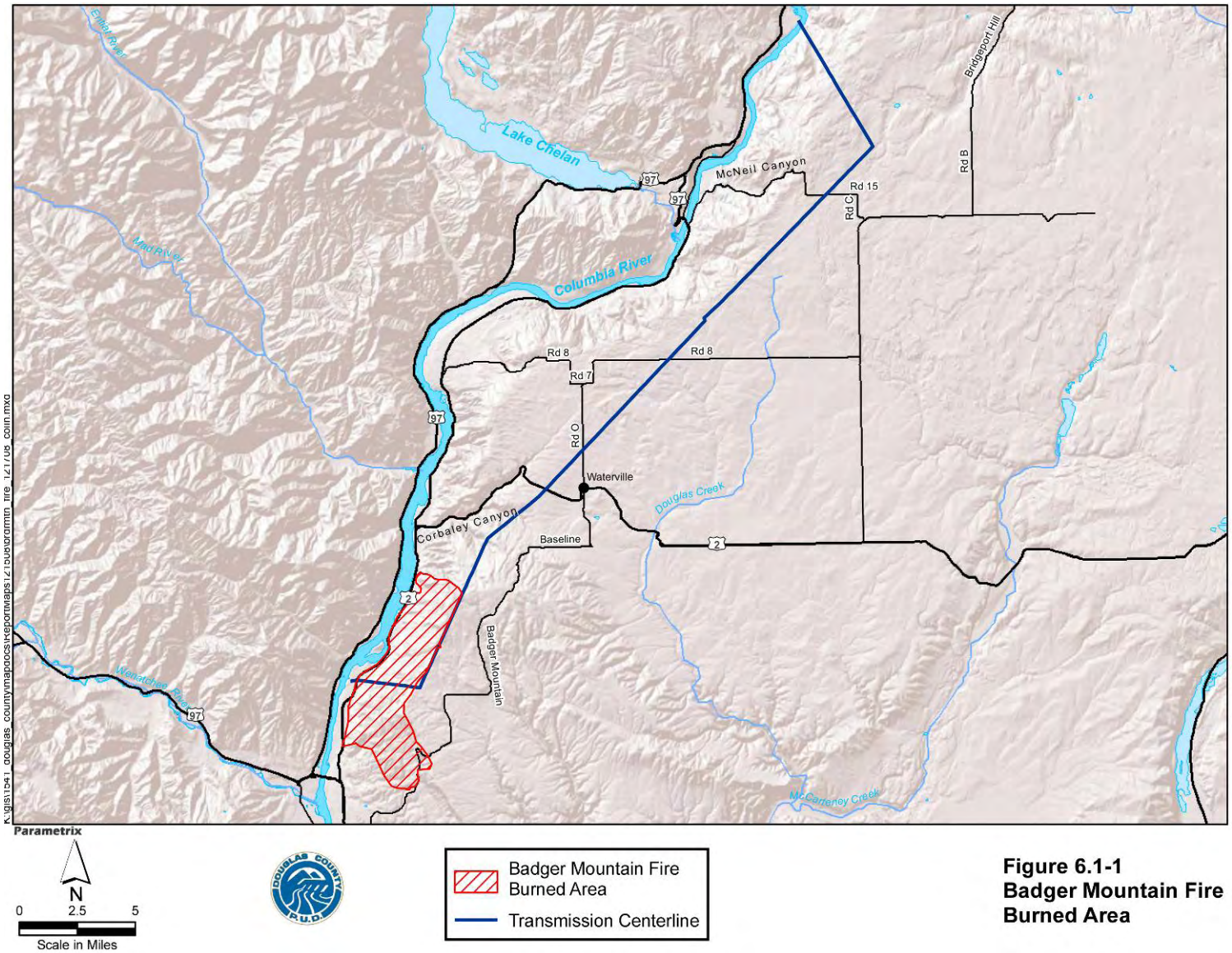

Figure 6.1-1 Badger Mountain Fire Burned Area

Figure 6.1-2 Badger Mountain Fire, July 2008

Table 6.1-1. Cover Type Acreage Within the Wells Transmission Line Corridor

	Area (acres) By Survey Zone				Total Area (acres) in Transmission Line Corridor	Percent of Transmission Line Corridor
	North	Ag Land	Badger	South		
Active Agriculture	91	468	24		583	52%
Cleared Conifer			41		41	4%
Cleared Open Conifer	7		3		10	1%
Conifer	<1		2		2	<1%
Grass	3	5	15	2	25	2%
Inactive Agriculture	66				66	6%
Open Conifer	<1		11		11	1%
Riparian	2	1	9	<1	12	1%
Shrub-Steppe	127	3	150	60	340	30%
Talus				3	3	<1%
Wetland - PEM	1		<1		1	<1%
Wetland - PFO	<1				<1	<1%
Other	3	4		16	23	2%
TOTAL	**300**	**481**	**255**	**81**	**1117**	**100%**

6.1.3.1 Active Agriculture

Over 50 percent of the transmission line corridor consists of the Active Agriculture cover type, defined by those lands that are actively cultivated. The majority of this cover type (468 acres) consists of wheat fields within the Ag Land Survey Zone in the middle of the transmission line corridor (between Towers #1053/2053 and #1139/2139). Few, smaller patches are also in the North and Badger Survey Zones.

6.1.3.2 Cleared Conifer

Cleared Conifer covers 4 percent (41 acres) of the transmission line corridor, all within the Badger Survey Zone. This cover type is similar to Conifer, but is cleared or maintained within the transmission line corridor. Conifer areas adjacent to the corridor are generally undisturbed or have an intact canopy. Although the tree layer in these areas has been removed, young Douglas-fir (Pseudotsuga menziesii) and ponderosa pine (Pinus ponderosa) continue to grow densely and would have a closed canopy at maturity. Other species identified in this cover type include Saskatoon serviceberry (Amelanchier alnifolia), big sagebrush (Artemisia tridentata), white sagebrush (Artemisia ludoviciana), common snowberry (Symphoricarpos albus), showy milkweed (Asclepias speciosa), tall annual willowherb (Epilobium brachycarpum), gray rabbitbrush (Ericameria nauseosa), oceanspray (Holodiscus discolor), and bulbous bluegrass (Poa bulbosa).

6.1.3.3 Cleared Open Conifer

The Cleared Open Conifer cover type occurs on 1 percent of the transmission line corridor (10 acres) in the North and Badger Survey Zones. This cover type is cleared or maintained within the transmission line corridor and is adjacent to Open Conifer areas that generally have undisturbed trees. The species composition is similar to Shrub-Steppe (see Section 6.1.3.9), but also contains a sparse amount of young Douglas-fir and ponderosa pine that would have an open canopy at maturity.

6.1.3.4 Conifer

The Conifer cover type was mapped on less than 1 percent of the transmission line corridor (2 acres). This cover type has one occurrence in the North Survey Zone and one occurrence in the Badger Survey Zone adjacent to a riparian corridor near Tyee View Loop Road. This cover type has a closed canopy of coniferous species dominated by Douglas-fir with some ponderosa pine. Conifer areas in the transmission line corridor are small, allowing overlap of shrub species from adjacent cover types to grow in the understory. Commonly observed species include Saskatoon serviceberry, common snowberry, oceanspray, big sagebrush, gray rabbitbrush, and wax currant (*Ribes cereum*). Typical herb layer species observed are common yarrow (*Achillea millefolium*), arrowleaf balsamroot (*Balsamorhiza sagittata*), silky lupine (*Lupinus sericeus* var. *sericeus*), longspur lupine (*Lupinus arbustus*), and bluebunch wheatgrass (*Pseudoroegneria spicata*).

6.1.3.5 Grass

Approximately 2 percent (25 acres) of the transmission line corridor consists of the Grass cover type. This cover type consists of an herbaceous stratum lacking tree and shrub strata. Grass areas occur in all four survey zones. Dominant species in this cover type include bluebunch wheatgrass, basin wildrye (*Leymus cinereus*), and cheatgrass (*Bromus tectorum*). Many of the common Grass species are similar to those found in the herbaceous layer of the Shrub-Steppe cover type.

6.1.3.6 Inactive Agriculture

The Inactive Agriculture cover type consists of those lands that are currently not cultivated, including CRP lands. This cover type occurs on 66 acres (6 percent) of the transmission line corridor, in the North Survey Zone. Many of these areas are in a transitional state, vegetated with introduced and native plants. Dominant plants include crested wheatgrass, gray rabbitbrush, tarragon (Artemisia dracunculus), and hoary tansyaster (Machaeranthera canescens). Since these areas have historically been disturbed, weedy species such as diffuse knapweed and Dalmatian toadflax are co-dominant.

6.1.3.7 Open Conifer

The Open Conifer cover type covers less than 1 acre in the North Survey Zone and 11 acres in the Badger Survey Zone. This cover type has an open canopy of coniferous trees, dominated by Douglas-fir and ponderosa pine. Many Shrub-Steppe associated species comprise the understory because of the lack of over story canopy closure. Shrub species commonly found are Saskatoon serviceberry, big sagebrush, three tip sagebrush (*Artemisia tripartita*), gray rabbitbrush (*Ericameria nauseosa*), Lewis' mock orange (*Philadelphus lewisii*), wax currant, common snowberry. Herb layer plants include common yarrow, tapertip onion (*Allium acuminatum*), cheatgrass, old-man's whiskers (*Geum triflorum*), silky lupine, longspur lupine, and bluebunch wheatgrass.

6.1.3.8 Riparian

The Riparian cover type was mapped on 12 acres (1 percent) of the transmission line corridor, occurring in all four Survey Zones. These riparian areas consist of deciduous forest or shrubland. Typical species include quaking aspen (*Populus tremuloides*), chokecherry (*Prunus virginiana*), Rocky Mountain maple (*Acer glabrum*), red-osier dogwood (*Cornus sericea*), Lewis' mock orange, Nootka rose (*Rosa nutkana*), wax currant, common snowberry, western white clematis (*Clematis ligusticifolia*), field horsetail (*Equisetum arvense*), Rocky Mountain iris (*Iris missouriensis*), feathery false lily of the valley (*Maianthemum racemosum*), starry false lily of the valley (*Maianthemum stellatum*), American speedwell (*Veronica americana*), and basin wildrye.

6.1.3.9 Shrub-Steppe

Shrub-Steppe is the most common native vegetation cover type within the transmission line corridor, covering 340 acres (30 percent) and occurring in all four Survey Zones. Big sagebrush, gray rabbitbrush, and antelope bitterbrush are the most dominant species in the shrub layer. The more common species in the herb layer include bluebunch wheatgrass, cheatgrass, parsnipflower buckwheat (*Eriogonum heracloides*), nineleaf biscuitroot (*Lomatium triternatum*), velvet lupine (*Lupinus leucophyllus*), silky lupine (*Lupinus sericeus* var. *sericeus*), arrowleaf balsamroot (*Balsamorhiza sagittata*), and desert yellow fleabane (*Erigeron linearis*).

6.1.3.10 Talus

One talus area covering 3 acres was mapped in the South Survey Zone. This area is mostly devoid of vegetation except along the fringe adjacent to Shrub-Steppe and where talus is shallow. Vegetation growing in the Talus cover type is sparse consisting of species that commonly occur in the adjacent Shrub-Steppe. Plants include big sagebrush, Saskatoon serviceberry, Rocky Mountain maple, green rabbitbrush (*Chrysothamnus viscidiflorus*), chokecherry, wax currant, roundleaf alumroot (*Heuchera cylindrica*), common yarrow (*Achillea millefolium*), and Oregon cliff fern (*Woodsia oregana*).

6.1.3.11 Wetland – Palustrine Emergent (PEM)

Palustrine emergent (PEM) wetlands are defined as nontidal wetland dominated by persistent emergents (grasses and/or forbs) (Cowardin et al. 1979). Emergent wetlands (Wetland – PEM cover type) occur in two small areas totaling approximately 1 acre (less than 1 percent) of the transmission line corridor. One is located in the North Survey Zone associated with a wet swale. The other is in the Badger Survey Zone and appears to be the headwaters of a small stream. These are seasonal wet areas dominated by an herbaceous layer. Principal species include basin wildrye, showy milkweed, and Canada thistle at the emergent wetland in the North Survey Zone. All dominant vegetation at the emergent wetland in the Badger Survey Zone was not identified[3], however Rocky Mountain iris, sedge species, rush species, and Japanese brome were observed.

6.1.3.12 Wetland – Palustrine Forested (PFO)

Palustrine forested (PFO) wetlands are defined as nontidal wetland dominated by trees (Cowardin et al. 1979). One forested wetland (Wetland – PFO cover type) was identified in the North Survey Zone mapped on less than 1 acre (less than 1 percent) of the transmission line corridor. This seasonal, depressional wetland continues outside of the corridor to the north, but does not appear to have a surface water connection to any other aquatic habitats. Principal species include quaking aspen, red-osier dogwood, and Nootka rose.

6.1.3.13 Other

The Other cover type aggregates many previously identified non-vegetative and nonnative vegetative cover types together including: borrow pit, county road asphalt, county road gravel, disturbed, eroded, farm yard, gravel, gravel road, highway, industrial, and orchard.

6.2 Wildlife Resources

Teams of two or three biologists conducted seven field visits over 24 days between March 26 and June 19, 2008. Between September 2 and October 28, 2008, teams of two biologists spent another 17 days in the field, conducting an additional five visits. Collectively, 83 person-days were spent conducting field surveys for wildlife species in spring and fall 2008. The following subsections summarize the results of individual survey efforts.

[3] Two attempts were made to identify plants in this wetland, but were quickly ended due to the presence of loose dogs.

6.2.1 Avian Surveys

6.2.1.1 Point-Transect Surveys

Biologists spent a total of 122 person-hours conducting 398 point count survey visits during May, June, September, and October 2008 (Table 6.2-1). With two exceptions, each station was visited eight times. The exceptions were Stations 49 and 50 in the Rocky survey segment, where surveys on the first visit in October could not be completed due to heavy rain. Ralph et al. (1995) recommend that surveys should not be conducted when it is raining, during heavy fog, or when noise from wind-blown vegetation interferes with counting. Within each of the six survey segments, biologists conducted avian surveys, walking between stations and recording bird observations along those transects. The total transect distance within the six survey segments was 9.0 miles, for a total of 72 miles of transect surveys during the eight survey visits.

Table 6.2-1 Avian Point Count Survey Stations and Transects in the Wells Project Transmission Line Corridor Study Area

Segment	Number of Point Count Stations	Total Transect Length (miles)
Wells	9	1.5
Mud Springs	8	1.6
Corbaley	7	1.8
Badger North	8	1.3
Badger South	9	1.3
Rocky	9	1.5
Total	***50***	***9.0***

A total of 3,732 birds of 103 species were observed during the study (Appendix K). Of these observations, 97 individuals could not be assigned to species; most of the latter were identified to species group (e.g., Unknown Flycatcher). An additional 220 bird observations were recorded incidentally. During the course of the eight survey visits, the number of new species observed in each season (i.e., species that had not been detected during previous visits during a given season) declined rapidly (Figure 6.2-1), indicating that the survey effort was likely sufficient to detect most species in the survey area during the survey period.

Of the 92 species identified during point-transect surveys, 76 were observed during the five-minute point counts at the 50 survey stations; the other 16 species were detected between stations only. To standardize for survey effort and habitat use, analysis of relative abundance was restricted to birds that were observed during point counts, excluding those that were seen only flying over and not using habitat within the plot. In the course of 398 point count survey visits, 607 birds were first detected within the 115-foot station plots, representing 50 species (10 of these observations could not be identified to a particular species).

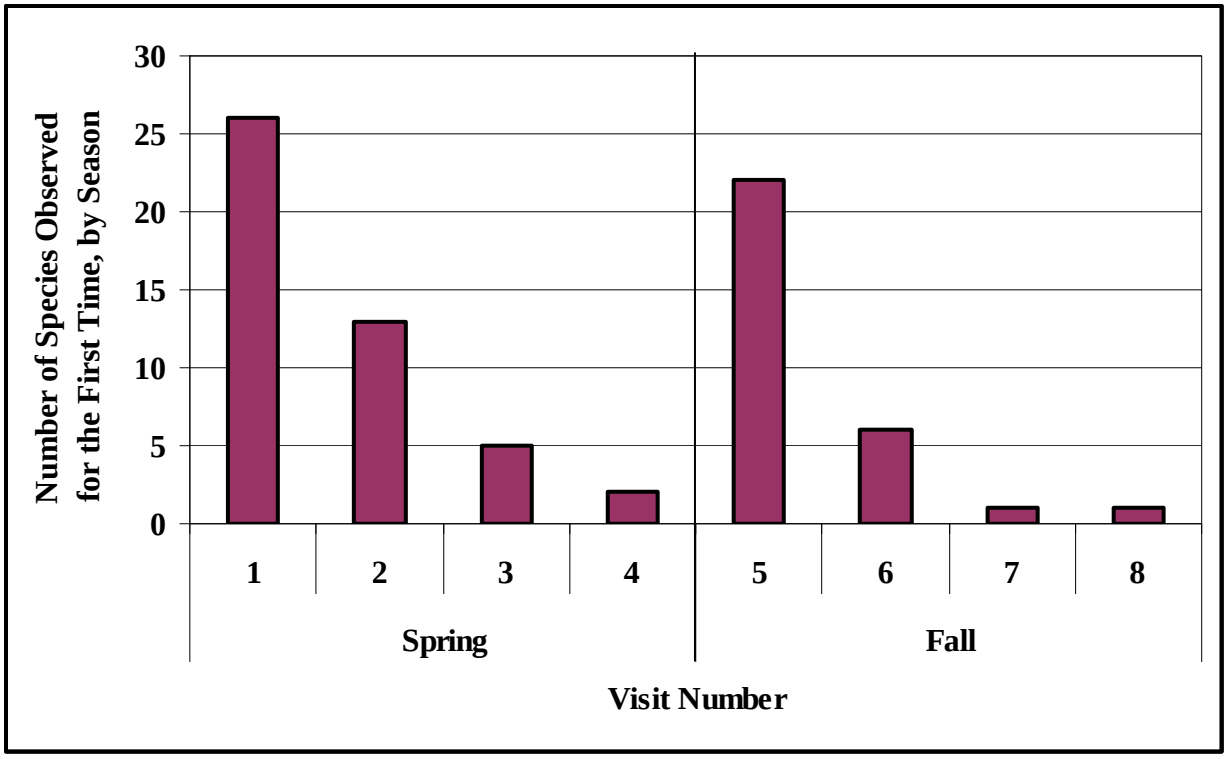

Figure 6.2-1 Number of Bird Species First Observed within Plots in the Wells Project Transmission Corridor Study Area, by Survey Visit and Season

Overall, an average of 0.74 ± 0.49 species and 1.95 ± 2.7 individual birds were detected per plot per survey during the eight survey periods (n = 398 surveys). The number of species detected per plot during spring surveys was greater than the number detected during fall surveys (1.15 species per plot in spring, compared to 0.41 species per plot in fall), while the number of individuals detected per plot did not vary substantially between the two seasons (1.96 individuals per plot in spring, 1.89 individuals per plot in fall). The relative abundance of individual bird species detected during these surveys ranged from 0.003 to 0.24 detections per survey (Appendix L). The order Passeriformes was most represented. American robin *(Turdus migratorius)* was the most abundant species, followed by Brewer's sparrow *(Spizella breweri)*, spotted towhee *(Pipilo maculatus)*, dark-eyed junco *(Junco hyemalis)*,and mountain chickadee *(Poecile gambeli)* (Appendix L).

Table 6.2-2 summarizes the most common species detected in each cover type, based on an analysis of relative abundance (number of birds observed per 5-minute visit within 115 feet of each of the 50 point count stations during both seasons; Appendix L). The cover types are arranged in descending order of the number of stations in which each type was the dominant class. For each cover type, species are listed in descending order of relative abundance. Descriptions of the vegetative characteristics of each cover type are presented in Section 6.1.3. Appendix M includes summaries of the areal cover and average height of different plant classes in each cover type, based on surveys conducted within point count survey plots.

Table 6.2-2 The Five Species Most Commonly Detected During Point Count Surveys in Each Habitat Type [1]

Shrub-Steppe
Brewer's Sparrow House Finch Dark-eyed Junco Spotted Towhee Vesper Sparrow
Cleared Conifer
American Robin Mountain Chickadee Spotted Towhee White-crowned Sparrow Dark-eyed Junco/Calliope Hummingbird
Shrub-Steppe–Burned [2]
Vesper Sparrow Chipping Sparrow
Agriculture–Inactive
Brewer's Sparrow/Vesper Sparrow/Western Meadowlark Eastern Kingbird Grasshopper Sparrow
Riparian
American Robin Spotted Towhee Mountain Chickadee/California Quail Dark-eyed Junco
Grass
Yellow-rumped Warbler Western Meadowlark American Robin/Chipping Sparrow/Grasshopper Sparrow/Lazuli Bunting/Red-breasted Nuthatch/Vesper Sparrow/White-crowned Sparrow
Conifer
Dark-eyed Junco Yellow-rumped Warbler/Brown-headed Cowbird/Nashville Warbler Black-headed Grosbeak/Western Tanager
Talus
Black-billed Magpie Western Kingbird Ruby-crowned Kinglet
Agriculture
Brown-headed Cowbird Western Meadowlark/Lazuli Bunting/Say's Phoebe
Grass–Burned [2]
No birds detected in plot

[1] Rankings based on relative abundance values in Appendix L; species are listed in descending order of relative abundance. For habitat types in which fewer than five species were detected during point count surveys, only the top-ranking are listed. Species names separated by a forward-slash (/) indicate those with identical relative abundance values in a given habitat type.
[2] Burned habitats reflect fall survey data only.

The greatest number of bird species was detected at stations where the dominant cover type was Shrub-Steppe, followed by those with Riparian and Cleared Conifer cover types (Table 6.2-3). Conifer habitat had the highest average number of species detected per survey (1.50), followed by the Riparian (1.13 species per survey), Grass (0.60), and Active Agriculture (0.50) cover types (Table 6.2-3). Shrub-Steppe, the most abundant cover type in the survey area (represented by 29 survey plots in spring and 22 survey plots in fall), had one of the lowest values for species detected per survey (0.23). These values are influenced by survey effort: as surveys are conducted in a particular area or habitat type, new species are detected with each successive visit, although the number of new species detected per survey can be expected to diminish (e.g., Figure 6.2-1, above). As a result, when considering the species richness for a particular habitat type, both the total number of species detected and the average number of species per survey should be borne in mind.

Table 6.2-3 Species Richness for Habitat Types within Point Count Survey Plots in the Wells Project Transmission Line Corridor Study Area

Dominant Cover Type[1]	Total Number of Surveys	Total Number of Species	Species per Survey
Agriculture	8	4	0.50
Agriculture - Inactive	40	6	0.15
Cleared Conifer	56	23	0.41
Conifer	8	13	1.63
Grass	20	12	0.60
Grass–Burned	4	0	0
Riparian	24	27	1.13
Shrub-steppe	176	39	0.22
Shrub-Steppe–Burned	54	2	0.04
Talus	8	3	0.36
Total	***398***	***50***	***0.13***

[1] Each plot was assigned a single cover class based on the cover type that covered the greatest proportion of the 115-foot (35-meter) radius that defined the survey plot.

Several bird nests were found during the course of field surveys, including those of calliope hummingbird (*Stellula calliope*), house finch (*Carpodacus mexicanus*), mourning dove (*Zenaida macroura*), mountain chickadee, vesper sparrow (*Pooecetes gramineus*), and Brewer's sparrow. Several species were observed using transmission towers. In addition to raptors and ravens (see Section 6.2.1.3, below), these included western kingbirds (*Tyrannus verticalis*), which used towers as perches while flycatching, red-naped sapsuckers (*Sphyrapicus nuchalis*), which drummed on towers, and Brewer's blackbirds (*Euphagus cyanocephalus*), which were frequently seen perching on towers and transmission lines.

6.2.1.2 Prairie Grouse Surveys

A total of 50.4 person-hours were devoted to focused surveys for the presence of sharp-tailed grouse or greater sage-grouse and signs of their presence (e.g., tracks, scat, calls) in the study area (Table 6.2-4). Focused searches took place in the areas identified in Figure 4.2-3, for a total linear distance of 13.3 miles. During the spring surveys, three dusky grouse were observed in the Badger North and Badger South survey segments. Two unidentified gallinaceous birds were also observed in these areas. One of these was seen in the vicinity of a dusky grouse in the Badger South segment. The other was a large bird in conifer habitat near the location of other dusky grouse observations. Grouse observations in the Badger South survey segment were in shrub-steppe habitat. Observations in the Badger North survey segment were in conifer habitat and shrub-steppe habitat near conifer cover. Gray partridge were observed in the Wells segment. No grouse were observed during focused surveys in the Cornehl or Rocky survey segments. No evidence of grouse use was observed during fall focused surveys.

In addition to the focused survey effort, incidental observations of grouse were recorded during all other field survey work. Gallinaceous species observed included dusky grouse, ring-necked pheasant, chukar, gray partridge, and California quail. On several occasions, biologists flushed dusky grouse from adjacent cover while walking through forested portions of the Badger North segment. In addition, two feather piles, identified as carcasses of gallinaceous birds, were found during avian collision surveys in the Cornehl survey segment. The feathers were determined to have come from a gray partridge and a ring-necked pheasant. A carcass of a dusky grouse was found in the Rocky survey segment, and a male dusky grouse was seen and heard displaying in that area during point-transect surveys. No evidence of transmission corridor use by greater sage-grouse or sharp-tailed grouse was detected during any surveys.

Table 6.2-4 Summary of Focused Survey Efforts for Grouse

Survey Date	Survey Area	Survey Effort (Person-hours)	Distance Covered (miles)
March 26	Cornehl	7.0	1.6
	Wells	13.6	2.3
March 27	Badger North	2.2	0.9
	Badger South	5.0	2.5
March 28	Badger South/ Rocky	9.2	4.4
April 9	Badger North	6.5	1.1
September 2	Wells	4.7	0.5
September 25	Badger South	2.3	0.9
Total		***50.4***	***14.2***

6.2.1.3 Raptor and Corvid Nest Surveys

Observations made during the helicopter survey, along with incidental observations from ground-based surveys and maintenance inspections, resulted in the identification of 11 raptor and corvid nests within or adjacent to the survey area (Figure 6.2-2). Of the 11 nests observed, two were identified as common raven (*Corvus corax*) nests, one was Swainson's hawk (*Buteo swainsoni*), four were red-tailed hawk (*B. jamaicensis*), and four could not be identified to species because they were inactive or because no adults were observed nearby. Seven of the nests were determined to be active, and five of those had nestlings present. Eight of the nests were on electrical transmission towers, two were in trees, and one was on a cliff. Both common raven nests were located on Douglas PUD transmission line structures. Three of the four red-tailed hawk nests were on transmission towers (one on a Douglas PUD tower, two on BPA towers) and one was in a tree. Similarly, three of the four unidentified nests were on transmission towers (two on Douglas PUD towers, one on a BPA tower).

In addition to nests, biologists identified evidence of raptors and other birds using transmission towers for perching and roosting. Along with direct observations of hawks, eagles, and ravens perched on towers, biologists found pellets, whitewash, and prey remains underneath many of the towers. During point-transect surveys in the fall season, a golden eagle was observed

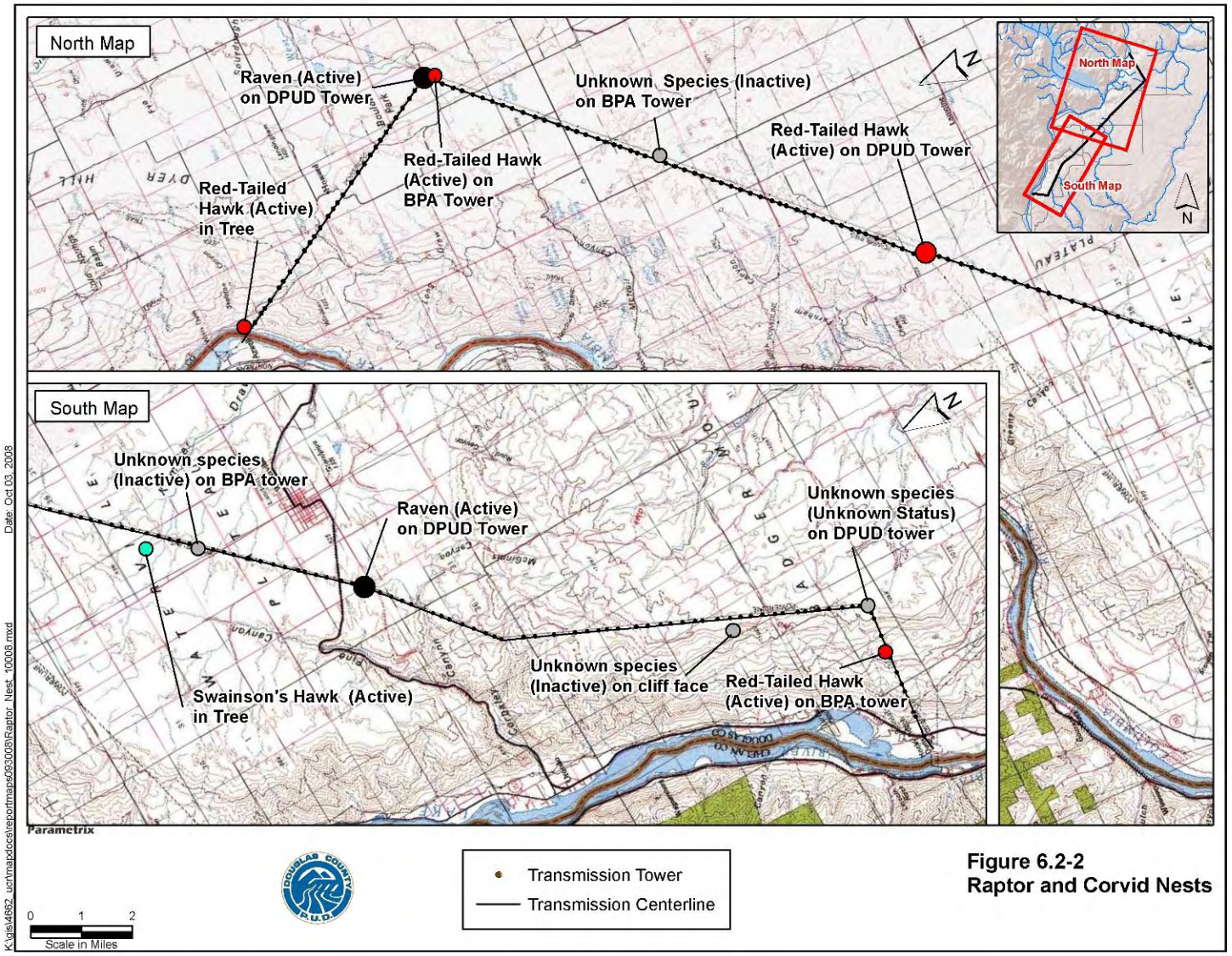

Figure 6.2-2 Raptor and Corvid Nests

Figure 6.2-2 Raptor and Corvid Nests Observed, Spring 2008.

perching on two different towers in the Mud Springs survey segment. The bird appeared to have prey (possibly a snake) in its talons.

6.2.1.4 Avian Collision Surveys

A total of 116.2 person-hours were spent on focused surveys for evidence of avian mortalities within the study area (63.6 person-hours during spring and 52.6 person-hours during fall). Two carcasses of gallinaceous birds were discovered during the spring surveys, and a third was found during botanical surveys along a different portion of the corridor. Both carcasses found during focused surveys were in the Cornehl segment. One observation was of a large number of ring-necked pheasant feathers scattered around and atop a large boulder; the arrangement of the feathers and the presence of whitewash on the boulder suggested predation by a raptor. The other observation in the Cornehl segment was of a pile of gray partridge feathers. No evidence of any other parts of the bird was observed in the area. The third carcass, an incidental observation, was of a dusky grouse carcass in the Rocky survey segment. The biologist who found the carcass did not observe any indication of a collision with the transmission line or other structures. The carcass shows signs of being fed on by a bobcat (B. Patterson, personal communication). An incidental observation of note occurred during the first survey visit, when approximately 20 Canada geese were seen safely flying over the transmission line during a snowstorm, heading away from Cornehl Lake.

The only carcass found during fall focused surveys was of a common nighthawk (*Chordeiles minor*). Numerous feathers, including brown-black primaries with a white bar near the base, were found scattered over a roughly 30-foot-radius area beneath the transmission line in the Columbia segment. No evidence of any other parts of the bird was observed in the area.

Two incidental observations of dead birds were made during the course of fall season surveys. On September 5, the botanists found a juvenile (post-fledging) great-horned owl carcass along the road in the Corbaley survey segment, about 30 feet from the transmission line corridor. The carcass was very fresh, with round shiny eyes and live body lice. Based on the prominent, protruding keel, emaciated pectoral muscles, and absence of any signs of disease or trauma, the probable cause of death was starvation, not collision or electrocution (B. Patterson, personal communication).

The other incidental observation of note occurred on October 29, when the remains of a great blue heron (*Ardea herodias*) were found beneath the transmission line on the west side of the Columbia River, 0.5 mile downstream of Wells Dam and approximately 200 feet from the nearest tower. Feathers and bones were scattered over a 4-foot by 6-foot area, indicating minimal disturbance by scavengers. Feathers did not show any signs of having been broken or chewed off, which likely indicates that the bird was not fed on by a predator. The bleaching of the bones, the absence soft tissue, and the presence of a few green shoots of grass underneath feathers suggested that the carcass had been at that site for a number of weeks, but probably not months. No evidence of trauma (e.g., broken bones) was immediately apparent. It is possible, but not certain, that the bird died as a result of a collision with the transmission line. Herons are frequently seen preying on fish at the hatchery adjacent to Wells Dam and are often observed approaching the facility from the south (J. McGee, personal communication). The site where the

carcass was found is approximately 0.5 mile south-southeast of the hatchery. In addition to collision, alternative causes of death matching the evidence include post-fledging starvation; toxins, disease, or parasites; accidental injury not related to power lines; injury due to predation control actions at the hatchery; illegal human-caused mortality; injury from competition for feeding sites; or injury due to direct predation or attempts to appropriate prey.

During the Terrestrial Work Group meeting on August 26, 2008, Douglas PUD and WDFW agreed to conduct additional surveys of raptor migration activity along the transmission line corridor. Between September 16 and 30, biologists from the two agencies collected observations of raptors from prominent ridges by Landingham Hill above Wells Dam, near McGinnis Canyon, and on Badger Mountain above Rocky Reach Dam. During that period, biologists spent 2 to 3 hours at these locations during the morning (9:00 to 11:00 am) and afternoon hours (2:00 to 4:00 pm), for a total of 10 observation periods.

Fall migrating hawk surveys resulted in 37 observations, including 6 raptor species, and 3 unidentified hawks. Raptor species observed along the transmission line corridor were: northern harrier (*Circus cyaneus*), Cooper's hawk (*Accipiter cooperii*), red-tailed hawk, golden eagle, merlin (*Falco columbarius*), and prairie falcon (*Falco mexicanus*). Thirteen birds were observed crossing over or under the transmission lines, and an additional thirteen were seen perching on towers. Biologists found no indication of raptors avoiding or being adversely affected by the transmission lines or towers (WDFW, unpublished data).

6.2.1.5 Avian-Transmission Line Interaction Literature Review

Electrocution

The most recent edition of *Suggested Practices for Avian Protection on Power Lines* (APLIC, 2006) focuses on reducing the risk of avian electrocutions. In the United States, raptors are more often harmed by electrocution than by collisions with power lines (APLIC 2006). In general, the risk of electrocution to birds is greater on distribution lines than on transmission lines. This is because distribution lines are built with smaller separations between energized conductors and between energized and grounded components, compared to transmission lines. For lines with phase-to-phase and phase-to-ground separation greater than 60 inches (which is the case for the Douglas PUD transmission line), the likelihood of electrocution is low and documented instances of birds receiving electrical injuries are rare. However, a nest situated above insulator strings may cause equipment failures due to contamination with excrement, prey remains, or nest materials (APLIC 2006).

Recommendations developed by APLIC (2006) are based on two principles: isolation and insulation. Isolation refers to providing at least 60 inches separation between energized components or energized and grounded components, to minimize or eliminate the risk that birds may bridge the gap between such components and thereby suffer electrical shock or electrocution. Insulation refers to covering phases or grounds where adequate separation is not feasible. As noted above, the Douglas PUD transmission line meets the 60-inch criterion, so provision of insulation is likely unnecessary. Annual maintenance inspections that have been

conducted since 1968 have found no evidence of birds being electrocuted by the Wells Project transmission line (J. McGee, personal communication).

In an analysis of 267 records of human-caused mortality of a vulnerable raptor species in Spain, González et al. (2007) found that electrocution was the most frequent causes of anthropogenic mortality, followed closely by poisoning. However, the study did not identify whether electrocution occurred on distribution lines or transmission lines. Sub-adults were electrocuted more frequently than adults. This may be related to the tendency for young individuals to use predominantly treeless areas with an abundance of rabbits, which coincided in that study area with a higher degree of human presence and a greater density of electrical power lines (González et al., 2007). In India, the wires of transmission lines were too far apart for wings of cranes to make contact with more than one wire and none died due to electrocution (Sundar and Choudhury, 2005).

Collision

The height that birds fly is an important factor for evaluating the potential for collisions with a transmission line. Spring and fall radar studies of nocturnal migrating birds in Douglas County show the majority of birds fly at elevations of 750 to 3,350 feet above the ground (Hamer et al., 2003). This is well above the height of the Wells Project transmission towers, which range from 45 to 85 feet.

A three-year study of sarus cranes (*Grus antigone*) in India found a total of 35 cranes killed and 8 cranes injured by wires (Sundar and Choudhury, 2005). Supply wires (less than 0.5 kV) were responsible for 97 percent of the mortality, mostly due to electrocution. Deaths and injuries associated with transmission lines (11 to 13.5 kV) resulted from collisions.

Electromagnetic Fields

In their examination of the effects of electromagnetic fields (EMFs) on various species of birds, Fernie and Reynolds (2005) found that different species responded in various ways. For example, American kestrels and tree swallows exposed to EMF levels similar to those found immediately below power lines showed reduced reproductive success. In contrast, wild eastern bluebirds, ferruginous hawks, ravens, golden eagles, and red-tailed hawks do not appear to be reproductively sensitive to EMFs from power lines (Fernie and Reynolds, 2005). In a study of Eurasian kestrel (*Falco tinnunculus*) nestlings, Costantini et al. (2007) found no significant relationship between EMF magnitude and body condition, carotenoid concentration, pro-oxidants, antioxidants, or general oxidative status.

Population-level Effects

By combining the estimates for mortality caused by communication towers, power lines, and window strike, Drewitt and Langston (2008) estimated that, as a minimum, several hundred million birds are killed annually by collisions in the United States. Data assembled by APLIC (2006) indicate that window collisions are likely responsible for the greatest proportion of human-caused avian mortality; electrocutions make up a minute fraction of the total amount

(thousands out of several hundred million). The estimate for mortality due to collisions with power lines (174 million birds) is near the low end of the estimated range for mortality due to collisions with windows (97 to 980 million birds) (APLIC, 2006; Erickson et al., 2005).

Drewitt and Langston (2008) found evidence that, in some circumstances at least, collision mortality can adversely affect the populations of relatively scarce and more vulnerable species. They noted that the increase in cumulative impacts from many sources of collision mortality is potentially the major cause for concern.

As noted above, González et al. (2007) identified electrocution as a significant component of anthropogenic mortality for Spanish imperial eagle (*Aquila adalberti*). Of 267 documented mortalities, 115 were attributable to electrocution and 6 were the result of collisions with energy industry facilities (which likely included power lines). That study did not determine whether such mortality had a substantial effect on population growth or survivorship.

Effects on Grouse and Other Landbirds

In 2004, Atamian et al. (2007) initiated a ten-year study to assess the impact of constructing a 345-kV transmission line on sage-grouse demography and population dynamics in central Nevada. As of year five of the study, no relationship between nest success and distance from the transmission line has been observed. However, counts of common ravens have increased by approximately 200 percent along the transmission line corridor. In addition, the number of common raven sightings at sage-grouse leks has increased, as has the number of instances in which lekking sage-grouse changed their response to disturbance by ravens (e.g., ceased strut, ducked down, flushed) (Atamian et al., 2007).

As noted in the draft literature review (EDAW, 2006b), avian predators of sage-grouse adults (large raptors) and nests (ravens) may use utility lines to increase their hunting efficiency, which could lead to decreased adult survival and/or nest success, thus triggering population declines as indicated by decreased attendance at the nearby leks. Alternatively, the perceived threat of predation associated with utility lines may also cause sage-grouse to avoid utility lines, effectively causing sage-grouse to abandon those leks, nest sites, and brood rearing areas near utility lines (Atamian et al. 2007).

There has been some recent indirect evidence in support of the avoidance hypothesis, in that lek locations have been found to have the least long-range visibility in combination with the greatest short-range visibility that the local topography will allow (Aspbury et al. 2004). In short, male sage-grouse may be choosing lek locations that maximize their visibility to female grouse near a lek, while at the same time minimizing the long-range visibility of the lek to predators (Aspbury et al. 2004).

In a long-term study of lesser prairie-chicken (*Tympanuchus pallidicinctus*) natural history at two study sites in Oklahoma and New Mexico, collisions with power lines played a minor role in mortality. Wolfe et al. (2007) recovered 322 carcasses of radio-tagged birds captured on leks. They were able to determine the cause of death for 260 of these birds. Predation by raptors accounted for the largest number of mortalities (91), followed by collisions with fences (86),

predation by mammals (76), collisions with power lines (4), and collisions with automobiles (3). Of the two study sites, the one with the greater degree of habitat fragmentation (smaller [160-acre] fenced lots, greater density of fences, roads, and power lines) had a greater rate of mortality associated with collisions (Wolfe et al., 2007).

Beck et al. (2006) evaluated movements and survival of 58 radio tagged juvenile greater sage-grouse during two winters in lowland and mountain valley study areas in southeastern Idaho. Fifty percent of deaths in the lowland population were attributable to human-related mortality, including legal harvest and collisions with manmade objects including fences, distribution lines and poles and transmission line structures being the predominant causes of mortality. All of the deaths in the mountain valley population were attributed to avian or mammalian predators. Based on the high juvenile survival rate observed, Beck et al. (2006) suggested that nesting success or early chick survival likely have a greater impact on sage-grouse populations, compared to juvenile survival.

6.2.2 Mammal Surveys

Direct observations and evidence for the presence of mammals in the survey area were noted during all field surveys. Collectively, a total of 330.1 person-hours were spent conducting point-transect surveys, prairie grouse surveys, raptor and corvid nest surveys, avian collision surveys, and reptile surveys. Biologists recorded all observations of mammals and mammal sign seen during these surveys, as well as incidental observations at other times. No RTE mammals were observed. Mule deer (*Odocoileus hemionus*) was the most common mammal observed, seen individually and in groups in all survey segments except Badger North. In addition to mule deer, evidence of the following mammal species was observed during field surveys:

Coyote *(Canis latrans)* – Tracks and scat along roads in all survey segments, individuals observed in the Rocky segment.

Bobcat *(Felis rufus)* – Tracks and scat along the road in the Rocky survey segment.

Cougar *(Puma concolor)* – Tracks in the Badger South and Corbaley survey segments. Territorial marker scat pile at trail intersection in the Rocky segment. Additional evidence of cougar presence is documented through WDFW Reports of Big Game Harvest (http://wdfw.wa.gov/wlm/game/harvest/index.htm and http://wdfw.wa.gov/wlm/game/harvest/2006/db/cougar9_columbia_basin.php). Five cougar were harvested in game management units (GMUs) 262 (includes Wells and Mud Springs areas) and 266 (includes Badger North and Badger South segments) in 2006.

Striped Skunk *(Mephitis mephitis)* – Tracks in the Badger North and Corbaley survey segments, probable scat in the Mud Springs survey segment, and a carcass in the Badger North survey segment.

Long-tailed Weasel *(Mustela frenata)* – Skulls in the Badger South and Cornehl survey segments. (Note: the size and morphological characteristics of the latter skull were intermediate between those of the long-tailed weasel and the short-tailed weasel [*M. erminea*]. Based on the

expected absence of short-tailed weasels from areas dominated shrub-steppe habitat [Johnson and Cassidy, 1997], the most probable identification is long-tailed weasel.)

American Badger *(Taxidea taxus)*– Large burrows in the Rocky and Wells survey segments.

Mountain Cottontail (*Sylvilagus nuttallii*) – Copious scat near large boulders in the Mud Springs and Wells survey segments. Small scat diameter (less than 1 centimeter) suggests cottontail rather than jackrabbit. Also, one individual and one carcass in the Wells survey segment.

Porcupine *(Erethizon dorsatum)* – Individual seen among rocks immediately east of the Mud Springs survey segment during helicopter survey.

Northern Pocket Gopher *(Thomomys talpoides)* – Abundant cores and castings in the Mud Springs, Corbaley, and Badger South survey segments.

Bushy-tailed Woodrat *(Neotoma cinerea)* – Fresh scat (3/8" x 2") under large rock in a talus pile in the Rocky survey segment, numerous dry pellets farther up, latrine in rocks.

Yellow-bellied Marmot *(Marmota flaviventris)* – Individuals observed and skull collected in the Wells survey segment.

Chipmunk (*Tamias* sp.; least or yellow pine) – Individuals briefly glimpsed in the Corbaley, Badger North, and Rocky survey segments.

Douglas' squirrel (*Tamiasciurus douglasii*) – Individuals seen in the Corbaley and Badger North survey segments.

Small runways observed in grassy areas in the Badger South survey segment were likely the work of voles, which may also have been responsible for gnawed bark on sagebrush plants nearby. In addition to the species documented above, a neighboring landowner in the Badger North survey segment reported seeing a black bear (*Ursus americanus)* in conifer habitat on his and adjoining properties. In addition, one bear was harvested in Badger GMU 266 (Badger North and Badger South areas) in 2007 (http://wdfw.wa.gov/wlm/game/harvest/2007/db/bear_bmu9.php) and one bear was harvested in Withrow GMU 262 (Wells and Mud Springs areas) in 2006 (http://wdfw.wa.gov/wlm/game/harvest/2006/db/bear_bmu9.php).

6.2.3 Reptile Surveys

Biologists spent a total of 41.5 person-hours searching 40 acres of potentially suitable habitat within the study area for the presence or evidence of reptiles. These visual encounter surveys were conducted at 41 avian point stations and 3 additional sites (Figure 6.2-3), and resulted in a total of 12 detections (0.30 detections per acre, 0.29 detections per person-hour). No RTE reptile species were observed. Seven species were observed during formal surveys: pygmy short-horned lizard, western skink, racer (including one egg), western terrestrial garter snake, and

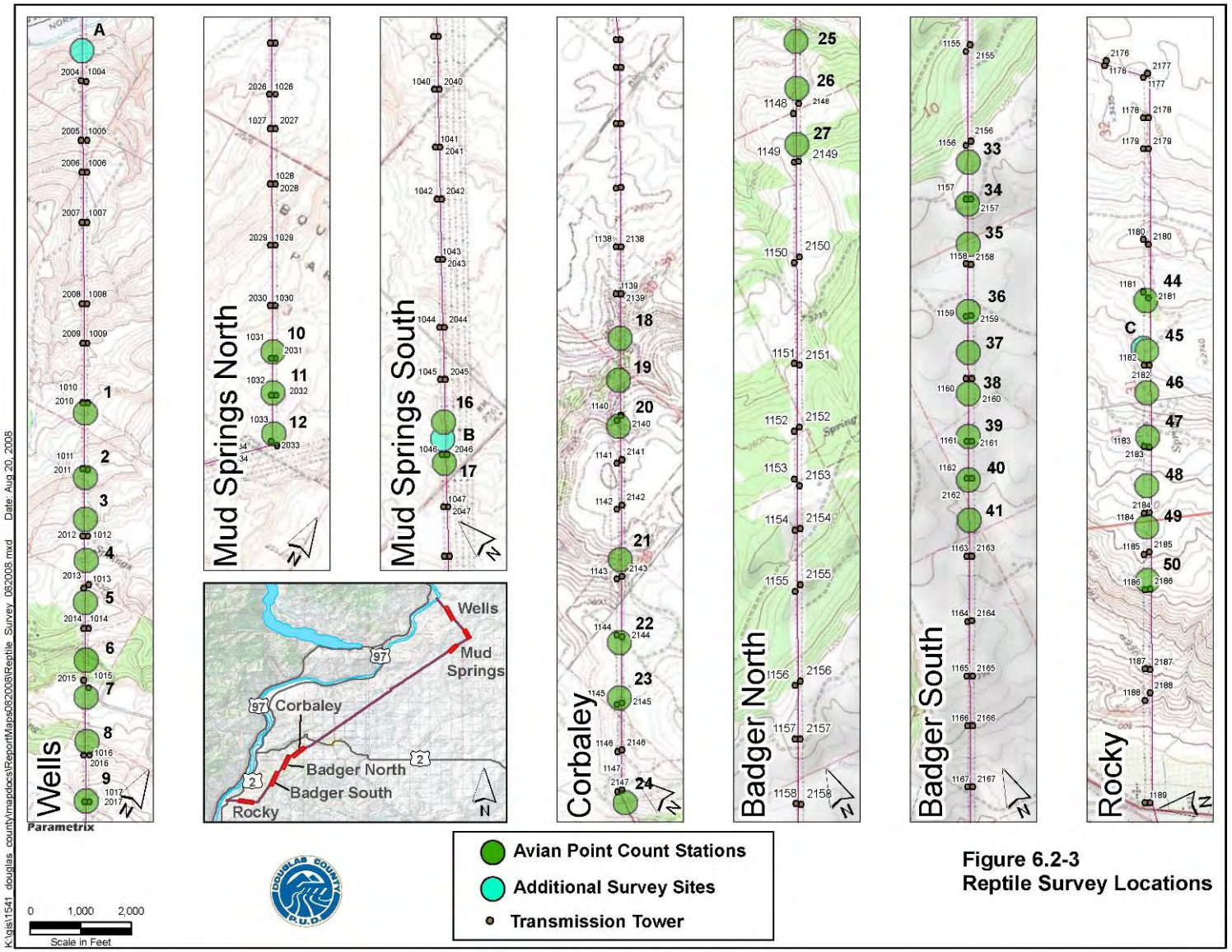

Figure 6.2-3 Reptile Survey Sites

western rattlesnake; an additional species, gopher snake, was observed only incidentally (Table 6.2-5). Most observations of reptiles were in the Wells and Rocky survey segments at the northern and southern ends of the study area.

A single amphibian was observed during reptile surveys, a long-toed salamander (*Ambystoma macrodactylum*) found in a shrub-covered talus patch in a narrow riparian strip in the Corbaley survey segment. No suitable breeding habitat (i.e., shallow pools with emergent vegetation) was evident nearby, although a small man-made pond was observed at a road crossing approximately 1,200 feet downslope. Another incidental observation of an amphibian occurred during botanical surveys in the Cornehl segment. The desiccated carcass of a tiger salamander (*A. tigrinum*) was found in an agricultural field approximately 1.5 miles from Cornehl Lake.

6.2.4 RTE Species

As defined in the study plan for the Transmission Line Wildlife and Botanical Study, RTE wildlife species include those that are listed as threatened or endangered under ESA, candidates for listing under ESA, and state-listed endangered, threatened, or candidate species (Appendix D).

Based on a review of species range and habitat requirements documented in existing information and databases, 46 RTE species were identified as potentially occurring in the study area. These include 29 species of birds, 3 amphibians, 2 reptiles, and 9 mammals. Analysis of PHS data from WDFW identified records of six RTE species occurring in the vicinity of the transmission line corridor study area (i.e., within 5 miles of the corridor and not associated with the Wells Reservoir). The RTE species identified in PHS were:

- Greater sage-grouse (Federal candidate, State-listed as threatened)
- Burrowing owl (*Athene cunicularia*) (State candidate)
- Loggerhead shrike (*Lanius ludovicianus*) (State candidate)
- Sage thrasher (*Oreoscoptes montanus*) (State candidate)
- Merriam's shrew (State candidate)
- White-tailed jackrabbit (State candidate)

In addition to the occurrences documented in the PHS database, local experts provided information about RTE species occurrence in the vicinity of the study area. The nearest known sage-grouse lek in the vicinity of the study area is approximately 5 miles east of the transmission line corridor, near the northern end of the route. The lek was last known to be active in 1995; no activity was observed during surveys in 2000 (M. Schroeder, WDFW, personal communication). In addition, Washington ground squirrel activity has been documented approximately 5 miles east of the corridor, near the southern end of the transmission line (R. Finger, WDFW, personal communication).

Table 6.2-5 Observations of Reptile Species in the Wells Project Transmission Corridor Survey Area

Survey Segment [1]	Date	Species	Habitat	Comments
Observations during Visual Encounter Surveys				
Wells	June 4	Western rattlesnake	Shrub-steppe	Juvenile (2 buttons), under log
Wells	June 4	Western skink	Shrub-steppe	2 individuals under rocks
Wells	June 4	Western terrestrial garter snake	Grass/shrub adjacent to conifer	Brownish, indistinct coloration
Wells	June 17	Unidentified snake	Sparse grass	Racer or garter
Wells	June 17	Western skink	Shrub-steppe	3 individuals in cobble/boulder piles
Corbaley	May 20	Racer	Shrub-steppe	Juvenile, under rock
Badger South	June 18	Pygmy short-horned lizard	Shrub-steppe	On bare soil
Rocky	June 19	Racer	Talus	In boulder pile
Rocky	June 6	Racer	Shrub-steppe	Egg on gopher diggings
Mud Springs	June 17	Western skink	Inactive Agriculture	In patch of rocks
Incidental Observations				
Wells	May 5	Western rattlesnake	Shrub-steppe	Heard only; sounded small
Wells	May 18	Western rattlesnake	Shrub-steppe	2 adults at separate locations
Wells	May 19	Gopher snake	Roadway	Crossing Road 20 near Tower 2014
Wells	Sept. 2	Racer	Shrub-steppe	Near Tower 1004
Wells	Sept. 23	Racer	Shrub-steppe	Near Tower 2006
Badger North	Sept. 3	Western rattlesnake	Riparian	On roadway
Badger South	Sept. 25	Gopher snake	Shrub-steppe	Diving into hole
Rocky	April 16	Western rattlesnake	Granitic rocks	Observed by cultural survey crew
Rocky	April 17	Pygmy short-horned lizard	Grass	Juvenile
Rocky	May 15	Pygmy short-horned lizard	Shrub-steppe	Observed by cultural survey crew
Rocky	Sept. 5	Gopher snake	Burned area	
Rocky	Sept. 5	Western skink	Burned area	On road near bird point count station #45

[1] Avian point-transect survey segment names are used here to identify the general vicinity along the transmission line corridor. Survey segments are arranged from north (Wells) to south (Rocky).

During field surveys in spring 2008, the only RTE species observed in the study area was the sage thrasher. Seventeen observations of sage thrashers (fifteen of which were singing male birds) were recorded both within and adjacent to the transmission line corridor in the Mud Springs, Corbaley, and Badger South survey segments. An incidental observation of a golden eagle (a State candidate) was recorded along Road D, approximately 1 mile west of the transmission line corridor.

Several additional avian RTE species were observed during point-transect surveys in fall 2008, including a sage thrasher and two golden eagles within or adjacent to the transmission line corridor, and two American white pelicans on the Columbia River below Wells Dam. The sage thrasher was seen in the Mud Springs segment in late September. One of the golden eagles was seen flying southward, outside the transmission line corridor, near where the transmission line reaches the top of the plateau in the Wells survey segment. The other golden eagle was observed within the transmission line corridor in the Mud Springs segment. This bird, which appeared to have prey in its talons, perched on two different towers before flying off to the northwest. One of the pelicans was observed flying over the transmission line where it crosses the Columbia River, and the other was seen floating on the river below the transmission lines.

No RTE mammals (e.g., Washington ground squirrel), reptiles (e.g., striped whipsnake), or amphibians were observed in the study area in the course of conducting field surveys for this study.

7.0 DISCUSSION

One occurrence of an RTE plant species (Thompson's clover, a State-listed threatened species) was observed and mapped within the transmission line corridor. One RTE bird species (sage thrasher, a State candidate) was documented in the study area. Of the other two avian RTE species observed, it is likely golden eagles use the study area to some degree, whereas white pelicans are unlikely to interact with the transmission line except for crossing over or under the lines near the Wells Dam tailrace. Invasive plant surveys mapped and documented nine occurrences of two Class B Designate weed species: Dalmatian toadflax and spotted knapweed.

Cover types were grouped into 13 mapping categories based on previously mapped GIS data and field observations. Active Agriculture covers 583 acres (52 percent) of the transmission line corridor. The most abundant native vegetation cover type in the corridor is Shrub-Steppe. The remaining 11 cover types (Cleared Conifer, Cleared Open Conifer, Conifer, Grass, Inactive Agriculture, Open Conifer, Riparian, Talus, Wetland–PEM, Wetland–PFO, and Other) individually comprise 6 percent of the transmission line corridor or less. Cleared Conifer and Cleared Open Conifer are native vegetation types that have anthropogenic alterations (overstory cleared). These areas often function as Shrub-Steppe and have a similar species composition in the understory. Inactive agriculture also has many of the same species, but has increased cover of invasive species.

Surveys documented the presence of 103 bird species in the study area. Based on an analysis of relative abundance (number of birds observed per 5-minute visit within 115 feet of the 50 point

count stations), the most common species in the study area was the American robin. Other commonly detected species (in descending order of relative abundance) were Brewer's sparrow, spotted towhee, dark-eyed junco, and mountain chickadee. The greatest number of species was detected where the dominant cover type was Shrub-Steppe (this is the most common cover type in the study area and therefore received the greatest survey effort), closely followed by Cleared Conifer and Riparian.

There was a marked difference in the number of species detected between spring and fall surveys. Differences were attributed to changes in bird behavior and appearances following the breeding season. During spring surveys, many species were identified by the songs of territorial individuals. Fewer birds were using breeding songs during the fall surveys. Species identification of many species in the fall surveys was limited to visual confirmation. In addition to few songs and calls, plumage characteristics made some species more difficult to distinguish (e.g., sparrow species) as species and age groups formed mixed flocks prior to migration. Eleven nests of raptors or corvids were detected within or adjacent to the study area, including four on Douglas County PUD transmission towers. All four nests on Douglas PUD transmission towers were at points where the transmission line changes direction; the towers at these locations include structural reinforcements. Three bird carcasses were found during focused surveys and three were found incidental to other survey efforts.

Reptile species observed included pygmy short-horned lizard, western skink, racer, western terrestrial garter snake, and western rattlesnake. Mammals that were documented through sign or direct observation included mule deer, coyote, bobcat, cougar, striped skunk, long-tailed weasel, America badger, porcupine, northern pocket gopher, bushy-tailed woodrat, yellow-bellied marmot, and Douglas' squirrel. Additional observations indicated the presence of chipmunks (yellow-pine or least) and voles (species unknown).

8.0 STUDY VARIANCE

There were no variances from the final the FERC-approved study plan for the Transmission Line Wildlife and Botanical Study.

9.0 ACKNOWLEDGMENTS

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Appendix A

Agency Correspondence

DOUGLAS COUNTY
Updated 4/15/2008

LISTED

Endangered

Pygmy rabbit (*Brachylagus idahoensis*) – Columbia Basin distinct population segment

Threatened

Bull trout *(Salvelinus confluentus)* – Columbia River distinct population segment
Spiranthes diluvialis (Ute ladies'-tresses), plant

CANDIDATE

Greater sage grouse *(Centrocercus urophasianus)* – Columbia Basin distinct population segment
Washington ground squirrel *(Spermophilus washingtoni)*

SPECIES OF CONCERN

Animals

Bald eagle *(Haliaeetus leucocephalus)* (delisted, monitor status)
Burrowing owl *(Athene cunicularia)*
California floater *(Anodonta californiensis)*, mussel
Columbian sharp-tailed grouse *(Tympanuchus phasianellus columbianus)*
Ferruginous hawk *(Buteo regalis)*
Giant Columbia spire snail *(Fluminicola columbiana)*
Kincaid meadow vole (*Microtus pennsylvanicus kincaidi*)
Loggerhead shrike *(Lanius ludovicianus)*
Long-eared myotis (*Myotis evotis*)
Northern goshawk *(Accipiter gentilis)*
Olive-sided flycatcher *(Contopus cooperi)*
Pacific lamprey *(Lampetra tridentata)*
Pallid Townsend's big-eared bat *(Corynorhinus townsendii pallescens)*
Peregrine falcon (*Falco peregrinus*) (Delisted, monitor status)
Redband trout (*Oncorhynchus mykiss*)
River lamprey (*Lampetra ayresi*)
Sagebrush lizard *(Sceloporus graciosus)*
Western brook lamprey (*Lampetra richardsoni*)
Westslope cutthroat trout *(Oncorhynchus clarki lewisi)*
Wolverine *(Gulo gulo)*

Vascular Plants

Cryptantha leucophaea (Gray cryptantha)
Delphinium viridescens (Wenatchee larkspur)
Petrophyton cinerascens (Chelan rockmat)
Phacelia lenta (Sticky phacelia)
Trifolium thompsonii (Thompson's clover)

WASHINGTON STATE DEPARTMENT OF
Natural Resources

DOUG SUTHERLAND
Commissioner of Public Lands

January 25, 2008

Dan Fisher
Parametrix Inc
411 108th Ave NE Suite 1800
Bellevue WA 98003

SUBJECT: Wells Project 230 kV Transmission Line Corridor, Douglas County (T28N R24E S18; T27N R24E S17,18; T25N R22E S17; T24N R21E S10,14,30,32,33; T24N R20E S35,36; T23N R20E S02)

We've searched the Natural Heritage Information System for information on rare plants and high quality native wetland and terrestrial ecosystems in the vicinity of your project. A summary of this information is enclosed. In your planning, please consider protection of these significant natural features. Please contact us for consultation on projects that may have an effect on these rare species or high quality ecosystems.

The information provided by the Washington Natural Heritage Program is based solely on existing information in the database. There may be significant natural features in your study area of which we are not aware. These data are being provided to you for informational and planning purposes only - the Natural Heritage Program has no regulatory authority. This information is for your use only for environmental assessment and is not to be redistributed. Others interested in this information should be directed to contact the Natural Heritage Program.

The Washington Natural Heritage Program is responsible for information on the state's rare plants as well as high quality ecosystems. For information on animal species of concern, please contact Priority Habitats and Species, Washington Department of Fish and Wildlife, 600 Capitol Way N, Olympia WA 98501-1091, or by phone (360) 902-2543.

Please visit our internet website at http://www.dnr.wa.gov/nhp for more information. Lists of rare plants and their status, rare plant fact sheets, as well as rare plant survey guidelines are available for download from the site. Please call me at (360) 902-1697 if you have any questions.

Sincerely,

Sandy Swope Moody

Sandy Swope Moody, Environmental Review Coordinator
Washington Natural Heritage Program

Enclosures

Asset Management & Protection Division, PO Box 47014, Olympia WA 98504-7014
FAX 360-902-1789

1111 WASHINGTON ST SE ▮ PO BOX 47000 ▮ OLYMPIA, WA 98504-7000
TEL: (360) 902-1000 ▮ FAX: (360) 902-1775 ▮ TTY: (360) 902-1125
Equal Opportunity Employer

WASHINGTON NATURAL HERITAGE INFORMATION SYSTEM
ENDANGERED, THREATENED AND SENSITIVE PLANT SPECIES &
HIGH QUALITY WETLAND ECOSYSTEMS AND HIGH QUALITY TERRESTRIAL ECOSYSTEMS
IN THE VICINITY OF WELLS PROJECT 230 KV TRANSMISSION LINE CORRIDOR
REQUESTED BY PARAMETRIX INC

Data Current as of January 2008

TOWNSHIP, RANGE AND SECTION	ELEMENT NAME	STATE STATUS	FEDERAL STATUS
T28N R24E S18 W2 T28N R23E S13 E2	*Schizachyrium scoparium* var. *scoparium* (Little bluestem)	T	
T27N R24E S17 W2 S18 E2	ARTEMISIA TRIPARTITA SSP. TRIPARTITA / FESTUCA IDAHOENSIS SHRUB HERBACEOUS VEGETATION (THREETIP SAGEBRUSH / IDAHO FESCUE)		
T25N R22E S17 N2OFNW S08 S2OFSW	ARTEMISIA TRIPARTITA SSP. TRIPARTITA / FESTUCA CAMPESTRIS SHRUB HERBACEOUS VEGETATION (THREETIP SAGEBRUSH / ROUGH FESCUE)		
T24N R21E S10 N2	PSEUDOTSUGA MENZIESII / CALAMAGROSTIS RUBESCENS FOREST (DOUGLAS-FIR / PINEGRASS)		
T24N R21E S14 SW	*Iliamna longisepala* (Longsepal globemallow)	S	
T24N R21E S30 E2	*Trifolium thompsonii* (Thompson's clover)	T	SC
T24N R21E S33 NE	*Trifolium thompsonii* (Thompson's clover)	T	SC
T24N R20E S26	*Trifolium thompsonii* (Thompson's clover)	T	SC
T23N R20E S02 W2 S10 E2 S15 E2	*Schizachyrium scoparium* var. *scoparium* (Little bluestem)	T	

WASHINGTON NATURAL HERITAGE PROGRAM

CRITERIA FOR HIGH-QUALITY WETLAND ECOSYSTEMS

The WNHP does not maintain a comprehensive inventory of all wetlands in the state. The database includes information only on those areas that have been surveyed by the program scientists and found to be relatively undisturbed high-quality wetlands. For wetlands included in the database, the physical characteristics, biota, ecosystem functions, processes and settings are essentially natural. For example, to be included in the WNHP database, a freshwater wetland site must meet these six criteria:

1. A native wetland ecosystem type (element) considered important for preservation within the state.

2. Little or no human-caused changes to wetland topography or soils.

3. No human caused changes to hydrology of the wetland, or the wetland appears to have recovered from any changes.

4. Few or no exotic plant species.

5. Little human-caused disturbance of native vegetation, or vegetation has recovered from past disturbance.

6. No major water quality problems.

Criteria 2-6 are weighted based on the amount of disturbance present in all known examples of a given wetland type. Thus a disturbed wetland may be included in the WNHP Information System if it has one of the highest quality examples remaining of a particular wetland type. On the other hand, an equally disturbed site may not be included in the WNHP Information System if it contains a wetland type which has many other undisturbed examples. A severe degree of disturbance would exclude a site from being entered into the WNHP Information System, even if no better examples of that wetland type exist.

CRITERIA FOR HIGH-QUALITY TERRESTRIAL ECOSYSTEMS

Occurrences of terrestrial ecosystem types are determined by the characteristics of each individual ecosystem type. Ecological quality refers to both the ecological condition and the ecological viability of a particular community.

Condition is determined by relative importance of native versus non-native species, extent and nature of human-caused disturbance, and how well the occurrence represents the ecosystem type definition. Viability is determined by size of the area and landscape setting.

Minimum criteria for an occurrence of a terrestrial ecosystem:

1. Native plants dominate the site: tree layers composed of only native species, at least 80 percent of the shrub and herbaceous layers are composed of native plants. Non-native plants are generally insignificant.

2. Little or insignificant disturbance to vegetation by logging, conversion to agriculture, heavy grazing, residential development, or other recent human extractive activities that alter the ecosystem processes.

3. Large enough for minimal viability and ecological function: at least 100 acres for forests in the montane provinces and at least four average tree heights wide at its narrowest width, at least 20 acres for forest in the Puget Lowlands, and at least 10 acres for native grasslands.

The degree to which these criteria are applied to a site depends on characteristics of the particular ecosystem types present. Some ecosystem types are found almost exclusively as small patches, perhaps in areas smaller than in criterion 3. In this case, meeting criteria 1 and 2 would be sufficient. Large but moderately disturbed ecosystems representative of types that have been altered throughout their range because of various land uses may need only meet criteria 1 and 3.

WASHINGTON NATURAL HERITAGE INFORMATION SYSTEM
Rare Plant Species

FEDERAL STATUS DEFINITIONS- (Note: Federally listed plant species are subject to the US Endangered Species Act.)

LE = Listed Endangered: Any taxon that is in danger of extinction throughout all or a significant portion of its range and that has been formally listed as such in the Federal Register under the Federal Endangered Species Act.

LT = Listed Threatened: Any taxon that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and that has been formally listed as such in the Federal Register under the Federal Endangered Species Act.

PE = Proposed Endangered: Any taxon that is in danger of extinction throughout all or a significant portion of its range and that has been proposed for listing as such in the Federal Register under the Federal Endangered Species Act.

PT = Proposed Threatened: Any taxon that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and that has been proposed for listing as such in the Federal Register under the Federal Endangered Species Act.

C = Candidate species: Taxa for which current information indicates the probable appropriateness of listing as Endangered or Threatened and that has been published in the Federal Register as a candidate for listing under the Federal Endangered Species Act.

SC = Species of Concern: Species whose conservation standing is of concern but for which status information is still needed. Species of concern lists are not published in the Federal Register.

STATE STATUS DEFINITIONS- (Note: The state ESA does not include provisions to list or protect rare plant species – the state rare plant list is advisory only.)

E = Endangered: Any taxon in danger of becoming extinct or extirpated from Washington within the foreseeable future if factors contributing to its decline continue. Populations of these taxa are at critically low levels or their habitats have been degraded or depleted to a significant degree.

T = Threatened: Any taxon likely to become Endangered in Washington within the foreseeable future if factors contributing to its population decline or habitat degradation or loss continue.

S = Sensitive: Any taxon that is vulnerable or declining and could become Endangered or Threatened in the state without active management or removal of threats.

X = Possibly Extinct or Extirpated from Washington: Based on recent field searches, a number of plant taxa are considered to be possibly extinct or extirpated from Washington. Taxa in this group are all high priorities for field investigations. If found, they will be assigned one of the above status categories.

R = Review: Taxa of potential concern, but for which no status has yet been assigned.
Group 1 = Taxa in need of additional field work before a status can be assigned.
Group 2 = Taxa with unresolved taxonomic questions.

W = Watch: Taxa more abundant and/or less threatened in Washington than previously assumed.

Non-Vascular Plant:

P = Priority: At this time, there is insufficient information to assign a statewide status to most of the non-vascular taxa. For now, the lichen and macrofungi lists have been divided into two priority groups based on criteria of occurrence pattern, vulnerability, threats, degree of protection, and taxonomy.

State of Washington

Department of Fish and Wildlife

Mailing Address: 600 Capitol Way N, Olympia WA 98501-1091, (360) 902-2200, TDD (360) 902-2207
Main Office Location: Natural Resources Building, 1111 Washington Street SE, Olympia WA

Date: JAN 2 5 2008

Dear Habitats and Species Requester:

Enclosed are the habitats and species products you requested from the Washington Department of Fish and Wildlife (WDFW). This package may also contain documentation to help you understand and use these products.

These products only include information that WDFW maintains in a computer database. They are not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife, nor are they designed to provide you with guidance on interpreting this information and determining how to proceed in consideration of fish and wildlife. These products only document the location of important fish and wildlife resources to the best of our knowledge. It is important to note that habitats or species may occur on the ground in areas not currently known to WDFW biologists, or in areas for which comprehensive surveys have not been conducted. Site-specific surveys are frequently necessary to rule out the presence of priority habitats or species.

Your project may require further field inspection or you may need to contact our field biologists or others in WDFW to assist you in interpreting and applying this information. Generally, for assistance on a specific project, you should contact the WDFW Habitat Program Manager for your county and ask for the area habitat biologist for your project area. Refer to the enclosed directory for those contacts.

Please note that sections potentially impacted by spotted owl management concerns are displayed on the 1:24,000 scale standard map products. If specific details on spotted owl site centers are required they must be requested separately.

These products are designed for users external to the forest practice permit process and as such, does not reflect all the information pertinent to forest practice review. The Forest Practice Rules adopted August 22, 1997 by the Forest Practice Board and administered by the Washington Department of Natural Resources require forest practice applications to be screened against marbled murrelet detection areas and detection sections. Marbled murrelet detection locations are included in the standard priority habitats and species products, but the detection areas and detection sections are not included. If your project is affected by Forest Practice Regulations, you should specially request murrelet detection areas.

WDFW updates this information as additional data become available. Because fish and wildlife species are mobile and because habitats and species information changes, project reviews for fish and wildlife should not rest solely on mapped information. Instead, they should also consider new information gathered from current field investigations. Remember, habitats and species information can only show that a species or habitat type is present, they cannot show that a species or habitat type is not present. These products should not be used for future projects. Please obtain updates rather than use outdated information.

Because of the high volume of requests for information that WDFW receives, we need to charge for these products to recover some of our costs. Enclosed is an invoice itemizing the costs for your request and instructions for submitting payment.

Please note that sensitive information (e.g., threatened and/or endangered species) may be included in this request. These species are vulnerable to disturbances and harassment. In order to protect the viability of these species we request that you not disseminate the information as to their whereabouts. Please refer to these species presence in general terms. For example: "A Peregrine Falcon is located within two miles of the project area".

If your request required a Sensitive Fish and Wildlife Information Release Agreement and you or your organization has one on file, please refer to that document for conditions regarding release of this information.

For more information on WDFW you may visit our web site www.wdfw.wa.gov or visit the Priority Habitats and Species site at www.wdfw.wa.gov/hab/phspage.htm .

For information on the state=s endangered, threatened, and sensitive plants as well as high quality wetland and terrestrial ecosystems, please contact the Washington Department of Natural Resources, Natural Heritage Program at PO Box 47014, Olympia Washington 98504-7014, by phone (360) 902-1667 or visit the web site at www.dnr.wa.gov/nhp .

If you have any questions or problems with the information you received please call me at (360) 902-2543 or fax (360) 902-2946.

Sincerely,

Lori L. Guggenmos

Lori Guggenmos, PHS Data Release Manager
Priority Habitats and Species

Enclosures

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
REGIONAL CONTACTS

For assistance with Priority Habitats and Species information, contact the appropriate regional office, listed below.

County...	Contact...
Asotin, Columbia, Ferry, Garfield, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	Region 1 Office 2315 North Discovery Place Spokane Valley, WA 99216-1566 Phone: (509) 892-1001
Adams, Chelan, Douglas, Grant Okanogan	Region 2 Office 1550 Alder Street NW Ephrata, WA 98823-9699 Phone: (509) 754-4624
Benton, Franklin, Kittitas, Yakima	Region 3 Office 1701 South 24th Avenue Yakima, WA 98902-5720 Phone: (509) 575-2740
Island, King, San Juan, Skagit, Snohomish, Whatcom	Region 4 Office 16018 Mill Creek Boulevard Mill Creek, WA 98012-1296 Phone: (206) 775-1311
Clark, Cowlitz, Klickitat, Lewis, Skamania, Wahiakum	Region 5 Office 2108 Grand Boulevard Vancouver, WA 98661 Phone: (360) 696-6211
Clallam, Grays Harbor, Jefferson, Kitsap, Mason, Pacific, Pierce, Thurston	Region 6 Office 48 Deveonshire Road Montesano, WA 98563-9618 Phone: (360) 249-4628

Appendix B

Rare, Threatened, and Endangered (RTE) Plant Species Potentially Occurring in the Wells Project Transmission Line Study Area

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Appendix B. Rare, Threatened, and Endangered (RTE) Plant Species Potentially Occurring in the Wells Project Transmission Line Study Area

Scientific Name	Common Name	Status [1,2]		Flowering	Elevation	Habitat [3]
		State	Federal			
Allium constrictum	Constricted Douglas' Onion	S	-	late-April to May	2070-2550 ft	Vernally moist areas on flat basalt lithosol and around the margins of rocky vernal ponds. It is less common on drier lithosols, and rarely seen on the driest lithosols.
Ammania robusta	Grand Red Stem	T	-	May and June	Columbia River	Mudflats with fine sandy and silty soils along margins of ponds, rivers, and other wet places.
Astragalus arrectus	Palouse Milk-vetch	T	-	late-May to early June	1000 – 4000 ft	Grassy hillsides, sagebrush flats, river bluffs, & open ponderosa pine/Douglas-fir forests in grassy or shrub-dominated openings growing on all aspects in soil ranging from rocky & dry to moist & rich.
Astragalus misellus var. *pauper*	Pauper Milk-vetch	S	-	April to mid-May	500-3000 ft	Open gentle slopes of ridgetops & upper slopes; rarely middle or lower slopes, mostly along the western margin of the Columbia Basin.
Astragalus multiflorus	Loose-flower Milk-vetch	T	-	June to July	> 800 ft	Frequently found on steep alkaline clay & also on calcareous soil in grasslands.
Astragalus sinuatus	Whited's Milk-vetch	E	SC	mid-April to early-May	800-2000 ft	Rocky hillsides associated with the big sagebrush /bluebunch wheatgrass association. Soils consist of wind-deposited silts mixed with small amounts of volcanic ash over basalt bedrock.
Camissonia pygmaea	Dwarf Evening-primrose	S	-	June to August	500-1850 ft	Unstable soil or gravel in steep talus, dry washes, banks, & roadcuts.
Carex comosa	Bristly Sedge	S	-	May to July	50-2000 ft	Marshes, lake shores, & wet meadows.
Carex sychnocephala	Many-headed Sedge	S	-	July to Sept	~800 ft	Moist or wet ground adjacent to marshes or along lake shores. Substrates vary from rather rocky to sandy & silty soils.
Carex tenuiflora	Sparse-leaved Sedge	T	-	late-July to mid-August		Bogs, fens, swamps, wet grassy areas, occasionally in seepage areas in forests. Occurs in a sedge marsh & sphagnum bog maintained by a beaver dam.
Centunculus minimus	Chaffweed	R1	-	May to June	~800 ft	Moist ground, ephemeral wet areas.

Appendix B. Rare, Threatened, and Endangered (RTE) Plant Species Potentially Occurring in the Wells Project Transmission Line Study Area (continued)

Scientific Name	Common Name	Status [1,2]		Flowering	Elevation	Habitat [3]
		State	Federal			
Cicuta bulbifera	Bulb-bearing hemlock	S	-	Growing season	240-3700 ft	Along edges of marshes, lake margins, & slow moving streams; in bogs, wet meadows, shallow standing water, hummocks, & floating mats.
Cryptanhta gracilis	Narrow-stem Cryptantha	S	-	May to June	1250 to 2680 ft.	Talus and pockets of silt. This species seems to require steep, somewhat unstable, open substrates.
Cryptantha leucophaea	Gray Cryptantha	S	SC	May to June	300-2500 ft	Grows on sandy substrate along the Columbia River within the Columbia Basin physiographic province.
Cryptantha spiculifera	Snake River Cryptantha	S	-	Identifiable May to June		Dry, open, flat or sloping areas in stable or stony soils. Occurs where overall cover of vegetation is relatively low.
Cryptogramma stelleri	Steller's Rockbrake	S	-	April to Oct	300-3500 ft	Moist, shaded cliffs and ledges
Delphinium viridescens	Wenatchee Larkspur	T	SC	July	1800 to 4200 ft.	Moist meadows, moist microsites in open coniferous forests, springs, seeps and riparian areas. All sites have surface water or saturated upper soil profiles into early summer. Habitats are usually moderately poorly to poorly drained and are silty - to clayey-loams in texture.
Eleocharis rostellata	Beaked Spike-rush	S	-	June to August	500-1850 ft	Streambanks, lake margins, around springs, & in marshes.
Erigeron piperianus	Piper's Daisy	S	-	May to June	400-2250 ft	Dry, open places, often with sagebrush on level ground to moderate slopes of all aspects. Soil is well drained & generally somewhat alkaline.
Githopsis specularioides	Common Blue-cup	S	-	mid-April to June	200-2500 ft	Open places at lower elevations, such as thin soils over bedrock outcrops, talus slopes, & gravelly prairies.
Hackelia cinerea	Gray Stickseed	S	-	mid-May to July	1600 to 1900 ft.	Open or sparsely forested areas, especially on cliffs or talus, or other exposed rock, often in mossy cracks.
Hackelia hispida var. *disjuncta*	Sagebrush Stickseed	S	-	May to June	600-2100 ft	Rocky talus & sparsely vegetated areas within an arid region at elevations.
Halimolobus perplexa var. perplexa	Puzzling Rockcress	T	-	May	1700 ft.	Lithosol and bare clayish soil with scattered rock.
Hierochloe odorata	Northern Sweetgrass	R1	-	April to July	325 to 4420 ft.	Moist soil from alpine to low montane elevations, possibly lower.

Appendix B. Rare, Threatened, and Endangered (RTE) Plant Species Potentially Occurring in the Wells Project Transmission Line Study Area (continued)

Scientific Name	Common Name	Status [1,2]		Flowering	Elevation	Habitat [3]
		State	Federal			
Iliamna longisepala	Longsepal Globemallow	S	-	June to August	500-4500 ft	Open hillsides & along gravelly streamside in shrub steppe & the adjacent forested slopes of the eastern flank of the Cascades.
Juncus tiehmii	Tiehm's Rush	T	-	mid-spring to early-fall	980-10170 ft	Water or saturated upper soil profiles into early summer. Bare areas with moist granitic sand along streams, seepage areas around outcrops, and depressions in meadows.
Juncus uncialis	Inch-high Rush	S	-	June	2100-2290 ft	Vernal pools, depressions, & swales.
Lipocarpha aristulata	Halfchaff Awned Sedge	T	-	June to September	360 to 420 ft	Along shorelines and islands below high water on silty substrates.
Mimulus suksdorfii	Suksdorf's Monkey-flower	S	-	mid-April on		Moist pockets & drainages, sagebrush steppe vegetation type, often in microhabitats that have undergone local disturbance from small erosive events (e.g., slumps, slides, bioturbidity, & frost boils).
Mimulus washingtonensis	Washington Monkey-flower	X	-	May to September	low	Low elevation, wet, open places.
Monolepis pusilla	Red Poverty-weed	T	-	identifiable from April to July	1950 to 2210 ft.	Desert regions and is often found on saline or alkaline soil. In Washington, this species has been found growing in saline/alkaline clay, salt-encrusted soil, and on the edge of a dry alkaline pond.
Nicotiana attenuata	Coyote Tobacco	S	-	June to Sept	400-1,000 ft	Dry, sandy bottom lands, dry rocky washes, & other dry open places.
Ophioglossum pusillum	Adder's-tongue	T	-	June to September	40-2300 ft	Bogs, fens, damp sand, pastures, wet meadows, grassy swales, moist woods, rich swamplands, mud creeks, & cedar swamps. Sometimes occurs on dry, sandy beaches or hillsides; the subterranean gametophyte may be an adaptation to seasonal drying &/or fire.

Appendix B. Rare, Threatened, and Endangered (RTE) Plant Species Potentially Occurring in the Wells Project Transmission Line Study Area (continued)

Scientific Name	Common Name	Status [1,2]		Flowering	Elevation	Habitat [3]
		State	Federal			
Oxytropis campestris var. *gracilis*	Slender Crazyweed	S	-	May to June		Prairies, mountain meadows, open woodlands, and on gravelly flood plains in moist or dry soils. Glacial outwash terraces near ephemeral ponds in sandy loam soil & near the coast on steep, dry, south-facing rock outcrops with shallow soil & some herbaceous cover in the salt spray zone.
Pediocactus nigrispinus	Snowball Cactus	R1	-	May to July	1000 to 4000 ft.	Low mountains & desert valleys.
Penstemon eriantherus var. *whitedii*	Fuzzytongue Penstemon	S	-	May to June	525-3835 ft	On west-facing slopes of small canyons, & in dry & rocky habitats in the foothills of the Cascade Range & in the Columbia Basin.
Petrophyton cinerascens	Chelan Rockmat	E	SC	late-July to late-August	800-1800 ft	Crevices & on ledges of open, east- or west-facing cliffs & rock (non-basalt) outcrops along the Columbia River in central WA.
Phacelia lenta	Sticky Phacelia	T	SC	mid-April to mid-June	1300 to 3400 ft.	Endemic to a small area of the arid open rocky habitats, occasionally being found on the talus below rock outcrops and on the upper rim of these outcrops.
Phacelia tetramera	Dwarf Phacelia	S	-	April to June	1200 to 2210 ft.	Alkaline soils and vernal pools
Platanthera sparsiflora	Canyon Bog-orchid	T	-	late-May to August	800-5200 ft	Columbia Basin region. It occurs on cliff crevices and adjacent. Open, wet areas, seeps and bogs.
Potamogeton filiformis var. *occidentalis*	Western Fineleaf Pondweed	R1	-	July to August	1074 to 3550 ft.	Shallow, standing, or slow-moving water.
Rotala ramosior	Lowland Toothcup	T	-	June to August	200-2300 ft	Damp areas in fine sand & silt around wetlands, lake & pond margins, & along free-flowing river reaches.
Schizachyrium scoparium var. *scoparium*	Little Bluestem	T	-	July to August	750 ft	Along the Columbia River, this species is located within remnant riparian vegetation.
Scutellaria angustifolia ssp. *micrantha*	Narrowleaf Skullcap	R1	-	May to June	2500-5700 ft	In a variety of open, moist, or dry, often rocky habitats east of the Cascade Range.
Sisyrinchium montanum	Strict Blue-eyed-grass	T	-	April to July	> 750 ft	Mossy, vernally moist seeps on hillsides in silt-loam substrate just above the high water level of the Columbia River.

Appendix B. Rare, Threatened, and Endangered (RTE) Plant Species Potentially Occurring in the Wells Project Transmission Line Study Area (continued)

Scientific Name	Common Name	Status [1,2]		Flowering	Elevation	Habitat [3]
		State	Federal			
Spiranthes diluvialis	Ute Ladies' Tresses	E	LT	mid-July to August	720-1500 ft	Stabilized gravel bars on the Columbia River that are moist throughout the growing season & inundated early in the growing season.
Spiranthes porrifolia	Western Ladies'-tresses	S	-	May to August	60-6800 ft	Wet meadows, along streams, in bogs, & on seepage slopes.
Thelypodium sagittatum ssp. *sagittatum*	Arrow Thelypody	S	-	June to July		Lower mountain valleys to desert plains in (alkaline) drying meadows.
Trichostema oblongum	Oblong Bluecurls	R1	-	July to August	1950 to 2400 ft.	Moist, open place, often in disturbed sites. .Alkaline soils in vernally moist areas that often dry by summer.
Trifolium thompsonii	Thompson's Clover	T	SC	mid-May to mid-July	140-3760 ft	Open ponderosa pine woods to areas dominated by bluebunch wheatgrass & herbs. Ridgelines, steep slopes, alluvial fans, & canyon bottoms. It also occurs on the deeper soils in areas characterized by "biscuit-swale" topography.
Utricularia minor	Lesser Bladderwort	R1	-	June to Sept	135 to 4000 ft.	Shallow, standing, or slow-moving water. Low nutrient lakes and peatbog pools.

[1] State Status of plant species is determined by the Washington Natural Heritage Program. Factors considered include abundance, occurrence patterns, vulnerability, threats, existing protection, & taxonomic distinctness.

E = Endangered. In danger of becoming extinct or extirpated from Washington within the foreseeable future if factors contributing to its decline continue.

T = Threatened. Likely to become Endangered in Washington within the foreseeable future if factors contributing to its population decline or habitat degradation or loss continue.

S = Sensitive. Vulnerable or declining & could become Endangered or Threatened in Washington without active management or removal of threats.

X = Possibly extinct or extirpated from Washington.

R1 = Review group 1. Of potential concern but needs more field work to assign another rank.

[2] Federal Status under the U.S. Endangered Species Act (ESA) as published in the Federal Register:

LE = Listed Endangered. In danger of extinction throughout all or a significant portion of its range.

LT = Listed Threatened. Likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

SC = Species of Concern. An unofficial status, the species appears to be in jeopardy, but insufficient information to support listing.

[3] Source: WNHP 2005

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Appendix C

Invasive Plant Species Potentially Occurring in the Wells Project Transmission Line Study Area

Appendix C. Invasive Plant Species Potentially Occurring in the Wells Project Transmission Line Study Area

Class A noxious weeds in Washington [1]

Common Name	Scientific Name	Designated for control
buffalobur	*Solanum rostratum*	Statewide
common crupina	*Crupina vulgaris*	Statewide
cordgrass, dense flower	*Spartina densiflora*	Statewide
cordgrass, salt meadow	*Spartina patens*	Statewide
cordgrass, common	*Spartina anglica*	Statewide
dyers woad	*Isatis tinctoria*	Statewide
eggleaf spurge	*Euphorbia oblongata*	Statewide
floating primrose-willow	*Ludwigia peploides*	Statewide
garlic mustard	*Alliaria petiolata*	Statewide
giant hogweed	*Heracleum mantegazzianum*	Statewide
goatsrue	*Galega officinalis*	Statewide
hawkweed, European	*Hieracium sabaudum*	Statewide
hawkweed, yellow devil	*Hieracium floribundum*	Statewide
hydrilla	*Hydrilla verticillata*	Statewide
johnsongrass	*Sorghum halepense*	Statewide
knapweed, bighead	*Centaurea macrocephala*	Statewide
knapweed, Vochin	*Centaurea nigrescens*	Statewide
kudzu	*Pueraria montana* var. *lobata*	Statewide
meadow clary	*Salvia pratensis*	Statewide
purple starthistle	*Centaurea calcitrapa*	Statewide
reed sweetgrass	*Glyceria maxima*	Statewide
ricefield bulrush	*Schoenoplectus mucronatus*	Statewide
sage, clary	*Salvia sclarea*	Statewide
sage, Mediterranean	*Salvia aethiopis*	Statewide
silverleaf nightshade	*Solanum elaeagnifolium*	Statewide
Spanish broom	*Spartium junceum*	Statewide
spurge flax	*Thymelaea passerina*	Statewide
Syrian bean-caper	*Zygophyllum fabago*	Statewide
Texas blueweed	*Helianthus ciliaris*	Statewide
thistle, Italian	*Carduus pycnocephalus*	Statewide
thistle, milk	*Silybum marianum*	Statewide
thistle, slenderflower	*Carduus tenuiflorus*	Statewide
variable-leaf milfoil	*Myriophyllum heterophyllum*	Statewide
velvetleaf	*Abutilon theophrasti*	Statewide
wild four o'clock	*Mirabilis nyctaginea*	Statewide

Class B noxious weeds designated for control in Regions 3 and 6, Washington [2]

Common Name	Scientific Name	Designated for control	
		Region 3	Region 6
alyssum, hoary	*Berteroa incana*	All except Okanogan County; Okanogan County except Ranges 29 through 31 East of Townships 37 through 40 North	All
arrowhead, grass-leaved	*Sagittaria graminea*	All	All
blackgrass	*Alopecurus myosuroides*	All	All
blueweed	*Echium vulgare*	All	All
broom, Scotch	*Cytisus scoparius*	All	All
bryony, white	*Byronia alba*	All	All
bugloss, annual	*Anchusa arvensis*	All	All
bugloss, common	*Anchusa officinalis*	All	All
camelthorn	*Alhagi maurorum*	All	All, except those portions of Section 23, 24, 25, and 29-36, T16N, R27E, W.M. lying outside Intercounty Weed District 52 and except Sections 1-12, T15N, R27E, W.M. in Grant County, and except the area west of Highway 17 and north of Highway 26 in Adams County
carrot, wild	*Daucus carota*	All (except where intentionally cultivated)	All, except Yakima County (except where intentionally cultivated)
catsear, common	*Hypochaeris radicata*	All	All
chervil, wild	*Anthriscus sylvestris*	All	All
cinquefoil, sulfur	*Potentilla recta*	All	All, except Yakima County
cordgrass, common	*Spartina anglica*	All	All
cordgrass, smooth	*Spartina alterniflora*	All	All
daisy, oxeye	*Leucanthemum vulgare*	NA	All, except those areas lying within Yakima and Kittitas Counties west of Range 13E
elodea, Brazilian	*Egeria densa*	All	All
fanwort	*Cabomba caroliniana*	All	All
fieldcress, Austrian	*Rorippa austriaca*	All	All
floating heart, yellow	*Nymphoides peltata*	All	All
gorse	*Ulex europaeus*	All	All
hawkweed queen-devil	*Hieracium glomeratum*	All	All
hawkweed, mouseear	*Hieracium pilosella*	All	All
hawkweed, orange	*Hieracium aurantiacum*	All	All
hawkweed, polar	*Hieracium atratum*	All	All
hawkweed, smooth	*Hieracium laevigatum*	All	All
hawkweed, yellow	*Hieracium caespitosum*	All	All
hedgeparsley	*Torilis arvensis*	All	All
helmet, policeman's	*Impatiens gladulifera*	All	All
herb-Robert	*Geranium robertianum*	All	All
houndstongue	*Cynoglossum officinale*	Chelan and Douglas Counties	Chelan and Douglas Counties
indigobush	*Amorpha fruticosa*	All	All
knapweed, black	*Centaurea nigra*	All	All except Kittitas County
knapweed, brown	*Centaurea jacea*	All	All except Kittitas County
knapweed, diffuse	*Centaurea diffusa*	NA	Grant County lying in: Townships 13-16 North, Ranges 25-27 East, Townships 17 and 18N, Ranges 25-30 East, Townships 19 and 20 North, Ranges 29 and 30 East, T21N, R23E, Sections 1-30, T21N, R26E, Sections 5, 6, 7, 8, 17, and 18, East 1/2 Township 21 N Range 27E, T21N, Ranges 28-30 E, those portions of Townships 22-28N, Ranges 28-30E, those portions of Townships 28-30E lying in Grant County All W.M.
knapweed, meadow	*Centaurea jacea x nigra*	All	All except Kittitas County
knapweed, Russian	*Acroptilon repens*	NA	Adams County, except for the area west of Highway 17 and north of Highway 26

Class B noxious weeds designated for control in Regions 3 and 6, Washington [2]

Common Name	Scientific Name	Designated for control	
		Region 3	Region 6
knapweed, spotted	*Centaurea stoebe* (*Centaurea biebersteinii*)	All	All
knotweed, Bohemian	*Polygonum bohemicum*	Chelan and Douglas Counties	Kittitas, Chelan, and Douglas Counties
knotweed, giant	*Polygonum sachalinense*	NA	Kittitas County only
knotweed, Himalayan	*Polygonum polystachyum*	NA	Kittitas County only
knotweed, Japanese	*Polygonum cuspidatum*	Chelan and Douglas Counties	Kittitas, Chelan, and Douglas Counties
Kochia	*Kochia scoparia*	NA	Kittitas County only
lepyrodiclis	*Lepyrodiclis holosteoides*	All	All
loosestrife, garden	*Lysimachia vulgaris*	All	All
loosestrife, purple	*Lythrum salicaria*	All except within 100 feet of the ordinary highway mark of the Okanogan River from the Canadian border south to Riverside	All, except that portion of Grant County lying:northerly of the Frenchman Hills-O'Sullivan Dam Road, southerly of Highway Interstate 90, easterly of the section line of the location of County Road J SW/NW (if constructed), westerly of the section line of the location of County Road H SE/NE (if constructed).
loosestrife, wand	*Lythrum virgatum*	All except within 100 feet of the ordinary highway mark of the Okanogan River from the Canadian border south to Riverside	All, except that portion of Grant County lying:northerly of the Frenchman Hills-O'Sullivan Dam Road, southerly of Highway Interstate 90, easterly of the section line of the location of County Road J SW/NW (if constructed), westerly of the section line of the location of County Road H SE/NE (if constructed).
nutsedge, yellow	*Cyperus esculentus*	All	All except those areas lying between State Highway 26 and State Highway 28, and westerly of Dodson Road in Grant County, and except S 1/2, Sec. 2, T20N, R25E, W.M.
oxtongue, hawkweed	*Picris hieracioides*	All	All
parrotfeather	*Myriophyllum aquaticum*	All	All
pepperweed, perennial	*Lepidium latifolium*	All	Kittitas County; Adams County, except for the area west of Highway 17 and north of Highway 26
primrose, water	*Ludwigia hexapetala*	All	All
puncturevine	*Tribulus terrestris*	All	Kittitas County only
ragwort, tansy	*Senecio jacobaea*	All	All
saltcedar	*Tamarix ramosissima*	All	All of Region 6, unless intentionally established prior to 2004
sandbur, longspine	*Cenchrus longispinus*	All	Adams County of Region 6, except for that area lying within Intercounty Weed District No. 52; Kittitas County
skeletonweed, rush	*Chondrilla juncea*	All	All, except that portion lying within Grant County that is: southerly of State Highway 28 northerly of Interstate Highway 90 easterly of Grant County Road 1 Northwest
sowthistle, perennial	*Sonchus arvensis ssp. arvensis*	All	Adams County
spurge, leafy	*Euphorbia esula*	All	All
starthistle, yellow	*Centaurea solstitialis*	All	All
swainsonpea	*Sphaerophysa salsula*	All	Weed District 3 of Grant County; Adams County
thistle, musk	*Carduus natans*	All	All
thistle, plumeless	*Carduus acanthoides*	All	All
thistle, Scotch	*Onopordum acanthium*	All	All
toadflax, Dalmatian	*Linaria dalmatica ssp. dalmatica*	Douglas County lying south of T25N and west of R25E, Okanogan County lying within T 33, 34, 35N, R19, 20, 21, 22E, except the southwest, southeast, and northeast quarters of the northeast quarter of section 27, T35N, R31E; and the northeast quarter of the southeast quarter of section 27, T35N, R21E	Kittitas, Chelan, Douglas, and Adams Counties; Weed District No. 3 of Grant County
watermilfoil, Eurasian	*Myriophyllum spicatum*	NA	Adams County

[1] Class A weeds = non-native species whose distribution in Washington State is still limited; eradication of all Class A weeds is required by state law.
[2] Class B weeds = non-native species whose distribution is limited to portions of Washington State. Because of differences in distribution, treatment of Class B weeds varies between regions of the state. In regions where a Class B weed is not yet widespread, prevention of new infestations is required; in these areas, the weed is a "Class B Designate," meaning it is designated for control by state law. This project is within Noxious Weed Regions 3 and 6.

Appendix D

Rare, Threatened, and Endangered (RTE) Wildlife Species That May Occur in the Wells Project Transmission Line Corridor Study Area

Appendix D. Rare, Threatened, and Endangered (RTE) Wildlife Species That May Occur in the Wells Project Transmission Line Corridor Study Area

Taxonomic Order Common name	*Scientific name*	RTE Status
BIRDS		
Pelicans (Pelicaniformes)		
American white pelican	*Pelecanus erythrorhynchus*	SE
Hawks, Falcons, Eagles (Falconiformes)		
Ferruginous hawk	*Buteo regalis*	FCo ST
Golden eagle	*Aquila chrysaetos*	SC
Merlin	*Falco columbarius*	SC
Northern goshawk	*Accipiter gentilis*	FCo SC
Peregrine falcon	*Falco peregrinus*	FCo SS
Upland Game Birds (Galliformes)		
Greater sage-grouse	*Centrocercus urophasianus*	FC ST
Sharp-tailed grouse	*Tympanuchus phasianellus*	FCo ST
Cranes (Gruiformes)		
Sandhill crane	*Grus canadensis*	SE
Cuckoos (Cuculiformes)		
Yellow-billed cuckoo	*Coccyzus americanus*	FC SC
Owls (Strigiformes)		
Burrowing owl	*Athene cunicularia*	FCo SC
Flammulated owl	*Otus flammeolus*	SC
Swifts (Apodiformes)		
Vaux's swift	*Chaetura vauxi*	SC
Woodpeckers (Piciformes)		
Black-backed woodpecker	*Picoides arcticus*	SC
Lewis’s woodpecker	*Melanerpes lewis*	SC
Pileated woodpecker	*Dryocopus pileatus*	SC
White-headed woodpecker	*Picoides albolarvatus*	SC

Appendix D. Rare, Threatened, and Endangered (RTE) Wildlife Species That May Occur in the Wells Project Transmission Line Corridor Study Area

Taxonomic Order Common name	*Scientific name*	RTE Status
Perching Birds (Passeriformes)		
Loggerhead shrike	*Lanius ludovicianus*	FCo SC
Sage sparrow	*Amphispiza belli*	SC
Sage thrasher	*Oreoscoptes montanus*	SC
AMPHIBIANS AND REPTILES		
Frogs (Anura)		
Columbia spotted frog	*Rana luteiventris*	SC
Northern leopard frog	*Lithobates pipiens*	FCo SE
Western toad	*Anaxyrus boreas*	FCo SC
Lizards and Snakes (Squamata)		
Sagebrush lizard	*Sceloporus graciosus*	FCo SC
Striped whipsnake	*Masticophis taeniatus*	SC
MAMMALS		
Shrews (Insectivora)		
Merriam's shrew	*Sorex merriami*	SC
Bats (Chiroptera)		
Townsend's big-eared bat	*Corynorhinus townsendii*	FCo SC
Rabbits (Lagomorpha)		
Black-tailed jackrabbit	*Lepus californicus*	SC
Pygmy rabbit	*Brachylagus idahoensis*	FE SE
White-tailed jackrabbit	*Lepus townsendii*	SC
Rodents (Rodentia)		
Washington ground squirrel	*Spermophilus washingtoni*	FC SC

Species Status: FE = Federal Endangered; FT = Federal Threatened; FC = Federal Candidate; FCo = Federal Species of Concern; SE = State Endangered; ST = State Threatened; SS = State Sensitive; SC = State Candidate.

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Appendix E

Blank Data Forms

Wells Project Transmission Line Avian Point Count Data Form

DATE: VISIT NUMBER:	**FIELD NOTES:**
OBSERVER:	
AREA ID:	
WEATHER[1]: WIND[2]:	

STN #	START TIME	SPP. CODE	Habitat	Age/ Sex[3]	Obs. Type[4]	<35 m from center	>35 m		NOTES
							In ROW	Out of ROW	

[1] **Clear** (<10% cover) / **Scat**tered clouds (10-50% cover) / **Brok**en clouds (50-90% cover) / **Over**cast (>90% cover) / **Driz**zle
[2] **Calm** / **Low** (1-5 mph) / **Mod**erate (6-20 mph); Wind > 20 mph is unsuitable for surveys
[3] **M**ale / **F**emale / **J**uvenile / **U**nknown
[4] **S**ong / **C**all / **V**isual (silent) / **F**lyover

Wells Transmission Line Grouse Survey Page ____ of ____

Date: _____ Observer(s): _____

Start Time: _____ Tower: _____ GPS Point: _____ Transect Description:

Stop Time: _____ Tower: _____ GPS Point: _____ Snow Cover:

Temperature: Cloud Cover: Wind Speed: Precipitation: Snow Depth:

Observations (one per species)

Point No. (GPS/map): _____ Nearest Tower No. _____ Dist from T-line: _____

dist. _____

bearing _____

Cover Type (circle one): **SS GR CON RIP AG CRP Other** _____ # Male _____

Sign Type (circle one): **animal auditory scat track feathers nest dusting site other** _____ # Female _____

Species (circle one): **GRSG STGR DUGR** # Unk. _____

Behavior: **Display Copulation Brood Nest Flush Fly Other** _____ # Chicks _____

Notes:

Photos:

Observations (one per species)

Point No. (GPS/map): _____ Nearest Tower No. _____ Dist from T-line: _____

dist. _____

bearing _____

Cover Type (circle one): **SS GR CON RIP AG CRP Other** _____ # Male _____

Sign Type (circle one): **animal auditory scat track feathers nest dusting site other** _____ # Female _____

Species (circle one): **GRSG STGR DUGR** # Unk. _____

Behavior: **Display Copulation Brood Nest Flush Fly Other** _____ # Chicks _____

Notes:

Photos:

Wells Transmission Line Tower Usage

Observer(s): _____ **Visit Date(s): _____**

Tower No.	Date	Observations*
1004/2004		
1005/2005		
1006/2006		
1007/2007		
1008/2008		
1009/2009		
1010/2010		
1011/2011		
1012/2012		
1013/2013		
1014/2014		
1015/2015		
1016/2016		
1017/2017		
1018/2018		
1019/2019		
1020/2020		
1021/2021		
1022/2022		
1023/2023		
1024/2024		
1025/2025		
1026/2026		
1027/2027		
1028/2028		
1029/2029		
1030/2030		
1031/2031		
1032/2032		
1033/2033		
1034/2034		
1035/2035		
1036/2036		
1037/2037		
1038/2038		
1039/2039		
1040/2040		
1041/2041		
1042/2042		
1043/2043		
1044/2044		
1045/2045		
1046/2046		
1047/2047		
1048/2048		
1049/2049		
1050/2050		

Tower No.	Date	Observations*
1051/2051		
1052/2052		
1053/2053		
1054/2054		
1055/2055		
1056/2056		
1057/2057		
1058/2058		
1059/2059		
1060/2060		
1061/2061		
1062/2062		
1063/2063		
1064/2064		
1065/2065		
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1067/2067		
1068/2068		
1069/2069		
1070/2070		
1071/2071		
1072/2072		
1073/2073		
1074/2074		
1075/2075		
1076/2076		
1077/2077		
1078/2078		
1079/2079		
1080/2080		
1081/2081		
1082/2082		
1083/2083		
1084/2084		
1085/2085		
1086/2086		
1087/2087		
1088/2088		
1089/2089		
1090/2090		
1091/2091		
1092/2092		
1093/2093		
1094/2094		
1095/2095		
1096/2096		
1097/2097		

* Indicate tower number, species, and behavior or evidence type. Leave blank for dates with no observations.

Wells Transmission Line Tower Usage

Observer(s): _____ **Visit Date(s): _____**

Tower No.	Date	Observations*
1098/2098		
1099/2099		
1100/2100		
1101/2101		
1102/2102		
1103/2103		
1104/2104		
1105/2105		
1106/2106		
1107/2107		
1108/2108		
1109/2109		
1110/2110		
1111/2111		
1112/2112		
1113/2113		
1114/2114		
1115/2115		
1116/2116		
1117/2117		
1118/2118		
1119/2119		
1120/2120		
1121/2121		
1122/2122		
1123/2123		
1124/2124		
1125/2125		
1126/2126		
1127/2127		
1128/2128		
1129/2129		
1130/2130		
1131/2131		
1132/2132		
1133/2133		
1134/2134		
1135/2135		
1136/2136		
1137/2137		
1138/2138		
1139/2139		
1140/2140		
1141/2141		
1142/2142		
1143/2143		
1144/2144		

Tower No.	Date	Observations*
1145/2145		
1146/2146		
1147/2147		
1148/2148		
1149/2149		
1150/2150		
1151/2151		
1152/2152		
1153/2153		
1154/2154		
1155/2155		
1156/2156		
1157/2157		
1158/2158		
1159/2159		
1160/2160		
1161/2161		
1162/2162		
1163/2163		
1164/2164		
1165/2165		
1166/2166		
1167/2167		
1168/2168		
1169/2169		
1170/2170		
1171/2171		
1172/2172		
1173/2173		
1174/2174		
1175/2175		
1176/2176		
1177/2177		
1178/2178		
1179/2179		
1180/2180		
1181/2181		
1182/2182		
1183/2183		
1184/2184		
1185/2185		
1186/2186		
1187/2187		
1188/2188		
1189/2189		

* Indicate tower number, species, and behavior or evidence type. Leave blank for dates with no observations.

Wells Transmission Line Mortality Data Page ____ of ____

Date: _____ Observer(s): _____

Start:	Time:	Tower:	GPS Point:
Stop:	Time:	Tower:	GPS Point:

Survey Type (circle one): **Focused** **Incidental**

Location: **Cornehl** **Columbia** **Other** _____

Observations (one per species)

Point No. (GPS/map): Nearest Tower No. ____ Distance (ft) to tower ____

dist. ____ Distance (ft) to transmission line ____

bearing ____

Species: ____ Sex: **M / F / Unk** Age: ____

Condition: **Broken bones** **Trauma** **Burns** **Advanced decomposition** Specimen Collected: **Y** / **N**

Evidence of Scavenging: ____

Photo #s: ____

Notes: ____

Observations (one per species)

Point No. (GPS/map): Nearest Tower No. ____ Distance (ft) to tower ____

dist. ____ Distance (ft) to transmission line ____

bearing ____

Species: ____ Sex: **M / F / Unk** Age: ____

Condition: **Broken bones** **Trauma** **Burns** **Advanced decomposition** Specimen Collected: **Y** / **N**

Evidence of Scavenging: ____

Photo #s: ____

Notes: ____

Wells Transmission Line Incidental Observations

Date	Location	Point No.	Observer(s)	GPS Point	Nearest Tower	Species	Cover Type	Detection Type	No.	Behavior	Comment

Wells Transmission Line Area-constrained Reptile Survey Datasheet

Date	Observer(s)	Plot No.	Plot Description	GPS ID	Start Time	Stop Time	Air Temp	Species	Lifestage	Microhabitat	Notes

Appendix F

Mammal Species That May Occur in the Wells Transmission Line Study Area

Appendix F. Mammal Species That May Occur in the Wells Transmission Line Study Area

Order: Artiodactyla (Even-toed Ungulates)	
Cervidae (Deer)	
Alces alces	Moose
Cervus elaphus	Elk
Odocoileus hemionus	Mule Deer
Odocoileus virginianus	White-tailed Deer
Order: Carnivora (Carnivores)	
Canidae (Dogs)	
Canis latrans	Coyote
Felidae (Cats)	
Lynx rufus	Bobcat
Puma concolor	Cougar
Mephitidae (Skunks)	
Mephitis mephitis	Striped Skunk
Mustelidae (Weasels, Badgers and Otters)	
Lontra canadensis	River Otter
Mustela frenata	Long-tailed Weasel
Mustela vison	Mink
Taxidea taxus	Badger
Procyonidae (Ringtail, Raccoon, and Coati)	
Procyon lotor	Raccoon
Ursidae (Bears)	
Ursus americanus	American Black Bear
Order: Chiroptera (Bats)	
Vespertilionidae (Vesper Bats)	
Antrozous pallidus	Pallid Bat
Corynorhinus townsendii	Townsend's Big-eared Bat
Euderma maculatum	Spotted Bat
Eptesicus fuscus	Big Brown Bat
Lasionycteris noctivagans	Silver-haired Bat
Lasiurus cinereus	Hoary Bat
Myotis californicus	California Myotis
Myotis ciliolabrum	Western Small-footed Myotis
Myotis evotis	Long-eared Myotis
Myotis lucifugus	Little Brown Bat
Myotis thysanodes	Fringed Myotis
Myotis volans	Long-legged Myotis
Myotis yumanensis	Yuma Myotis
Pipistrellus hesperus	Western Pipistrelle

Appendix F. Mammal Species That May Occur in the Wells Transmission Line Study Area

Order: Soricomorpha (Shrews, Moles)	
Soricidae (Shrews)	
Sorex merriami	Merriam's Shrew
Sorex vagrans	Vagrant Shrew
Order: Lagomorpha (Rabbits, Hares, Pikas)	
Leporidae (Rabbits and Hares)	
Brachylagus idahoensis	Pygmy Rabbit
Lepus californicus	Black-tailed Jackrabbit
Lepus townsendii	White-tailed Jackrabbit
Sylvilagus nuttallii	Nuttall's Cottontail
Order: Rodentia (Rodents)	
Castoridae (Beaver)	
Castor canadensis	Beaver
Erethizodontidae (Porcupines)	
Erethizon dorsatum	Porcupine
Geomyidae (Pocket Gophers)	
Thomomys talpoides	Northern Pocket Gopher
Heteromyidae (Pocket Mice, Kangaroo Rats, Kangaroo Mice)	
Perognathus parvus	Great Basin Pocket Mouse
Muridae (Rats, Mice, Voles and Lemmings)	
Lemmiscus curtatus	Sagebrush Vole
Microtus longicaudus	Long-tailed Vole
Microtus montanus	Montane Vole
Mus musculus	House Mouse
Neotoma cinerea	Bushy-tailed Woodrat
Ondatra zibethicus	Muskrat
Onychomys leucogaster	Northern Grasshopper Mouse
Peromyscus maniculatus	Deer mouse
Reithrodontomys megalotis	Western Harvest Mouse
Sciuridae (Squirrels, Chipmunks, Marmots, Prairie Dogs)	
Marmota flaviventris	Yellow-bellied Marmot
Spermophilus washingtoni	Washington Ground Squirrel
Tamias amoenus	Yellow-pine Chipmunk
Tamias minimus	Least Chipmunk
Tamiasciurus douglasii	Douglas' Squirrel

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Appendix G

RTE Plant Location

(PRIVILEGED INFORMATION)

AVAILABLE UPON REQUEST

In accordance with 18 C.F.R. § 388.112, Appendix G of the Transmission Line Wildlife and Botanical Study has been removed because it contains Privileged Information. This appendix includes the location of a plant identified as a federal species of concern and a state threatened species the disclosure of which could create a risk of harm to the species.

Appendix H

Invasive Plant Species Location

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CEST - 7
(< 0.1 ac, Trace cover)

Rd 20

Rd 20

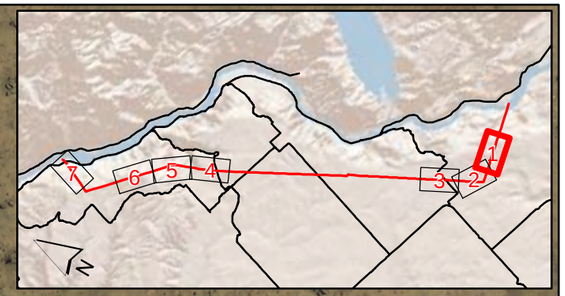
Rd D

Rd 19

Rd C

#1014 #1015 #1016 #1017 #1018 #1019 #1020 #1021 #1022 #1023 #1024 #1025 #1026 #1027 #1028

#2014 #2015 #2016 #2017 #2018 #2019 #2020 #2021 #2022 #2023 #2024 #2025 #2026 #2027 #2028



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Parametrix

N

0 500 1,000
Feet

Invasive Plant Species
- CEST= *Centaurea stoebe*, Spotted Knapweed
- LIDA = *Linaria dalmatica*, Dalmatian Toadflax

Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

Road
- Public
- Private
- Access

Appendix H
Map 1
Invasive Plant Species Locations

Rd D
Rd C
Rd 16
Rd 17
#1044
#1043
#2043
#1042
#2042
#1041
#2041
#1040
#2040
#1039
#2039
#1038
#2038
#1037
#2037
#1036
#2036
#1035
#2035
#1034
#2034
#1032
#1031
#2032
#1030
#2031
#1029
#2030
#1028
#2029
#1027
#2028
#2027
#2026
CEST - 6
(3.8 ac, Moderate cover)
1
2
3
4
5
6
7
N
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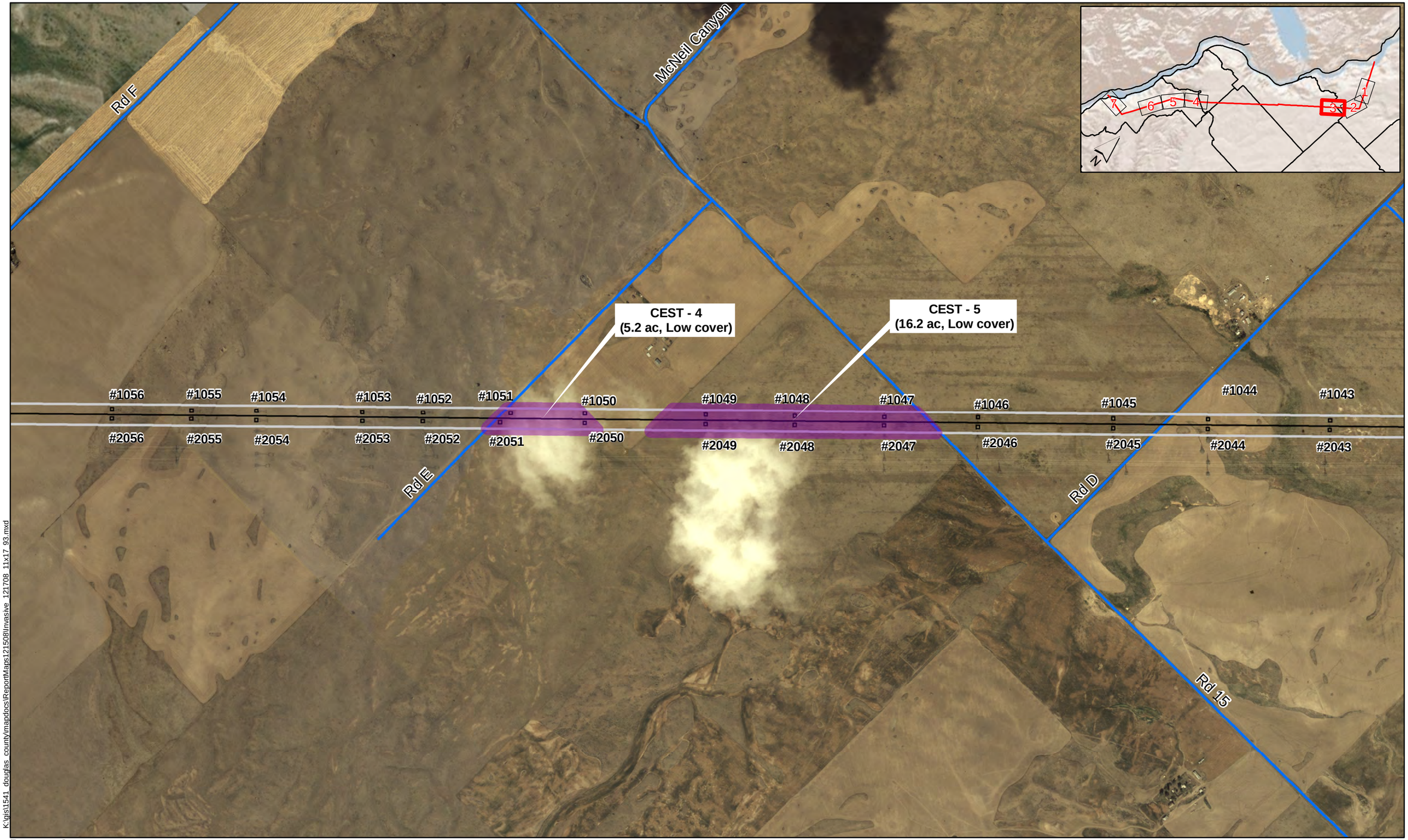
Parametrix
N
0 500 1,000
Feet
Invasive Plant Species
CEST= *Centaurea stoebe*, Spotted Knapweed
LIDA = *Linaria dalmatica*, Dalmatian Toadflax
Wells Transmission Line
Right of Way
Transmission Line Centerline
Transmission Tower
Stream
Road
Public
Private
Access
Appendix H
Map 2
Invasive Plant Species Locations



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Parametrix

0 500 1,000 Feet

Invasive Plant Species
- CEST= *Centaurea stoebe*, Spotted Knapweed
- LIDA = *Linaria dalmatica*, Dalmatian Toadflax

Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

Road
- Public
- Private
- Access

Appendix H
Map 3
Invasive Plant Species Locations

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Parametrix

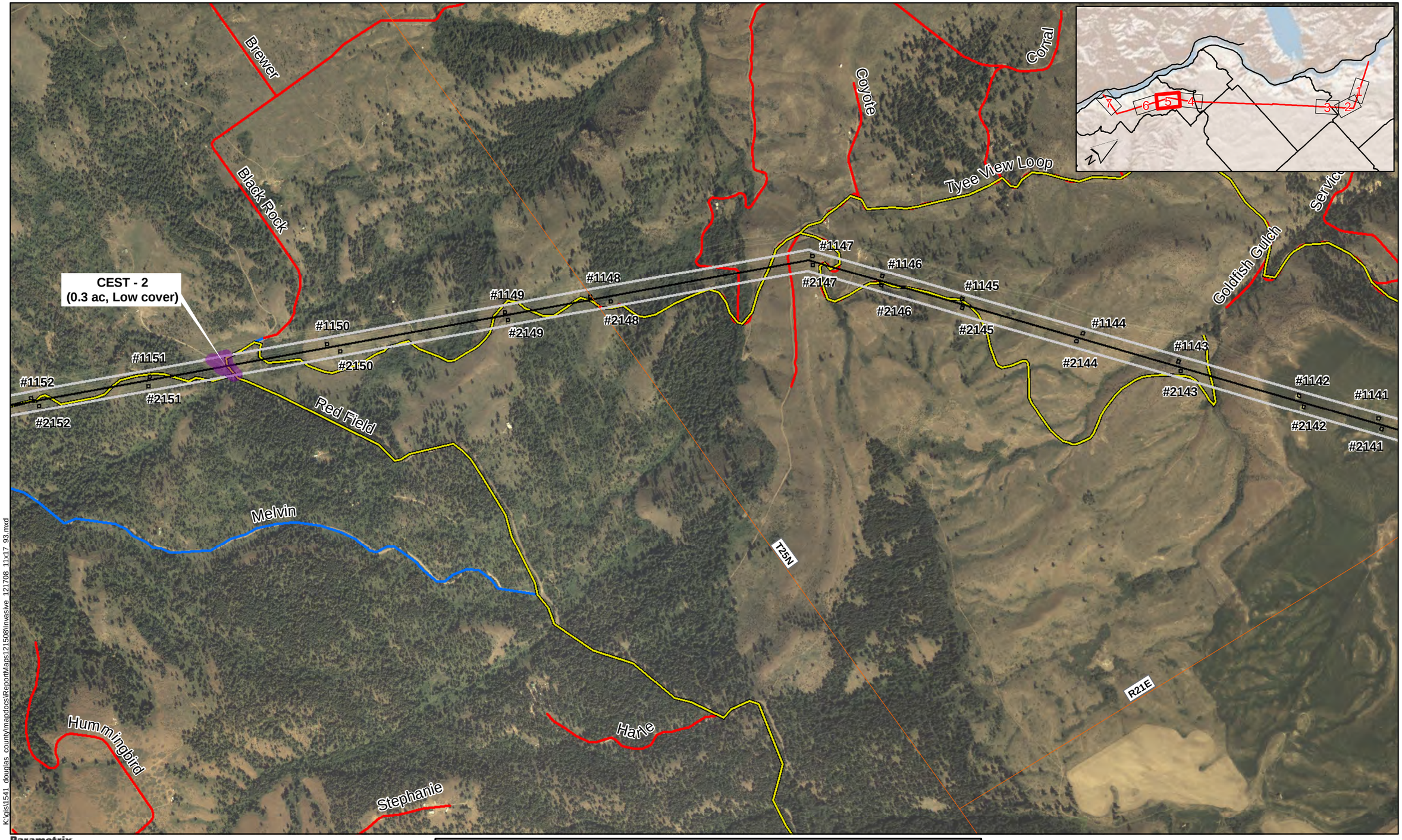
0 500 1,000 Feet

Invasive Plant Species
- CEST= *Centaurea stoebe*, Spotted Knapweed
- LIDA = *Linaria dalmatica*, Dalmatian Toadflax

Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

Road
- Public
- Private
- Access

Appendix H
Map 4
Invasive Plant Species Locations



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Parametrix

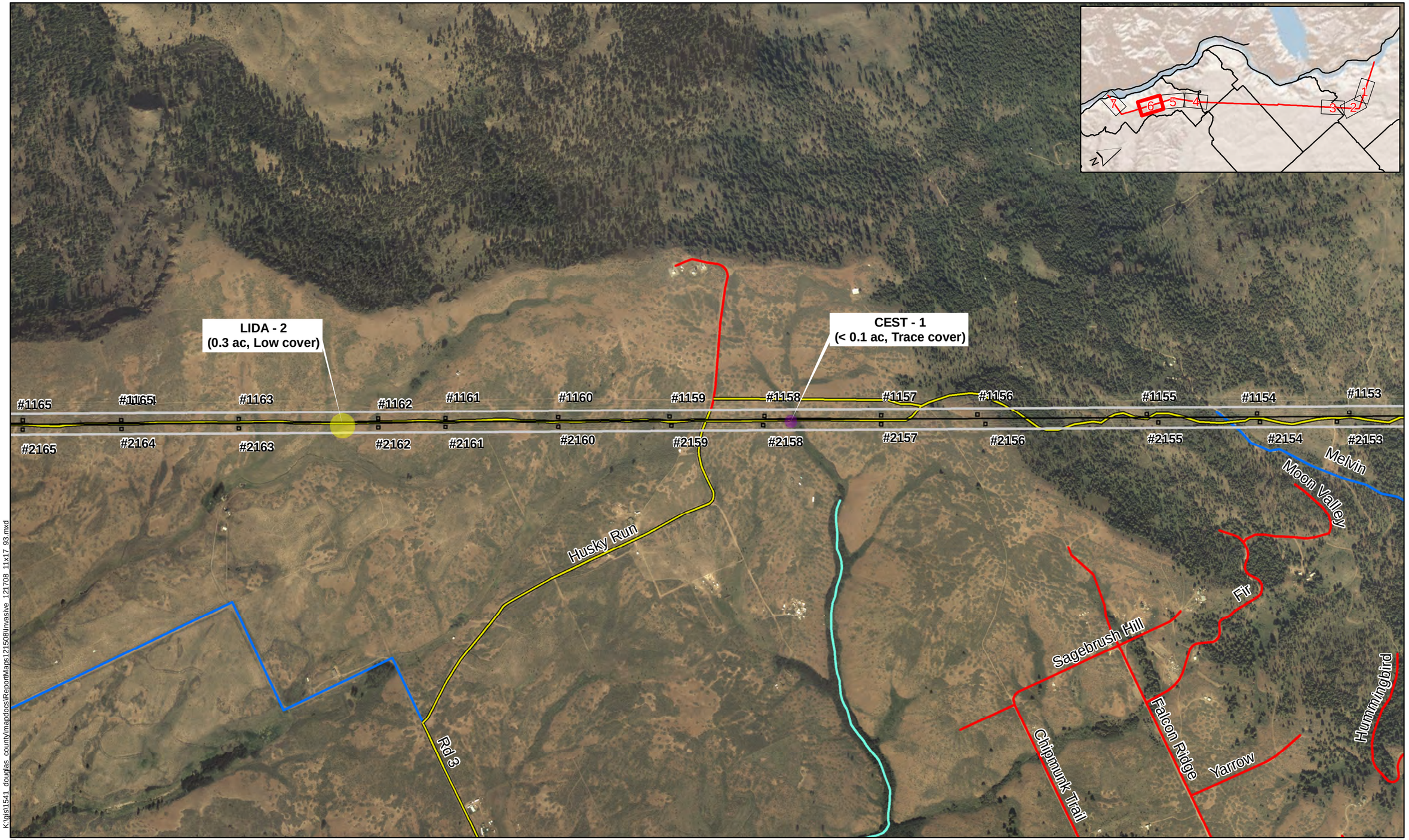
0 500 1,000 Feet

Invasive Plant Species
- CEST= *Centaurea stoebe*, Spotted Knapweed
- LIDA = *Linaria dalmatica*, Dalmatian Toadflax

Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

Road
- Public
- Private
- Access

Appendix H
Map 5
Invasive Plant Species Locations



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Parametrix

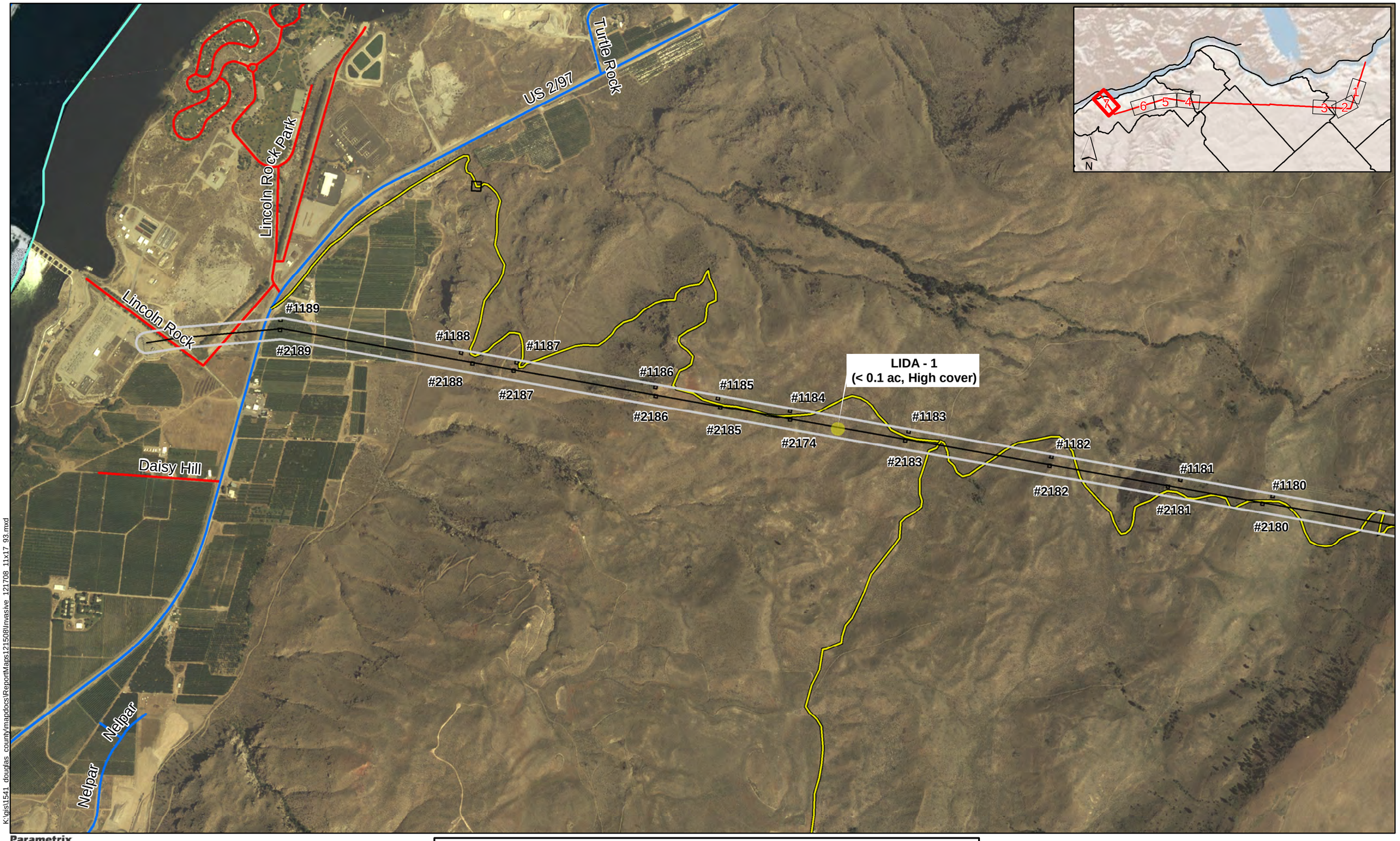
0 500 1,000 Feet

Invasive Plant Species
- CEST= *Centaurea stoebe*, Spotted Knapweed
- LIDA = *Linaria dalmatica*, Dalmatian Toadflax

Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

Road
- Public
- Private
- Access

Appendix H
Map 6
Invasive Plant Species Locations



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Parametrix

N

0 500 1,000 Feet

Invasive Plant Species
- CEST= *Centaurea stoebe,* Spotted Knapweed
- LIDA = *Linaria dalmatica,* Dalmatian Toadflax

Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

Road
- Public
- Private
- Access

Appendix H
Map 7
Invasive Plant Species Locations

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Appendix I

Cover Type Maps

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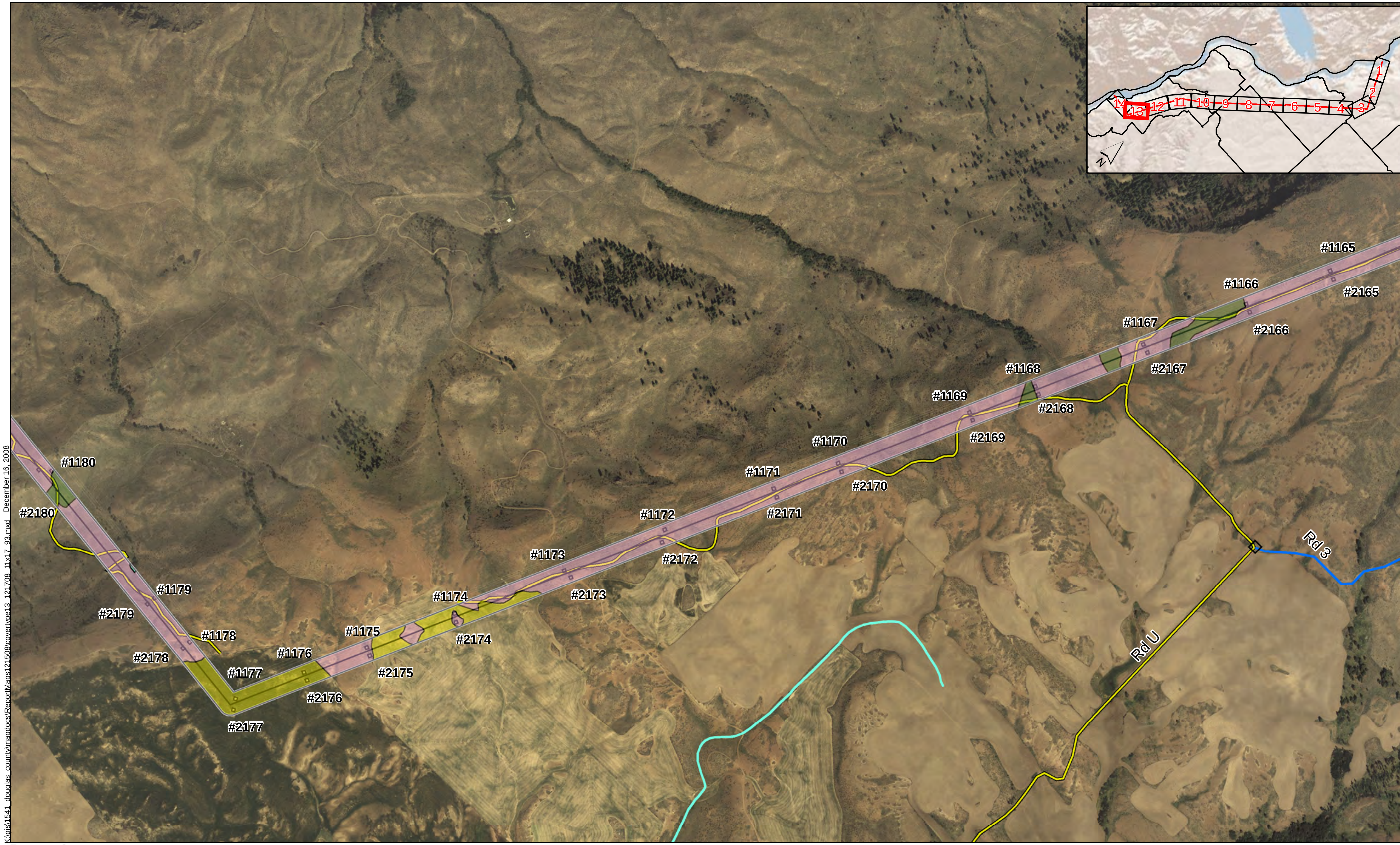
Appendix I
Map 1
Cover Type



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Parametrix

N

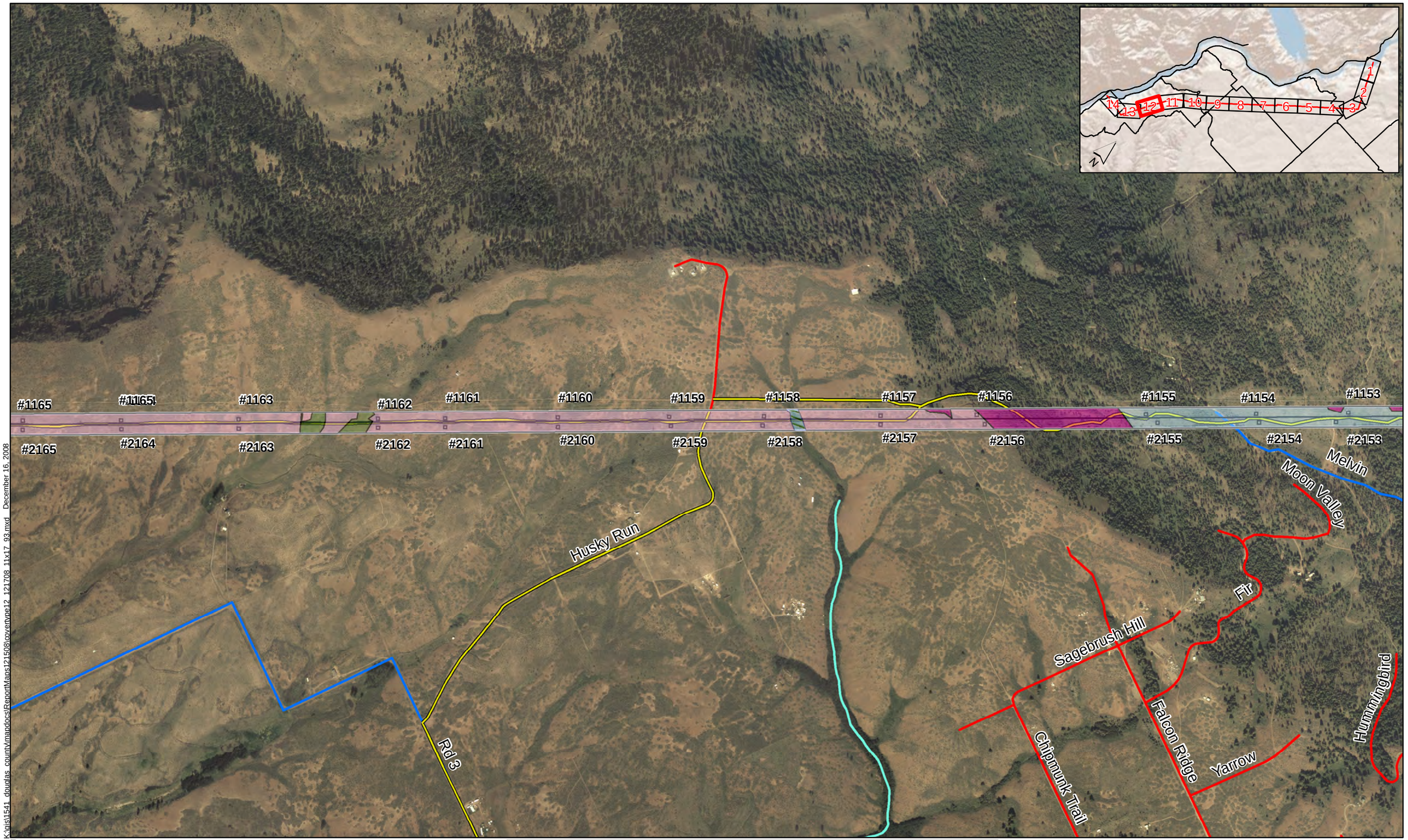
0 500 1,000 Feet

Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

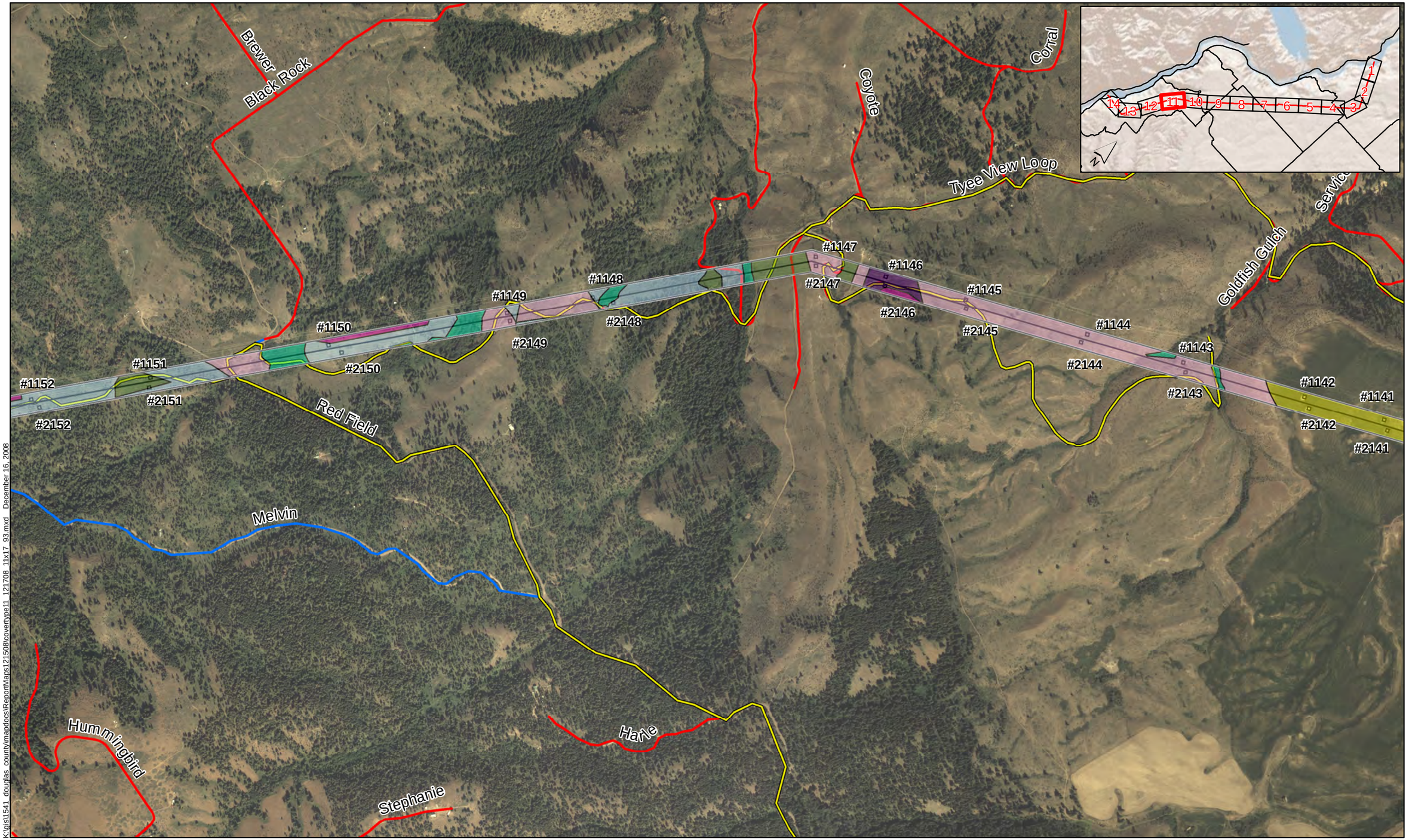
Road
- Public
- Access

Cover Type
- Active Agriculture
- Grass
- Shrub-Steppe
- Riparian

Appendix I
Map 13
Cover Type



Appendix I
Map 12
Cover Type



Parametrix

0 500 1,000 Feet

Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

Road
- Public
- Private
- Access

Cover Type
- Active Agriculture
- Cleared Conifer
- Cleared Open Conifer
- Grass
- Open Conifer
- Riparian
- Shrub-Steppe

Appendix I
Map 11
Cover Type

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Parametrix

0 500 1,000 Feet

Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

Road
- Public
- Private
- Access

Cover Type
- Active Agriculture
- Conifer
- Open Conifer

Other
- Riparian
- Shrub-Steppe

Appendix I
Map 10
Cover Type

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Parametrix

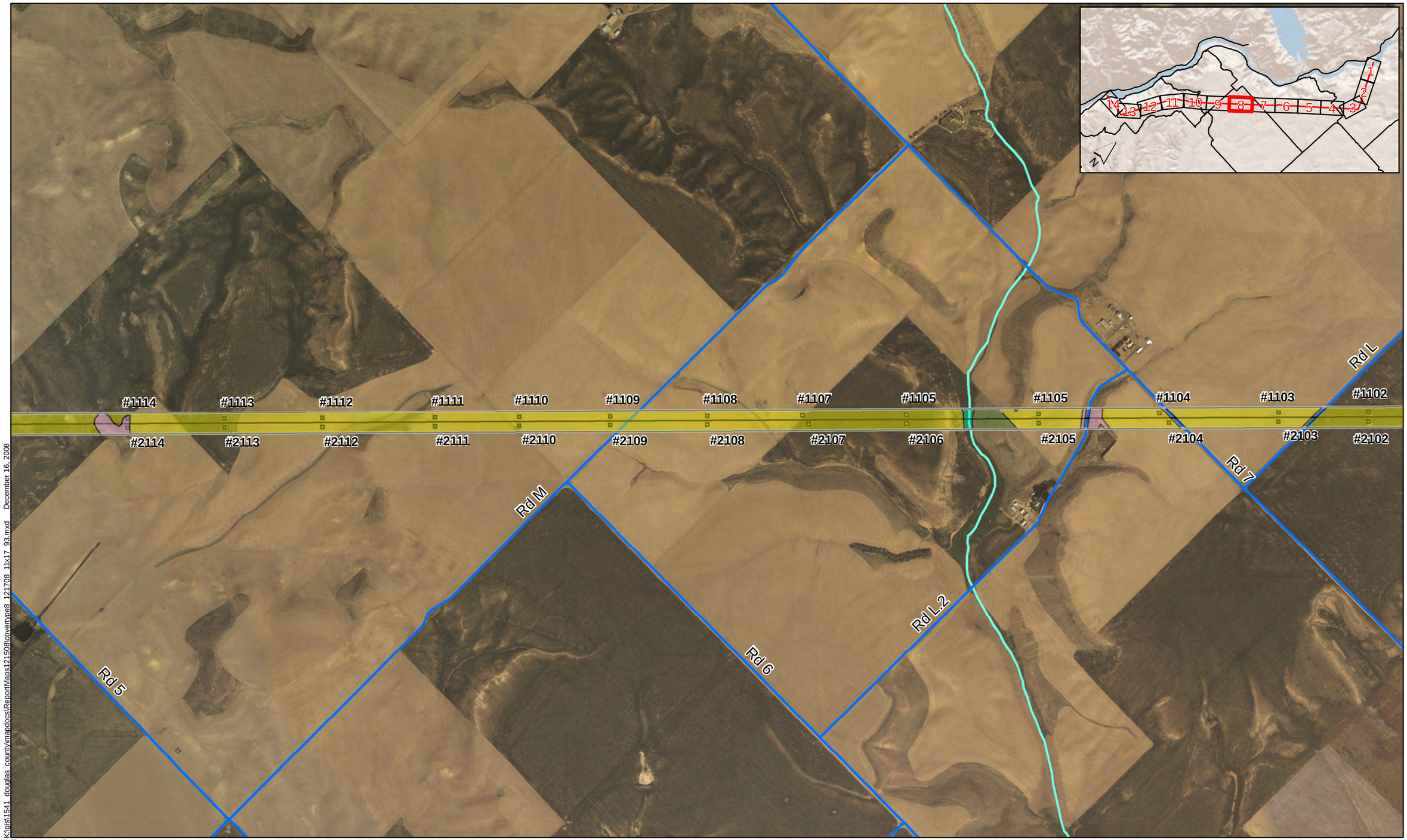
0 500 1,000 Feet

Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

Road
- Public
- Access

Cover Type
- Active Agriculture
- Grass
- Other

Appendix I
Map 9
Cover Type



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Parametrix

0 500 1,000 Feet

DOUGLAS COUNTY P.U.D.

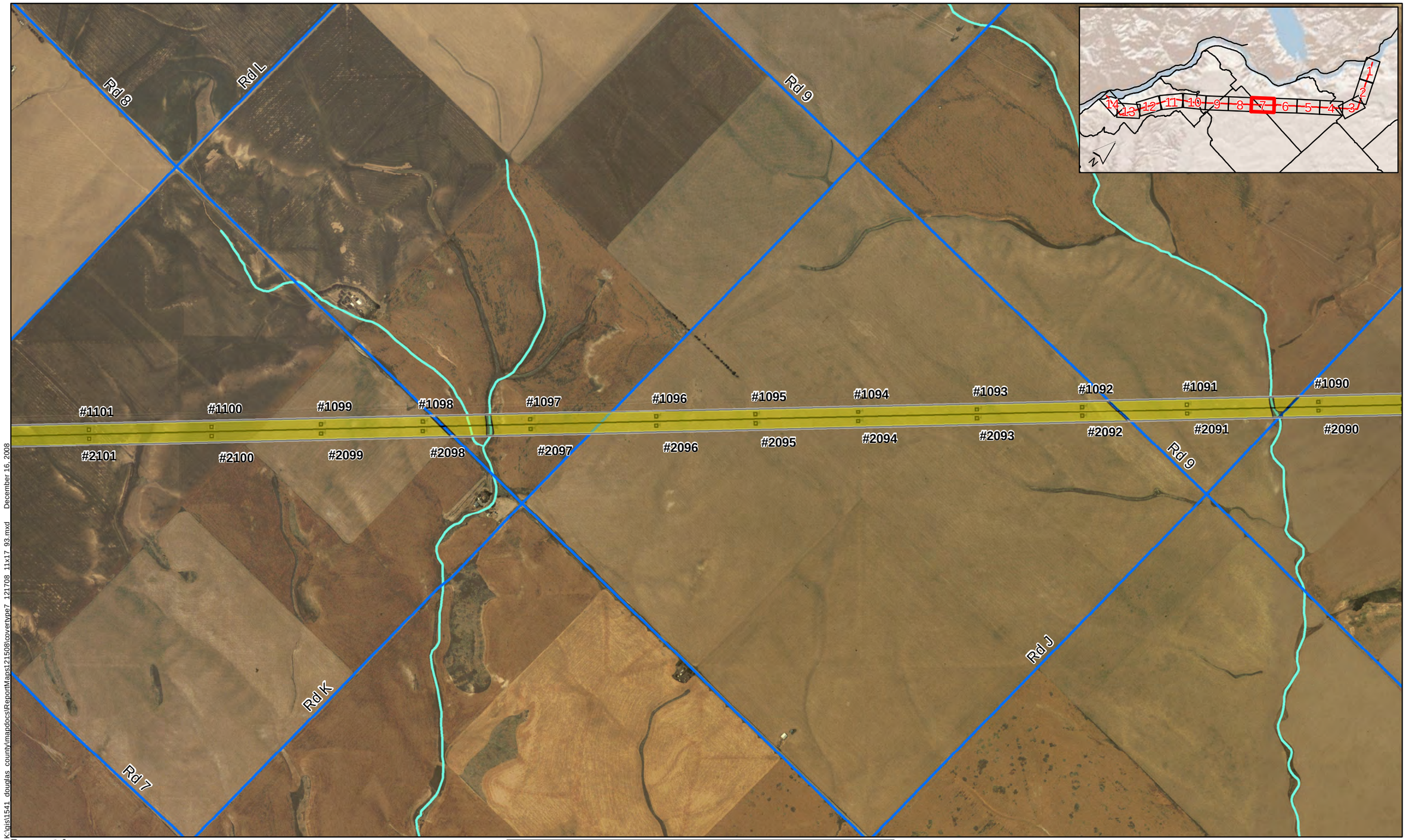
Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

Road
- Public
- Access

Cover Type
- Active Agriculture
- Grass

Other
- Riparian
- Shrub-Steppe

Appendix I
Map 8
Cover Type



Appendix I
Map 7
Cover Type

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Parametrix

0 500 1,000 Feet

DOUGLAS COUNTY P.U.D.

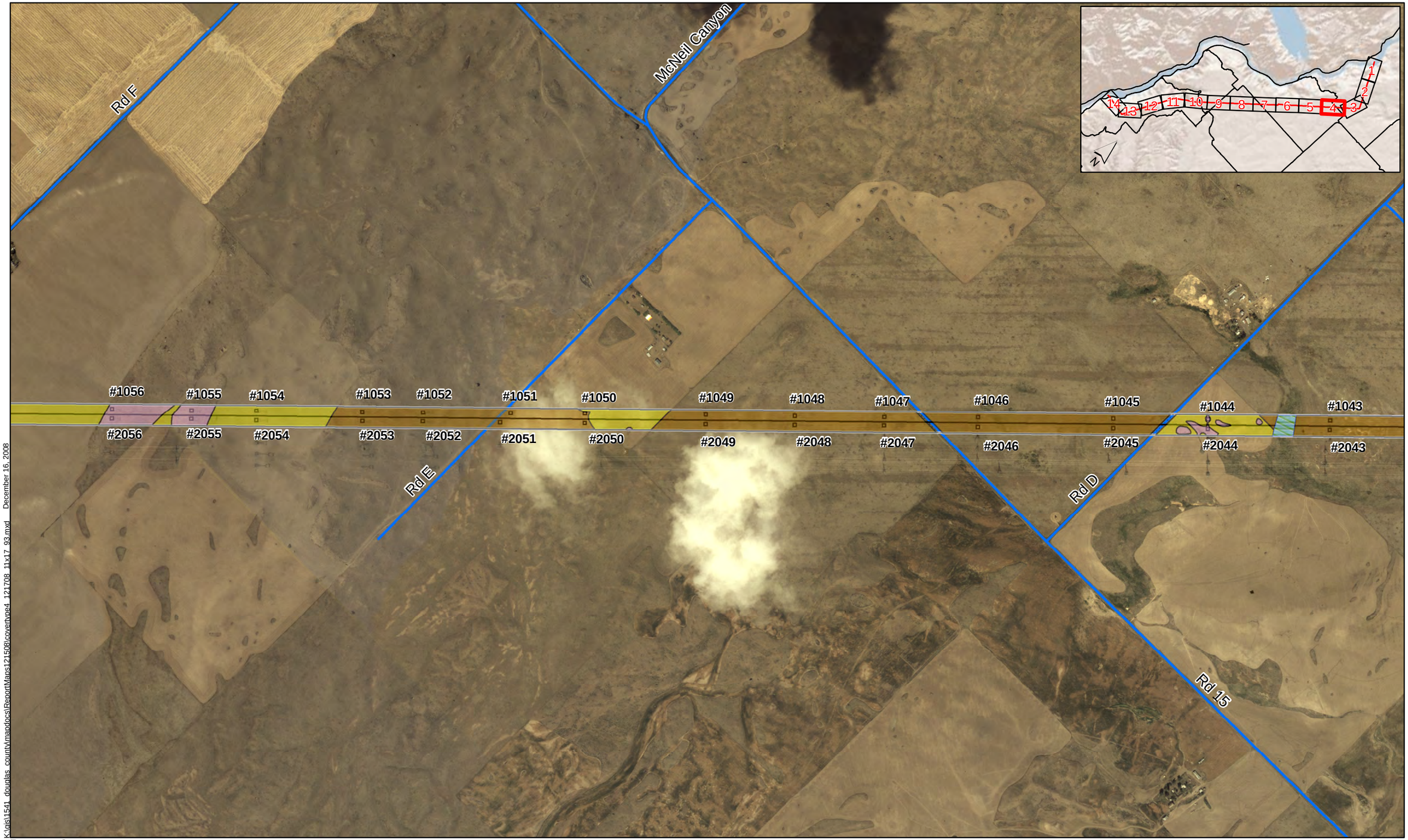
Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

Road
- Public
- Private
- Access

Cover Type
- Active Agriculture
- Other
- Shrub-Steppe

Appendix I
Map 6
Cover Type

Appendix I
Map 5
Cover Type



Appendix I
Map 4
Cover Type

Appendix I
Map 3
Cover Type

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Parametrix

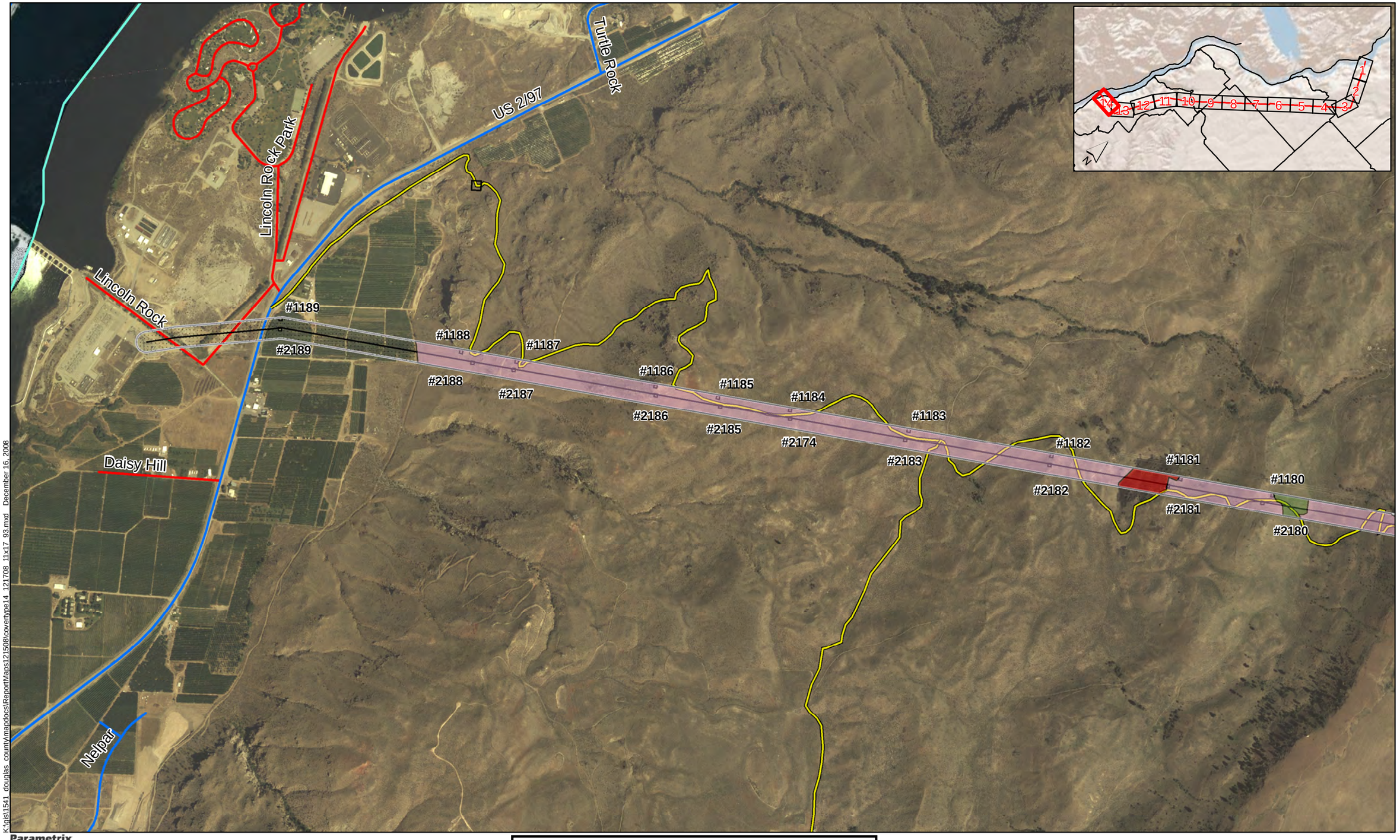
0 500 1,000 Feet

Wells Transmission Line
- Right of Way
- Transmission Line Centerline
- Transmission Tower
- Stream

Road
- Public
- Access

Cover Type
- Active Agriculture
- Cleared Open Conifer
- Grass
- Open Conifer
- Other
- Shrub-Steppe

Appendix I
Map 2
Cover Type



Appendix I
Map14
Cover Type

Appendix J

Plant Species List

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Appendix J. Wells Project Transmission Line Plant Species List

			North									Ag Land [1]			Badger								South				
Family Name	**Scientific Name**	**Common Name**	**Cleared Open Conifer**	**Conifer**	**Grass**	**Inactive Ag**	**Open Conifer**	**Riparian**	**Shrub-Steppe**	**Wetland - PEM**	**Wetland - PFO**	**Grass**	**Riparian**	**Shrub-Steppe**	**Cleared Conifer**	**Cleared Open Conifer**	**Conifer**	**Grass**	**Open Conifer**	**Riparian**	**Shrub-Steppe**	**Wetland - PEM**	**Grass**	**Riparian**	**Shrub-Steppe**	**Talus**
Aceraceae	Acer glabrum	Rocky Mountain maple																	X	X				X	X	X
Asteraceae	Achillea millefolium	common yarrow			X		X		X										X	X	X				X	X
Asteraceae	Agoseris glauca	pale agoseris							X										X		X				X	
Asteraceae	Agoseris heterophylla	annual agoseris																							X	
Poaceae	Agropyron cristatum ssp. pectinatum	crested wheatgrass			X	X			X										X		X				X	
Liliaceae	Allium acuminatum	tapertip onion			X		X												X		X				X	
Rosaceae	Amelanchier alnifolia	Saskatoon serviceberry			X		X	X	X						X				X						X	X
Boraginaceae	Amsinckia tessellata	bristly fiddleneck			X																X				X	
Apiaceae	Angelica arguta	Lyall's angelica																	X	X						
Asteraceae	Antennaria dimorpha	low pussytoes					X		X																X	
Asteraceae	Antennaria microphylla	littleleaf pussytoes					X																			
Asteraceae	Antennaria rosea	rosy pussytoes					X		X																	
Apocynaceae	Apocynum androsaemifolium	spreading dogbane							X										X	X	X				X	
Brassicaceae	Arabis cusickii	Cusick's rockcress																	X		X					
Brassicaceae	Arabis holboellii	Holboell's rockcress					X		X										X		X				X	
Caryophyllaceae	Arenaria capillaris	slender mountain sandwort			X				X												X				X	X
Asteraceae	Arnica cordifolia	heartleaf arnica																	X							
Asteraceae	Artemisia dracunculus	tarragon				X			X												X					
Asteraceae	Artemisia ludoviciana	white sagebrush													X											
Asteraceae	Artemisia rigida	stiff sagebrush																							X	
Asteraceae	Artemisia tridentata	big sagebrush			X		X		X						X				X		X				X	X
Asteraceae	Artemisia tripartita	threetip sagebrush					X		X										X		X				X	
Asclepiaceae	Asclepias speciosa	showy milkweed			X				X	X					X				X		X					
Fabaceae	Astragalus purshii	woolypod milkvetch							X																X	
Asteraceae	Balsamorhiza sagittata	arrowleaf balsamroot			X		X		X										X		X				X	
Berberidacee	Berberis aquifolium	hollyleaved barberry																		X	X					
Betulaceae	Betula occidentalis var. o.	water birch						X																		
Liliaceae	Brodiaea douglasii	largeflower triteleia							X										X	X	X				X	
Poaceae	Bromus japonicus	Japanese brome					X		X												X				X	
Poaceae	Bromus tectorum	cheatgrass			X		X		X									X	X		X				X	
Liliaceae	Calochortus lyallii	Lyall's mariposa lily					X												X						X	
Liliaceae	Calochortus macrocarpus	sagebrush mariposa lily							X												X					
Onagraceae	Camissonia andina	Blackfoot River evening-primrose							X																	
Cyperaceae	Carex spp.	sedge species					X		X											X						
Scrophulariaceae	Castilleja miniata	giant red Indian paintbrush																	X		X					
Scrophulariaceae	Castilleja thompsonii	Thompson's Indian paintbrush					X		X												X				X	
Asteraceae	Centaurea diffusa	diffuse knapweed			X				X										X		X		X		X	
Asteraceae	Centaurea stoebe	spotted knapweed							X												X					

Appendix J. Wells Project Transmission Line Plant Species List (Continued)

			North									Ag Land [1]			Badger								South				
Family Name	**Scientific Name**	**Common Name**	**Cleared Open Conifer**	**Conifer**	**Grass**	**Inactive Ag**	**Open Conifer**	**Riparian**	**Shrub-Steppe**	**Wetland - PEM**	**Wetland - PFO**	**Grass**	**Riparian**	**Shrub-Steppe**	**Cleared Conifer**	**Cleared Open Conifer**	**Conifer**	**Grass**	**Open Conifer**	**Riparian**	**Shrub-Steppe**	**Wetland - PEM**	**Grass**	**Riparian**	**Shrub-Steppe**	**Talus**
Asteraceae	Chaenactis douglasii	Douglas' dustymaiden			X				X												X				X	
Brassicaceae	Chorispora tenella	crossflower							X												X				X	
Asteraceae	Chrysothamnus viscidiflorus	green rabbitbrush			X		X		X												X				X	X
Onagraceae	Circaea alpina	small enchanter's nightshade																	X							
Asteraceae	Cirsium arvense	Canada thistle			X				X	X									X							
Asteraceae	Cirsium vulgare	bull thistle						X																		
Portulacaceae	Claytonia perfoliata	miner's lettuce																	X						X	
Ranunculaceae	Clematis ligusticifolia	western white clematis						X												X	X				X	
Ranunculaceae	Clematis occidentalis	western blue virginsbower																	X							
Scrophulariaceae	Collinsia parviflora	maiden blue eyed Mary							X																	
Polemoniaceae	Collomia grandiflora	Grand collomia																	X		X				X	
Polemoniaceae	Collomia linearis	Tiny trumpet					X		X										X						X	
Polemoniaceae	Collomia tenella	diffuse collomia																								
Santalaceae	Comandra umbellata	bastard toadflax					X		X										X						X	
Convolvulaceae	Convolvulus arvensis	field bindweed																X	X		X				X	
Asteraceae	Conyza canadensis	Canadian horseweed				X																				
Cornaceae	Cornus sericea	red-osier dogwood						X												X						
Rosaceae	Crataegus douglasii	black hawthorn						X																		
Asteraceae	Crepis atrabarba	bearded hawksbeard							X												X				X	
Asteraceae	Crepis intermedia	limestone hawksbeard			X		X		X										X		X					
Boraginaceae	Cryptantha thompsonii	Thompson's cryptantha							X																	
Boraginaceae	Cryptantha spp.	cryptanthna species							X																	
Ranunculaceae	Delphinium nuttallianum	twolobe larkspur					X		X										X		X				X	
Brassicaceae	Descurainia sophia	herb sophia																			X					
Primulaceae	Dodecatheon pulchellum ssp. cusickii	Cusick's shootingstar					X		X										X						X	
Poaceae	Elymus elymoides	squirreltail							X												X				X	
Onagraceae	Epilobium angustifolium	fireweed																			X					
Onagraceae	Epilobium brachycarpum	tall annual willowherb				X			X						X			X	X		X					
Equisetaceae	Equisetum arvense	field horsetail						X												X						
Equisetaceae	Equisetum hyemale	Scouringrush horsetail																								
Asteraceae	Ericameria nauseosa	gray rabbitbrush			X	X	X		X						X				X		X				X	
Asteraceae	Erigeron corymbosus	longleaf fleabane			X				X												X					
Asteraceae	Erigeron filifolius	threadleaf fleabane					X		X												X					
Asteraceae	Erigeron linearis	desert yellow fleabane					X		X									X	X		X				X	
Asteraceae	Erigeron pumilus	shaggy fleabane			X		X		X																X	
Polygonaceae	Eriogonum compositum	arrowleaf buckwheat																			X				X	
Polygonaceae	Eriogonum elatum	tall woolly buckwheat							X												X				X	
Polygonaceae	Eriogonum heracleoides	parsnipflower buckwheat					X		X										X		X				X	
Polygonaceae	Eriogonum niveum	snow buckwheat							X									X	X		X				X	

Appendix J. Wells Project Transmission Line Plant Species List (Continued)

			North									Ag Land [1]			Badger								South				
Family Name	**Scientific Name**	**Common Name**	**Cleared Open Conifer**	**Conifer**	**Grass**	**Inactive Ag**	**Open Conifer**	**Riparian**	**Shrub-Steppe**	**Wetland - PEM**	**Wetland - PFO**	**Grass**	**Riparian**	**Shrub-Steppe**	**Cleared Conifer**	**Cleared Open Conifer**	**Conifer**	**Grass**	**Open Conifer**	**Riparian**	**Shrub-Steppe**	**Wetland - PEM**	**Grass**	**Riparian**	**Shrub-Steppe**	**Talus**
Polygonaceae	Eriogonum strictum	blue mountain buckwheat							X										X		X				X	
Polygonaceae	Eriogonum thymoides	thymeleaf buckwheat			X		X		X									X			X				X	
Asteraceae	Eriophyllum lanatum	common wooly sunflower							X										X		X				X	
Poaceae	Festuca idahoensis	Idaho fescue							X																	
Poaceae	Festuca rubra	red fescue							X																X	
Gentianaceae	Frasera albicaulis	white-stemmed frasera					X														X					
Asteraceae	Gaillardia aristida	common gaillardia							X																	
Rubiaceae	Galium aparine	stickywilly																	X	X					X	
Rubiaceae	Galium trifidum	threepetal bedstraw																		X	X					
Rubiaceae	Galium sp.	bedstraw																							X	
Asteraceae	Geranium viscosissimum	sticky purple geranium					X		X											X	X					
Asteraceae	Geum triflorum	old man's whiskers					X		X										X	X	X				X	
Boraginaceae	Hackelia arida	sagebrush stickseed							X												X				X	
Boraginaceae	Hackelia micrantha	Jessica sticktight																		X	X					
Asteraceae	Helianthella uniflora	oneflower helianthella																	X		X					
Asteraceae	Helianthus annuus	common sunflower			X																					
Asteraceae	Heterotheca villosa	hairy false goldenaster																			X					
Saxifragaceae	Heuchera cylindrica	roundleaf alumroot					X		X										X		X				X	X
Rosaceae	Holodiscus discolor	oceanspray													X				X	X					X	
Polemoniaceae	Ipomopsis aggregata	Scarlet gilia							X												X					
Iridaceae	Iris missouriensis	Rocky Mountain iris						X	X											X						
Juncaceae	Juncus spp.	rush species					X																			
Cupressaceae	Juniperus scopulorum	Rocky Mountain juniper							X																	
Asteraceae	Lactuca serriola	prickly lettuce							X										X						X	
Boraginaceae	Lappula redowskii	cupped stickseed			X		X		X										X		X				X	
Poaceae	Leersia oryzoides	Rice cutgrass																								
Brassicaceae	Lepidium densiflorum	common pepperweed							X																	
Polemoniaceae	Leptodactylon pungens	granite prickly phlox			X				X												X				X	
Polemoniaceae	Leptosiphon liniflorus	narrowflower flaxflower							X																	
Portulacaceae	Lewisia rediviva	bitter-root			X													X			X				X	
Poaceae	Leymus cinereus	basin wildrye			X			X	X	X										X	X				X	
Scrophulariaceae	Linaria dalmatica	Dalmatian toadflax			X		X		X												X				X	
Saxifragaceae	Lithophragma parviflorum	smallflower woodland-star					X		X										X						X	
Boraginaceae	Lithospermum ruderale	western stoneseed			X		X		X										X		X				X	
Apiaceae	Lomatium ambiguum	Wyeth biscuitroot																							X	
Apiaceae	Lomatium geyeri	Geyer's biscuitroot																							X	
Apiaceae	Lomatium grayi	Gray's biscuitroot																							X	
Apiaceae	Lomatium macrocarpum	bigseed biscuitroot							X										X		X				X	
Apiaceae	Lomatium nudicaule	barestem biscuitroot																	X		X				X	

Appendix J. Wells Project Transmission Line Plant Species List (Continued)

			North									Ag Land [1]			Badger								South				
Family Name	**Scientific Name**	**Common Name**	**Cleared Open Conifer**	**Conifer**	**Grass**	**Inactive Ag**	**Open Conifer**	**Riparian**	**Shrub-Steppe**	**Wetland - PEM**	**Wetland - PFO**	**Grass**	**Riparian**	**Shrub-Steppe**	**Cleared Conifer**	**Cleared Open Conifer**	**Conifer**	**Grass**	**Open Conifer**	**Riparian**	**Shrub-Steppe**	**Wetland - PEM**	**Grass**	**Riparian**	**Shrub-Steppe**	**Talus**
Apiaceae	Lomatium triternatum	nineleaf biscuitroot					X		X										X		X				X	
Fabaceae	Lupinus arbustus	longspur lupine					X												X							
Fabaceae	Lupinus leucophyllus	velvet lupine							X												X				X	
Fabaceae	Lupinus polyphyllus	bigleaf lupine																	X	X	X					
Fabaceae	Lupinus sericeus var. sericeus	silky lupine			X		X		X										X		X				X	
Fabaceae	Lupinus sulphureus var. subsaccatus	soft lupine																								
Fabaceae	Lupinus sulphureus var. sulphureus	sulphur lupine							X										X						X	
Fabaceae	Lupinus spp.	lupine species																	X							
Asteraceae	Lygodesmia juncea	rush skeletonweed							X																	
Asteraceae	Machaeranthera canescens	hoary tansyaster				X			X												X					
Liliaceae	Maianthemum racemosum	feathery false lily of the valley						X											X	X	X				X	
Liliaceae	Maianthemum stellatum	starry false lily of the valley						X											X	X	X					
Fabaceae	Medicago sativa	alfalfa			X																					
Lamiaceae	Mentha arvensis	wild mint							X										X		X					
Lamiaceae	Mentha spicata	spearmint																			X				X	
Boraginaceae	Mertensia longiflora	small bluebells							X										X						X	
Polemoniaceae	Microsteris gracilis	slender phlox							X										X		X				X	
Scrophulariaceae	Mimulus guttatus	seep monkeyflower																		X						
Asteraceae	Nestotus stenophyllus	narrowleaf mock goldenweed																	X							
Asteraceae	Nothocalais troximoides	sagebrush false dandelion							X												X				X	
Scrophulariaceae	Orthocarpus luteus	yellow owl's-clover							X																	
Apiaceae	Osmorhiza berteroi	sweetcicely																	X	X						
Scrophulariaceae	Penstemon deustus	scabland penstemon																							X	
Scrophulariaceae	Penstemon eriantherus var. eriantherus	fuzzytongue penstemon																	X							
Scrophulariaceae	Penstemon fruticosis	bush penstemon																			X					
Scrophulariaceae	Penstemon gairdneri	Gairdner's penstemon			X																X				X	
Scrophulariaceae	Penstemon richardsonii	cutleaf beardtongue																		X	X					
Scrophulariaceae	Penstemon speciosus	royal penstemon																							X	
Scrophulariaceae	Penstemon pruinosus	Chelan beardtongue																			X					
Apiaceae	Perideridia gairdneri	Gardner's yampah							X											X	X					
Hydrophyllaceae	Phacelia hastata	silverleaf phacelia							X										X		X				X	
Hydrophyllaceae	Phacelia humilis	low phacelia							X										X						X	
Hydrophyllaceae	Phacelia linearis	threadleaf phacelia																							X	
Poaceae	Phalaris arundinacea	reed canarygrass						X																		
Hydrangaceae	Philadelphus lewisii	Lewis' mock orange					X	X	X										X	X					X	
Polemoniaceae	Phlox diffusa	spreading phlox																							X	
Polemoniaceae	Phlox longifolia	longleaf phlox					X		X										X		X				X	
Polemoniaceae	Phlox speciosa	showy phlox																							X	
Pinaceae	Pinus ponderosa	ponderosa pine			X		X		X						X				X		X				X	

Appendix J. Wells Project Transmission Line Plant Species List (Continued)

			North									Ag Land [1]			Badger								South				
Family Name	**Scientific Name**	**Common Name**	**Cleared Open Conifer**	**Conifer**	**Grass**	**Inactive Ag**	**Open Conifer**	**Riparian**	**Shrub-Steppe**	**Wetland - PEM**	**Wetland - PFO**	**Grass**	**Riparian**	**Shrub-Steppe**	**Cleared Conifer**	**Cleared Open Conifer**	**Conifer**	**Grass**	**Open Conifer**	**Riparian**	**Shrub-Steppe**	**Wetland - PEM**	**Grass**	**Riparian**	**Shrub-Steppe**	**Talus**
Boraginaceae	Plagiobothrys spp.	popcorn flower species							X																	
Poaceae	Poa bulbosa	bulbous bluegrass			X				X						X				X		X				X	
Salicaceae	Populus balsamifera ssp. trichocarpa	black cottonwood																	X	X						
Salicaceae	Populus tremuloides	quaking aspen						X											X	X						
Rosaceae	Potentilla glandulosa	sticky cinquefoil					X																			
Rosaceae	Potentilla gracilis	slender cinquefoil							X																	
Rosaceae	Prunus virginiana	chokecherry						X	X										X	X	X				X	X
Poaceae	Pseudoroegneria spicata	bluebunch wheatgrass			X		X	X	X									X	X		X				X	
Pinaceae	Pseudotsuga menziesii	Douglas-fir							X						X				X		X					
Rosaceae	Purshia tridentata	antelope bitterbrush					X		X										X						X	
Ranunculaceae	Ranunculus glaberrimus	sagebrush buttercup							X																	
Anacardiaceae	Rhus glabra	smooth sumac																	X						X	
Grossulariaceae	Ribes cereum	wax currant			X		X	X	X										X	X	X				X	X
Rosaceae	Rosa nutkana	Nootka rose			X			X	X										X	X	X				X	X
Rosaceae	Rubus parviflorus	thimbleberry					X													X						
Polygonaceae	Rumex crispus	curly dock			X			X											X	X	X				X	
Salicaceae	Salix lucida ssp. lasiandra	Pacific willow																		X						
Salicaceae	Salix spp.	willow species					X		X										X							
Chenopodiaceae	Salsola tragus	prickly Russian thistle				X			X																	
Caprifoliaceae	Sambucus caerulea	blue elderberry							X										X	X	X				X	
Saxifragaceae	Saxifraga integrifolia	wholeleaf saxifrage							X										X						X	
Asteraceae	Senecio integerrimus	tall western groundsel					X		X										X		X				X	
Crassulaceae	Sedum lanceolatum	spearleaf stonecrop																	X						X	
Crassulaceae	Sedum spp.	stonecrop species							X										X							
Caryophyllaceae	Silene douglasii	Seabluff catchfly					X		X										X		X					
Caryophyllaceae	Silene menziesii	Menzies' campion																	X							
Brassicaceae	Sisymbrium altissimum	tall tumblemustard			X			X	X										X		X					
Solanaceae	Solanum triflorum	cutleaf nightshade																					X			
Asteraceae	Solidago canadensis	Canada goldenrod							X												X					
Asteraceae	Sonchus asper	spiny sowthistle			X			X	X												X					
Caprifoliaceae	Symphoricarpos albus	common snowberry			X		X	X	X						X				X	X					X	
Asteraceae	Taraxacum officinale	common dandelion			X				X										X	X	X				X	
Ranunculaceae	Thalictrum occidentale	western meadow-rue						X											X	X						
Brassicaceae	Thlaspi arvense	field pennycress							X										X		X					
Anacardiaceae	Toxicodendron rydbergii	western poison ivy						X	X																	
Asteraceae	Tragopogon dubius	yellow salsify			X		X		X										X		X				X	
Fabaceae	Trifolium thompsonii	Thompson's clover																							X	
Urticaceae	Urtica dioica	stinging nettle																		X						
Liliaceae	Veratrum californicum	California false hellebore																		X						

Appendix J. Wells Project Transmission Line Plant Species List (Continued)

			North									Ag Land [1]			Badger								South			
Family Name	**Scientific Name**	**Common Name**	**Cleared Open Conifer**	**Conifer**	**Grass**	**Inactive Ag**	**Open Conifer**	**Riparian**	**Shrub-Steppe**	**Wetland - PEM**	**Wetland - PFO**	**Grass**	**Riparian**	**Shrub-Steppe**	**Cleared Conifer**	**Cleared Open Conifer**	**Conifer**	**Grass**	**Open Conifer**	**Riparian**	**Shrub-Steppe**	**Wetland - PEM**	**Grass**	**Riparian**	**Shrub-Steppe**	**Talus**
Scrophulariaceae	Verbascum thapsus	common mullein			X				X										X		X				X	
Scrophulariaceae	Veronica americana	American speedwell						X												X						
Fabaceae	Vicia americana	American vetch							X																	
Violaceae	Viola vallicola	sagebrush violet						X											X							
Dryopteridaceae	Woodsia oregana	Oregon cliff fern					X		X										X						X	X
Liliaceae	Zigadenus venenosus	meadow deathcamas					X		X										X		X				X	

[1] Species observed in the Grass, Riparian, and Shrub-Steppe cover types within the Ag Land Survey Zone are similar to those cover types in the North Survey Zone

Appendix K

Bird Species Detected During Field Surveys during the Breeding and Fall Seasons, by Habitat Type

Appendix K. Bird Species Detected During Field Surveys during the Breeding and Fall Seasons, by Habitat Type

Species Name	Active Agriculture	Burned Area	Inactive Agriculture	Grass	Open Conifer	Riparian	River	Shrub-Steppe	Talus	Unknown	Total
Buntings, New World Sparrows & Allies (Family Emberizidae)											
Brewer's Sparrow			29			1		130			**160**
Chipping Sparrow				2	13	6		35			**56**
Dark-eyed Junco					81	1		64			**146**
Golden-crowned Sparrow								1			**1**
Grasshopper Sparrow			14					2			**16**
Lark Sparrow								6			**6**
Savannah Sparrow								1			**1**
Song Sparrow					2	1					**3**
Spotted Towhee				1	68	26		43		1	**139**
Unidentified Sparrow		1	1					15			**17**
Vesper Sparrow	1	9	16	4	2	2		126		1	**161**
White-crowned Sparrow					7	6		52			**65**
Caracaras, Falcons (Family Falconidae)											
American Kestrel		6	2		3			12			**23**
Crows, Jays (Family Corvidae)											
Black-billed Magpie		1	1	1	34	1		25	2	3	**68**
Clark's Nutcracker					5	5				1	**11**
Northern Raven	2		2		9			27		6	**46**
Steller's Jay		1			43	12		9		3	**68**
Unidentified Jay										1	**1**
American Crow			40								**40**
Ducks, Geese, Swans (Family Anatidae)											
Canada Goose							10	21			**31**
Common Merganser							10				**10**
Mallard							20				**20**
Finches (Family Fringillidae)											
American Goldfinch			3	3	8	2		5			**21**
Cassin's Finch								2			**2**
House Finch				21	6	5		36			**68**
Pine Siskin					7			12			**19**
Purple Finch						2		1			**3**

Appendix K. Bird Species Detected During Field Surveys during the Breeding and Fall Seasons, by Habitat Type

Species Name	Active Agriculture	Burned Area	Inactive Agriculture	Grass	Open Conifer	Riparian	River	Shrub-Steppe	Talus	Unknown	Total
Red Crossbill					102			83		1	**186**
Goldcrests, Kinglets (Family Regulidae)											
Golden-crowned Kinglet					1						**1**
Ruby-crowned Kinglet					16	4		5			**25**
Grosbeaks, Saltators & Allies (Family Cardinalidae)											
Black-headed Grosbeak				1	22	10		2			**35**
Lazuli Bunting				3	19	12		23			**57**
Hummingbirds (Family Trochilidae)											
Calliope Hummingbird					14	2		2			**18**
Rufous Hummingbird					1						**1**
Unidentified Hummingbird					2			1			**3**
Kites, Hawks, Eagles (Family Accipitridae)											
Cooper's Hawk					1	3		3			**7**
Golden Eagle			1					1		1	**3**
Northern Harrier	1		3	1				7		1	**13**
Red-tailed Hawk		1	2		8	1		21		8	**41**
Rough-legged Hawk	3										**3**
Sharp-shinned Hawk					2			2			**4**
Swainson's Hawk	2		2								**4**
Unidentified Accipiter								1		1	**2**
Bald Eagle							1				**1**
Larks (Family Alaudidae)											
Horned Lark			6					16			**22**
Mockingbirds, Thrashers (Family Mimidae)											
Sage Thrasher			2			1		15			**18**
New World Blackbirds (Family Icteridae)											
Brewer's Blackbird	6				2			29			**37**
Brown-headed Cowbird			3		40	12		8			**63**
Bullock's Oriole					2	16		2			**20**
Red-winged Blackbird			2			1		8			**11**
Western Meadowlark			47	2	2			141	1	6	**199**

Appendix K. Bird Species Detected During Field Surveys during the Breeding and Fall Seasons, by Habitat Type

Species Name	Active Agriculture	Burned Area	Inactive Agriculture	Grass	Open Conifer	Riparian	River	Shrub-Steppe	Talus	Unknown	Total
New World Quail (Family Odontophoridae)											
California Quail		1	1		50	11		86	9	18	**176**
New World Warblers (Family Parulidae)											
MacGillivray's Warbler					2	3		5			**10**
Magnolia Warbler					1						**1**
Nashville Warbler					21	8		5			**34**
Orange-crowned Warbler						1		7			**8**
Townsend's Warbler					4	1		2			**7**
Wilson's Warbler					2	5		4			**11**
Yellow Warbler					1	1		2			**4**
Yellow-rumped Warbler				2	25			50			**77**
Nightjars (Family Caprimulgidae)											
Common Poorwill								1			**1**
Nuthatches, Wallcreeper (Family Sittidae)											
Pygmy Nuthatch					1						**1**
Red-breasted Nuthatch					68	5		11		3	**87**
Owls (Family Strigidae)											
Great Horned Owl					2			0			**2**
Northern Pygmy Owl					3						**3**
Short-eared Owl								1			**1**
Pheasants, Fowl & Allies (Family Phasianidae)											
Chukar		20						2		1	**23**
Dusky Grouse					6			5			**11**
Gray Partridge	1							4			**5**
Ring-necked Pheasant			2							2	**4**
Unidentified Grouse						1					**1**
Pigeons, Doves (Family Columbidae)											
Common Pigeon								4			**4**
Mourning Dove	3		1		12	9		23		5	**53**
Plovers (Family Charadriidae)											
Killdeer			2								**2**
Starlings (Family Sturnidae)											

Appendix K. Bird Species Detected During Field Surveys during the Breeding and Fall Seasons, by Habitat Type

Species Name	Active Agriculture	Burned Area	Inactive Agriculture	Grass	Open Conifer	Riparian	River	Shrub-Steppe	Talus	Unknown	Total
European Starling			6		2	12		44			**64**
Swallows, Martins (Family Hirundinidae)											
Barn Swallow			2					1			**3**
Tree Swallow										1	**1**
Unidentified Swallow			1								**1**
Violet-green Swallow								2			**2**
Tanagers & Allies (Family Thraupidae)											
Western Tanager					17	4		1			**22**
Thrushes (Family Turdidae)											
American Robin			1	8	300	48		205		1	**563**
Mountain Bluebird	2	7		1				25			**35**
Townsend's Solitaire					1			1			**2**
Western Bluebird								16			**16**
Hermit Thrush						2					**2**
Tits, Chickadees (Family Paridae)											
Black-capped Chickadee					1	4		1			**6**
Mountain Chickadee					109	13		3	1		**126**
Treecreepers (Family Certhiidae)											
Brown Creeper					2						**2**
Tyrant Flycatchers (Family Tyrannidae)											
Dusky Flycatcher					12	4		1			**17**
Eastern Kingbird			7		2	5		14			**28**
Least Flycatcher						1					**1**
Olive-sided Flycatcher					2					1	**3**
Say's Phoebe	1				2	1		4			**8**
Unidentified Flycatcher					4	1					**5**
Western Kingbird			3		2	1		37	1		**44**
Western Wood Pewee				1	26	10		5		3	**45**
Vireos, Greenlets (Family Vireonidae)											
Cassin's Vireo					6					1	**7**
Warbling Vireo					2	1					**3**
Waxwings & Allies (Family Bombycillidae)											

Appendix K. Bird Species Detected During Field Surveys during the Breeding and Fall Seasons, by Habitat Type

Species Name	Active Agriculture	Burned Area	Inactive Agriculture	Grass	Open Conifer	Riparian	River	Shrub-Steppe	Talus	Unknown	Total
Cedar Waxwing					13	23		1			**37**
Woodpeckers (Family Picidae)											
Downy Woodpecker					1						**1**
Hairy Woodpecker					7	1					**8**
Northern Flicker		1			24	12		25		1	**63**
Red-naped Sapsucker					1	1		2			**4**
Unidentified Woodpecker					3	1					**4**
Wrens (Family Troglodytidae)											
House Wren					15	4		3			**22**
Winter Wren						1					**1**
Canyon Wren								1			**1**
Unknown											
Unknown		5			4	2		50		2	**63**
Pelicans (Family Pelecanidae)											
American White Pelican							2				**2**
Wagtails, Pipits (Family Motacillidae)											
Buff-bellied Pipit	6						7				**13**
Shrikes (Family Laniidae)											
Northern Shrike							1	1			**2**
Herons, Bitterns (Family Ardeidae)											
Great Blue Heron							3				**3**
Total	**28**	**53**	**202**	**51**	**1,278**	**329**	**54**	**1,650**	**14**	**73**	**3,732**

Appendix L

Relative Abundance of Bird Species Detected During Avian Point Count Surveys

Appendix L. Relative Abundance of Bird Species Detected During Avian Point Count Surveys, Breeding Season 2008

Species	Overall Relative Abundance[1]	Cover Type							
		Active Agriculture	Inactive Agriculture	Cleared Conifer	Conifer	Grass	Riparian	Shrub-Steppe	Talus
American Goldfinch	0.025			0.010			0.005	0.010	
American Robin	0.085			0.015	**0.005**	0.010	0.010	0.045	
Black-billed Magpie	0.020								**0.020**
Black-headed Grosbeak	0.065			0.010	**0.010**		0.010	0.035	
Brewer's Blackbird	0.070							**0.070**	
Brewer's Sparrow	**0.200**		**0.025**					**0.175**	
Brown-headed Cowbird	0.075	**0.010**		0.015	**0.015**		**0.015**	0.020	
Bullock's Oriole	0.045				**0.005**	0.005	0.010	0.025	
California Quail	0.005			0.005					
Calliope Hummingbird	0.055			**0.025**			0.010	0.020	
Cassin's Vireo	0.010			0.010					
Cedar Waxwing	0.030						0.005	0.025	
Chipping Sparrow	0.045			0.015		0.010		0.020	
Clark's Nutcracker	0.025						**0.025**		
Dark-eyed Junco	0.010			0.010					
Dusky Flycatcher	0.025			0.010	**0.005**		0.005	0.005	
Eastern Kingbird	0.045		**0.020**					0.025	
European Starling	0.010							0.010	
Grasshopper Sparrow	0.010		**0.010**						
House Finch	0.035			0.005			0.005	0.025	
House Wren	0.015						0.005	0.010	
Lazuli Bunting	**0.090**	**0.005**		**0.020**		0.010	0.010	0.045	
Least Flycatcher	0.005						0.005		
MacGillivray's Warbler	0.020			0.005			**0.015**		
Mountain Chickadee	**0.100**			**0.070**	**0.005**		0.010	0.015	
Mourning Dove	0.040			0.005				0.035	
Nashville Warbler	0.065			0.015	**0.015**		0.010	0.025	
Northern Flicker	0.020							0.020	
Orange-crowned Warbler	0.010							0.010	
Red Crossbill	0.015							0.015	

Appendix L. Relative Abundance of Bird Species Detected During Avian Point Count Surveys, Breeding Season 2008

Species	Overall Relative Abundance[1]	Cover Type							
		Active Agriculture	Inactive Agriculture	Cleared Conifer	Conifer	Grass	Riparian	Shrub-Steppe	Talus
Red-breasted Nuthatch	0.005			0.005					
Ruby-crowned Kinglet	0.005						0.005		
Sage Thrasher	0.010							0.010	
Say's Phoebe	0.005	**0.005**							
Spotted Towhee	**0.170**			**0.050**	**0.005**		**0.040**	**0.075**	
Townsend's Warbler	0.005							0.005	
Unidentified Hummingbird	0.005			0.005					
Unidentified Sparrow	0.005							0.005	
Vesper Sparrow	**0.130**		**0.025**	0.010		0.010	0.010	**0.075**	
Western Kingbird	0.070					0.005		**0.055**	**0.010**
Western Meadowlark	**0.085**	**0.005**	**0.025**			0.015		0.040	
Western Tanager	0.015			0.005	**0.005**		0.005		
Western Wood Pewee	0.020				**0.005**			0.015	
White-crowned Sparrow	0.010			0.005			0.005		
Wilson's Warbler	0.030				**0.005**		**0.015**	0.010	
Yellow Warbler	0.005						0.005		
Yellow-rumped Warbler	0.005			0.005					

Appendix L. Relative Abundance of Bird Species Detected During Avian Point Count Surveys, Fall 2008

Species	Overall Relative Abundance[1]	Cover Type								
		Active Agriculture	Inactive Agriculture	Cleared Conifer	Conifer	Grass	Riparian	Shrub-Steppe	Burned Shrub-Steppe	Talus
American Robin	**0.399**			**0.106**			0.278	0.015		
Black-billed Magpie	0.005									**0.005**
Brewer's Sparrow	0.010							0.010		
California Quail	0.045						**0.045**			
Chipping Sparrow	0.020			0.005				0.010	**0.005**	
Cooper's Hawk	0.005						0.005			
Dark-eyed Junco	**0.177**			**0.015**	**0.040**		**0.035**	**0.086**		
Dusky Flycatcher	0.005							0.005		
Dusky Grouse	0.005							0.005		
House Finch	**0.091**					**0.010**	0.005	**0.076**		
House Wren	0.005							0.005		
Mountain Chickadee	0.056			**0.020**			**0.035**			
Northern Flicker	0.010							0.010		
Northern Raven	0.005			0.005						
Red-breasted Nuthatch	0.040					**0.010**		**0.030**		
Ruby-crowned Kinglet	0.020						0.010	0.005		**0.005**
Say's Phoebe	0.005							0.005		
Spotted Towhee	0.040			0.010		**0.005**	**0.020**	0.005		
Steller's Jay	0.015						0.005	0.010		
Swainson's Hawk	0.005		**0.005**							
Unidentified Sparrow	0.005							0.005		
Unidentified Woodpecker	0.005						0.005			
Unknown	0.030	**0.005**		**0.015**		**0.005**		0.005		
Vesper Sparrow	0.010								**0.010**	
Western Meadowlark	0.010					**0.005**		0.005		
Western Tanager	0.005				**0.005**					
White-crowned Sparrow	**0.066**			**0.025**		**0.010**	0.010	**0.020**		
Yellow Warbler	0.010							0.010		
Yellow-rumped Warbler	**0.091**				**0.035**	**0.025**		**0.030**		

Appendix L. Relative Abundance of Bird Species Detected During Avian Point Count Surveys, Breeding Season and Fall 2008

Species	Overall Relative Abundance[1]	Cover Type								
		Active Agriculture	Inactive Agriculture	Cleared Conifer	Conifer	Grass	Riparian	Shrub-Steppe	Burned Shrub-Steppe	Talus
American Goldfinch	0.013			0.005			0.003	0.005		
American Robin	**0.241**			**0.060**	0.003	0.005	**0.143**	0.030		
Black-billed Magpie	0.013									**0.013**
Black-headed Grosbeak	0.033			0.005	**0.005**		0.005	0.018		
Brewer's Blackbird	0.035							0.035		
Brewer's Sparrow	**0.106**		**0.013**					**0.093**		
Brown-headed Cowbird	0.038	**0.005**		0.008	**0.008**		0.008	0.010		
Bullock's Oriole	0.023				0.003	0.003	0.005	0.013		
California Quail	0.025			0.003			**0.023**			
Calliope Hummingbird	0.028			0.013			0.005	0.010		
Cassin's Vireo	0.005			0.005						
Cedar Waxwing	0.015						0.003	0.013		
Chipping Sparrow	0.033			0.010		0.005		0.015	**0.003**	
Clark's Nutcracker	0.013						0.013			
Cooper's Hawk	0.003						0.003			
Dark-eyed Junco	**0.093**			0.013	**0.020**		**0.018**	**0.043**		
Dusky Flycatcher	0.015			0.005	0.003		0.003	0.005		
Dusky Grouse	0.003							0.003		
Eastern Kingbird	0.023		**0.010**					0.013		
European Starling	0.005							0.005		
Grasshopper Sparrow	0.005		0.005							
House Finch	0.063			0.003		0.005	0.005	**0.050**		
House Wren	0.010						0.003	0.008		
Lazuli Bunting	0.045	**0.003**		0.010		0.005	0.005	0.023		
Least Flycatcher	0.003						0.003			
MacGillivray's Warbler	0.010			0.003			0.008			
Mountain Chickadee	**0.078**			**0.045**	0.003		**0.023**	0.008		
Mourning Dove	0.020			0.003				0.018		
Nashville Warbler	0.033			0.008	**0.008**		0.005	0.013		
Northern Flicker	0.015							0.015		
Northern Raven	0.003			0.003						

Appendix L. Relative Abundance of Bird Species Detected During Avian Point Count Surveys, Breeding Season and Fall 2008

Species	Overall Relative Abundance[1]	Cover Type								
		Active Agriculture	Inactive Agriculture	Cleared Conifer	Conifer	Grass	Riparian	Shrub-Steppe	Burned Shrub-Steppe	Talus
Orange-crowned Warbler	0.005							0.005		
Red Crossbill	0.008							0.008		
Red-breasted Nuthatch	0.023			0.003		0.005		0.015		
Ruby-crowned Kinglet	0.013						0.008	0.003		**0.003**
Sage Thrasher	0.005							0.005		
Say's Phoebe	0.005	**0.003**						0.003		
Spotted Towhee	**0.106**			**0.030**	0.003	0.003	**0.030**	**0.040**		
Steller's Jay	0.008						0.003	0.005		
Swainson's Hawk	0.003		0.003							
Townsend's Warbler	0.003							0.003		
Unidentified Hummingbird	0.003			0.003						
Unidentified Sparrow	0.005							0.005		
Unidentified Woodpecker	0.003						0.003			
Unknown	0.015	**0.003**		0.008		0.003		0.003		
Vesper Sparrow	0.070		**0.013**	0.005		0.005	0.005	**0.038**	**0.005**	
Western Kingbird	0.035					0.003		0.028		**0.005**
Western Meadowlark	0.048	**0.003**	**0.013**			**0.010**		0.023		
Western Tanager	0.010			0.003	**0.005**		0.003			
Western Wood Pewee	0.010				0.003			0.008		
White-crowned Sparrow	0.038			**0.015**		0.005	0.008	0.010		
Wilson's Warbler	0.015				0.003		0.008	0.005		
Yellow Warbler	0.008						0.003	0.005		
Yellow-rumped Warbler	0.048			0.003	**0.018**	**0.013**		0.015		

[1] Relative abundance was calculated as the total number of detections within 115-foot-radius point count survey plots during 5-minute surveys, divided by the total number of survey visits (200). Blanks indicate zero values. See Appendix K for a list of all bird species detected during field surveys.

For each cover type, the top five relative abundance values are indicated in **bold** typeface. The names of the six species with the greatest overall relative abundance values are similarly denoted.

Appendix M

Vegetation Characterization for Avian Point Count Survey Plots

Appendix M. Vegetation Characterization for Avian Point Count Survey Plots

Cover Type	Percent Cover					
	Total Vegetation	Conifer Trees	Hardwood Trees	Evergreen Shrub	Deciduous Shrub	Herbaceous
Cleared Conifer	75	10	5	20	33	35
Conifer	90	25	0	0	25	40
Grass - Burned	10	0	0	0	1	9
Grass	65	5	0	23	0	52
Inactive Agriculture	49	0	0	12	15	38
Riparian	84	12	55	0	54	5
Shrub-Steppe	60	1	5	33	19	31
Shrub-Steppe - Burned	14	0	0	15	3	7
Total	56	7	8	13	19	27

Cover Type	Average Height (meters)				
	Conifer Trees	Hardwood Trees	Evergreen Shrubs	Deciduous Shrub	Herbaceous
Cleared Conifer	5.8	2.0	0.8	1.3	0.5
Conifer	5.0		1.5		0.3
Grass - Burned				0.5	0.5
Grass	8.0		0.8		0.4
Inactive Agriculture			0.5	0.5	0.4
Riparian	10.7	5.5		2.6	0.4
Shrub-Steppe	2.0	2.0	0.9	1.1	0.4
Shrub-Steppe - Burned			0.3	0.6	0.3
Total	6.5	3.8	0.8	1.3	0.4