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

WELLS HYDROELECTRIC PROJECT

FERC NO. 2149

INTERIM REPORT
REQUIRED BY FERC

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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 contracted Parametrix, Inc. to conduct 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 48 potential occurrences of two Class B Designate weed species, Dalmatian toadflax (*Linaria dalmatica* ssp. *dalmatica*) and spotted knapweed (*Centaurea stoebe*). This result (48 occurrences) is based on lumping spotted knapweed (Class B Designate) and diffuse knapweed (*Centaurea diffusa*) (Class B non-designate weed for Douglas County Regions 3 and 6). During early surveys, differentiation of knapweed species was difficult due to similarities in early life forms for both species. Occurrences will be revisited during the final botanical survey to identify to species. The number of invasive plants is expected to decrease in subsequent drafts of this report, following late summer botanical surveys once spotted knapweed and diffuse knapweed are differentiated. Furthermore, since Dalmatian toadflax is only a Class B Designate in Douglas County south of Township 25N and west of Range 25E, occurrences north of Township 25N will be excluded from the total for the final report. Occurrences of two Class C weed species, field bindweed (*Convolvulus arvensis*) and Canada thistle (*Cirsium arvense*), were also noted, but not mapped.

Cover types were grouped into 11 mapping categories based on previously mapped geographic information system (GIS) data and field observations. Descriptions, abundance, and distribution for each of these cover type categories and information on associated species will be discussed in subsequent drafts of this report, following data collection during the late summer surveys in early September 2008.

Surveys documented the presence of 91 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 Brewer's sparrow (*Spizella breweri*). Other commonly detected species (in descending order of relative abundance) were spotted towhee (*Pipilo maculatus*), vesper sparrow (*Pooecetes gramineus*), mountain chickadee (*Poecile gambeli*), and lazuli bunting (*Passerina amoena*). The greatest number of species was detected where the dominant cover type was open conifer, closely followed by riparian and then shrub-steppe (which was the most common cover type in the study area, and in which the greatest survey effort occurred). One RTE bird species [sage thrasher (*Oreoscoptes montanus*), a State candidate] was documented in the study area.

Eleven nests of raptors or corvids were detected within or adjacent to the study area, including four on Douglas County PUD transmission towers. No evidence of avian mortality due to collisions with the transmission lines or towers was documented.

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 (*Felis 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*), and yellow-bellied marmot (*Marmota flaviventris*). Additional observations indicated the presence of chipmunks (*Tamias* spp., yellow-pine or least) and voles (species unknown).

LIST OF ACRONYMS & ABBREVIATIONS

CFR	U.S. Code of Federal Regulations
COE	U.S. Army Corps of Engineers
CRP	Conservation Reserve Program
ESA	Endangered Species Act
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

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 feel long, 168 feet wide, with a crest elevation of 795 feet in height. 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. The lines run parallel to each other on 45-85 foot steel towers along a common 235-foot wide right-of-way (Figure 3.1-1). Elevations along the transmission line corridor range from 780 feet above mean sea level (msl) at the Wells Reservoir to approximately 4,200 feet at Badger Mountain.

The Wells Reservoir is approximately 30 miles long. The Methow and Okanogan rivers are tributaries of the Columbia River within the Wells Reservoir. The Wells Project boundary extends approximately 1.5 miles up the Methow River and approximately 15.5 miles up the Okanogan River. The surface area of the reservoir is 9,740 acres, with a gross storage capacity of 331,200 acre-feet and usable storage of 97,985 acre-feet at normal maximum water surface elevation of 781 above msl (Figure 1.1-1).

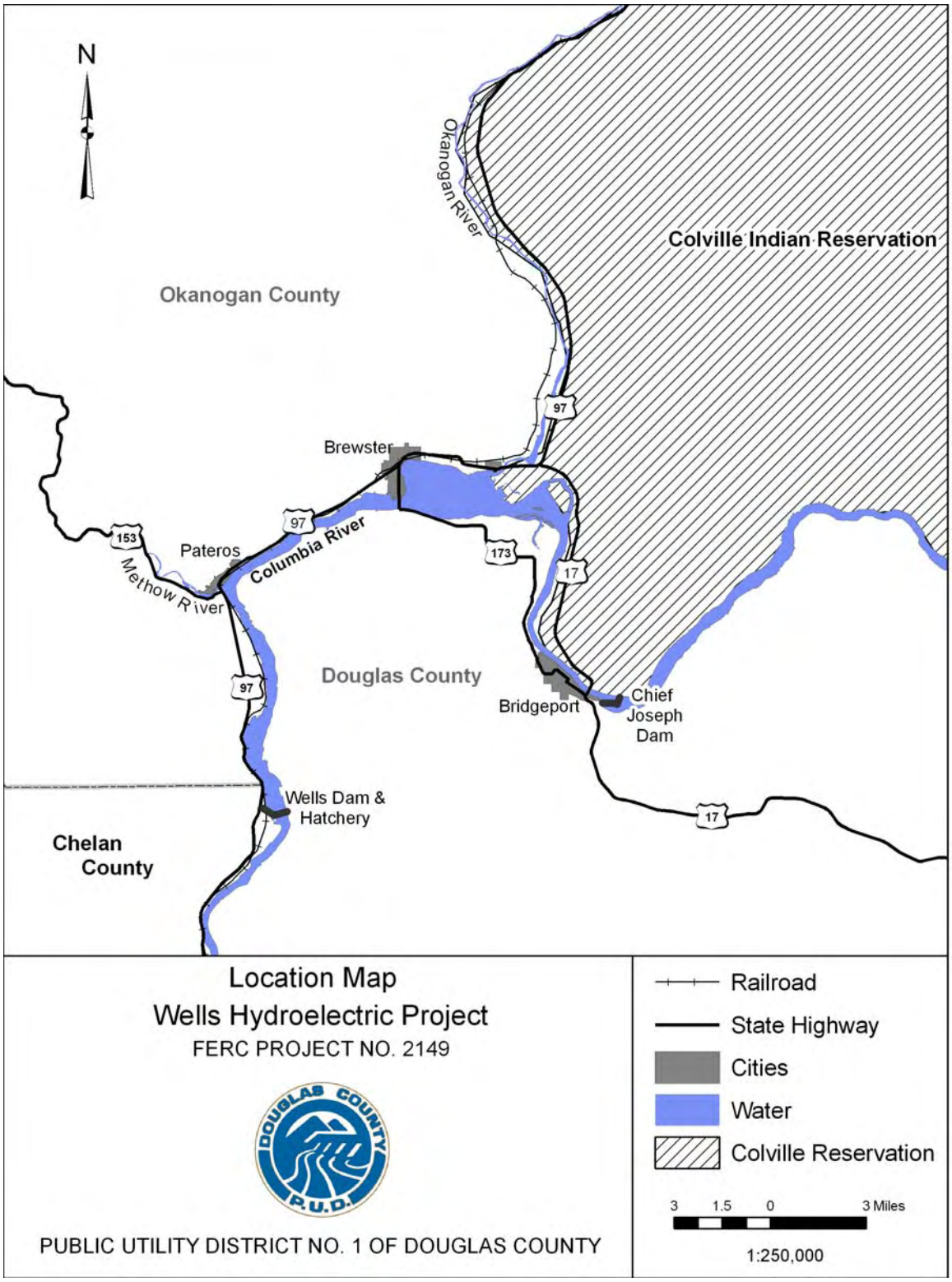

Figure 1.1-1 Location Map of the Wells Hydroelectric Project

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.

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 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 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 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, FERC issued its Study Plan Determination based on its review of the RSP Document and comments from stakeholders. 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.

These study plans have been implemented during the designated ILP study period. The results from the study plans have been developed into 12 Study Reports. Each report is included in Douglas PUD's Initial Study Report (ISR) Document, which is scheduled for filing with FERC on October 15, 2008.

This report provides initial results from the Transmission Line Wildlife and Botanical Study. Additional field sampling is scheduled to take place during September and October 2008. The final report, including the results from all of the 2008 sampling efforts, will be completed and available to the public in early 2009.

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 is 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 the corridor. In addition, this study provides the information needed to meet the FERC requirements during the Wells ILP.

Pursuant to 18 CFR 5.5(vii)(A), RTE species for this study were defined as:

- Federally listed as threatened, endangered, proposed or candidates 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 are as follows:

- 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 are as follows:

- 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 3.1-1 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 long. The transmission lines begin at Wells Dam and cross the Columbia River from Carpenter Island in Chelan County to Douglas County. The transmission lines run southeast to the Boulder Park area, then turn southwest across agricultural fields, past the town of Waterville and over Badger Mountain. The lines descend the west slope of Badger Mountain and end at Douglas Switchyard. The study area for botanical and wildlife resources is the 235-foot-wide transmission line corridor, excluding all actively cultivated fields.

The 230 kV transmission lines run 41 miles (65.6 km) from the switchyard atop the 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 right-of-way. Each phase has two parallel conductors suspended 96 inches to 105 inches (2.4 to 2.6m) below the bridge and approximately 24 feet (7.3 m) between phases. The transmission lines begin at Wells Dam and cross the Columbia River from Carpenter Island in Chelan County to Douglas County. After crossing the river, the transmission lines travel southeast to the Boulder Park area then turn southwest across wheat fields, past the town of Waterville and over Badger Mountain. The Douglas Switchyard is located in close proximity to the Rocky Reach Switchyard, operated by Chelan PUD and the Sickler Substation, operated by the Bonneville Power Administration (BPA). The 230 kV lines connect to the regional transmission grid at BPA's Sickler Substation.

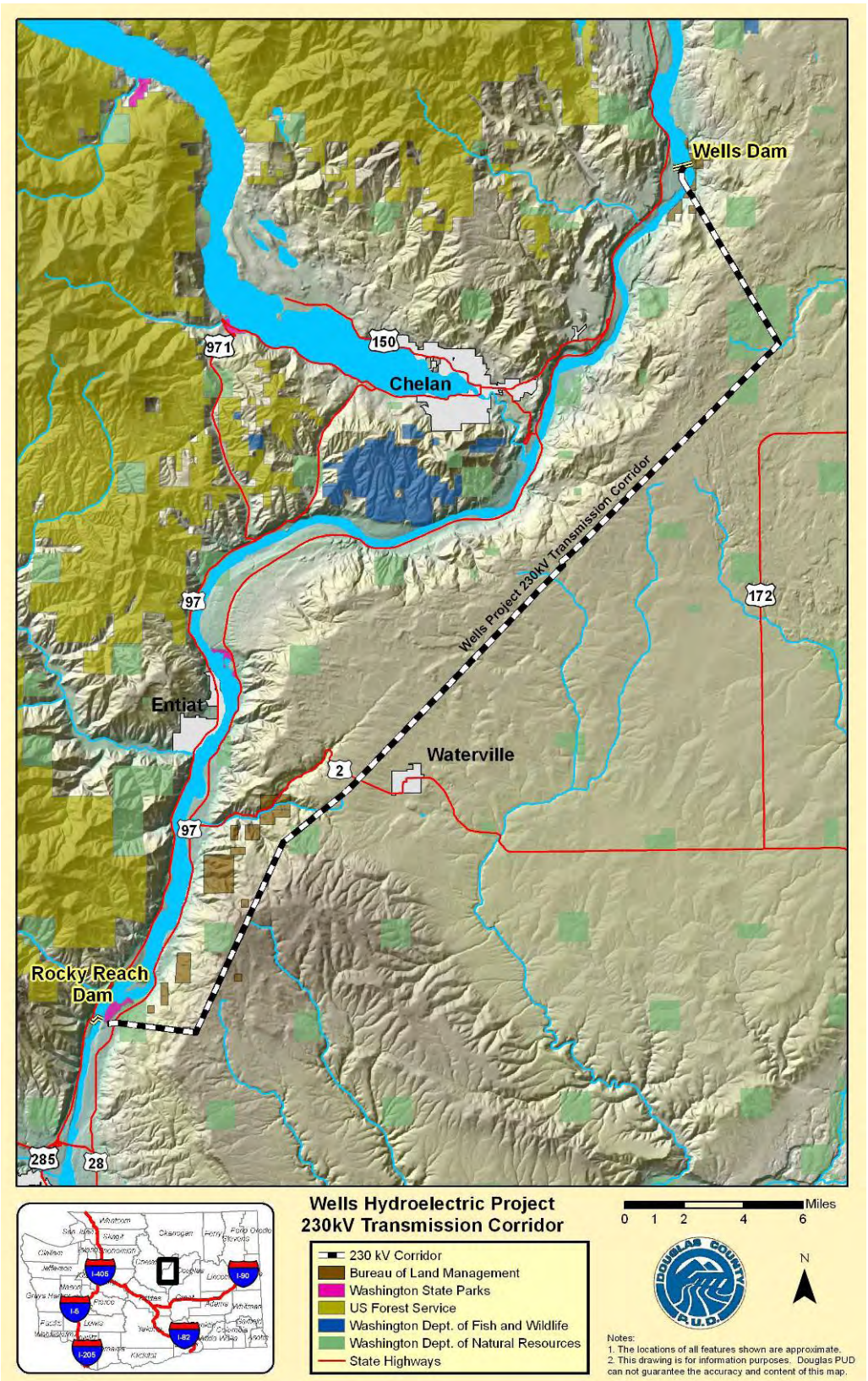

Figure 3.1-1 Location Map – Wells Dam 230 kV Transmission Line Corridor

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 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 on 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 wildlife species listed or proposed for listing under WAC 232-12-297. WDFW also maintains a list of RTE species and a database with locations of all recorded sightings. Johnson and Cassidy (1997) also provides species range information for all wildlife 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 in both the local birding

professional biologist communities, 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 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, determine whether bird collision is a problem, and provide 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 is 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 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 build Exhibits J and K showing the route of the transmission line of the Wells Project 2149. 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 the spread of noxious weeds and bird collisions.

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.

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, 2006), 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, 2006; 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 rare 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).

5.1.1.2 Field Surveys

Surveys for RTE plants in the transmission line corridor involved visually searching suitable habitat. 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, and July 8–11, 2008. One more survey is scheduled for early September 2008 focusing on cover type mapping.

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. A list of all plant species identified during field surveys is being compiled and will be provided in the final report.

WNHP sighting forms were completed for each RTE plant population found in the transmission line corridor. Data collected includes population size and area, phenology (i.e., 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. This 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 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. The first two phases identified general cover types through (1) photo interpretation and (2) field verification. The third phase will be the production of the final cover type map.

Douglas PUD received digitized 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 aerial 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. 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 spring 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. These are grassland, open conifer, riparian, shrub steppe, talus, and formerly cultivated lands currently enrolled in the Conservation Reserve Program (CRP). Additional cover classes included actively cultivated fields and various barren and disturbed sites (e.g., highways, gravel roads, orchards). Of approximately 1,117 acres of land area within the 41-mile transmission line corridor, more than 600 acres (55 percent) was classified as 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 area of the study area was mapped as shrub-steppe habitat; therefore, the greatest number of stations (31 of 50) was established in areas classified as shrub-steppe habitat.

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
Agricultural Lands	614	N/A	1	2
CRP [1]	36	7	5	10
Grass	5	1	1	2
Open Conifer	52	10	9	18
Other [2]	24	5	0	0
Riparian	6	1	2	4
Shrub-Steppe	377	75	31	62
Talus	3	1	1	2
Total	***1,117***	***100***	***50***	***100***

[1] Note that this cover type is identified as Idle Agriculture in the remainder of this report.
[2] Includes highways, gravel roads, orchards, and other non-vegetated or atypical cover types.

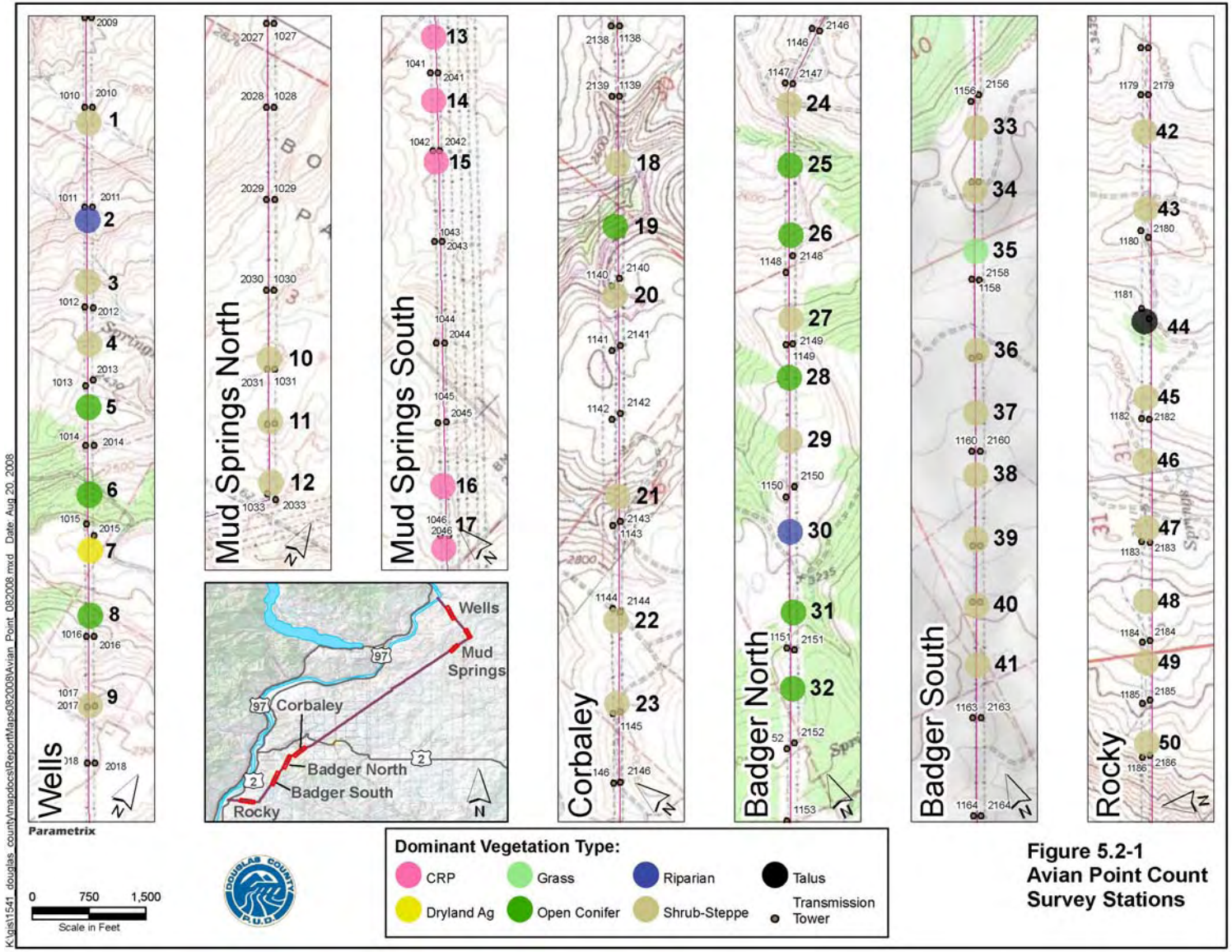

Figure 5.2-1 Avian Point Count Survey Stations

The placement of point count stations was constrained by practical and logistical considerations. For example, individual stations were at least 800 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. Constraints and 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 60 percent of the area within the survey plot consisted of shrub-steppe habitat and 40 percent consisted of riparian habitat, the station would be assigned to the shrub-steppe class. At one station (Station #7, in the Wells survey segment), agricultural lands and native grassland habitat were interspersed to such an extent that the agricultural cover type was identified as the dominant type within the survey plot, amounting to 55 percent of the plot area.

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.

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.

Each point count survey station visit lasted 5 minutes (following a settling period of at least 1 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.

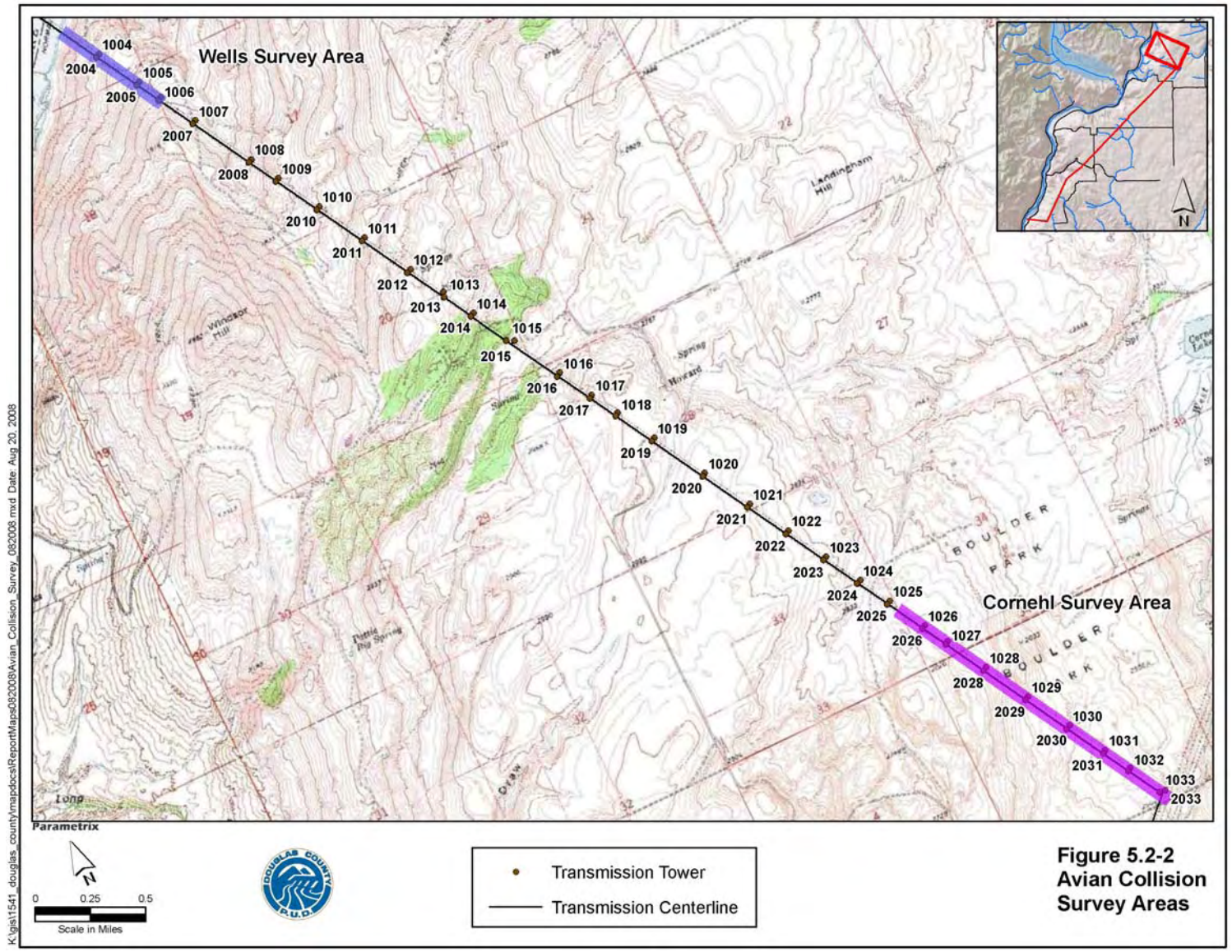

Figure 5.2-2 Avian Collision Survey Areas

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. 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.

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-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. The interval between visits ranged from 6 to 20 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.

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.

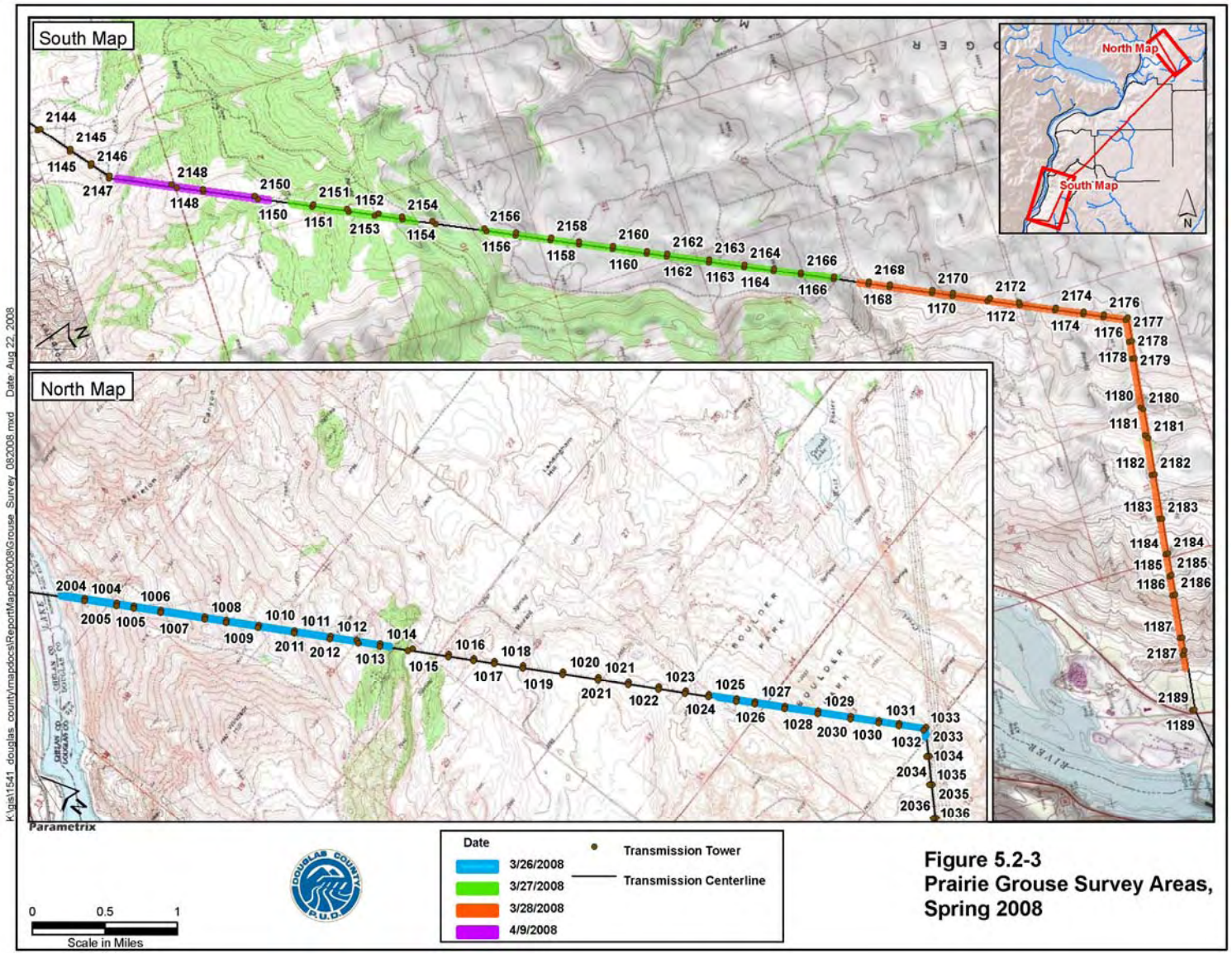

Figure 5.2-3 Prairie Grouse Survey Areas, Spring 2008

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 5.2.1.1), 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 will be conducted to identify potential effects of the 230 kV transmission lines and towers on raptors and prairie grouse. Refereed journal articles and gray literature will be reviewed. The literature review will be summarized in the final study report, after fall surveys are complete.

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—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—are RTE species (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 (Call, 1986). 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 spring 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 (*Masticophis taeniatus*)
- 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 and summarizes the cover types mapped in the study area. The areas where botanical surveys occurred are depicted in Figure 6.1-1. A total of approximately 18 miles of the transmission line corridor were surveyed.

6.1.1 RTE Plant Inventory

Field surveys for RTE plants were conducted three times over the 2008 growing season: May 5–8, June 9–12, and July 8–11, 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 and extends outside of the study area. 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 include big sagebrush, bluebunch wheatgrass, crested wheatgrass (*Agropyron cristatum),* and silky lupine (*Lupinus sericeus*).

This section will be expanded following the completion of the late summer surveys, to include discussions of late summer survey results.

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, and because local weed control boards have the option to require control for these species. Douglas County currently has no weed control board and does not track or control noxious weed species in any formal way. The Washington State University Agricultural Extension Service, however, provides weed management information and services to Douglas County government and residents.

Field surveys for invasive plants were conducted three times over the 2008 growing season: May 5–8, June 9–12, and July 8–11, 2008. One more field survey will be conducted in September 2008, focusing on cover type mapping.

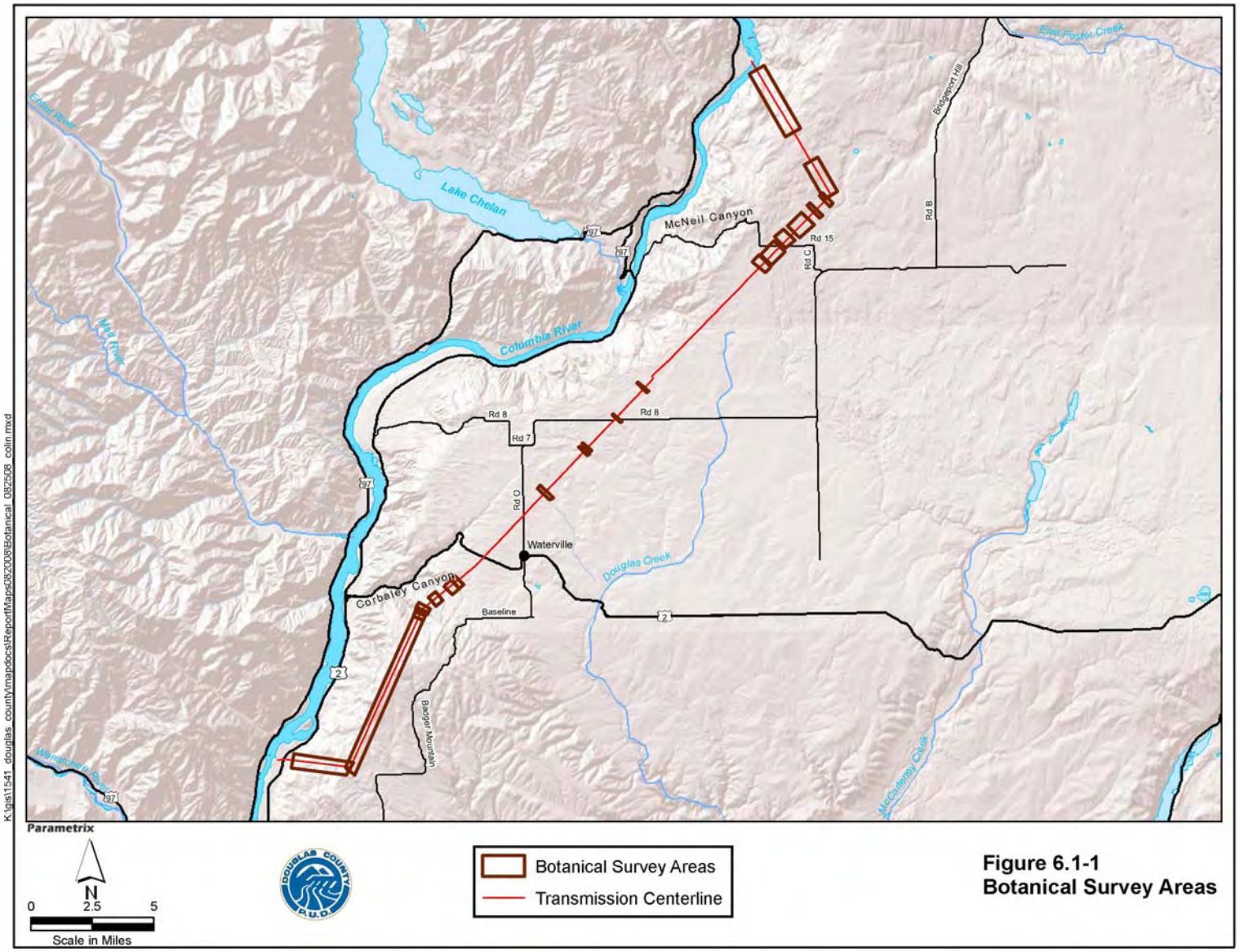

Figure 6.1-1 Botanical Survey Areas

No Class A weed species were identified in the study area during invasive plant surveys. However, 48 occurrences of two Class B Designate weed species (Dalmatian toadflax [*Linaria dalmatica* ssp. *Dalmatica*] and spotted knapweed [*Centaurea stoebe*]) and one other Class B weed species (diffuse knapweed [*Centaurea diffusa*]) were recorded and mapped (see maps in Appendix H). This result (48 occurrences) is based on lumping spotted knapweed (Class B Designate) and diffuse knapweed (Class B non-designate weed in Douglas County Regions 3 and 6). During early surveys, differentiation of knapweed species was difficult due to similarities in early life forms for both species. Occurrences will be revisited during the final botanical survey to identify to species. The number of invasive plants is expected to decrease in subsequent drafts of this report, following late summer botanical surveys once spotted knapweed and diffuse knapweed are differentiated.

In addition, two Class C weed species, field bindweed (*Convolvulus arvensis*) and Canada thistle (*Cirsium arvense*), were also mapped during field work. Control efforts for Class B weeds are not mandated by the state but are left to the discretion of the local County Weed Control Boards. 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. Studies indicate that grasslands without Dalmatian toadflax may produce two and a half times as much grass as areas with toadflax. 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).

Dalmatian toadflax occurs throughout the study area, primarily in shrub-steppe habitat, with 19 infestations mapped (see Appendix H). This species covers a total of approximately 50 acres within the study area, and has a range of population sizes and densities. The regional distribution of this species is not precisely known, although the presence of Dalmatian toadflax in contaminated seed mixes planted as part of the CRP has created large infestations of this species in parts of eastern Washington.

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, 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 occurs throughout the study area, primarily in shrub-steppe habitat. A total of 19 populations of knapweed (spotted and diffuse) have been mapped (see Appendix H). Some knapweed populations were not identified to species because identification of knapweed species is difficult when plants are young. Populations will be revisited during the final botanical survey to differentiate species.

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, 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. A total of 19 populations of knapweed (spotted and diffuse) have been mapped (see Appendix H). As previously mentioned, some knapweed populations were not identified to species because identification of knapweed species is difficult when plants are young. Populations will be revisited during the final botanical survey to differentiate species.

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).

Five populations of Canada thistle were identified, primarily in shrub-steppe habitat.

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, streambanks, and lakeshores.

Field bindweed was most commonly found on roads or roadsides, with 13 populations identified.

This section will be expanded following the completion of the late summer surveys, to include discussions of late summer survey results.

6.1.3 Cover Type Mapping

The total area of the Wells Project transmission line corridor covers approximately 1,117 acres. A total of 17 cover types were identified and have been grouped into 11 different categories: Shrub-Steppe, Grass, Conifer, Open Conifer, Cleared Conifer, Cleared Open Conifer, Riparian, Idle Agriculture, Dryland Agriculture, Talus, and Other (includes borrow pit, county road asphalt, county road gravel, disturbed, erosion, farm yard, gravel, gravel road, highway, industrial, orchard). The Idle Agriculture cover type includes formerly cultivated fields where nonagricultural vegetation types have been allowed to grow. CRP parcels are a good example of the Idel Agriculture cover type.

Descriptions, abundance, and distribution for each of these cover types and information on associated species will be discussed in subsequent drafts of this report, following data collection during September 2008.

It is important to note that portions of the southern end of the study area were burned during the Badger Mountain Fire in July 2008. 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 will be surveyed in September and documented along with pre-fire observations in subsequent reports.

Figure 6.1-2 Badger Mountain Fire, July 2008.

This section will be expanded following the completion of the late summer surveys, to include discussions of late summer survey results.

6.2 Wildlife Resources

Teams of two or three biologists conducted seven field visits over 24 days between March 26 and June 19, 2008. Collectively, a total of 49 person days were spent conducting field surveys for wildlife species. The following subsections summarize the results of individual survey efforts.

6.2.1 Avian Surveys

6.2.1.1 Point-Transect Surveys

Biologists spent 63.4 person-hours conducting 200 point count survey visits during May and June 2008, visiting each of the 50 stations four times (Table 6.2-1). 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 each survey segment was 9.0 miles, for a total of 36 miles of transect surveys during the four 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 1,723 birds of 85 species were observed during the point-transect surveys. Of these observations, 15 could not be assigned to a particular species; most of the latter were identified to species group (e.g., Unknown Flycatcher). An additional 89 birds were recorded incidentally. With the inclusion of incidental sightings, a total of 91 bird species were observed during field surveys (Appendix I). During the course of the four breeding season survey visits, the number of new species observed (i.e., species that had not been detected during previous visits) declined rapidly (Figure 6.2-1), indicating that the survey effort was likely sufficient to detect most species breeding in the survey area.

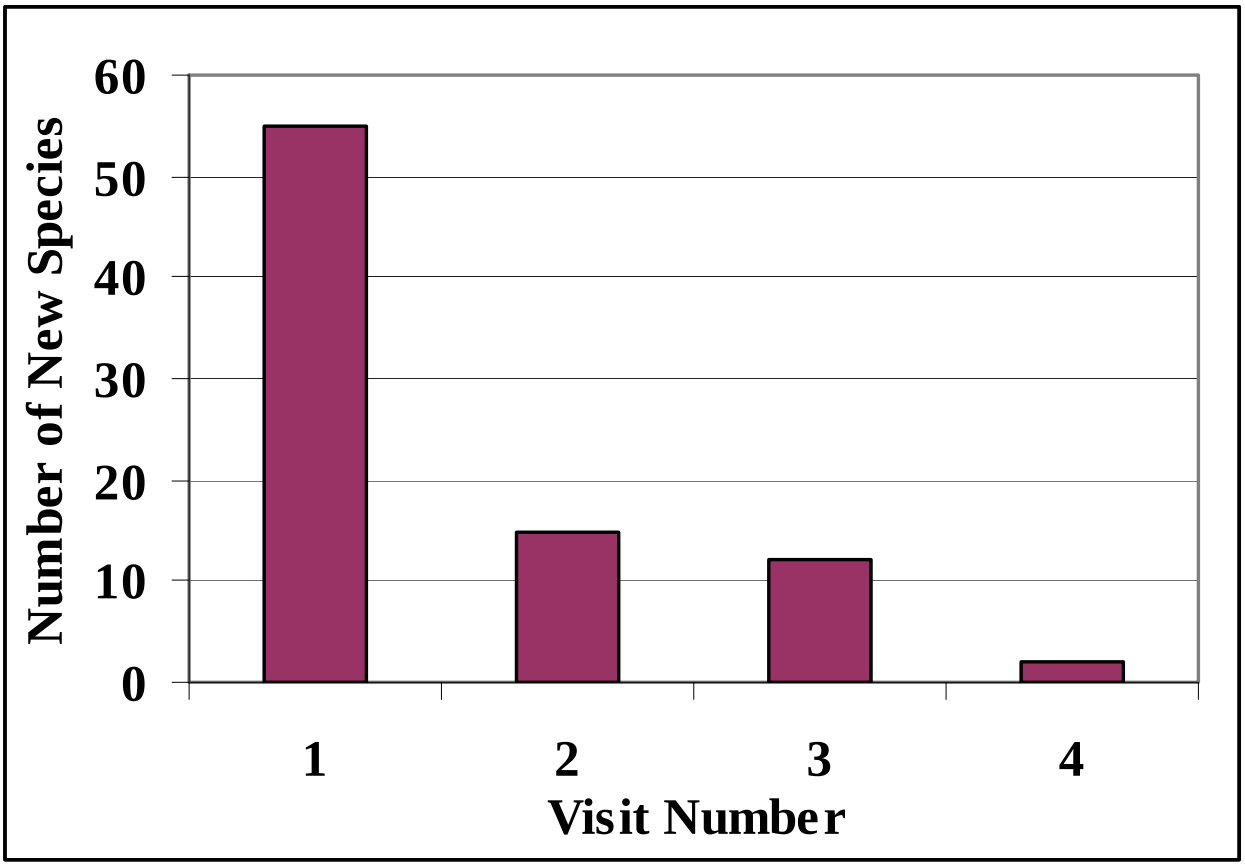

Figure 6.2-1 Number of Bird Species First Observed in the Wells Project Transmission Corridor Study Area, by Survey Visit

Of the 85 species identified during point-transect surveys, 71 were observed during the 5-minute point counts at the 50 survey stations; the other 14 species were detected between stations only. During point counts, 390 birds were first detected within the 115-foot station plots, representing 46 species (four of these observations could not be identified to a particular species). These 390 observations form the basis for the analyses of relative abundance that follow.

Overall, an average of 1.7 ± 0.6 species and 2.0 ± 0.7 individual birds were detected per plot per survey during the four survey periods (n = 200 surveys). The relative abundance of individual bird species detected during these surveys ranged from 0.005 to 0.2 detections per survey (Appendix J). The order Passeriformes was most represented. Brewer's Sparrow *(Spizella breweri)* was the most abundant, followed by spotted towhee *(Pipilo maculatus)* and vesper sparrow *(Pooecetes gramineus)* (Appendix J). Other commonly detected land birds included mountain chickadee (*Poecile gambeli*), lazuli bunting (*Passerina amoena*), American robin *(Turdus migratorius*), western meadowlark (*Sturnella neglecta*), brown-headed cowbird (*Molothrus ater*), and western kingbird (*Tyrannus verticalis*).

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). 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.

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

Dryland Agriculture [1]	Brown-headed Cowbird, Western Meadowlark, Lazuli Bunting, Say's Phoebe
Grass [1]	Western Meadowlark, American Robin, Chipping Sparrow, Bullock's Oriole
Idle Agriculture	Brewer's Sparrow, Vesper Sparrow, Western Meadowlark, Eastern Kingbird, Grasshopper Sparrow
Open Conifer	Spotted Towhee, Mountain Chickadee, Nashville Warbler, Black-headed Grosbeak, American Robin
Riparian	Spotted Towhee, Clark's Nutcracker, Brown-headed Cowbird, Wilson's Warbler, Black-headed Grosbeak
Shrub-Steppe	Brewer's Sparrow, Spotted Towhee, Vesper Sparrow, Mountain Chickadee, Lazuli Bunting
Talus [1]	Black-billed Magpie, Western Kingbird

[1] At stations where the dominant cover type was grass, dryland agriculture, or talus cover, fewer than five species were detected during point count surveys.

The greatest number of bird species was detected at stations where the dominant cover type was open conifer, closely followed by those with riparian and shrub-steppe cover types (Table 6.2-3). Riparian habitat had the highest average number of species detected per survey (2.50), followed by grassland (1.00), agriculture (1.00), and open conifer (0.83) habitat types (Table 6.2-3). Shrub-steppe, the most abundant habitat type in the survey area (represented by 124 survey plots), had the second-lowest average number of species detected per survey (0.26). These values are influenced by survey effort: as more surveys are conducted in a particular area or habitat type, 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 particularly habitat type, both the total number of species detected and the average number of species per survey should be borne in mind. The comparatively large number of species detected in riparian habitat during only eight survey visits suggests that additional survey visits would likely have identified additional species at stations where riparian habitat is the dominant cover type.

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**
Dryland Agriculture	4	4	1.00
Grassland	4	4	1.00
Idle Agriculture	20	5	0.25
Open Conifer	36	30	0.83
Riparian	8	20	2.50
Shrub-steppe	124	32	0.26
Talus	4	2	0.50
Total	***200***	***47***	***0.24***

[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.

6.2.1.2 Prairie Grouse Surveys

A total of 43.4 person-hours were devoted to focused surveys for the presence of grouse species or signs of habitat use (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 12.1 miles. During these 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 or 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.

Table 6.2-4 Summary of Focused Survey Efforts for Grouse, Spring 2008

Survey Date	Survey Area	Survey Effort (Person-hours)	Distance Covered (miles)
March 26	Cornehl	7.0	1.3
	Wells	13.6	2.1
March 27	Badger North	2.2	0.9
	Badger South	5.0	2.4
March 28	Badger South/ Rocky	9.2	4.5
April 9	Badger North	6.5	1.0
Total		***43.4***	***12.1***

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. 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. Two more survey visits are planned for September 2008.

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 or corvid nests within or adjacent to the survey area (Figure 6.2-2). Of the 11 nests observed, 2 were identified as common raven nests, 1 was Swainson's hawk, 4 were red-tailed hawk, and 4 could not be identified 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.

Seven of the nests were on electrical transmission line structures (towers or poles), two were in trees, and one was on a cliff. All common raven nests were located on transmission line structures. The unknown nests located in trees were very likely built by Swainson's or red-tailed hawks, based on location and size, but this is not certain.

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 that likely provide visual screening from predators and protection from the elements.

6.2.1.4 Avian Collision Surveys

A total of 63.6 person-hours were spent on focused surveys for the evidence of avian mortalities associated with the transmission line and associated structures. No evidence of mortality was discovered that could be attributed to collisions. Two carcasses of gallinaceous birds were discovered during these 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 botanists who found the carcass did not observe any indication of a collision with the transmission line or other structures. An incidental observation of note occurred during the first survey visit, when approximately 20 Canada geese were seen flying over the transmission line during a snowstorm, heading away from Cornehl Lake.

Five additional focused surveys are scheduled for fall 2008.

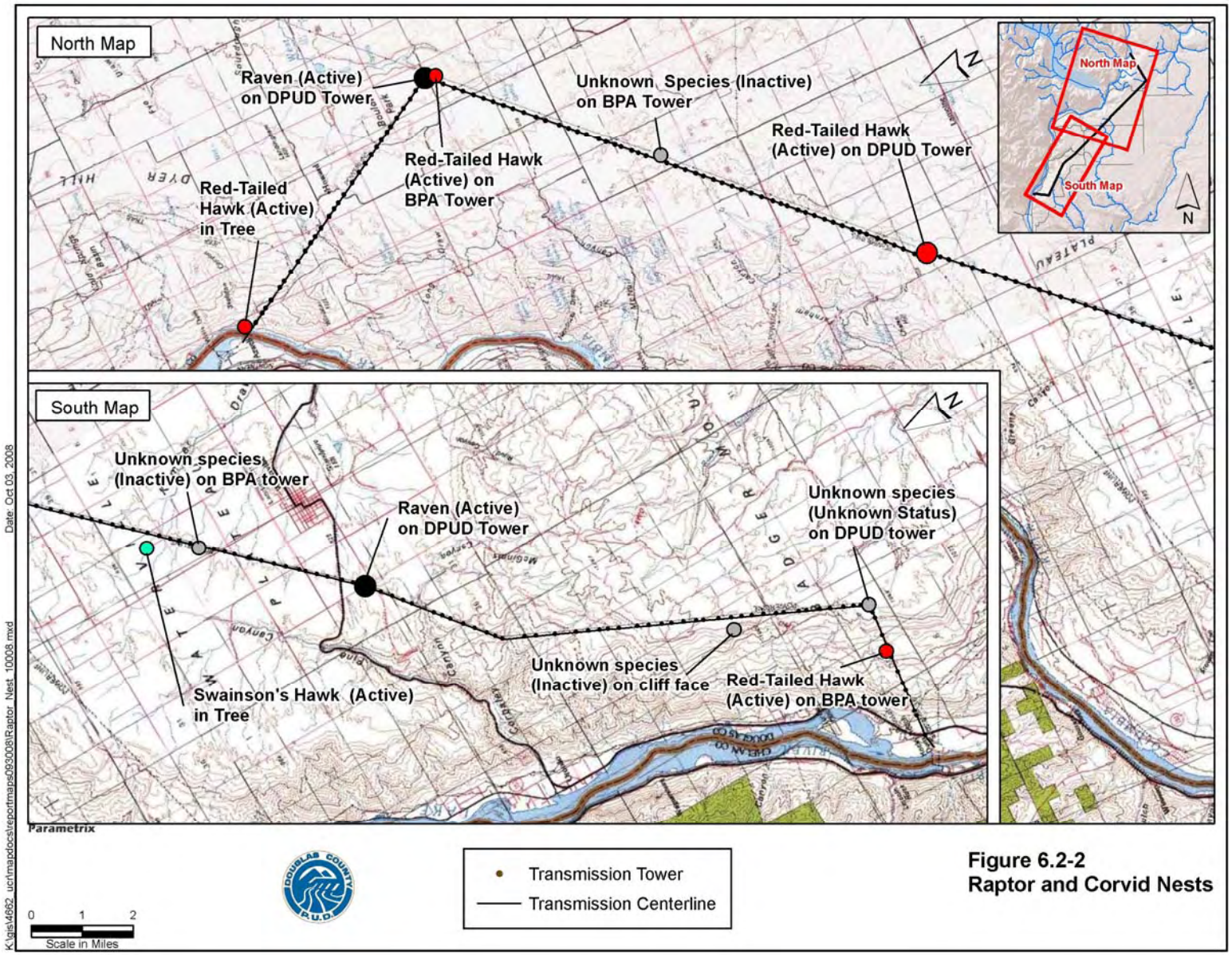

Figure 6.2-2 Raptor and Corvid Nests Observed, Spring 2008.

6.2.1.5 Avian T-line Interaction Literature Review

This discussion, to be added following the completion of fall season surveys, will summarize the results of a review of new literature that has been published since the completion of the draft literature review that was prepared for Douglas PUD in 2006, emphasizing the potential effects of the 230 kV transmission lines and towers on raptors and prairie grouse.

6.2.2 Mammal Surveys

Observations and evidence for the presence of mammals in the survey area were noted during all field surveys. Collectively, a total of 212.8 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. 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 spring surveys:

Coyote *(Canis latrans)* – Tracks and scat along roads in the Corbaley and Rocky survey segments, one individual in the Rocky area.

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

Cougar *(Felis concolor)* – Tracks in the Badger South and Corbaley survey segments. 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 were harvested in game management units (GMUs) 262 (Wells and Mud Springs areas) and 266 (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)* – Skull in the Badger South survey segment.

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

Rabbit (probably 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, rabbit 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 in the Wells survey segment.

Chipmunk (*Tamias* sp.; least or yellow pine) – Individuals briefly glimpsed in the Badger North and Rocky 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). Virtually all of these were either legal harvest to address a damage bear, or bear encountered incidental to deer hunting.

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. A total of seven species were observed during formal surveys: pygmy short-horned lizard, western skink, racer (including one egg), western terrestrial garter snake, and 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.

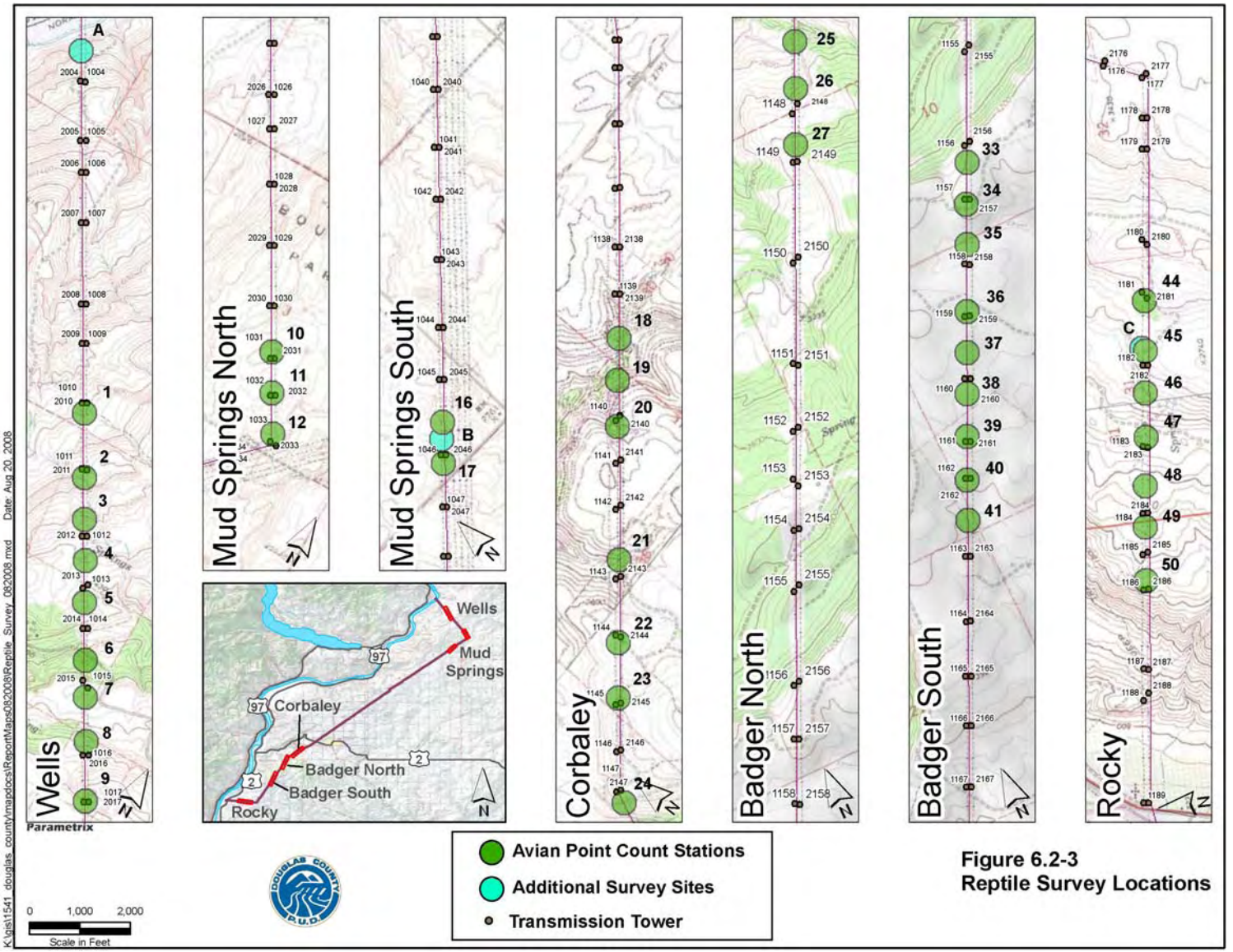

Figure 6.2-3 Reptile Survey Sites

Table 6.2-5 Observations of Reptile Species in the Wells Project Transmission Corridor Survey Area, Spring 2008

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	Idle 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
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

[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).

A single amphibian was observed during visual encounter surveys, a long-toed salamander 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.

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 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 following RTE species were reported by PHS:

- 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).

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.

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. Invasive plant surveys mapped and documented 48 potential occurrences of two Class B Designate weed species: Dalmatian toadflax and spotted knapweed. However, this number is expected to decrease in subsequent drafts of this report, following late summer botanical surveys when spotted knapweed and diffuse knapweed can be differentiated.

Cover types were grouped into 11 mapping categories based on previously mapped GIS data and field observations. Descriptions, abundance, and distribution for each of these cover type categories and information on associated species will be discussed in subsequent drafts of this report, following data collection during the late summer surveys in early September 2008.

Surveys documented the presence of 91 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 50 point count stations), the most common species in the study area was the Brewer's sparrow. Other commonly detected species (in descending order of relative abundance) were spotted towhee, vesper sparrow, mountain chickadee, and lazuli bunting. The greatest number of species was detected where the dominant cover type was open conifer, closely followed by riparian and shrub-steppe (which was the most common cover type in the study area, and in which the greatest survey effort occurred).

Eleven nests of raptors or corvids were detected within or adjacent to the study area, including four on Douglas County PUD transmission towers. No evidence of avian mortality due to collisions with the transmission lines or towers was documented.

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, and yellow-bellied marmot. 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 FERC-approved study plan for the Transmission Line Wildlife and Botanical Study. The final study report, including all field sampling activities for 2008, will be complete and available to the public in early 2009.

9.0 ACKNOWLEDGMENTS

We would like to acknowledge all landowners who graciously provided access, and often valuable insights and information. Many thanks also to Scott Kreiter, Jim McGee, and Dick Weinstein of Douglas PUD for the time and effort they put in to shuttling vehicles and biologists on the transmission line, and to Beau Patterson for his assistance with the botanical surveys.

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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

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.

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			
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.
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.

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			
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.
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.

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			
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.
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.

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			
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.
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.

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			
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 forseeable future if factors contributing to its decline continue.

T = Threatened. Likely to become Endangered in Washington within the forseeable 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 forseeable 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 2008

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]		**Designated for control**	
Common Name	**Scientific Name**	**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

Class B noxious weeds designated for control in Regions 3 and 6, Washington [2]		**Designated for control**	
Common Name	**Scientific Name**	**Region 3**	**Region 6**
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
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

Class B noxious weeds designated for control in Regions 3 and 6, Washington [2]		**Designated for control**	
Common Name	**Scientific Name**	**Region 3**	**Region 6**
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)		
Bald eagle	*Haliaeetus leucocephalus*	FCo ST
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
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*	FCo 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

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**
Bats (Chiroptera)		
Townsend's big-eared bat	*Corynorhinus townsendii*	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.

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		
1066/2066		
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
Mephitidae (Skunks)	
Mephitis mephitis	Striped Skunk
Mustelidae (Weasels, Badgers and Otters)	
Lontra canadensis	Northern River Otter
Mustela frenata	Long-tailed Weasel
Mustela vison	Mink
Taxidea taxus	American Badger
Procyonidae (Ringtail, Raccoon, and Coati)	
Procyon lotor	Northern 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
Order: Insectivora (Shrews, Moles, Hedgehogs)	
Soricidae (Shrews)	
Sorex merriami	Merriam's Shrew
Sorex vagrans	Vagrant Shrew

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

Talpidae (Moles)	
Scapanus orarius	Coast Mole
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	Mountain Cottontail
Order: Rodentia (Rodents)	
Castoridae (Beaver)	
Castor canadensis	American Beaver
Erethizodontidae (Porcupines)	
Erethizon dorsatum	North American 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)	
Clethrionomys gapperi	Southern Red-backed Vole
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	Deermouse
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

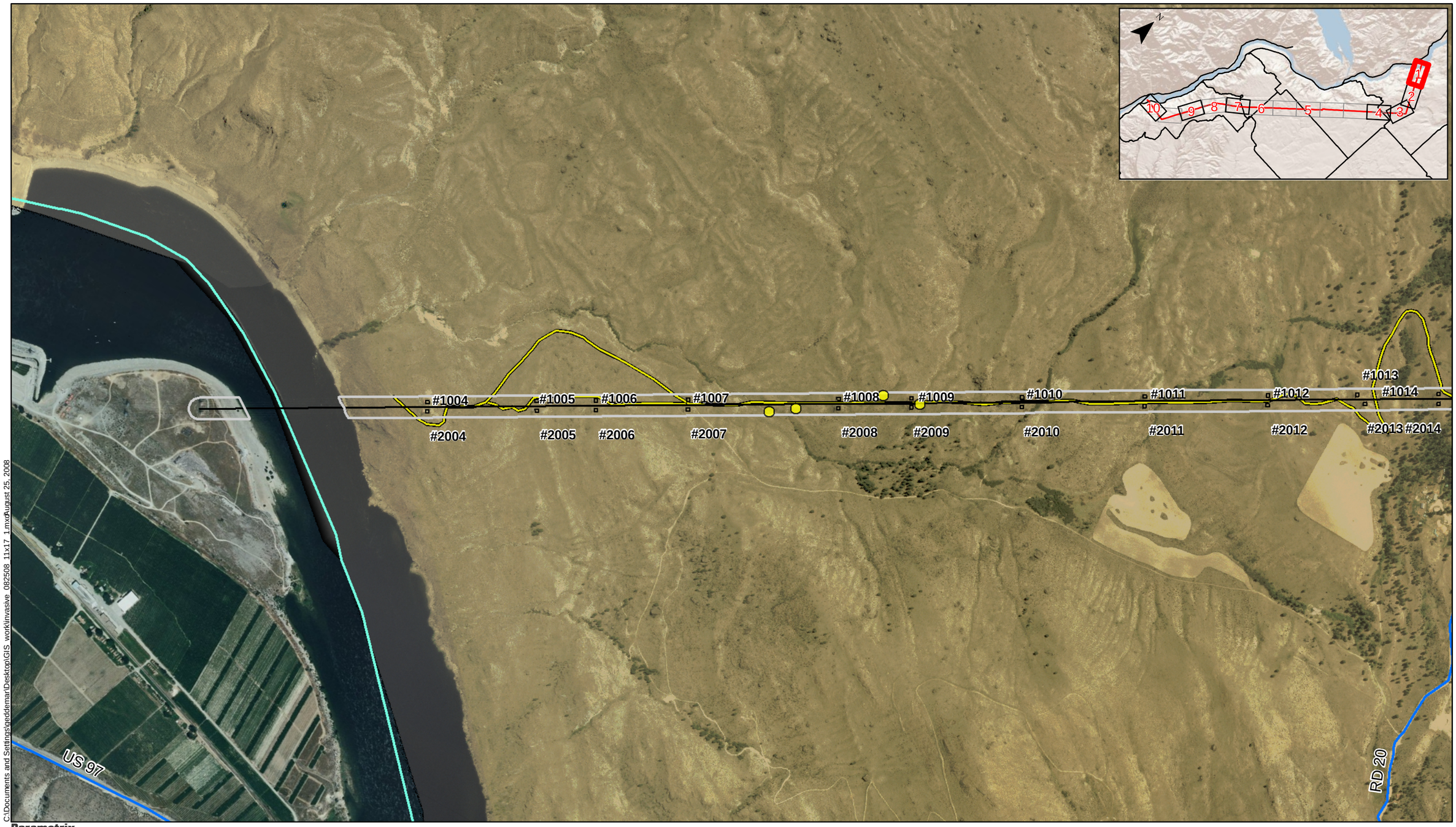
Appendix G

RTE Plant Location

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 Locations



C:\Documents and Settings\geddenat\Desktop\GIS_work\invasive_082508_11x17_1.mxd August 25, 2008

Parametrix

N

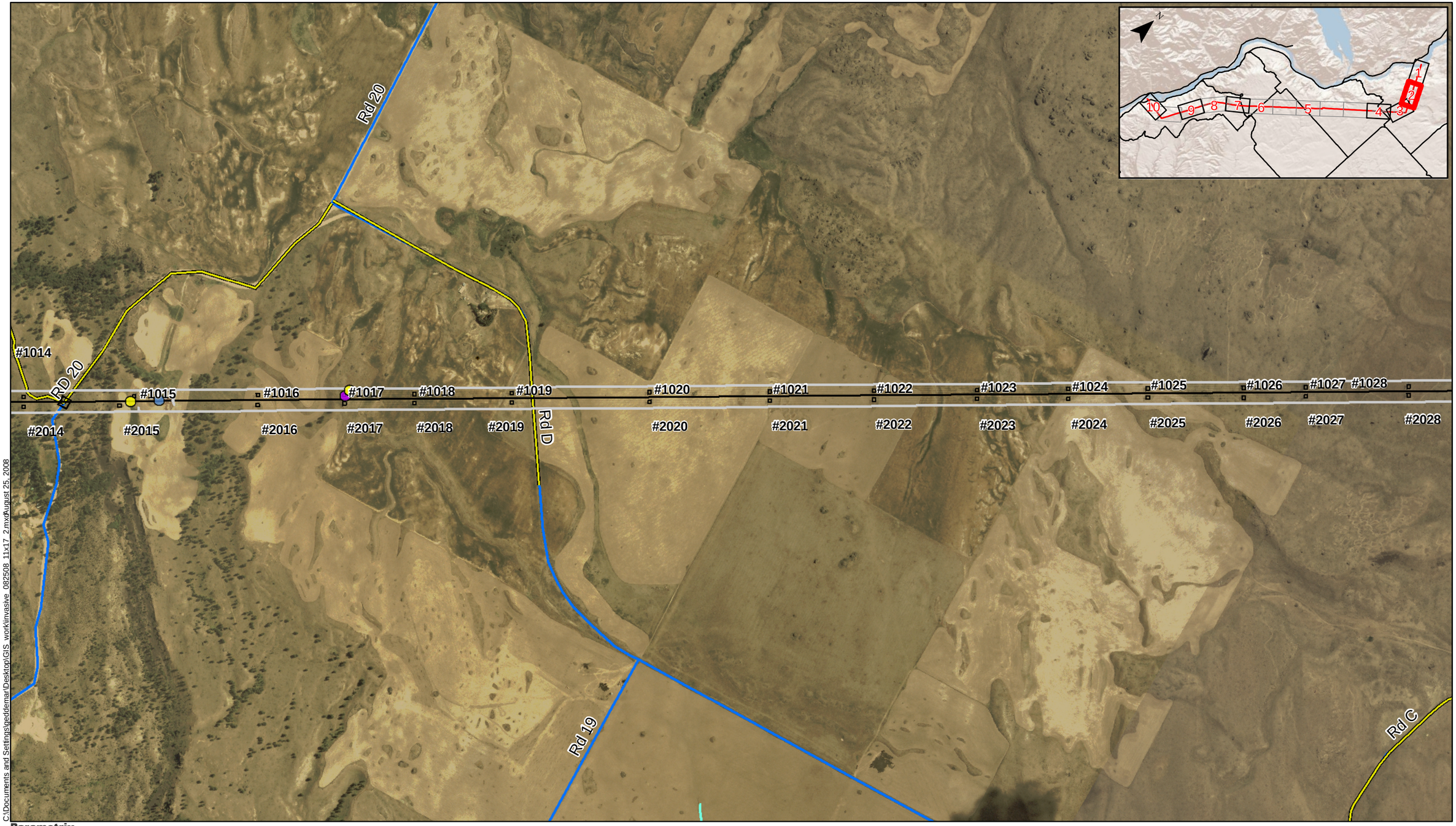
0 500 1,000 Feet

Transmission Tower
230Kv Transmission Centerline
230kv Transmission Line Right of Way
Stream

Invasive Species (Small Population)
Dalmatian Toadflax
Diffuse/Spotted Knapweed
Knapweed/Toadflax

Roads
Public
Private
Access

Appendix H Map 1
Invasive Plant Species Locations



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Parametrix

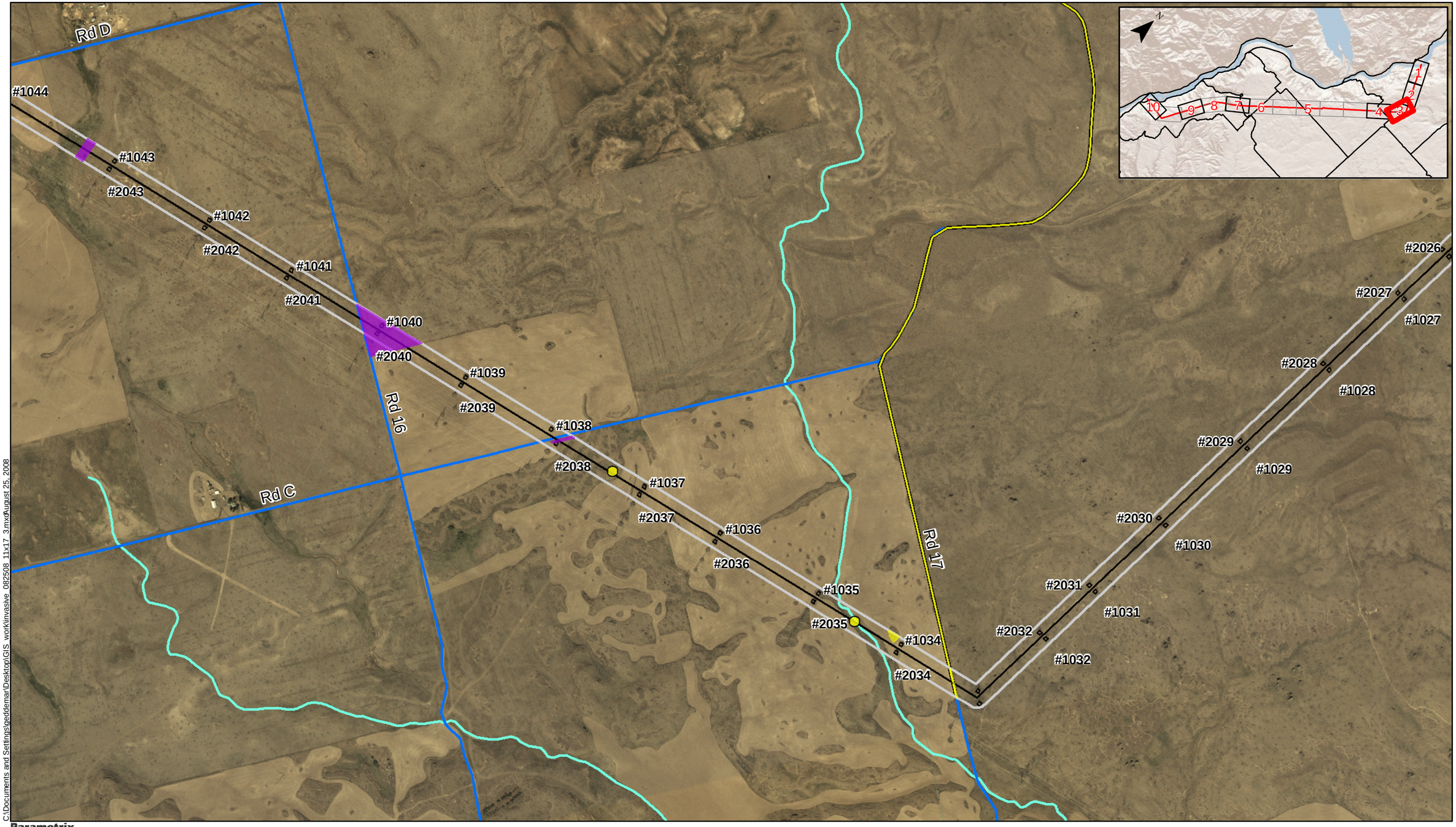
0 500 1,000 Feet

Transmission Tower
230Kv Transmission Centerline
230kv Transmission Line Right of Way
Stream

Invasive Species (Small Population)
Dalmatian Toadflax
Diffuse/Spotted Knapweed
Knapweed/Toadflax

Roads
Public
Private
Access

Appendix H Map 2
Invasive Plant Species Locations



Parametrix

N

0 500 1,000 Feet

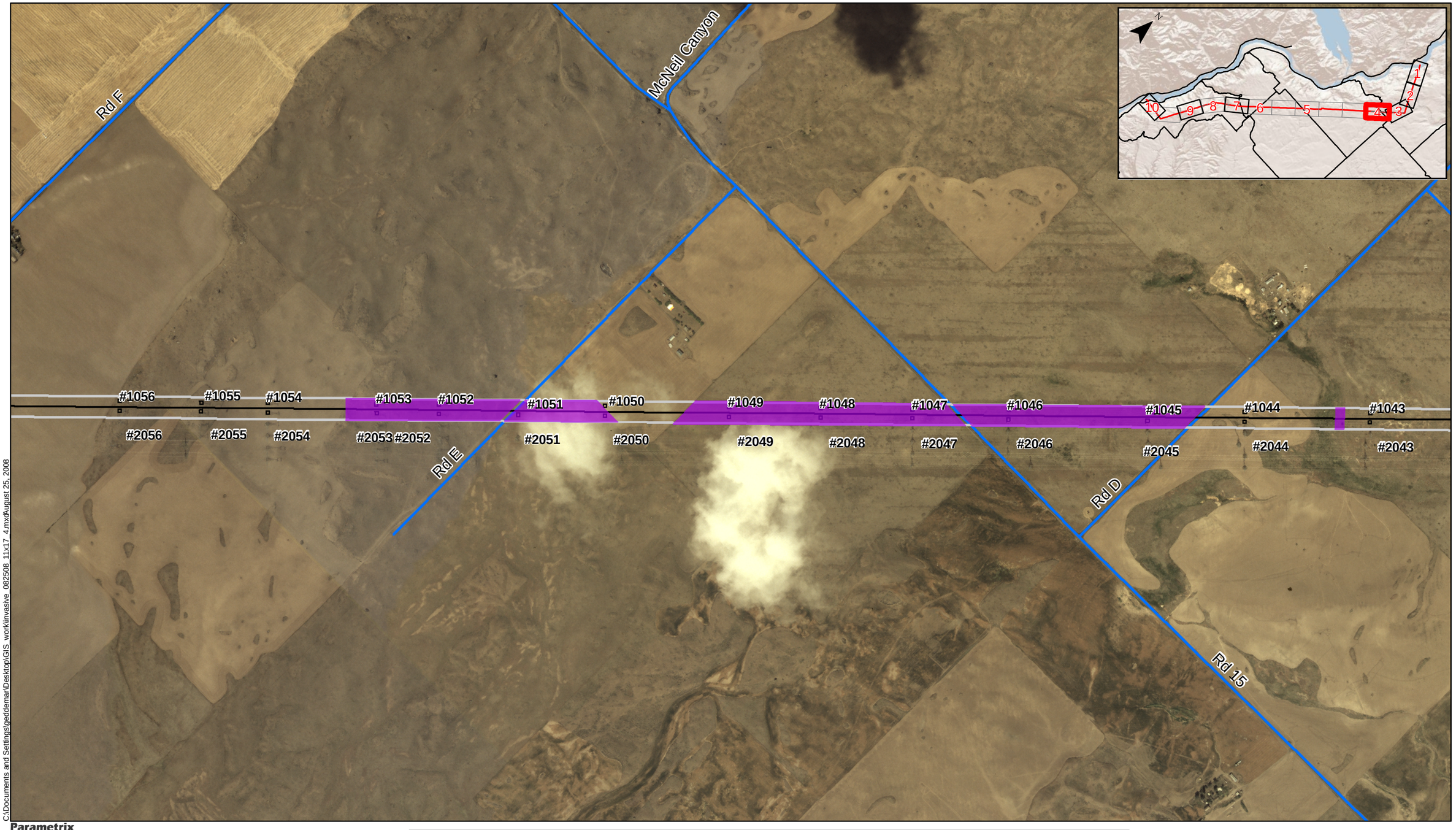
Transmission Tower
230Kv Transmission Centerline
230kv Transmission Line Right of Way
Stream

Invasive Species (Small Population)
Dalmatian Toadflax
Diffuse/Spotted Knapweed
Knapweed/Toadflax

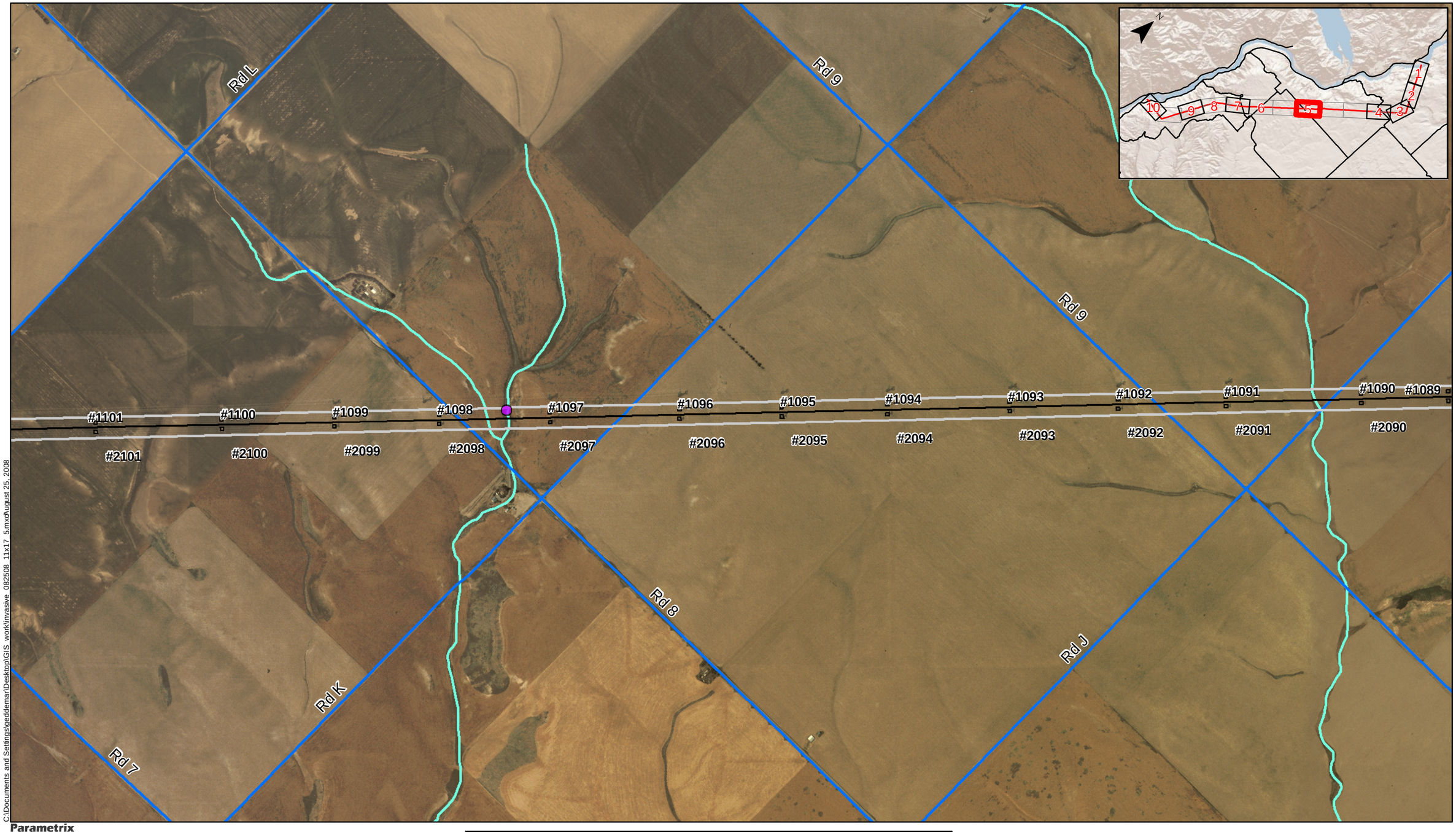
Invasive Species (Large Population Areas)
Dalmatian Toadflax (>4,000 sq. ft)
Diffuse/Spotted Knapweed (>4,000 sq. ft)

Roads
Public
Private
Access

Appendix H Map 3
Invasive Plant Species Locations



Appendix H Map 4
Invasive Plant Species Locations



Appendix H Map 5
Invasive Plant Species Locations

Appendix H Map 6
Invasive Plant Species Locations

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Parametrix

N

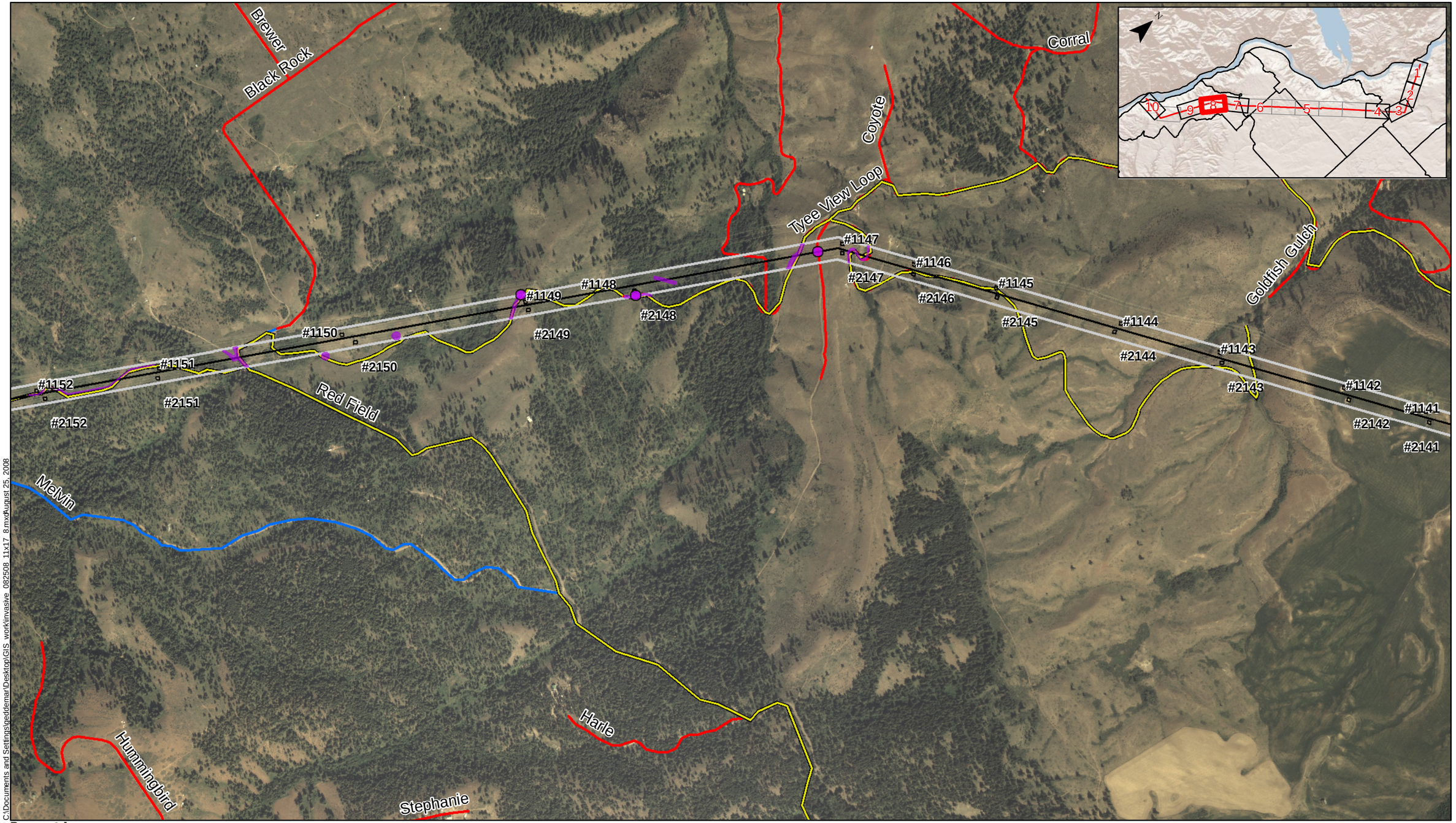
0 500 1,000 Feet

Transmission Tower
230Kv Transmission Centerline
230kv Transmission Line Right of Way
Stream

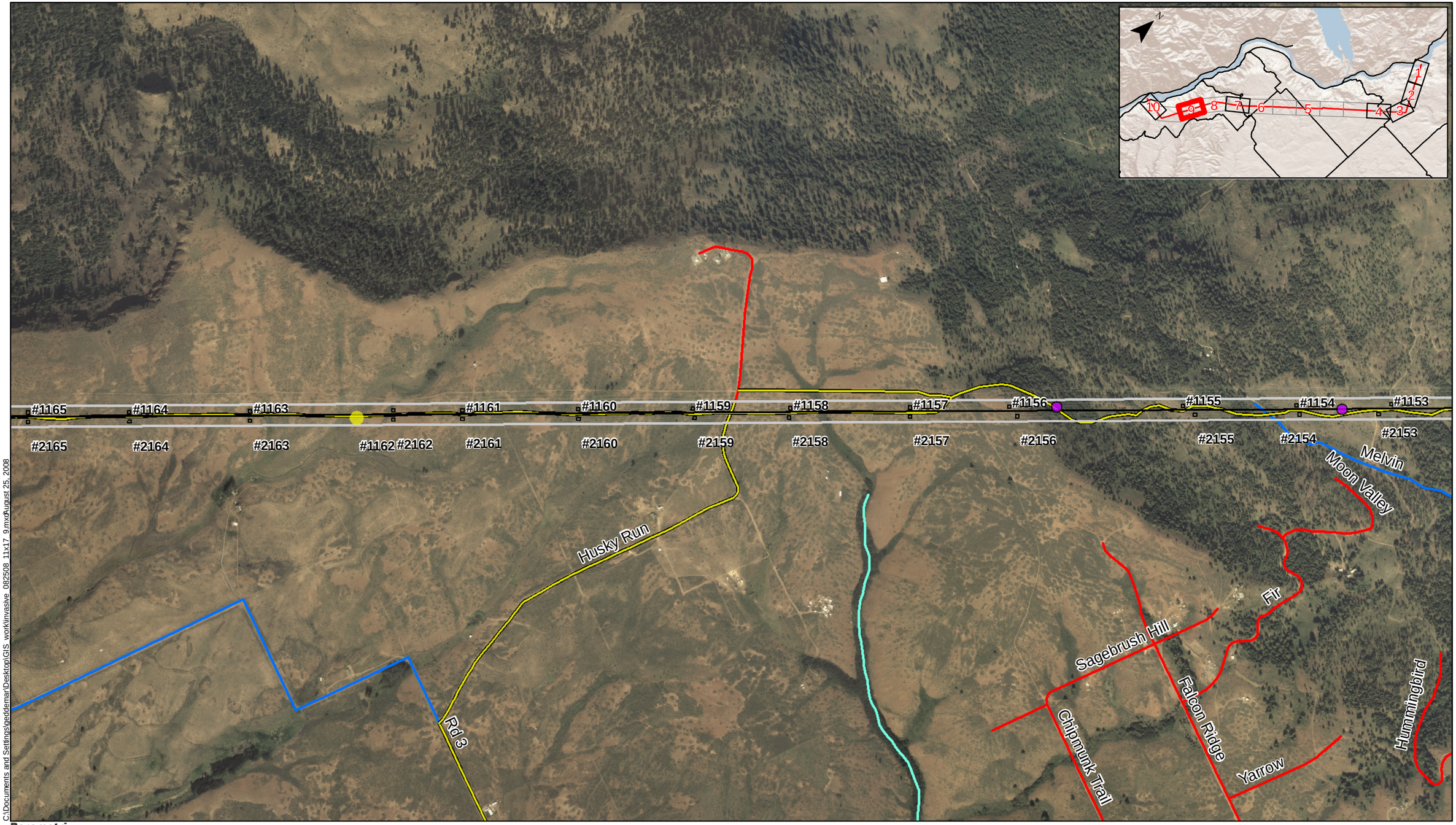
Invasive Species (Small Population)
Dalmatian Toadflax
Diffuse/Spotted Knapweed
Knapweed/Toadflax

Roads
Public
Private
Access

Appendix H Map 7
Invasive Plant Species Locations



Appendix H Map 8
Invasive Plant Species Locations



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Parametrix

N

0 500 1,000 Feet

Douglas County P.U.D.

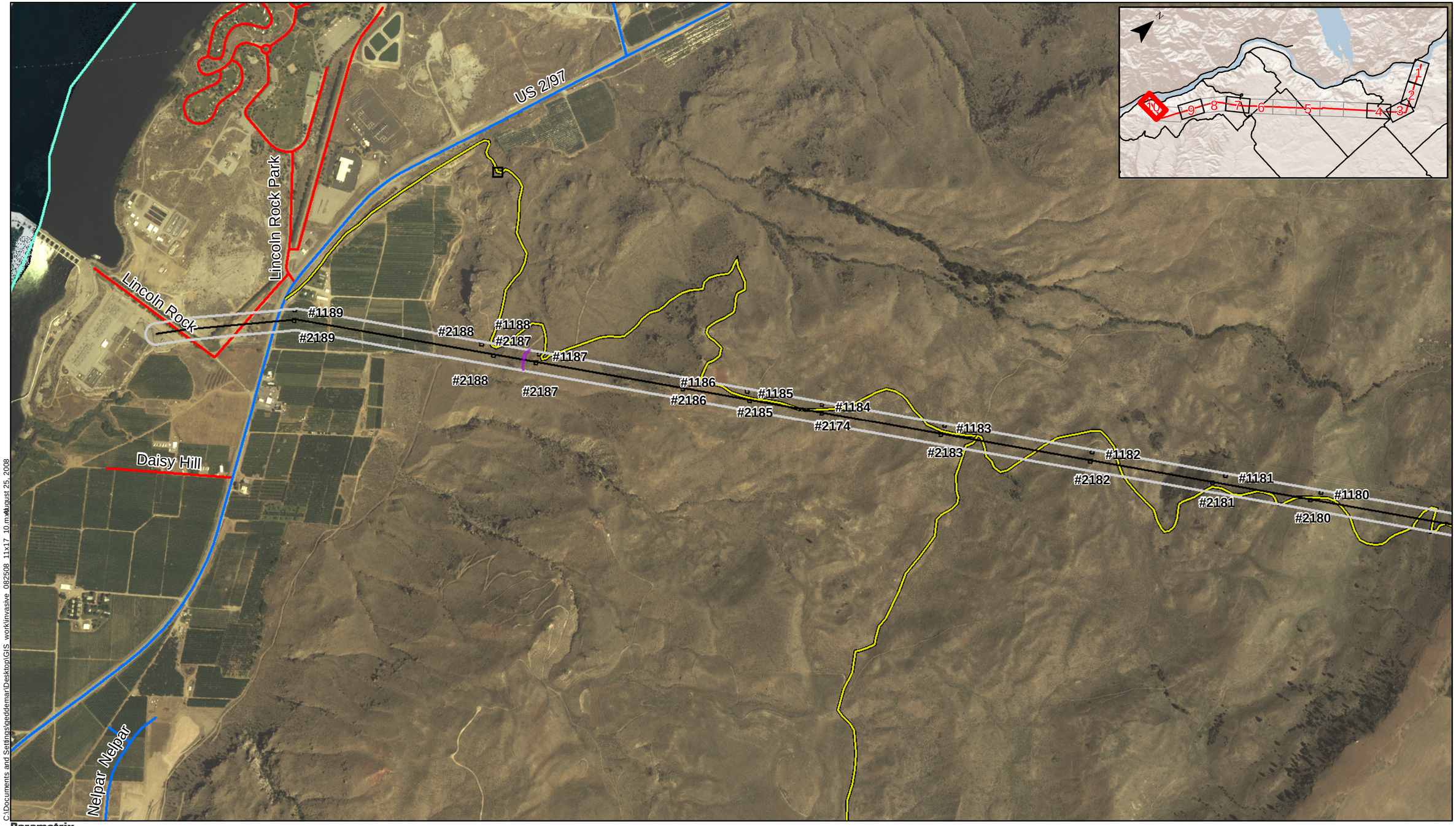
- Transmission Tower
- 230Kv Transmission Centerline
- 230kv Transmission Line Right of Way
- Stream

Invasive Species (Small Population)
- Dalmatian Toadflax
- Diffuse/Spotted Knapweed
- Knapweed/Toadflax

Invasive Species (Large Population Areas)
- Dalmatian Toadflax (>4,000 sq. ft)

Roads
- Public
- Private
- Access

Appendix H Map 9
Invasive Plant Species Locations



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Parametrix

N

0 500 1,000 Feet

Transmission Tower
230Kv Transmission Centerline
230kv Transmission Line Right of Way
Stream

Invasive Species (Small Population)
Dalmatian Toadflax
Diffuse/Spotted Knapweed
Knapweed/Toadflax

Invasive Species (Large Population Areas)
Diffuse/Spotted Knapweed (>4,000 sq. ft)

Roads
Public
Private
Access

Appendix H Map 10
Invasive Plant Species Locations

Appendix I

Bird Species Detected During Field Surveys, by Habitat Type

Appendix I Bird Species Detected During Field Surveys, by Habitat Type

Species Name	Habitat								Total
	Dryland Ag.	Idle Ag.	Grass	Open Conifer	Riparian	Shrub-Steppe	Talus	Unknown	
Ducks, Geese, Swans (Family Anatidae)									
Canada Goose						21			21
Pheasants, Fowl & Allies (Family Phasianidae)									
Chukar						2		1	3
Dusky Grouse				3		4			7
Gray Partridge	1					4			5
Ring-necked Pheasant		2						2	4
Unidentified Grouse					1				1
New World Quail (Family Odontophoridae)									
California Quail		1		30		16		13	60
Kites, Hawks, Eagles (Family Accipitridae)									
Cooper's Hawk				1	1				2
Golden Eagle						1			1
Northern Harrier		3				5			7
Red-tailed Hawk		1		6		11		4	22
Roughlegged Hawk	2								2
Sharp-shinned Hawk				2					2
Swainson's Hawk	2								2
Caracaras, Falcons (Family Falconidae)									
American Kestrel				3		4			7
Plovers (Family Charadriidae)									
Killdeer		2							2
Pigeons, Doves (Family Columbidae)									
Common Pigeon						4			4
Mourning Dove				12	7	20		5	44
Owls (Family Strigidae)									
Great Horned Owl						0			0
Northern Pygmy Owl				1					1
Short-eared Owl						1			1
Nightjars (Family Caprimulgidae)									
Common Poorwill						1			1
Hummingbirds (Family Trochilidae)									
Calliope Hummingbird				14	2	2			18
Rufous Hummingbird				1					1
Unidentified Hummingbird				2		1			3
Woodpeckers (Family Picidae)									
Hairy Woodpecker				2					2
Northern Flicker				7	6	11			24
Red-naped Sapsucker				1	1	2			4
Unidentified Woodpecker				1					1
Tyrant Flycatchers (Family Tyrannidae)									
Dusky Flycatcher				12	2	1			15
Eastern Kingbird		7			3	13			23
Least Flycatcher					1				1

Appendix I Bird Species Detected During Field Surveys, by Habitat Type

Species Name	Habitat								Total
	Dryland Ag.	Idle Ag.	Grass	Open Conifer	Riparian	Shrub-Steppe	Talus	Unknown	
Olive-sided Flycatcher				2				1	3
Say's Phoebe	1			2	1	1			5
Western Kingbird		3		2	1	37	1		43
Western Wood Pewee			1	24	10	5		3	43
Unidentified Flycatcher				4					4
Vireos, Greenlets (Family Vireonidae)									
Cassin's Vireo				5					5
Warbling Vireo				2	1				3
Crows, Jays (Family Corvidae)									
Black-billed Magpie				1		13	2	2	18
Clark's Nutcracker				4	5				9
Northern Raven		2		4		16		1	23
Steller's Jay				4		1		2	7
Unidentified Jay								1	1
Larks (Family Alaudidae)									
Horned Lark						1			1
Swallows, Martins (Family Hirundinidae)									
Barn Swallow						1			1
Tree Swallow								1	1
Tits, Chickadees (Family Paridae)									
Black-capped Chickadee					4	1			5
Mountain Chickadee				40	1	2	1		44
Nuthatches, Wallcreeper (Family Sittidae)									
Pygmy Nuthatch				1					1
Red-breasted Nuthatch				16		1		3	20
Treecreepers (Family Certhiidae)									
Brown Creeper				1					1
Wrens (Family Troglodytidae)									
House Wren				15	4	2			21
Winter Wren					1				1
Goldcrests, Kinglets (Family Regulidae)									
Golden-crowned Kinglet				1					1
Ruby-crowned Kinglet				1					1
Thrushes (Family Turdidae)									
American Robin		1	1	29	14	28		1	74
Mountain Bluebird						12			5
Townsend's Solitaire				1					1
Western Bluebird						4			4
Mockingbirds, Thrashers (Family Mimidae)									
Sage Thrasher		1			1	15			17
Starlings (Family Sturnidae)									
European Starling				2	2	20			4
Waxwings & Allies (Family Bombycillidae)									
Cedar Waxwing				8	9				17

Appendix I Bird Species Detected During Field Surveys, by Habitat Type

Species Name	Habitat								Total
	Dryland Ag.	Idle Ag.	Grass	Open Conifer	Riparian	Shrub-Steppe	Talus	Unknown	
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				3	1	2			6
Wilson's Warbler				2	5	4			11
Yellow Warbler				1	1				2
Yellow-rumped Warbler				3					3
Tanagers & Allies (Family Thraupidae)									
Western Tanager				16	3	1			20
Buntings, New World Sparrows & Allies (Family Emberizidae)									
Brewer's Sparrow		28			1	128			157
Chipping Sparrow				12	3	29			44
Dark-eyed Junco				5		3			8
Golden-crowned Sparrow						1			1
Grasshopper Sparrow		14				2			16
Lark Sparrow						6			6
Savannah Sparrow						1			1
Song Sparrow				2					2
Spotted Towhee				61	18	36			115
Vesper Sparrow		16	4	2	2	113		1	138
White-crowned Sparrow				2		2			4
Unidentified Sparrow						2			2
Grosbeaks, Saltators & Allies (Family Cardinalidae)									
Black-headed Grosbeak			1	22	10	2			35
Lazuli Bunting			3	18	12	20			53
New World Blackbirds (Family Icteridae)									
Brewer's Blackbird	6					27			33
Brown-headed Cowbird		3		40	12	8			63
Bullock's Oriole				2	16	2			20
Red-winged Blackbird		2			1	1			4
Western Meadowlark		29	2	2		132	1	6	172
Finches (Family Fringillidae)									
American Goldfinch		3	2	6	2	3			16
Cassin's Finch						2			2
House Finch				2	5	4			11
Pine Siskin				7					7
Purple Finch						1			1
Red Crossbill				65		33			98
Unidentified									
Unknown						3			3
Total	**12**	**118**	**14**	**564**	**182**	**869**	**5**	**47**	**1,811**

Appendix J

Relative Abundance of Bird Species Detected During 2008 Spring Avian Point Count Surveys

Appendix J. Relative Abundance of Bird Species Detected During 2008 Spring Avian Point Count Surveys

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

Appendix J. Relative Abundance of Bird Species Detected During 2008 Spring Avian Point Count Surveys

Species	Overall Relative Abundance[1]	Cover Type						
		Dryland Ag.	Idle Agriculture	Grassland	Open Conifer	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**				**0.060**	**0.025**	**0.085**	
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	**0.085**	
Western Kingbird	0.070						0.060	**0.010**
Western Meadowlark	**0.085**	**0.005**	**0.025**	**0.015**			0.040	
Western Tanager	0.015				0.010	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			

[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 I 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.