

**WILDLIFE RESOURCES
FINAL STUDY REPORT**

AVIAN, AMPHIBIAN, REPTILE, AND SMALL MAMMAL SURVEYS

WELLS HYDROELECTRIC PROJECT

FERC NO. 2149

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ABSTRACT

In 2005, Public Utility District No. 1 of Douglas County (Douglas PUD) conducted a wildlife resources study to collect information pertinent to the Wells Hydroelectric Project Integrated Licensing Process. The primary objective of the study was to document the occurrence, distribution, and habitat use of birds, amphibians, reptiles, and small mammals on Project lands, including those species listed as rare, threatened, or endangered (RTE). RTE species detected in the study area during 2005 field studies were limited to species with relatively minor status designations. Only one federally listed species was documented, the bald eagle (threatened), and only one state listed species was documented, the American white pelican (threatened).

Surveys were conducted that targeted land birds, small mammals, amphibians, and reptiles. Surveys documented the presence of 120 bird species in the Project area. In terms of passerine (perching bird) species, the European starling was the most abundant, followed by the red-winged blackbird. Other commonly detected land birds included the white-crowned sparrow, California quail, American robin, northern rough-winged swallow, and Brewer's blackbird. Results of avian point count surveys indicate that the study area supports the greatest species diversity during the breeding season when neo-tropical migrant species are nesting. However, during the fall, the greatest abundance of birds occurs in the study area when single and mixed species flocks move into the region during southward migration. The largest relative abundance of birds was recorded at stations centered in wetland habitat during the breeding season. In general, avian abundance and species richness in agricultural areas were low compared to wetland and riparian habitat types.

The four amphibian species documented in 2005 included Pacific treefrog, Great Basin spadefoot toad, bullfrog, and long-toed salamander. Seven reptile species were detected during the 2005 surveys: painted turtle, gopher snake, yellow-bellied racer, sagebrush lizard, western terrestrial garter snake, common garter snake, and western rattlesnake.

Twelve small mammal species were captured in 2005, with the deer mouse being the most common species. Other species documented included the bushy-tailed woodrat, cottontail rabbit, long-tailed weasel, western harvest mouse, meadow vole, montane vole, vagrant shrew, masked shrew, house mouse, Great Basin pocket mouse, and sagebrush vole. Eight other mammal species were detected incidentally. Total small mammal capture rates were by far the greatest in riparian habitat, followed by wetland and idle agriculture.

1.0 INTRODUCTION

This report presents the results of the wildlife resource studies that were conducted for the Wells Hydroelectric Project (FERC No. 2149) (Wells Project), located on the Columbia River in the State of Washington. The Wells Project is a 774 megawatt (MW) run-of-river hydroelectric project owned and operated by the Public Utility District No. 1 of Douglas County (Douglas PUD) and licensed by the Federal Energy Regulatory Commission (FERC). The original 50-year license, issued on July 12, 1962, is set to expire on May 31, 2012. To continue operating the Wells Project beyond May 31, 2012, Douglas PUD is required to initiate relicensing proceedings no later than May 31, 2007. Douglas PUD is using the Integrated Licensing Process (ILP) established by the FERC regulations issued July 23, 2003 in Order 2002 and revised on February 23, 2004. The ILP is intended to facilitate issue identification and resource studies, beginning with a summary of existing information in a Pre-Application Document (PAD). The wildlife resource studies described in this report were conducted to provide baseline information for the PAD being prepared by Douglas PUD.

1.1 General Description of the Wells Hydroelectric Project

The Wells Hydroelectric Project is located at river mile (RM) 515.8 on the Columbia River in the State of Washington. Wells Dam is located approximately 30 river miles downstream from the Chief Joseph Project, owned and operated by the United States Army Corps of Engineers, and 42 miles upstream from the Rocky Reach Hydroelectric Project owned and operated by Chelan County PUD. 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 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 the hydrocombine, which is 1,130 feet long, 168 feet wide, with a crest elevation of 795 feet in height.

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 normal maximum 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 elevation of 781. The normal maximum water surface elevation of the reservoir is 781 feet (Figure 1).

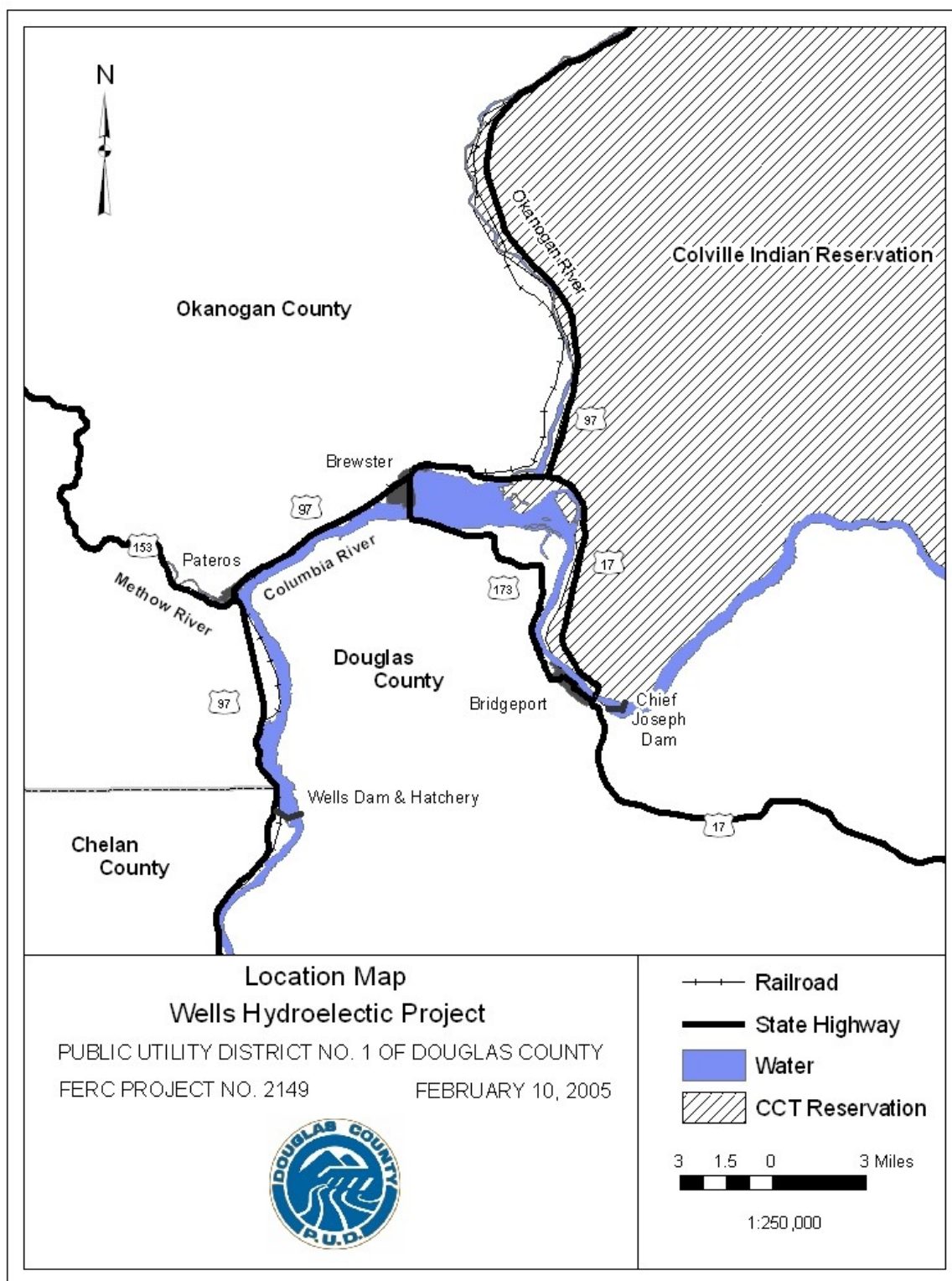


Figure 1.1-1 Wells Hydroelectric Project Location Map

1.2 Relicensing Process

Douglas PUD is using the ILP, as required by FERC regulations issued July 23, 2003 (18 CFR Part 5), to relicense the Wells Project. The first major step in this process is preparation of a PAD, with the purpose of providing the FERC with existing information relevant to the Wells Project. For wildlife resources, the PAD is required to include descriptions of the following:

- Wildlife resources, including invasive species, in the Project vicinity. Components of this description must include: (1) upland habitat(s) in the Project vicinity, including the Project's transmission line corridor or right-of-way and a list of animal species that use the habitat(s); and (2) temporal or spatial distribution of species considered important because of their commercial, recreational, or cultural value.
- Wetlands, riparian, and littoral habitats in the Project vicinity and a list of animal species, including invasive species, which use these habitats.
- Listed rare, threatened and endangered, candidate, or special status species that may be present in the Project vicinity. Components of this description must include: (1) a list of federal- and state-listed, or proposed to be listed, threatened and endangered species known to be present in the Project vicinity; (2) identification of habitat requirements; (3) references to any known biological opinion, status reports, or recovery plan pertaining to a listed species; (4) extent and location of any federally designated critical habitat, or other habitat for listed species in the Project vicinity; and (5) temporal and spatial distribution of the listed species within the Project vicinity (18 CFR § 5.6(v, vi, vii)).

2.0 STUDY GOAL

The overall goal of the wildlife resource studies is to provide Douglas PUD with information to direct land management decisions and avoid damage to habitats on Project lands that support rare, threatened, and endangered (RTE) species and important wildlife. The wildlife resource studies have three primary objectives:

- (1) Describe the **avian** use of five primary habitats—(1) wetland, (2) riparian, (3) shrub steppe, (4) agriculture, and (5) idle agriculture—during the breeding season and during fall migration. This assessment also documented the presence of RTE bird species on Project lands. For inclusion in the PAD, the FERC defines RTE species as listed rare, threatened, and endangered, candidate, or special status species (CFR 18.5.6 (vii)). In Washington, the term RTE is typically defined to include the following species:
 - Federally listed as threatened or endangered;
 - Proposed for federal listing as threatened or endangered;
 - Federal species of concern;
 - State listed as threatened or endangered; or
 - State listed as sensitive
- (2) Describe the occurrence, distribution, and habitat use of **amphibian and reptile species**, including those listed as RTE species.

- (3) Describe the **small mammal** communities in each of the five primary habitats—(1) wetland, (2) riparian, (3) shrub steppe, (4) agriculture, and (5) idle agriculture—including RTE species.

3.0 STUDY AREA

The study area for the wildlife resource studies consists of all lands lying between the Wells Project Boundary and the shorelines of the Columbia, Methow, and Okanogan rivers. The FERC Wells Project Boundary extends from the tailrace of Wells Dam (RM 515.8) upstream to the tailrace of Chief Joseph Dam (RM 544.5). The Project Boundary also extends to RM 15.5 on the Okanogan River and RM 1.5 on the Methow River. The distance from shoreline to Project Boundary varies because of topography and backwater effects of the reservoir, but is < 50 ft in some areas. The study area covers approximately 2,539 ac of land. Incidental observations of wildlife were also made at several ponds and wetlands that are adjacent to but outside the FERC Wells Project Boundary, but that are closely connected to reservoir water levels.

For discussion purposes, the study area was divided into five zones (Appendix A):

- Zone 1 - Wells Dam tailrace (RM 514.4) to the upstream end of Pateros (RM 524), including 1.5 miles of the Methow River upstream of the confluence;
- Zone 2 - Pateros to the Brewster Bridge (RM 530);
- Zone 3 - Brewster Bridge to the north end of Park Island (RM 538.3);
- Zone 4 - Park Island to Chief Joseph Dam (RM 544.5); and
- Zone 5 - The Okanogan River, from the confluence to RM 15.5.

The Wells Project study area is near the junction of the Columbia Basin and Okanogan Highlands physiographic provinces (Franklin and Dyrness 1988). The study area is in the big sagebrush/bluebunch wheatgrass (*Artemisia tridentata*/*Pseudoroegneria* [*Agropyron*] *spicata*) ecological zone, which occurs throughout much of the Columbia Basin (Daubenmire 1970; Franklin and Dyrness 1988). This ecological zone is also described as the Central Arid Steppe (Cassidy 1997).

Wildlife habitat in the study area is a mixture of upland, riparian, and wetland communities, although land uses and development have resulted in habitat loss and fragmentation in the study area. Each of these vegetation communities is described below.

- **Wetland and Riparian**—Wetland and riparian vegetation communities collectively occupy 31% of the land within the existing Wells Project Boundary (excluding the reservoir area) (EDAW 2006). Although there is wetland and riparian habitat in all five zones, Zones 3 and 5 have the most by far due to the presence of Cassimer Bar, Washburn Island, and the Wells Wildlife Area (WWA—Bridgeport Bar and other units); the Okanogan River in Zone 5 is almost entirely bordered by mostly intact riparian

habitats. Narrow fringes of wetland occur throughout much of the study area, but the combination of steep terrain and long history of agricultural land uses, livestock grazing, and other development limits the extent of these habitats in many areas outside of the WWA. The WWA Bridgeport Bar Unit is intensively managed as waterfowl migration stopover habitat and for the production of upland gamebirds. Corn, wheat, and alfalfa are grown in irrigated fields. Patches of riparian trees and shrubs also are supported by summer irrigation.

- **Wetlands**—Emergent wetland communities occupy approximately 11% of the study area, mostly in Zones 3 and 5 (EDAW 2006). Emergent wetlands are dominated by bulrush (*Scirpus validus*), narrowleaf cattail (*Typha latifolia*), Canada goldenrod (*Solidago canadensis*), jointleaf rush (*Juncus articulatus*), foxtail barley (*Hordeum jubatum*), red top (*Agrostis alba*), common rush (*Juncus effusus*), yellow flag (*Iris pseudacorus*), purple loosestrife (*Lythrum salicaria*), and reed canarygrass (*Phalaris arundinacea*). Predominant lower-growing herbaceous species include bugle weed (*Lycopus americana*, *L. asper*), rush (*Juncus balticus*, *J. effusus*, *J. longistylis*), western panicgrass (*Panicum acuminatum*), sedges (*Carex* spp.), loosestrife (*Lysimachia thyrsiflora*, *L. ciliata*), *Galium* sp., horsetail (*Equisetum hyemale*, *E. arvense*), marsh spikerush (*Eleocharis palustris*), and Kentucky bluegrass (*Poa pratensis*). Common aquatic bed species in protected areas of the reservoir and in ponds include: common waterweed (*Elodea canadensis*), leafy pondweed (*Potamogeton foliosus*), eurasian watermilfoil (*Myriophyllum spicatum*), curly leaf pondweed (*Potamogeton crispus*), Flat-stem pondweed (*Potamogeton zosteriformis*), and American pondweed (*Potamogeton nodosus*) (Lê and Kreiter 2005).
- **Riparian**—Riparian areas cover approximately 18% of the lands in the study area (EDAW 2006). Native tree species in the riparian areas include black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) and a few nearly tree-sized Rocky Mountain juniper (*Juniperus scopulorum*), Bebb's willow (*Salix bebbiana*), and Sitka alder (*Alnus viridis* ssp. *sinuata*). However, most riparian woodlands are dominated by non-native species including white cottonwood (*Populus alba*), Russian olive (*Elaeagnus angustifolia*), silver maple (*Acer saccharinum*), eastern cottonwood (*Populus deltoides*), Siberian elm (*Ulmus pumila*), and white mulberry (*Morus alba*).

Riparian shrublands contain a high proportion of both native and non-native species. Coyote willow (*Salix exigua*), Bebb's willow, Sitka alder, and western birch (*Betula occidentalis*) are widespread native species. Saplings of black cottonwood, Oregon ash (*Fraxinus latifolia*), shining willow (*Salix lucida* ssp. *lasiandra*), Siberian elm, and white mulberry are common within at least some riparian shrublands. Wood rose (*Rosa woodsii*) is ubiquitous and is the co-dominant shrub in many stands. Multiflora rose (*Rosa multiflora*) and Tatarian honeysuckle (*Lonicera tatarica*), a non-native, are particularly common upstream of Brewster. Russian olive shrubs are abundant at Cassimer Bar.

- **Littoral Zone-Wash**—Littoral Zone-Wash habitat occupies over 2% of the lands in the study area. These areas have essentially no vegetation present; late in the growing season, however, annual herbaceous vegetation may occur if exposed long enough.

- **Agriculture**—Much of the land along Wells Reservoir is intensively managed for agricultural purposes; more than 20% of the land within the study area is occupied by actively managed fruit orchard, cropland, or pasture (EDAW 2006). These agricultural activities within the Project Boundary are allowed by permit from Douglas PUD.
- **Idle Agriculture**—More than 5% of the lands within the study area is composed of idle agricultural lands. These areas consist of fallow fields that have not been used for crops or livestock grazing in recent years and former orchards that have had the trees removed but not replanted. The mostly herbaceous vegetation is dominated by weedy species.
- **Shrub Steppe**—Shrub steppe communities comprise approximately 20% of the study area. Shrub steppe habitat types are dominated by big sagebrush, bitterbrush (*Purshia tridentata*), and grey rabbitbrush (*Chrysothamnus nauseosus*), along with species such as snow buckwheat (*Eriogonum niveum*), Gray's biscuitroot (*Lomatium grayi*), bluebunch wheatgrass, cheatgrass (*Bromus tectorum*), one-sided bluegrass (*Poa secunda*), threadleaf fleabane (*Erigeron filifolius*), and fernleaf biscuitroot (*Lomatium dissectum*) in the understory.
- **Grass and Forblands**—Grass and forblands occupy about 5% of the study area (EDAW 2006). Lands and open areas that lack shrub cover are typically associated with historical ground disturbance. Areas with moist growing conditions are dominated by species such as reed canarygrass, tall fescue (*Festuca arundinacea*), smooth brome (*Bromus inermis*), tall wheatgrass (*Elytrigia pontica*), streambank wheatgrass (*Agropyron dasystachyum*), and quackgrass (*Elymus repens*). Hairy brome (*Bromus japonicus*) and annual fescue (*Vulpia* sp.) often occur in disturbed upland sites.
- **Weed-Dominated Areas**—Weed-dominated areas cover about 6% of the study area (EDAW 2006). Common species include diffuse knapweed (*Centaurea diffusa*), tall pepperweed (*Lepidium latifolium*), mullein (*Verbascum thapsus*), yellow salsify (*Tragopogon dubius*), St. John's wort (*Hypericum perforatum*), smooth brome, cheatgrass, Mexican fireweed (*Kochia scoparia*), orchard grass (*Dactylis glomerata*), tall fescue, morning glory (*Convolvulus arvensis*), prickly lettuce (*Lactuca serriola*), and hairy whitetop (*Cardaria pubescens*).
- **Conifer Woodlands**—Woodlands dominated by Ponderosa pine (*Pinus ponderosa*) occupy only 0.2% of study area lands; all of the woodland acreage is confined to one small area along the Okanogan River (EDAW 2006). There are other areas with widely scattered Ponderosa pine trees, but those areas are not mapped as conifer woodlands because they do not have contiguous tree cover.
- **Rock/Talus**—Rock outcrops and talus are very rare, occupying only 12 ac, or 0.5% of the study area (EDAW 2006). Douglas maple (*Acer glabrum*), smooth sumac (*Rhus glabra*), mock orange (*Philadelphus lewisii*), poison ivy (*Rhus radicans*), service berry (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana*), and western white clematis (*Clematis ligusticifolia*) are common shrub species in rock outcrop areas.

- **Developed**—Areas occupied by human-built structures, such as roads, railroads, industrial areas, developed recreation sites, and the dam, occupy nearly 7% of the lands in the study area. Many of these areas are devoid of vegetation, but some have weedy species.

For additional detail on the acreage of habitat types and the botanical composition of the habitat types in the each of the five study zones, please refer to the following document—Botanical Resources Final Study Report for the Wells Hydroelectric Project (EDAW 2006).

4.0 METHODOLOGY

The following sections summarize the methods for the avian surveys, amphibian and reptile surveys, and small mammal surveys. A Washington Department of Fish and Wildlife (WDFW) scientific collection permit was obtained prior to beginning all surveys. In addition, a permit was obtained from the Confederated Tribes of the Colville Reservation to access sampling sites on the reservation. The WDFW Priority Habitats and Species (PHS) database was queried to identify RTE species occurrence records in the Project vicinity (Appendix B).

4.1 Avian Surveys

Avian field surveys conducted as part of Wells Hydroelectric Project relicensing studies included point count surveys and reservoir surveys. Point count surveys (Ralph et al. 1995) were conducted during the breeding season and the fall migration to assess the use of study area habitats during different periods of the avian lifecycle. In addition to formal surveys, avian species observed incidental to other relicensing wildlife field studies were recorded and included in a comprehensive wildlife species database that was compiled for the Project.

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

- Provide a comprehensive inventory of avian species occurring within the Wells Project (study area);
- Assess the use of Wells Project habitats by birds, with a specific focus on wetland and riparian habitat located peripheral to the reservoir;
- Assess the use of the Wells Reservoir by waterbirds (i.e., waterfowl, seabirds, gulls, terns, shorebirds, and herons) as well as raptors during the breeding and non-breeding seasons; and
- Document the occurrence of avian RTE species and assess their use of Wells Project habitats.

The sections below describe specific methodology for each component of avian field studies conducted in 2005.

4.1.1 Pre-field Planning

Prior to conducting avian surveys, biologists reviewed available data and conducted reconnaissance within the study area to determine the extent of available habitat and 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 habitat in each of the five study area zones.

At the time of pre-field planning, Douglas PUD identified five major habitat types within the study area: wetland, riparian, shrub steppe, agriculture, and idle agriculture. During pre-field planning, available habitat in each study area zone was reviewed to identify potential point count station locations that would allow equal sampling by habitat type and zone. In addition to the five terrestrial habitat types, surveys documented observations of birds in open water habitats associated with point count stations. Point count stations had to be located to practically allow two biologists to complete the surveys over the course of a week-long period given logistical and timing constraints (point counts must be conducted from 15 minutes before sunrise to 4 hours after sunrise). Given these constraints, it was determined that a suitable goal was to establish a minimum of three point count stations in each of the five habitat types in each study area zone.

The distribution of established point count stations across habitat types and study area zones is listed in Table 4.1-1. In general, between three and six point count stations were established in each zone for each habitat type, with the exception of idle agriculture. Pre-field planning review determined that the amount of idle agriculture habitat was limited in many study area zones. Thus, it was not possible to establish three point count stations in this habitat type in all five study zones. Consequently, point count stations in idle agriculture were opportunistically located to maximize sampling in available habitat. In total, 76 point count stations were established as part of pre-field planning for avian surveys (Appendix C). Survey stations were located a minimum of 660 ft apart to prevent repeat sampling of birds, with a specific emphasis on wetland and riparian habitat.

Table 4.1-1. Distribution of Established Point Count Survey Stations Across Habitat Types and Study Area Zones.

	Habitat Type					Total
	Wetland	Riparian	Shrub Steppe	Agriculture	Idle Ag.	
Zone 1	3	3	4	3	0	13
Zone 2	3	6	4	3	0	16
Zone 3	5	6	3	3	2	19
Zone 4	3	3	3	3	1	13
Zone 5	4	3	3	3	2	15
Total	18	21	17	15	5	76

Pre-field planning for reservoir surveys included inspection of all reservoir and aquatic habitats in each study area zone to confirm boat access. Pre-field planning review determined that a boat survey of all reservoir and aquatic habitat could be conducted in all areas, excluding the Methow River and the Okanogan River upstream of the Monse Bridge where water depth restricted

access. Reservoir surveys were scheduled for the fall when large numbers of migrating and overwintering birds were known to use aquatic habitat in the study area.

4.1.2 Field Surveys

Four point count surveys were conducted at each of the 76 stations for a total of 304 point count surveys. Each point count station was surveyed once by a biologist during each of the four survey periods: May 23-26; June 20-24; September 12-15; and October 6-9 (2005).

Two reservoir surveys were conducted during the fall of 2005. Surveys were conducted by two biologists traveling in a boat on all accessible portions of the reservoir and along the Okanogan River up to the Monse Bridge over the course of a single day on September 13, and over the course of 2 days on October 7 and 8. The specific field methodologies for all avian surveys are described below.

4.1.2.1 Point Count Station Surveys

Point count survey methods generally followed those described in Ralph et al. (1993), Altman (1995), Altman (2001), Altman and Bart (2001), and Bibby and Hill (1992). A single biologist conducted each point count survey beginning after a minimum period of 1 minute after arrival at the station to allow wildlife to acclimate to the presence of the surveyor. Surveys were conducted for 5 minutes from the center of the 164-ft circular point count station.

During the survey, all bird detections were recorded along with: (1) the estimated distance from the center of the point count station of each bird detected; (2) the specific habitat type associated with each detection; and (3) the time of each detection relative to the beginning of the point count survey.

Due to the narrowness, and in some locations the small size, of habitat patches, each bird detection was recorded by habitat and whether the detection was within or beyond 164 ft of the point count station center during the 5-minute survey. This allowed the habitat association for all avian detections to be characterized in two ways: (1) by the point count plot, which was defined by the most prevalent habitat within the 164-ft radius of the center of the point count station; and (2) by the specific habitat in which each bird detected was recorded (see Figure 4.1-1). As mentioned, surveys were conducted from 15 minutes before sunrise until 4 hours after sunrise.

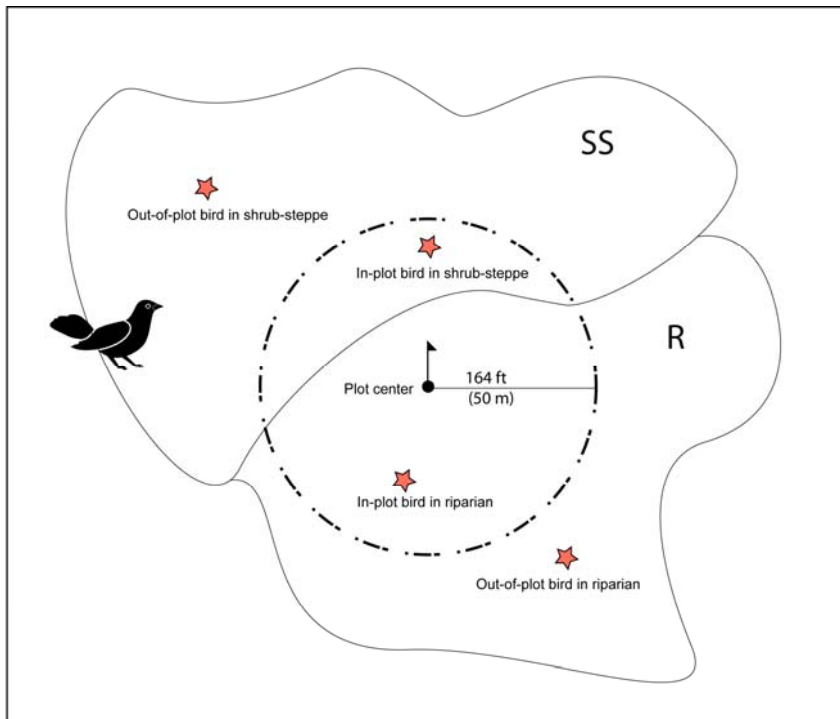


Figure 4.1-1. Conceptual Diagram of Typical Avian Point Count Survey Plot Layout.

The vegetation in each bird survey plot (n=76) was characterized using a modification of the Relevé method (Mueller-Dombois and Ellenberg 1974). Within each plot, the approximate height and depth of the canopy (if present) were estimated and recorded. In addition, the percent of vegetative cover (projected onto the ground) was estimated in four strata:

1. Tree layer (plants taller than 16.4 ft);
2. Tall shrub layer (plants 6.6 to 16.4 ft tall);
3. Low shrub layer (plants between 1.6 and 6.6 ft); and
4. Herbaceous layer (plants less than 1.6 ft tall).

Within the tree and shrub layers, percent coverage was estimated individually for coniferous and hardwood plant groups and for species. The diameter at breast height (dbh) of trees in the plot was measured, as well as the number and dbh of snags. Slope and aspect of the terrain at each station was also recorded.

4.1.2.2 Fall Reservoir Surveys

Fall reservoir surveys were conducted by two biologists in a single boat. All accessible areas were surveyed while scanning reservoir, aquatic, and riparian habitats with field glasses. The boat was stopped when large rafts or flocks of birds were encountered. Surveys were typically conducted by starting in the upstream reaches and progressing downstream to Wells Dam.

During the surveys, the location and species of all waterbirds, raptors, shorebirds, gulls, terns, and herons were recorded.

4.1.3 Analysis and Documentation

Point count survey data were recorded in the field on an Avian Survey Data Form (Appendix D). Reservoir survey data were compiled in individual field notebooks. Incidental observation data were compiled in individual field notebooks and then entered onto a habitat-species matrix,



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which was continually updated throughout the field season.

All bird detections during the 2005 field surveys were entered into an Excel spreadsheet database. This database included all avian data from the point count surveys, reservoir surveys, as well as incidental observations. Within this comprehensive database, separate spreadsheets were maintained for summarizing point count survey data, reservoir survey data, incidental observation data, and specific detections of avian RTE species.

Analyses included:

- 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 and by the primary point count station habitat. In the results section (Section 5.1), data are presented in two ways: (1) for all detections based on the habitat in which each bird was actually using; and (2) by plot (in-plot detections), which may include several habitats but is defined by the primary habitat type.
- Relative abundance was calculated as the number of birds of each species detected per survey, with stratification by study area zone, season, and plot habitat type. This allowed for direct comparison of detection rates using Analysis of Variance (ANOVA) (Zar 1974).
- A separate analysis of avian presence/absence data was conducted following recently developed occupancy-related applications that incorporate variation in detectability of species in different habitats and in different seasons (MacKenzie 2005). These statistical methods estimate the probability of occupancy (use) by each species during different periods of the year based on repeated presence/absence surveys, such as what was done with the point count surveys. This approach gives a more accurate estimate of occupancy and has an associated error term that aids in evaluating the data. The approach used in this report follows the methods described by MacKenzie et al. (2002) and Royle and Nichols (2003). The computer Program PRESENCE (v2.0) (Proteus, Inc. and USGS

website) was employed to analyze data using a constant probability single season model (MacKenzie et al. 2002) and the Royle point-count model (Royle 2004), both using plot habitat type as a covariate.

Several indices that describe avian species richness, diversity, and evenness were calculated for each habitat type. These included the following:

<p>Shannon-Weiner Diversity Index</p> $H' = - \sum_{i=1}^s (p_i)(\ln p_i)$ <p>S = total number of species in the sample p_i = proportion of all individuals in sample that belong to species i $\ln p_i$ = natural logarithm of p_i</p>	<p>Simpson's Dominance Index</p> $C = \sum_{i=1}^s (p_i)^2$ <p>S = total number of species in the sample p_i = proportion of all individuals in sample that belong to species i</p>
<p>Evenness</p> $J = \frac{H}{H_{max}}$ <p>H = Shannon-Weiner Diversity Index $H_{max} = \ln S$ $\ln S$ = natural logarithm of S S = total number of species in sample</p>	<p>Richness</p> <p>= total number of species in the sample</p>

Results of the avian studies and associated analyses are presented in Section 5.1 of this report.

4.2 Amphibian and Reptile Surveys

Amphibian and reptile surveys were conducted at sites within the study area that have potential habitat for the seven amphibian and 12 reptilian species that potentially occur in the study area (Table 4.2-1). The list of species potentially occurring in the study area was developed by reviewing species distribution and habitat requirements from the following sources:

- Washington State Amphibian and Reptile Atlas (WDNR Website)
- Amphibians of Oregon, Washington, and British Columbia: a field identification guide (Corkran and Thoms 1996)
- Amphibians of Washington and Oregon (Leonard et al. 1993)

Amphibian and reptile surveys included the following tasks: (1) pre-field planning, (2) field surveys, (3) analysis and documentation. The following sections describe each of these tasks.

4.2.1 Pre-field Planning

Prior to conducting the field surveys for amphibians and reptiles, biologists reviewed the following:

- Aerial photography;
- Field notes and photos taken during a reconnaissance trip (March 2005);
- Field guides;
- Washington State amphibian and reptile atlases;
- WDFW PHS maps and database records; and
- Other existing information related to species identification, distribution, and habitat requirements.

This information was used to identify 40 potential amphibian and 20 reptile survey locations, which were distributed among the five study area zones (Appendices E and F).

Breeding habitat for all seven amphibian species consists of wetlands and ephemeral or permanent ponds or puddles. Thus, planning for amphibian surveys focused on identifying the locations of these habitat types and prioritizing survey timing during the egg deposition and larvae/tadpole development stages. Adult amphibians are most readily located and identified during these periods. In addition, several of the species have egg masses that are unique and can be used to distinguish species. Due to the varying amphibian breeding periods, surveys were scheduled to occur during May and June of 2005.

Reptile surveys were planned to: (1) gather baseline data for the five primary habitat types in the study area—shrub steppe, wetland, riparian, agriculture, and idle agriculture; and (2) specifically search areas with rock outcroppings or particularly rocky terrain. Reptile surveys were planned to occur throughout the summer of 2005 to maximize probability of suitable weather conditions (warm and dry) for detecting these species.

Table 4.2-1. Amphibian and Reptile Species Potentially Occurring in the Wells Hydroelectric Project Study Area.

Amphibians	Reptiles
<ul style="list-style-type: none"> ▪ Long-toed Salamander (<i>Ambystoma macrodactylum</i>) ▪ Tiger Salamander (<i>Ambystoma tigrinum</i>) ▪ Great Basin Spadefoot (<i>Spea intermontana</i>) ▪ Pacific Treefrog (<i>Hyla regilla</i>) ▪ Western Toad (<i>Bufo boreas</i>) ▪ Bullfrog (<i>Rana catesbeiana</i>) ▪ Columbia Spotted Frog (<i>Rana luteiventris</i>) 	<ul style="list-style-type: none"> ▪ Painted Turtle (<i>Chrysemys picta</i>) ▪ Short-horned Lizard (<i>Phrynosoma douglassii</i>) ▪ Sagebrush Lizard (<i>Sceloporus graciosus</i>) ▪ Western Fence Lizard (<i>Sceloporus occidentalis</i>) ▪ Western Skink (<i>Eumeces skiltonianus</i>) ▪ Rubber Boa (<i>Charina bottae</i>) ▪ Yellow-bellied Racer (<i>Coluber constrictor</i>) ▪ Night Snake (<i>Hypsiglena torquata</i>) ▪ Gopher Snake (<i>Pituophis catenifer</i>) ▪ Western Terrestrial Garter Snake (<i>Thamnophis elegans</i>) ▪ Common Garter Snake (<i>Thamnophis sirtalis</i>) ▪ Western Rattlesnake (<i>Crotalus viridis</i>)

4.2.2 Field Surveys

Field surveys for amphibians and reptiles were conducted at 34 wetland and pond sites (Appendix E). Several of the potential amphibian breeding sites that were identified during the planning stage were located on the Confederated Tribes of the Colville (CCT) Reservation and were not accessible during May and early June because access permission was not granted in time to survey the sites during the primary amphibian breeding season.

Reptile surveys were conducted at the 76 avian point count plots, which were distributed among the five primary habitat types, and at 19 areas with rock outcrops or generally rocky terrain (see maps in Appendix F). The methods used during the field surveys included the following:

- Area-constrained searches of ponds and wetlands for still water-breeding amphibian egg masses and larvae;
- Funnel trapping for larval and adult amphibians in selected pond and wetland habitats;
- Area-constrained searches for reptiles in selected sites and at all of the avian point count plots (Section 4.1.2.1);
- Nighttime auditory surveys for adult amphibians; and
- Live trapping for reptiles (conducted during May avian surveys and during June small mammal trapping).

At a number of sites, multiple methods were utilized to increase probability of detection (Table 4.2-2). These techniques are described in the following sections. Additional detail can be found in Heyer et al. (1994), Olson and Leonard (1997), and Thoms et al. (1997).

4.2.2.1 Area-constrained Searches of Ponds and Wetlands and Funnel Trapping

At each pond or wetland selected for survey, a team of two biologists conducted visual encounter surveys (VES) for reptiles and amphibian egg masses, larvae, and adults. In total, 24.2 person-hours were spent conducting the VES during the amphibian breeding season. Biologists first visually searched the shoreline, water column, vegetation, and under cover objects within the wetland for adults, larvae, and egg masses. Mesh dip nets with small openings were then used to sweep through vegetation and substrate to find amphibians (Shaffer et al. 1994). At each site, the total survey area and the length of time spent surveying were recorded. All adults, egg masses, and larvae encountered were identified using species characteristics presented in Corkran and Thoms (1996). Site data, including range of water depths, vegetation species, substrate type, and water temperature, were also recorded on standardized datasheets (Appendix D).

Based on the results of VES efforts, eight sites were selected to receive follow-up sampling with funnel traps to verify species presence. At each of these eight sites, three to five un-baited, mesh funnel traps, each measuring 10 x 10 x 18 inches, were placed in wetlands to capture adult and larval amphibians (Adams et al. 1997).

Table 4.2-2. Amphibian Survey Methods Utilized at Each Survey Site.

Site ¹	Survey Method			
	VES	Auditory	Pitfall	Funnel Trap
1	X			
2	X			
3	X	X		X
4	X			
5	X		X	X
6	X			
7	X			
8	X			
9-13			not accessible ²	
14	X			
15	X			
16	X	X	X	X
17	X			
18	X			
19	X			
20	X			
21	X	X		
22	X			
23	X			
24	X			
25	X			
26	X			
27	X	X		X
28	X			
29	X	X	X	X
30	X	X		
31	X			
32	X			
33	X			X
34	X	X		
35	X	X		
36	X			
37	X			
38	X		X	X
39	X		X	X

¹ See Appendix E for site locations² Sites 9-13 were located on the CCT Reservation. Access permission was not granted in time to survey the sites during the primary amphibian breeding season.



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4.2.2.2 Area-constrained Searches of Riparian and Upland Habitats

In conjunction with the egg mass and larvae surveys, area-constrained VES methods were used to search for amphibians and reptiles in riparian and upland habitats in proximity to the surveyed ponds. Biologists searched habitat within a defined area, looking in the low-growing vegetation and under cover objects, such as large rocks and large woody debris (LWD) (Crump and Scott 1994; Corn and Bury 1990). Cover objects were returned to their original position to avoid degrading habitat.

Throughout the summer, searches for reptiles and amphibians were also conducted at each of the 76 avian point count plots and within selected areas adjacent to the reservoir that had rocky terrain (Appendix F). Each of the avian point count stations was visited once in June and once in August-September for the reptile and amphibian surveys. The May and June surveys were conducted primarily in the morning, while the August-September surveys were during the middle of the day during normally hot temperatures. Nineteen areas with rocky habitat were surveyed. The reptile survey areas ranged between 0.1 and 34 ac, individually, and totaled 108 ac. Most of the larger reptile survey areas were located along the southern shoreline between the Wells Dam and Pateros (Zone 1). All areas were surveyed once or twice during the summer. Dedicated reptile surveys in the 19 sites totaled 47.4 person-hours.

4.2.2.3 Evening Visual and Auditory Surveys

Eight pond and wetland sites that were surveyed for amphibian egg masses and larvae were also surveyed during the late evening hours, once during May-June, to listen for amphibian vocalizations. These auditory surveys were aimed at increasing the probability of detecting frog species that are typically more active nocturnally (Thoms et al. 1997). Biologists used headlamps and flashlights to search shoreline areas and listened for treefrog, spotted frog, spadefoot toad, and western toad calls. All visual or auditory detections of amphibians were recorded on datasheets.

4.2.2.4 Live Trapping

Coincidental to the avian breeding season surveys in May, five wetland/pond sites, one in each of the five study area zones, were sampled for amphibians using pitfall traps. An array of five pitfall traps connected by 6- to 9-ft-long sections of metal drift fence were installed along a portion of the perimeter of each site (Corn 1994). Each site was sampled using this method for a 3-night period.

During small mammal sampling in June, five pitfall traps were installed at 10 sites in the five primary habitats (see Section 4.3). Although not specifically targeting amphibians and reptiles, pitfall traps for small mammals can also result in capture of adults of some amphibian species and reptiles.

4.2.3 Analysis and Documentation

The relative abundance of amphibians and reptiles was summarized based on survey effort (person-hours) and by site, with results presented in Section 5.2.

4.3 Small Mammal Surveys

Small mammal surveys included the following tasks, as described below: (1) pre-field planning, (2) field surveys, and (3) analysis and documentation.

4.3.1 Pre-field Planning

A literature review identified 14 small mammal species with ranges that include the Wells Project study area (Johnson and Cassidy 1997). The objective of the small mammal surveys was to determine species occurrence and basic relative abundance in each of the five primary habitats in the study area—wetland, riparian, shrub steppe, agriculture, and idle agriculture. Evaluating the presence and relative abundance of small mammals is best accomplished through trapping (Call 1986). Because terrestrial small mammals include a variety of species with different activity patterns and life history, multiple trap methods are necessary for basic species inventories. Various box traps are suitable for many of the mice, voles, and woodrats. Pitfall traps are particularly effective for shrews (McComb et al. 1991, as cited in Jones et al. 1996). The sampling effort used in small mammal surveys varies greatly but typically requires, at a minimum, replication of sampling sites, the use of trap arrays, and sampling over at least 3 nights (Call 1986). The number of traps used in an array can vary; typically, studies designed to document species occurrence and relative abundance requires 100-200 traps per array (Jones et al. 1996).

Because the objective of the Wells Project relicensing small mammal surveys was to assess presence and relative abundance and not population dynamics or body condition, live trapping



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methods were emphasized (MELPRIB 1998). Thus, the small mammal surveys were planned to use a combination of Sherman live traps, pitfall traps, and larger Havahart live traps.

Aerial photography was used to select two sites in each of the five habitat types, for a total of 10 small mammal trapping sites (Appendix G). To be selected for sampling, a site had to be large enough to fit an array of 50-100 traps. A trap array was then plotted on the photograph for each site. Array dimensions varied depending on the configuration of the habitat patches. In narrow patches, the arrays had two or three parallel transects; in larger habitat patches, arrays were laid out with as many as 10 parallel rows.

4.3.2 Field Surveys

Each of the 10 small mammal sampling sites was surveyed for 3 consecutive nights during May-June 2005 following the guidelines presented by Jones et al. (1996). At each site, biologists set a total of 100 Sherman live traps, five Havahart traps, and five pitfall traps. Sherman trap stations were approximately 16-33 ft apart within the array. Two Sherman live traps were placed at each station. Ninety-seven percent of Sherman traps were 2 x 2½ x 9 inches in size; 3% were 4 x 4½ x 15 inches. The Havahart and pitfall traps were placed randomly throughout the array. A typical arrangement of traps is illustrated in Figure 4.3-1.

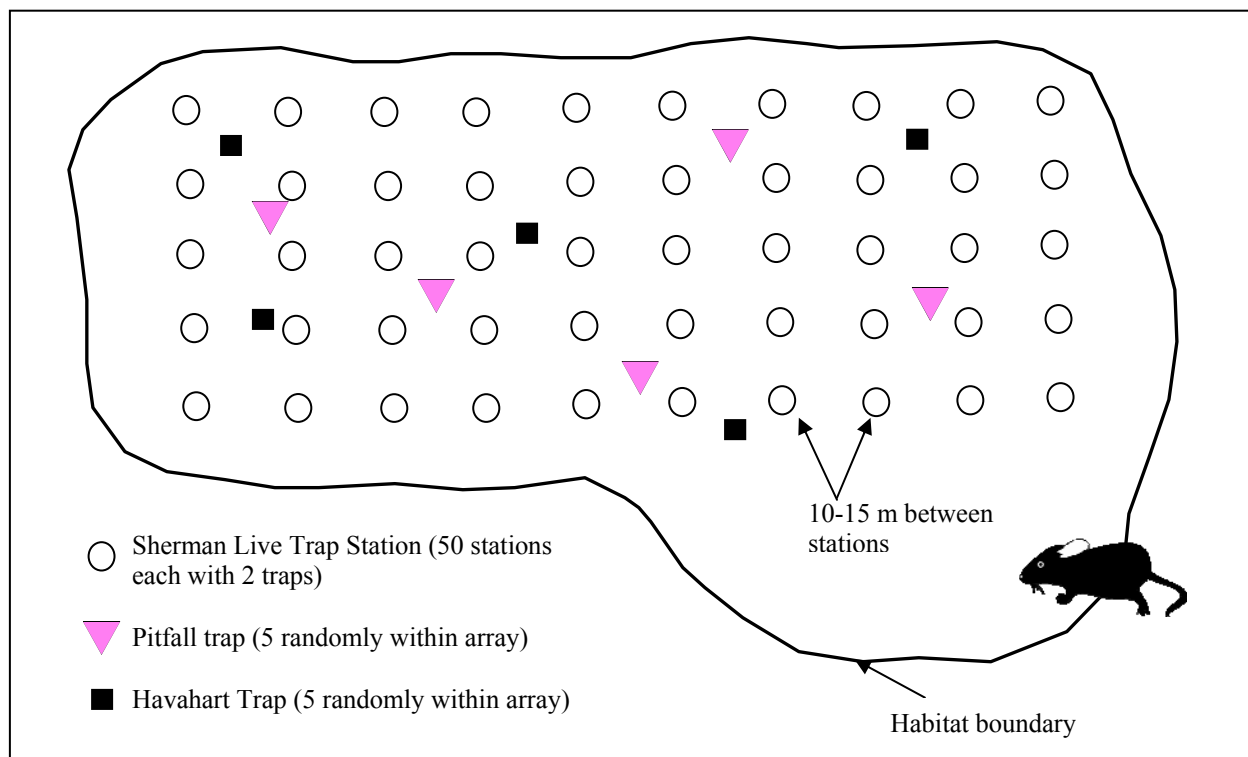


Figure 4.3-1. Conceptual Diagram of Typical Small Mammal Trapping Array.

The pitfall traps were constructed from #10 metal cans or similar materials taped together to attain adequate depth. Sections of aluminum flashing were used to create drift fences radiating outward from each pitfall trap approximately 10 ft every 120 degrees. Sherman live traps were

baited with peanut butter and birdseed; pitfall traps with bacon; and Havahart traps with vegetables and cat food. Cotton bedding material was added to each Sherman live trap to provide insulation and cover.

Traps were opened or set in the late-afternoon or evening, but only after air temperature had decreased sufficiently. Traps were checked the next day before 9-10 a.m. to ensure that captured animals did not suffer from heat exposure. Captured mammals were identified to species and marked by clipping fur patches or using non-toxic color dye on the tail. Recaptures were documented on datasheets to allow for analysis using Lincoln-Peterson capture-recapture methods (Nichols and Dickman 1996). Use of the study area by larger rodents was documented by recording visual observations or sign incidental to all field surveys (Call 1986).

In all, the trapping effort in each of the five habitats was as follows:

- 600 Sherman trap-nights;
- 30 Havahart trap-nights; and
- 30 pitfall trap-nights.

The total trapping effort was 3,000 Sherman trap-nights, 150 Havahart trap-nights, and 150 pitfall trap-nights.

4.3.3 Analysis and Documentation

This capture-recapture technique allowed for the calculation of both relative abundance and absolute densities of small mammals in each habitat type. Relative abundance of small mammal species was calculated from the number of unmarked animals of each species captured within each habitat type. Total abundance of all species combined for each of the five habitat types was calculated using the Lincoln-Peterson Index (Overton 1971). The Lincoln-Petersen Index is a ratio estimator that requires sampling of both marked and unmarked individuals in a population over a period of time. The Lincoln-Peterson Index was calculated for Day 2 and Day 3, based on

the number of marked individuals and recapture data.

Lincoln-Peterson Ratio

- $N^* = \frac{(n_1+1)(n_2+1)}{m_2+1} - 1$
- $Var(N^*) = \frac{(n_1+1)(n_2+1)(n_1-m_2)(n_2-m_2)}{(m_2+1)^2(m_2+2)}$

N^* = estimated population

n_1 = number of animals caught in sample 1

n_2 = number of animals caught in sample 2

m_2 = number of marked animals caught in sample 2

Various diversity indices were also calculated for each habitat type as described in Section 4.1.3. Results of the small mammal surveys are summarized in Section 5.3.

5.0 RESULTS

The following sections describe the results of the avian, amphibian and reptile, and small mammal surveys conducted in 2005 for the Wells Hydroelectric Project relicensing studies.

5.1 Avian Surveys

In total, 120 bird species were detected in the study area during Wells Project relicensing field studies conducted in 2005. A matrix showing the distribution of detected avian species across habitat types and study area zones is provided in Table 5.1-1. More than 28,000 bird detections were recorded during field studies. This total includes 9,760 bird detections recorded during all four avian point count survey periods (n=304 surveys), 18,517 during fall reservoir surveys, and hundreds of incidental detections.

Overall, an average of 3.5 ± 2.2 species and 14.4 ± 86.4 individual birds were detected per plot per survey during the four survey periods (n=304 surveys). The relative abundance of individual bird species detected during the four avian point count surveys (using all detections within and outside of the 164-ft radius point count station plots) ranged from less than ($<$) 0.01 to 13.3 detections per survey (Table 5.1-2). Because a high percentage of the point count survey stations were located close to the shoreline, numerous waterfowl and waterbirds were recorded and accounted for a substantial percentage of the detections. Three of the top 10 most abundant avian species detected during point count surveys are waterfowl (Table 5.1-2) – the American coot (*Fulica americana*), American wigeon (*Anas americana*), and Canada goose (*Branta canadensis*) – providing an indication of the relative importance of the reservoir itself as waterfowl habitat within the Wells study area. The most abundant bird species detected during avian point count surveys in the study area was the American coot, with 2,022 individual detections recorded for an average relative abundance of 13.3 birds/survey (Table 5.1-2).

In terms of passerine (perching bird) species, the European starling (*Sturnus vulgaris*) was the most abundant, and nearly twice as common as the next most frequently detected species, the red-winged blackbird (*Agelaius phoeniceus*; Table 5.1-2). Other commonly detected land birds included the white-crowned sparrow (*Zonotrichia leucophrys*), California quail (*Callipepla californica*), American robin (*Turdus migratorius*), northern rough-winged swallow (*Stelgidopteryx serripennis*), and Brewer's blackbird (*Euphagus cyanocephalus*). European starlings accounted for a total of 783 detections (5.1 birds/survey) (Table 5.1-2). The abundance of this species is notable because the European starling is a non-native invasive avian species that is known to out-compete native bird species.

The following sections summarize avian survey results by season, study area zone, and habitat type.

Table 5.1-1. Wells Hydroelectric Project Bird Detections by Habitat Type and Study Area Zone.

Species ¹	Study Area Zone (1-5)						
	Lacustrine	Riverine	Wetland	Riparian	Shrub Steppe	Agriculture	Idle Agriculture
Total Number of Species (120)							
PELAGIC BIRDS AND HERONS (9)							
Common Loon ^{SS,SP}	1,2,3,4	5					
Eared Grebe	3,4						
Horned Grebe SM	1,2,3,4	5					
Red-necked Grebe SM	1,2,3,4	5					
Western Grebe	1,2,3,4	5					
American White Pelican ^{SE,SP}	1,2,3,4	5					
Double-crested Cormorant ^{SP}	1,2,3,4	5	3,5	3			
Great Egret SM			1,2,3,4				
Great Blue Heron ^{SP,SM}			1,2,3,4,5	2,3,4,5			
WATERFOWL (16)							
Canada Goose	1,2,3,4	5	1,2,3,4,5			1,2,3,5	
Mallard	1,2,3,4	5	1,2,3,4,5				
Gadwall	1,2,3,4	5	1,2,3,4,5				
American Wigeon	1,2,3,4	5	1,2,3,5				
Northern Pintail	2						
Blue-winged Teal	1,2,3,4	5	3				
Cinnamon Teal	3,5						
Ruddy Duck	1,3,4						
Wood Duck ^{SP}	1,2,3,4	5	3	5			
Redhead	3						
Ring-necked Duck	5						
Scaup spp.	1,2,3,4	5	2,5				
Barrow's Goldeneye ^{SP}	3		3				
Bufflehead ^{SP}	1,2,3						
Common Merganser	1,2,3,4	5					
Hooded Merganser ^{SP}			3				
RAPTORS, GAMEBIRDS (14)							
Turkey Vulture SM	3		3	3	2,3	3	3
Osprey SM	1,2,3,4	5		3,5	3	2,3	
Northern Harrier				3	5	5	
Sharp-shinned Hawk			3	3,4	2,3,4		
Cooper's Hawk			3,4	3,5		3	
Golden Eagle ^{SC,SP}					1		

Table 5.1-1. Wells Hydroelectric Project Bird Detections by Habitat Type and Study Area Zone.

Species ¹	Study Area Zone (1-5)						
	Lacustrine	Riverine	Wetland	Riparian	Shrub Steppe	Agriculture	Idle Agriculture
Bald Eagle ^{FT,ST,SP}	1		1		1,2,5		
Red-tailed Hawk	4,5		3,4,5	3,4,5	1,2,3,4,5	1,3,4,5	
American Kestrel			3	3,5	2,3,4		
Peregrine Falcon ^{FCo,SS,SP}					5		
Prairie Falcon ^{SP}					5		
Chuckar ^{SP}	1						
Ring-necked Pheasant ^{SP}			1,4	3,5	3,5	2,3,4,5	
California Quail			1,2,3,4	2,3,4,5	1,2,3,4,5	1,2,3,4,5	
RAILS, CRANES, SHOREBIRDS, GULLS, TERNS, AND DOVES (17)							
Virginia Rail			1				
American Coot	1,2,3,4	5	1,3				
American Golden Plover			4				
Killdeer	1,3,5		1,2,3,4,5	1,2,4,5	1,2,3,4	1,2,3,4,5	
Greater Yellowlegs			3,4				
Spotted Sandpiper	1,2,3,4	5	1,2,3,4,5	2,3,4,5	2	2	
Dowitcher spp.			4,5				
Common Snipe			1,2,5				
Wilson's Phalarope ^{SP}			3				
Bonaparte's Gull	2,3,4		2,3				
Ring-Billed Gull	1,2,3,4	5	1,2,3,4,5	1,2,3,4,5			
California Gull	1,2,3,4	5	1,2,3,4,5	1,2,3,4,5			
Caspian Tern SM	1,2,3,4	5	3				
Common Tern	1,2,3,4	5	3				
Black Tern ^{FCo,SM}	3		3				
Rock Dove	2					5	
Mourning Dove			1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	
OWLS, GOATSUCKERS, SWIFTS, HUMMINGBIRDS, AND KINGFISHERS (6)							
Great Horned Owl			2,3	2,3,5		4	
Western Screech Owl				3			
Common Nighthawk			5		1,2	1,2,3	
Rufous Hummingbird			2			5	
Black-chinned Hummingbird			4	3	1		
Belted Kingfisher	1,2,3,4	5	1,2,3,4,5	1,2,3,4,5	3		
WOODPECKERS AND FLYCATCHERS (7)							
Northern Flicker			1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	1,2,3,4	3,4
Downy Woodpecker			5	5	3		

Table 5.1-1. Wells Hydroelectric Project Bird Detections by Habitat Type and Study Area Zone.

Species ¹	Study Area Zone (1-5)						
	Lacustrine	Riverine	Wetland	Riparian	Shrub Steppe	Agriculture	Idle Agriculture
Western Wood Pee-wee			3,5	1,2,3,4,5	1,2,3,5	3,4	
Willow Flycatcher			1,3,5	2,3,4			
Say's Phoebe			4		1,2	2,4	
Eastern Kingbird			2,3,4,5	2,3,4,5	2,3,4	1,2,3,4,5	5
Western Kingbird			1,2,5	1,2,3,4,5	1,2,3,4	1,2,3,4,5	
VIREOS, CORVIDS, AND SWALLOWS (10)							
Steller's Jay				2,4,5		4	
Black-Billed Magpie			1,4	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	
American Crow			3,4,5	1,2,3,4,5	1,2,3,4,5	3,4,5	4
Common Raven			1,2,5	3,5	1,2,4,5	1,3,4	
Tree Swallow	1,2,3,4	5	1,3	1,2,3,4,5		1,3,4	5
Violet-green Swallow	1,2,3,4	5	1,3	2,5	1,2,3	5	5
Cliff Swallow	1,2,3,4	5		3,4	3	3	
Bank Swallow	1,2		1	1	1		
Northern Rough-winged Swallow	1,2,3,4	5	3,5	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	3
Barn Swallow	1,2,3,4	5	2	2,3	3		
CHICKADEES, WRENS, AND KINGLETS (6)							
Black-Capped Chickadee			4	3,4			
House Wren						4	4
Canyon Wren					1,5		
Marsh Wren			1,3,4,5	3		3	
Ruby-crowned Kinglet			1	2			
Golden-crowned Kinglet				5			
THRUSHES, STARLINGS, AND WAXWINGS (5)							
Gray Catbird			2,3,5	2,3,4,5		4	
European Starling	1,2,3,4	5	2,3,4,5	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	3,4,5
American Robin			1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	3,4,5
American Pipit					3		
Cedar Waxwing			4	2,3,4	1	3,5	
WARBLERS AND TANAGERS (9)							
Orange-crowned Warbler				3,5	2		
Nashville Warbler				5			
Yellow-rumped Warbler			1,2,3,4,5	2,3,4,5	2,3,4	2,3,	3
Yellow Warbler			2,3,4,5	1,2,3,4,5			

Table 5.1-1. Wells Hydroelectric Project Bird Detections by Habitat Type and Study Area Zone.

Species ¹	Study Area Zone (1-5)						
	Lacustrine	Riverine	Wetland	Riparian	Shrub Steppe	Agriculture	Idle Agriculture
MacGillivray's Warbler				3			
Wilson's Warbler			2,3,4,5	1,2,3,4,5			
Common Yellowthroat			2,3,4,5	2,4,5	2	5	
Yellow-breasted Chat				2,4	1,4		
Western Tanager				2,3,5			
SPARROWS, ICTERIDS, AND FINCHES (21)							
Spotted Towhee			3,4	2,3,5	1,5	3	3
Chipping Sparrow			4	5	1,3	3	
Lark Sparrow					3	1	
Grasshopper Sparrow SM						5	
Savannah Sparrow			2		1,2,3,4,5	1,3,4,5	5
Lincoln's Sparrow				2,4	3	4	5
Song Sparrow			1,2,3,4,5	1,2,3,4,5	2,3,4	1,2,3,4,5	
White-crowned Sparrow			1,3,5	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	3,4,5
Dark-eyed Junco				2,3,5	5	5	3,5
Black-headed Grosbeak				3,4	3,5	4	
Lazuli Bunting				3,4,5	2,4		
Western Meadowlark					1,2,3,4,5	2,3,4,5	3,4
Yellow-headed Blackbird			3				
Red-winged Blackbird			1,2,3,4,5	1,2,3,4,5	2,3,4	2,3,4,5	3,5
Brewer's Blackbird			1,2,3,4,5	2,3,4,5	1,2,3,4,5	1,2,3,4,5	3,4,5
Brown-headed Cowbird			3,4,5	1,2,3,4,5	4,5	1,2,3,4,5	3,5
Bullock's Oriole			1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	3,4,5
House Finch			1,3,4,5	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	
American Goldfinch			1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	3,4,5
Evening Grosbeak			3				
House Sparrow				4		2,3	

¹ RTE Species are indicated by the following codes in superscript: FT=Federal Threatened; FCo=Federal Species of Concern; SE=State Endangered; ST=State Threatened; SC=State Candidate; SS=State Sensitive; SP=State Priority; SM=State Monitor.

Note: Includes results from targeted avian surveys (i.e., point count surveys and reservoir surveys), as well as all bird detections recorded incidental to other field studies.

Table 5.1-2. Relative Abundance of Bird Species Detected During 2005 Avian Point Count Surveys¹.

Species	Grand Total		Breeding		Fall	
	Relative Abundance	Rank	Relative Abundance	Rank	Relative Abundance	Rank
American Golden Plover	0.01	102	0.00	86	0.01	77
American Coot	13.30	1	0.03	51	13.27	1
American Crow	0.42	31	0.10	35	0.32	24
American Goldfinch	0.82	19	0.56	12	0.26	28
American Kestrel	0.04	77	0.01	59	0.03	63
American Pipit	0.01	102	0.00	86	0.01	77
American Robin	1.97	8	0.84	10	1.13	8
American Wigeon	3.47	3	0.00	86	3.47	3
American White Pelican	0.42	31	0.00	86	0.42	20
Bald Eagle	0.03	83	0.01	59	0.01	69
Barrow's Goldeneye	0.03	83	0.00	86	0.03	63
Barn Swallow	0.89	17	0.13	30	0.76	14
Black-billed Magpie	0.55	26	0.17	29	0.38	22
Black-capped Chickadee	0.14	58	0.03	53	0.11	39
Black-chinned Hummingbird	0.01	90	0.01	59	0.00	88
Belted Kingfisher	0.24	43	0.06	43	0.18	32
Brown-headed Cowbird	0.34	37	0.32	20	0.02	65
Black-headed Grosbeak	0.07	64	0.07	39	0.00	88
Black Tern	0.01	90	0.01	59	0.00	88
Bonaparte's Gull	0.01	102	0.01	74	0.00	88
Brewer's Blackbird	1.90	10	1.30	5	0.61	15
Bullock's Oriole	0.88	18	0.88	8	0.00	88
Blue-winged Teal	0.01	90	0.01	59	0.00	88
Canada Goose	2.68	5	1.51	3	1.17	6
California Gull	0.21	47	0.07	39	0.14	35
Canyon Wren	0.02	85	0.02	56	0.00	88
California Quail	2.73	4	0.93	7	1.80	5
Caspian Tern	0.01	102	0.01	74	0.00	88
Cedar Waxwing	0.41	34	0.12	31	0.30	27
Chipping Sparrow	0.04	77	0.03	53	0.01	69
Chuckar	0.01	102	0.01	74	0.00	88
Cliff Swallow	1.11	15	1.11	6	0.00	88
Cooper's Hawk	0.05	73	0.00	86	0.05	54
Common Loon	0.16	50	0.04	49	0.13	37
Common Merganser	0.13	59	0.08	38	0.05	54
Common Nighthawk	0.01	102	0.01	74	0.00	88
Common Raven	0.15	54	0.07	39	0.08	45
Common Snipe	0.05	73	0.00	86	0.05	54
Common Yellowthroat	0.12	60	0.12	31	0.00	88
Double-crested Cormorant	0.44	30	0.38	18	0.06	50
Dark-eyed Junco	0.08	63	0.00	86	0.08	45
Dowitcher Species	0.19	48	0.00	86	0.19	31
Downy Woodpecker	0.02	85	0.00	86	0.02	65
Eastern Kingbird	0.36	36	0.35	19	0.01	77

Table 5.1-2. Relative Abundance of Bird Species Detected During 2005 Avian Point Count Surveys¹.

Species	Grand Total		Breeding		Fall	
	Relative Abundance	Rank	Relative Abundance	Rank	Relative Abundance	Rank
European Starling	5.15	2	1.36	4	3.79	2
Evening Grosbeak	0.04	77	0.04	49	0.00	88
Gadwall	0.34	38	0.23	25	0.11	40
Great Blue Heron	0.14	55	0.05	46	0.09	42
Golden-crowned Kinglet	0.01	90	0.00	86	0.01	69
Great Horned Owl	0.01	102	0.01	74	0.00	88
Gray Catbird	0.14	55	0.07	39	0.07	48
Great Egret	0.05	70	0.00	86	0.05	53
Grasshopper Sparrow	0.01	102	0.01	74	0.00	88
Greater Yellowlegs	0.01	90	0.00	86	0.01	69
House Finch	1.69	11	0.63	11	1.07	9
Horned Grebe	0.05	73	0.00	86	0.05	54
Hooded Merganser	0.02	85	0.00	86	0.02	65
House Sparrow	0.07	64	0.01	59	0.06	50
House Wren	0.01	102	0.01	74	0.00	88
Killdeer	0.70	23	0.25	24	0.45	19
Lazuli Bunting	0.05	73	0.05	48	0.00	88
Lark Sparrow	0.01	90	0.01	59	0.00	88
Lincoln's Sparrow	0.16	50	0.00	86	0.16	33
Mallard	1.32	12	0.27	23	1.05	10
MacGillivray's Warbler	0.01	90	0.00	86	0.01	69
Marsh Wren	0.19	48	0.09	37	0.11	40
Mourning Dove	0.63	25	0.49	13	0.14	35
Nashville Warbler	0.01	90	0.01	59	0.00	88
Northern Flicker	0.69	24	0.20	28	0.49	18
Northern Harrier	0.01	90	0.00	86	0.01	69
Northern Pintail	0.01	90	0.00	86	0.01	69
Northern Rough-winged Swallow	1.95	9	1.95	1	0.00	88
Orange-crowned Warbler	0.03	80	0.02	56	0.01	69
Osprey	0.16	52	0.11	33	0.05	54
Pied-billed Grebe	0.06	67	0.00	86	0.06	50
Prairie Falcon	0.01	102	0.00	86	0.01	77
Purple Finch	0.06	67	0.06	43	0.00	88
Ring-billed Gull	0.39	35	0.02	56	0.37	23
Ruby-crowned Kinglet	0.02	85	0.00	86	0.02	65
Red-necked Grebe	0.01	102	0.00	86	0.01	77
Ring-necked Pheasant	0.14	55	0.11	33	0.03	60
Rock Dove	0.01	90	0.01	59	0.00	88
Red-tailed Hawk	0.22	46	0.10	35	0.12	38
Ruddy Duck	0.01	102	0.00	86	0.01	77
Rufous Hummingbird	0.01	90	0.01	59	0.00	88
Red-winged Blackbird	2.61	6	1.77	2	0.84	11
Say's Phoebe	0.02	85	0.01	59	0.01	77
Savannah Sparrow	0.23	45	0.01	74	0.22	29
Scaup Species	0.79	21	0.00	86	0.79	13

Table 5.1-2. Relative Abundance of Bird Species Detected During 2005 Avian Point Count Surveys¹.

Species	Grand Total		Breeding		Fall	
	Relative Abundance	Rank	Relative Abundance	Rank	Relative Abundance	Rank
Song Sparrow	0.98	16	0.42	16	0.56	16
Spotted Sandpiper	0.47	29	0.46	15	0.01	77
Spotted Towhee	0.09	62	0.01	59	0.08	45
Sharp-shinned Hawk	0.05	70	0.01	74	0.05	54
Steller's Jay	0.03	80	0.00	86	0.03	60
Tree Swallow	0.74	22	0.23	25	0.51	17
Turkey Vulture	0.24	44	0.01	59	0.22	29
Unknown Buteo	0.01	102	0.00	86	0.01	77
Unknown Duck	0.42	31	0.00	86	0.42	20
Unknown Species	0.33	39	0.01	74	0.32	24
Unknown Sparrow	0.82	19	0.01	59	0.80	12
Unknown Swallow	0.07	66	0.00	86	0.07	49
Violet-green Swallow	1.18	13	0.86	9	0.32	24
Virginia Rail	0.01	102	0.00	86	0.01	77
White-crowned Sparrow	2.59	7	0.00	86	2.59	4
Western Grebe	0.16	52	0.01	59	0.14	34
Western Kingbird	0.28	41	0.28	22	0.00	88
Western Meadowlark	0.50	27	0.41	17	0.09	42
Western Screech Owl	0.01	102	0.01	74	0.00	88
Western Tanager	0.01	102	0.01	74	0.00	88
Western Wood Pee-wee	0.47	28	0.47	14	0.01	77
Willow Flycatcher	0.05	70	0.05	46	0.00	88
Wilson's Warbler	0.26	42	0.22	27	0.03	60
Wood Duck	0.12	60	0.03	53	0.09	42
Yellow-breasted Chat	0.03	80	0.03	51	0.00	88
Yellow Warbler	0.29	40	0.29	21	0.00	88
Yellow-headed Blackbird	0.06	67	0.06	43	0.00	88
Yellow-rumped Warbler	1.14	14	0.00	86	1.14	7
Total	64.21		21.26		42.95	

¹ **Bold** indicates among the most abundant species during that survey period.

Note: Relative abundance is the average number of detections per survey.

5.1.1 Avian Seasonal Use of the Study Area

The relative abundance of bird species varied tremendously between the breeding season and fall migration. Results of avian point count surveys indicate that study area habitats support the greatest species diversity (i.e., largest number of distinct species) during the breeding season when neo-tropical migrant species are nesting. However, during the fall, the greatest abundance of birds (i.e., a largest number of individuals) occurs in the study area when single and mixed species flocks move into the region during southward migration. As illustrated in Figure 5.1-1, species detections were distributed fairly evenly across habitat types during the breeding season; during the fall, a larger proportion of total avian detections were associated with the open water habitat of the reservoir. The total number of detections during the two breeding season survey periods was 3,231 compared to 6,529 in the two fall survey periods.

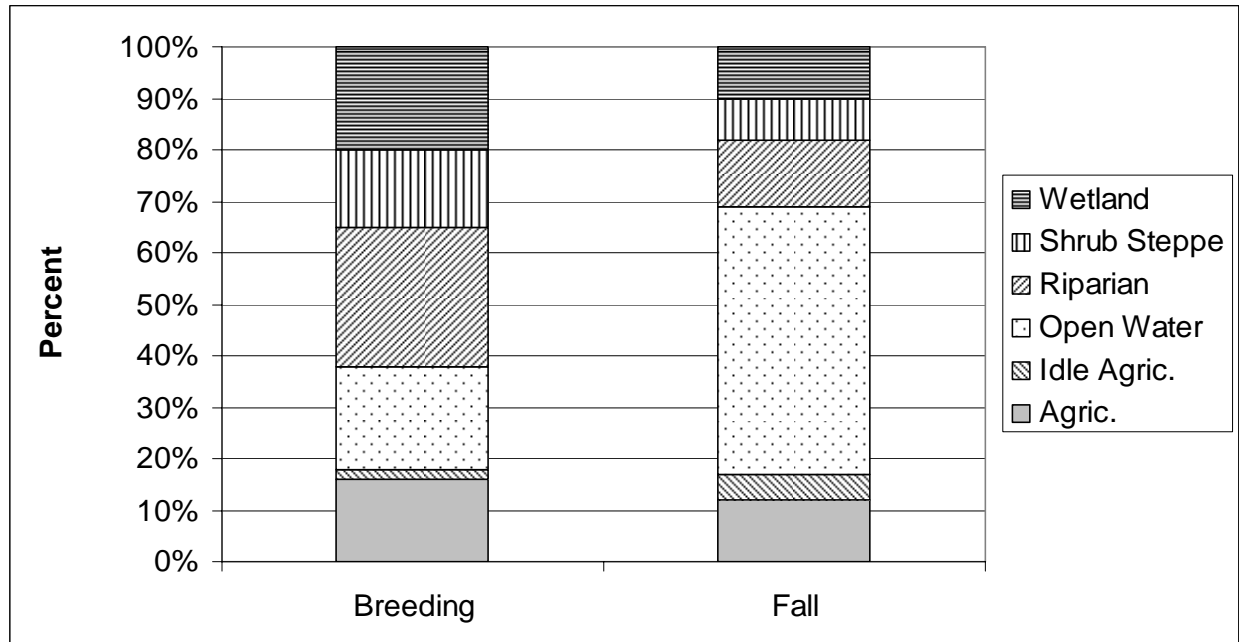


Figure 5.1-1. Proportion of Breeding Season and Fall Avian Detections by Habitat During Point Count Surveys.

During the breeding season, the total avian abundance at individual point count plots varied from a low of 5 to a high of 98, while species richness ranged between 6 and 22 at each plot during the breeding season with no obvious geographical trends (Appendix H). Total avian abundance and species richness results from the fall surveys and for each point count station are shown in Appendix I.

Over all habitats, the average number of individuals and species detected within each point count plot during fall surveys was significantly different (ANOVA, $p < 0.05$, 302 d.f.) from the breeding season estimates. During the breeding season, an average of 8.4 ± 6.7 birds/survey were detected within each plot, whereas in the fall, 20.3 ± 122.0 birds/survey were detected (Table 5.1-3). Species richness was higher during the breeding season, when 4.2 ± 2.4 species/plot/survey were detected compared to 2.8 ± 1.8 species/plot/survey in the fall (Table 5.1-3). Riparian and wetland habitats supported more species during both the breeding season and fall migration compared to other habitat types. In the fall, greater relative abundance was detected in idle agriculture and agricultural plots (Table 5.1-3). Differences among the five habitats are discussed in more detail in later sections of this report.

A comparison of relative abundance estimates in the breeding season and the fall migration provides an indication of the relative importance of habitats between the two seasons and the shifts in avian species that occur. During the breeding season, the northern rough-wing swallow was the most commonly observed species (Table 5.1-2). This species is colonial and highly active during its aerial foraging and thus has a high detection rate. During the breeding season, only a single waterfowl species, the Canada goose, is included in the 10 most abundant bird species detected.

Table 5.1-3. Relative Abundance of In-plot Birds by Plot Habitat Type (164-ft Radius).

Habitat Type	Overall				Breeding Season				Fall Migration			
	No. Surveys	Rel. Abund. (birds/ survey)	Species Richness		No. Surveys	Rel. Abund. (birds/ survey)	Species Richness		No. Surveys	Rel. Abund. (birds/ survey)	Species Richness	
			Total	Spp. Per Survey			Total	Spp. Per Survey			Total	Spp. Per Survey
Idle Agriculture	20	10.8 ± 14.5	27	3.4 ± 2.6	10	8.0 ± 5.3	21	4.2 ± 2.8	10	13.6 ± 19.9	15	2.6 ± 2.3
Wetland	72	10.6 ± 11.0	61	4.2 ± 2.3	36	10.8 ± 6.8	38	5.0 ± 2.3	36	10.4 ± 14.2	43	3.4 ± 2.0
Agriculture	60	9.3 ± 9.3	44	3.2 ± 2.0	30	6.9 ± 4.3	29	3.7 ± 2.1	30	11.6 ± 12.1	30	2.7 ± 1.7
Riparian	84	27.8 ± 163.4	68	3.7 ± 2.2	42	8.2 ± 4.8	43	4.7 ± 2.4	42	47.4 ± 230.7	47	3.0 ± 1.6
Shrub Steppe	68	7.3 ± 11.4	44	2.7 ± 1.9	34	7.5 ± 9.8	27	3.1 ± 2.2	34	7.0 ± 13.0	30	2.3 ± 1.5
Total	304	14.4 ± 86.4	90	3.5 ± 2.2	152	8.3 ± 6.7	59	4.2 ± 2.4	152	20.3 ± 122.0	67	2.8 ± 1.8

The relatively high abundance of Canada geese during the breeding season (1.5 birds/plot/survey) cannot specifically be attributed to their use of reservoir open water habitat. Canada geese were observed to forage and brood young in a variety of habitats in the study area, including wetland, riparian, and agricultural areas. The Canada goose was one of three species—the other being American robin and European starling—that were ranked in the top 10 species observed during the breeding season, fall, and overall (Table 5.1-2). The European starling was the fourth most abundant species detected during the breeding season and the third most abundant species detected during fall point count surveys (Table 5.1-2). The prevalence of this species during both the breeding and non-breeding season reflects its biology and opportunistic use of area habitats: European starlings nest throughout the Project vicinity and then form large flocks that may migrate locally during the non-breeding season or winter.

The percentage of plots at which each species was detected represents one measure of how widespread each avian species is within the study area. In all, 15 species were detected at more than 50% of the plots within one or more of the five habitat types during the breeding season (two surveys) or the fall migration (two surveys) (Table 5.1-4).

Figure 5.1-2 illustrates avian diversity, species dominance, evenness, and species richness calculated for the five sampled habitats plus open water for the breeding season and fall migration. Shannon-Weiner Diversity Index and evenness values were found to be higher during the breeding season than the fall across all habitat types (Figure 5.1-2). During the breeding season, avian diversity was greatest in riparian habitats and lowest in open water. The fall avian species diversity, as estimated by the Shannon-Weiner Index, was lower than breeding season indices in all habitats (Figure 5.1-2). Wetland, riparian, and shrub steppe habitat types had indices > 2.0, followed by agriculture, idle agriculture, and open water. In terms of sheer species richness (i.e., total number of avian species), riparian habitat was greatest during the breeding season, with 58 species; species richness in wetland habitat was highest in the fall, with 51 species. Idle agricultural areas contained the lowest diversity in both seasons.

- **Breeding Season**—Species that influence the high avian diversity during the breeding season (Table 5.1-2) primarily include long-distance neo-tropical migrants such as the northern rough-winged swallow, cliff swallow (*Petrochelidon pyrrhonota*), violet-green swallow (*Tachycineta thalassina*), tree swallow (*Tachycineta bicolor*), and barn swallow (*Hirundo rustica*), all of which are known to breed in colonies or in large numbers in habitat peripheral to the reservoir. Many neo-tropical migrant species that return to the study area during the breeding season are typically associated with wetland or riparian habitat such as the Bullock's oriole (*Icterus bullockii*), western wood pee-wee (*Contopus sordidulus*), eastern kingbird (*Tyrannus tyrannus*), western kingbird (*Tyrannus verticalis*), Wilson's warbler (*Wilsonia pusilla*), and common yellowthroat (*Geothlypis trichas*). This influx of bird species during the breeding season disproportionately affects results for study area wetland and riparian habitats, accounting for the high avian species richness (i.e., number of bird species) confirmed in these habitat types during the breeding season (Figure 5.1-2).

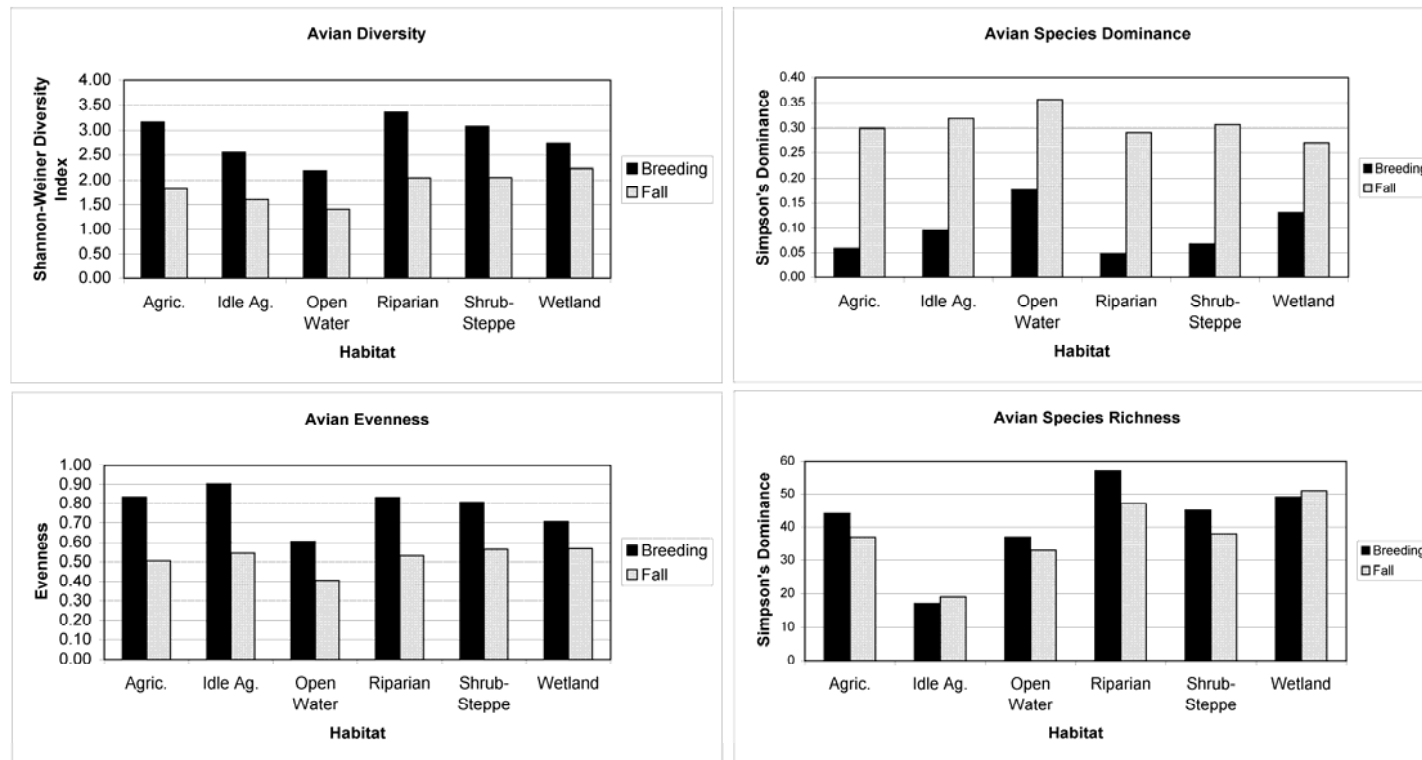


Figure 5.1-2. Avian Diversity Parameters for Various Habitats in the Study Area During the Breeding Season and Fall.

Table 5.1-4. Species that were Detected in More than 50% of the Point Count Stations of Each Habitat Type.

Species	Breeding Season	Fall Migration
American Robin	Idle Agriculture Wetland	
American Goldfinch	Idle Agriculture Shrub Steppe Wetland	
Brewer's Blackbird	Idle Agriculture Shrub Steppe	
Bullock's Oriole	Agriculture Idle Agriculture Riparian Shrub Steppe Wetland	
California Quail	Agriculture Idle Agriculture Shrub Steppe	Agriculture Idle Agriculture
Eastern Kingbird	Wetland	
European Starling		Agriculture Idle Agriculture
House Finch	Shrub Steppe	
Northern Flicker		Agriculture Idle Agriculture Shrub Steppe Wetland
Northern Rough-winged Swallow	Agriculture Idle Agriculture Wetland	
Red-winged Blackbird	Idle Agriculture Riparian Wetland	Wetland
Song Sparrow	Riparian Wetland	
Western Wood Pee-wee	Idle Agriculture Shrub Steppe Wetland	
White-Crowned Sparrow		Agriculture Idle Agriculture
Yellow Warbler	Idle Agriculture Wetland	

- **Fall Season**—During the fall, large numbers of waterfowl, notably American coot, American wigeon, mallard (*Anas platyrhynchos*), and scaup (*Aythya* spp.) spend time on the open water habitat of the study area prior to migrating south. Reservoir survey results and additional information on the use of the reservoir by waterfowl species are provided in Section 5.1.1.2 below.

Analysis of presence-absence from the point count station data indicated that the repeated surveys in the breeding and fall seasons did not yield high precision in terms of estimated occupancy for the most abundant land bird species based on the detectability probabilities calculated from the dataset (Table 5.1-5). The proportions occupied (or occupancy rate) estimated by the two methods (i.e., constant probability and repeated count [Royle] methods) were generally substantially higher than the raw percentage of plots that each species was detected in within each season. For example, brown-headed cowbirds (*Molothrus ater*) were seen in 36% of the point count stations during the breeding season, but the model estimates that they would be expected to be present in 67% under the constant probability method and 72% under the Royle method (Table 5.1-5).

Similarly, the European starling is predicted to be present in 60% of the sites in the breeding season and 49% in the fall. However, the small number of survey periods resulted in very wide confidence intervals for occupancy rates for most species. For some species, the data were limited and resulted in the estimation being erroneous, a limitation of the modeling that has been recognized by researchers. The species-season combinations that could not be calculated are indicated with “n/a” in Table 5.1-5. Based on the generally lower Akaike’s information criterion (AIC) score for the constant probability method, it is used in the remainder of this section to discuss the results. Several points are evident from this analysis:

- Occupancy was similar between seasons for the American goldfinch (*Carduelis tristis*), California quail, song sparrow (*Melospiza melodia*), and western meadowlark (*Sturnella neglecta*) (Table 5.1-5);
- American robin and Bullock’s oriole were estimated to be present in 98 and 96% of the plots during the breeding season based on them being actually detected in 71 and 78% of the point count stations, respectively;
- Eastern kingbirds were also very common in the breeding season and, based on the modeling, are predicted to be present in 85% of the plots; and
- The house finch (*Carpodacus mexicanus*) was predicted to be present in 91% of stations in the fall, while American goldfinch, American robin, northern flicker (*Colaptes auratus*), and white-crowned sparrow were each estimated to be present in 70-75% of the plots in the fall.

Table 5.1-5. Estimated Occupancy and Detection Rates Based on Constant Probability and Repeated Count Models.¹

Species	Season	Naïve Proportion of Stations	Constant Probability Method			Repeated Count (Royle Biometrics) Method				
			AIC ²	Proportion Occupied	Detection Probability	AIC	Occupancy (Psi)		Detection Probability	
				(Psi)	mean (SE)		mean (SE)	95% C.I.	mean (SE)	95% C.I.
American Goldfinch	breeding	0.58	203.38	0.86 (0.15)	0.43 (0.08)	226.87	0.87 (0.24)	0.40-1.34	0.18 (0.16)	-0.14-0.5
	fall	0.49	189.7	0.77 (0.16)	0.39 (0.09)	204.52	0.79 (0.25)	0.29-1.28	0.20 (0.15)	-0.10-0.49
American Robin	breeding	0.71	214.02	0.98 (0.12)	0.48 (0.07)	253.98	0.99 (0.13)	0.73-1.25	0.10 (0.28)	-0.44-0.64
	fall	0.48	187.07	0.74 (0.16)	0.40 (0.09)	201.64	0.74 (0.23)	0.28-1.20	0.22 (0.15)	-0.07-0.51
Brown-headed cowbird	breeding	0.36	159.27	0.67 (0.21)	0.31 (0.11)	166.45	0.72 (0.32)	0.10-1.34	0.17 (0.15)	-0.13-0.46
	fall	0.04	N/A	N/A	N/A	33.55	1.00 (0.00)	1.00-1.00	0.00 (0.00)	-0.00-0.00
Brewer’s Blackbird	breeding	0.58	204.09	0.79 (0.11)	0.48 (0.08)	228.93	0.73 (0.17)	0.39-1.07	0.29 (0.14)	0.01-0.57
	fall	0.17	N/A	N/A	N/A	93.96	1.00 (0.00)	1.00-1.00	0.00 (0.00)	0.00-0.00
Bullock’s Oriole	breeding	0.78	213.60	0.96 (0.09)	0.56 (0.07)	268.22	0.85 (0.18)	0.49-1.21	0.29 (0.18)	-0.07-0.64
	fall	0.00	4.00	0.00 (0.00)	0.92 (0.00)	4.00	0.00 (N/A)	N/A	0.00 (N/A)	N/A
California Quail	breeding	0.62	207.81	0.77 (0.09)	0.55 (0.07)	238.74	0.66 (0.11)	0.43-0.89	0.40 (0.13)	0.15-0.65
	fall	0.43	179.98	0.64 (0.13)	0.43 (0.10)	192.37	0.62 (0.18)	0.27-0.96	0.29 (0.14)	0.02-0.56
Eastern Kingbird	breeding	0.41	170.20	0.85 (0.28)	0.28 (0.10)	179.47	0.96 (0.28)	0.40-1.51	0.08 (0.16)	-0.23-0.38
	fall	0.01	N/A	N/A	N/A	48.22	0.00 (0.00)	0.00-0.00	0.50 (0.18)	0.15-0.85
European Starling	breeding	0.36	160.61	0.60 (0.16)	0.36 (0.11)	168.17	0.60 (0.22)	0.16-1.03	0.24 (0.15)	-0.05-0.52
	fall	0.32	150.74	0.49 (0.13)	0.40 (0.11)	156.82	0.48 (0.16)	0.16-0.79	0.30 (0.14)	0.02-0.59
House Finch	breeding	0.38	167.13	0.45 (0.07)	0.62 (0.09)	178.05	0.39 (0.07)	0.25-0.52	0.57 (0.11)	0.36-0.78
	fall	0.55	197.91	0.96 (0.21)	0.35 (0.09)	217.32	1.00 (0.04)	0.92-1.08	0.05 (0.24)	-0.41-0.51
Northern Flicker	breeding	0.30	N/A	N/A	N/A	144.25	1.00 (0.00)	1.00-1.00	0.00 (0.00)	0.00-0.01
	fall	0.55	200.69	0.71 (0.10)	0.53 (0.08)	223.92	0.62 (0.12)	0.38-0.86	0.38 (0.13)	0.14-0.63
Northern Rough-winged Swallow	breeding	0.62	208.16	0.79 (0.10)	0.53 (0.08)	238.47	0.69 (0.14)	0.43-0.96	0.36 (0.13)	0.10-0.62
	fall	0.00	4.00	0.00 (0.00)	0.92 (0.00)	4.00	0.00 (N/A)	N/A	0.00 (N/A)	N/A
Red-winged Blackbird	breeding	0.63	196.96	0.68 (0.06)	0.74 (0.06)	233.96	0.52 (0.06)	0.41 (0.63)	0.69 (0.07)	0.54
	fall	0.28	139.74	0.37 (0.09)	0.50 (0.12)	144.73	0.34 (0.10)	0.16 (0.52)	0.44 (0.14)	0.17-0.71
Song Sparrow	breeding	0.51	194.88	0.66 (0.10)	0.53 (0.08)	214.53	0.58 (0.11)	0.36-0.80	0.40 (0.12)	0.16-0.65
	fall	0.45	180.52	0.79 (0.20)	0.34 (0.10)	192.63	0.85 (0.31)	0.25-1.45	0.14 (0.15)	-0.16-0.44
White-crowned Sparrow	breeding	0.00	4.00	0.00 (0.00)	0.92 (0.00)	4.00	0.00 (N/A)	N/A	0.00 (N/A)	N/A
	fall	0.62	204.67	0.71 (0.08)	0.64 (0.07)	237.71	0.57 (0.08)	0.42-0.71	0.54 (0.10)	0.35-0.74
Western Meadowlark	breeding	0.41	173.88	0.49 (0.08)	0.59 (0.09)	186.27	0.42 (0.08)	0.27-0.57	0.53 (0.11)	0.31-0.74
	fall	0.14	87.41	0.47 (0.40)	0.17 (0.15)	88.38	0.53 (0.56)	-0.56-1.63	0.10 (0.16)	-0.22-0.43
Western Wood Pee-wee	breeding	0.57	201.16	0.68 (0.08)	0.59 (0.07)	227.02	0.56 (0.09)	0.39-0.74	0.48 (0.11)	0.27-0.70
	fall	0.01	N/A	N/A	N/A	48.22	0.00 (N/A)	N/A	0.50 (0.18)	0.15-0.85
Yellow Warbler	breeding	0.37	165.54	0.50 (0.10)	0.49 (0.10)	174.66	0.46 (0.11)	0.24 (0.68)	0.40 (0.13)	0.14-0.65
	fall	0.00	4.00	0.00 (0.00)	0.92 (0.00)	4.00	0.00 (N/A)	N/A	0.00 (N/A)	N/A
Yellow-rumped Warbler	breeding	0.00	4.00	0.00 (0.00)	0.92 (0.00)	4.00	0.00 (N/A)	N/A	0.00 (N/A)	N/A
	fall	0.42	176.27	0.50 (0.08)	0.61 (0.08)	189.72	0.43 (0.07)	0.28-0.57	0.55 (0.11)	0.34-0.76

¹ Mackenzie (2005), MacKenzie et al. (2002), Royle and Nichols (2003).

² AIC = Akaike's information criterion (smaller values generally indicate better model fit) (Royle and Nichols (2003)).

5.1.1.1 Avian Use of Study Area Zones

Because avian relative abundance was greater in wetland and riparian habitats relative to other habitats during the breeding season, it could reasonably be assumed that the study area zone with the largest proportion of these habitats would support the largest number of birds during the breeding season. And, in fact, the highest relative abundance of birds detected during the breeding season was found Zone 5, which has the highest proportion, and largest total acreage, of wetland and riparian habitat (EDAW 2006). The periphery of the Okanogan River in Zone 5 provides high quality habitat for the variety of neo-tropical migrants and other breeding passerines that typically nest in wetland and/or riparian habitat. Specific sites found to support large numbers of nesting birds through qualitative observation include: the riparian and wetland habitat on the Cassimer Bar; wetland and riparian habitat within and around the WWA in Zone 4; the large, contiguous wetland area along Washburn Island; and riparian areas on study area islands. Within each study area zone, the observed breeding season relative abundance and species richness varied greatly among the individual survey stations, depending on specific location and habitat type (Appendices H and I).



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The abundance of all bird detections increased across all study area zones from the breeding season to fall. The increases in Zones 1 and 3 may have been influenced by large rafts of waterbirds, especially American coots, American wigeon, and scaup spp., detected on the reservoir during the fall. Increases in Zones 2 and 4 may have been affected by the large flocks of sparrows congregating in agricultural and idle agricultural areas. Zone 5 experienced a decrease in the relative abundance of detected birds from breeding season to fall migration. Zone 5 includes relatively large expanses of riparian areas bordering the Okanogan

River. Flocking sparrows in this region likely did not present abundances comparable to those produced by riparian-associated birds during the breeding season.

5.1.1.2 Avian Use of Individual Habitats

The sections below described the use of each habitat type by avifauna during the breeding season based on the results of 2005 surveys, with a specific emphasis on habitat-species associations. Information is provided for the habitat each bird detection was associated with and also for data stratified by the habitat type of each point count station.

Wetland Habitat

During breeding season point count surveys, 20% of all birds detected were recorded in wetlands (Figure 5.1-1); only riparian habitats had a higher absolute abundance. In the fall, however, only 10% of all birds detected were in wetland habitats, substantially less than open water, agricultural, and riparian habitats.

Relative abundance of in-plot bird detections in wetland plots, a measure reflecting the specific use of wetlands and associated peripheral habitat areas, was 10.8 ± 6.8 birds/survey, the highest of any habitat during the breeding season (Table 5.1-3). There was no difference in the relative abundance in wetland plots between the breeding season and fall ($p > 0.05$). With a total of 38 species detected, breeding season species richness in wetland survey plots was second only to plots in riparian habitat (Table 5.1-3). Species richness for in-plot detections in wetlands was slightly higher in the breeding season, with 5.0 ± 2.3 species per survey compared to 3.4 ± 2.0 species per survey in the fall. There was, however, no significant difference between the two seasons.

Many of the wetland-associated breeding birds typically nest either semi-colonially or in large, compact aggregations. Table 5.1-6 shows the 20 most abundant bird species detected in wetland habitat across all point count stations during breeding season and fall migration point count surveys. The red-winged blackbird, a semi-colonial wetland nesting bird, was most abundant during the breeding season, accounting for nearly 30% of all detections in wetlands. This species typically nests colonially in aggregations (Ehrlich et al. 1988).

Another blackbird species, the Brewer's blackbird, was also abundant in wetland habitat during breeding season (Table 5.1-6). Brewer's blackbirds typically nest in open areas (e.g., grassland or shrub steppe habitat) located adjacent to wetlands, but utilize wetland habitat for foraging during the breeding season.

The Canada goose was the second most abundant species detected in wetland habitat during breeding season surveys, representing 16% of all birds detected in wetlands (Table 5.1-6). This species does not necessarily nest colonially but breeds in a variety of natural and artificial nests (i.e., nesting platforms located off the shoreline) located around the reservoir and river. After hatching, Canada geese were often found in large multi-brood flocks especially in wetland habitat, which offers suitable cover for hatchlings.

Although the largest relative abundance of in-plot bird detections were recorded at stations centered in wetland habitat during the breeding season, fall relative abundance in wetland habitat ranked third behind agricultural and idle agricultural habitat (Table 5.1-3). In-plot species richness in wetland habitat remained relatively high during the fall, likely reflecting adults and juveniles remaining in breeding habitat prior to migrating south (Table 5.1-3).

The red-winged blackbird was also the most abundant species detected in wetlands in the fall. However, the fall abundance of this species was about half of the spring abundance (Table 5.1-6). This decrease was largely due to the migration of resident birds but may also be partially attributed to the lower probability of detection in the fall when this vocal bird stops singing and visual detection is required. After breeding, red-winged blackbirds in the study area were

dispersed into small flocks that used wetland and riparian habitats prior to migrating to wintering areas. Some of these birds may winter locally within the Columbia Basin, while others may travel longer distances. California quail became much more common in wetland habitat during the fall, and represented over 10% of all detections (Table 5.1-6).

Table 5.1-6. The 20 Most Abundant Bird Species Detected in Wetland Habitat Point Count Surveys.

Breeding Season (n=152 surveys)			Fall Migration (n=152 surveys)		
Species	No. Detections	Percent of all Wetland Detections	Species	No. Detections	Percent of all Wetland Detections
Red-winged Blackbird	194	29.7	Red-winged Blackbird	101	16.3
Canada Goose	108	16.5	California Quail	64	10.4
Brewer's Blackbird	52	8.0	Killdeer	49	7.9
Spotted Sandpiper	31	4.7	Yellow-rumped Warbler	47	7.6
Song Sparrow	23	3.5	Brewer's Blackbird	41	6.6
Bullock's Oriole	19	2.9	European Starling	32	5.2
American Robin	17	2.6	Dowitcher Spp.	29	4.7
Mallard	17	2.6	Mallard	25	4.0
Killdeer	16	2.5	Song Sparrow	25	4.0
American Goldfinch	15	2.3	Marsh Wren	16	2.6
Northern Rough-winged Swallow	14	2.1	American Crow	14	2.3
Eastern Kingbird	13	2.0	Turkey Vulture	13	2.1
Common Yellowthroat	11	1.7	White-crowned Sparrow	15	2.4
Marsh Wren	11	1.7	American Robin	12	1.9
Mourning Dove	11	1.7	Belted Kingfisher	10	1.6
Yellow Warbler	9	1.4	Ring-billed Gull	10	1.6
Yellow-headed Blackbird	9	1.4	American Goldfinch	9	1.5
Western Kingbird	8	1.2	House Finch	9	1.5
Violet-green Swallow	7	1.1	Northern Flicker	9	1.5
Evening Grosbeak	6	0.9	Barn Swallow	8	1.3
Total Detections	653	90.5		618	87.1

Other notable additions to the variety of bird species found in wetland habitats in the study area during the fall include the yellow-rumped warbler (*Dendroica coronata*) and the European starling. The yellow-rumped warbler is a native wood warbler species that does not breed in the study area but migrates through the study area during the fall. During the fall, yellow-rumped warblers were observed foraging in small flocks, especially in wetland habitats. The European starling was not among in the 20 most abundant bird species detected in wetland habitat during the breeding season; during the fall, however, the species was observed in large (500+ individuals) flocks, which often foraged and roosted in wetland and/or riparian habitats along the reservoir.

Riparian Habitat

Overall, 27% of all birds detected during the breeding season were in riparian habitats, more than any other habitat (Figure 5.1-1). Absolute abundance during the fall was about half that of the spring, and substantially less than open water. During the breeding season, 43 avian species were detected in riparian habitat, while 47 species were detected in the fall. Relative abundance of in-plot bird detections (a measure reflecting the specific use of riparian and associated peripheral habitat areas) was 8.2 ± 4.8 birds/plot/survey— second only to wetlands during the breeding season. Although fall relative abundance (47.4 ± 230.7 birds/plot/survey) within riparian plots was higher than during the breeding season, the difference was marginally not significant ($p > 0.05$) due to the extreme variability in the fall (Table 5.1-3). Riparian in-plot species richness was higher than any other habitat in the breeding season (4.7 ± 2.4 species/plot/survey) and second to wetland habitats in the fall (Table 5.1-3). The fall and breeding season species richness for in-plot detections differed significantly ($p < 0.01$).

Table 5.1-7 shows the 20 most abundant bird species detected in riparian habitat during breeding season and fall point count surveys. Avian relative abundances in riparian habitat were within a smaller range than those calculated for wetland habitat. In general, riparian breeding birds included a diverse collection of neotropical migrant species including the Bullock's oriole, western wood pee-wee, American robin, yellow warbler (*Dendroica petechia*), and Wilson's warbler. These species were found to nest solitarily or in loose aggregations within riparian areas. Repeat detections of these species were frequent in riparian habitat, and a distinct change in the use of riparian habitat by birds was noted between the breeding and fall seasons.

The European starling was the most abundant species detected in riparian habitat during breeding season surveys, representing 12% of all birds detected in riparian habitat (Table 5.1-7). This species opportunistically utilizes habitat and developed areas with suitable nesting cavities for breeding.

Several raptor nests were found in riparian habitat. These included two red-tailed hawk (*Buteo jamaicensis*) nests (one in Zone 3 and one in Zone 5), four great horned owl (*Bubo virginianus*) nests (two in Zone 5, one in Zone 3 on Cassimer Bar, and one in Zone 2 on a nest platform constructed for osprey (*Pandion haliaetus*), and three osprey nests.

During the fall, detections of neo-tropical breeding species, such as the Bullock's oriole and the western wood pee-wee, decreased substantially as these species migrated out of the area. Similar to the breeding season, the European starling was also the most abundant bird detected in riparian habitat in the fall, although their numbers increased greatly.

During the fall, the European starling represented 22% of all detections in riparian habitat, nearly double that of breeding season detections (Table 5.1-7). This likely reflects the tendency of this species to occur in large flocks. Starlings were noted to be especially abundant in study area Zones 3 and 5 during the fall where they were roosting in poplar (*Populus alba*) groves in large numbers. Notable additions in riparian habitat in the fall were the white-crowned sparrow and yellow-rumped warbler, which were prevalent in mixed species flocks (Table 5.1-7).

Table 5.1-7. The 20 Most Abundant Bird Species Detected in Riparian Habitat Point Count Surveys.

Breeding Season (n=152 surveys)			Fall Migration (n=152 surveys)		
Species	No. Detections	Percent of all Riparian Detections	Species	No. Detections	Percent of all Riparian Detections
European Starling	103	12.0	European Starling	180	21.6
Bullock's Oriole	77	9.0	White-crowned Sparrow	92	11.0
Western Wood Pee-wee	51	5.9	Yellow-rumped Warbler	81	9.7
Red-winged Blackbird	47	5.5	House Finch	61	7.3
American Robin	41	4.8	American Robin	46	5.5
Double-crested Cormorant	40	4.7	Cedar Waxwing	45	5.4
Brewer's Blackbird	39	4.5	California Quail	43	5.1
House Finch	35	4.1	Unknown Species	33	4.0
Song Sparrow	33	3.8	Northern Flicker	29	3.5
Spotted Sandpiper	33	3.8	Barn Swallow	23	2.8
Yellow Warbler	33	3.8	Unidentified Sparrow	22	2.6
Wilson's Warbler	30	3.5	Song Sparrow	21	2.5
Eastern Kingbird	26	3.0	Black-capped Chickadee	12	1.4
Mourning Dove	24	2.8	Red-winged Blackbird	12	1.4
Northern Rough-winged Swallow	24	2.8	Turkey Vulture	12	1.4
Cliff Swallow	20	2.3	Belted Kingfisher	11	1.3
California Quail	16	1.9	Lincoln's Sparrow	11	1.3
Western Kingbird	16	1.9	American Goldfinch	11	1.3
American Goldfinch	15	1.7	Gray Catbird	9	1.1
Brown-headed Cowbird	15	1.7	Black-billed Magpie	8	1.0
Total	858	83.7		835	91.3

Shrub Steppe Habitat

Fifteen percent of all bird detections recorded during breeding season point count surveys were associated with shrub steppe habitat (Figure 5.1-1). This proportion represents the second lowest of all habitat types; only idle agricultural habitat had a lower number of avian detections (Figure 5.1-1). Fewer than 10% of fall avian detections were in shrub steppe, again, less than any other habitat except idle agriculture (Figure 5.1-1). Shrub steppe may not provide high quality foraging habitat for flocking birds in comparison to available open areas and grassland.

In-plot bird detections at point count stations centered in shrub steppe habitat during the breeding season included relatively few species—only 27 total species and 3.1 ± 2.2 species/plot/survey. Relative abundance (7.5 ± 9.8 birds/plot/survey) was also low compared with other habitats. In-plot breeding season species richness and relative abundance were lower only in idle agriculture and agriculture habitats, respectively. During the fall, however, relative abundance (7.0 ± 13.0 birds/plot/survey) of in-plot bird detections in shrub steppe was lower than any other habitat type but not significantly so ($p > 0.05$). Average species richness was 2.6 ± 2.3 species/plot/survey in

the breeding season, which was close to being significantly different from the fall season (2.5 ± 1.6 species/plot/survey) at the $\alpha=0.05$ level ($p=0.067$).

The most common birds in shrub steppe habitat were species favoring relatively open areas for breeding but requiring shrubs for nest placement. Table 5.1-8 shows the 20 most commonly detected species in shrub steppe habitat. The California quail was the most abundant species in this habitat type during the breeding season (Table 5.1-8). Other shrub steppe associated nesting species include the Brewer's blackbird and western meadowlark. In addition, shrub steppe habitat near the reservoir was used by many species, including swallows and wetland and riparian nesting species, as secondary foraging habitat during the breeding season.

A significant change was noted in the most abundant avian species using shrub steppe habitat between breeding and fall migratory seasons (Table 5.1-8). Fall point count survey results were largely affected by the presence of large mixed species flocks chiefly composed of sparrows, many of which were not identifiable to species (Table 5.1-8). The white-crowned sparrow was the most abundant bird species occurring in shrub steppe habitat in the fall. The European starling was also detected in abundance as flocks moved through and across shrub steppe areas to suitable foraging and/or roosting habitats.

Agricultural Habitat

In general, avian abundance and species richness in agricultural areas were low compared to other habitat types. During breeding season point count surveys, only 16% of all birds were detected in agricultural areas, higher than idle agriculture and shrub steppe detections but far below riparian, wetland, and open water habitats (Figure 5.1-1). During the fall, the total number of birds observed in agricultural areas was more similar to riparian and wetland habitats.

In total, 29 and 30 species were detected in agricultural habitat during the breeding season and fall, respectively. Relative abundance of in-plot bird detections, a measure reflecting the specific use of agricultural lands and associated peripheral habitat areas, were 6.9 ± 4.3 birds/plot/survey, the lowest of any habitat during the breeding season (Table 5.1-3). Relative abundance increased substantially in the fall, with 11.6 ± 12.1 birds/plot/survey, third only to idle agricultural and wetland.

The mean values for the two seasons were significantly different from each other ($p < 0.05$). An average of 3.7 ± 2.1 species/plot/survey was detected in agricultural plots during the breeding season; this dropped to 2.7 ± 1.7 species/plot/survey in the fall, which differed significantly from the breeding season estimate ($p < 0.05$) (Table 5.1-3).

Table 5.1-9 lists the 20 most frequent bird species detected in agricultural areas during breeding season and fall point count surveys. This list is topped by the European starling, which may use cavities associated with agricultural facilities for nesting.

Table 5.1-8. The 20 Most Abundant Bird Species Detected in Shrub Steppe Habitat During Point Count Surveys.

Breeding Season (n=152 surveys)			Fall Migration (n=152 surveys)		
Species	No. Detections	Percent of all Shrub Steppe Detections	Species	No. Detections	Percent of all Shrub Steppe Detections
California Quail	65	13.5	White-crowned Sparrow	62	12.7
Brewer's Blackbird	61	12.6	Unidentified Sparrow	52	10.7
Western Meadowlark	41	8.5	Violet-green Swallow	46	9.4
Violet-green Swallow	37	7.7	European Starling	44	9.0
Northern Rough-winged Swallow	32	6.6	Black-billed Magpie	31	6.4
European Starling	26	5.4	Yellow-rumped Warbler	27	5.5
House Finch	25	5.2	Northern Flicker	23	4.7
American Goldfinch	22	4.6	Savannah Sparrow	23	4.7
American Robin	21	4.3	American Crow	20	4.1
Bullock's Oriole	20	4.1	House Finch	18	3.7
Mourning Dove	16	3.3	American Robin	14	2.9
Black-billed Magpie	14	2.9	Brewer's Blackbird	14	2.9
Western Kingbird	12	2.5	California Quail	10	2.1
Western Wood Pee-wee	9	1.9	Mourning Dove	10	2.1
Brown-headed Cowbird	7	1.4	Unidentified Swallow	10	2.1
Purple Finch	7	1.4	Song Sparrow	9	1.8
Osprey	5	1.0	Unknown Species	9	1.8
American Crow	4	0.8	Western Meadowlark	9	1.8
Common Raven	4	0.8	American Goldfinch	8	1.6
Song Sparrow	4	0.8	Common Raven	7	1.4
Total	483	89.4		487	91.6

The California quail was the second most abundant bird detected in agricultural areas. This species may nest in adjacent habitats, but likely moves broods into agricultural areas for cover and food. In general, bird species actually nesting within agricultural areas are few. In orchard areas, avian exclusion techniques (e.g., air cannons, netting, etc.) are used to keep birds away from valuable crops. Native birds likely use agricultural land as secondary foraging habitat during the nesting season.

Both agricultural and idle agricultural areas had relatively high numbers of sparrows and mixed-species flocks during the fall season. This noted change in use of agricultural areas by birds during the fall is reflected in the high relative abundance for this habitat type.

Table 5.1-9. The 20 Most Abundant Bird Species Detected in Agricultural Habitat During Point Count Surveys.

Breeding Season (n=152 surveys)			Fall Migration (n=152 surveys)		
Species	No. Detections	Percent of all Agriculture Detections	Species	No. Detections	Percent of all Agriculture Detections
European Starling	64	12.6	White-crowned Sparrow	195	25.3
California Quail	58	11.4	European Starling	187	24.3
American Robin	40	7.9	American Robin	98	12.7
Brewer's Blackbird	32	6.3	House Finch	63	8.2
Northern Rough-winged Swallow	30	5.9	Brewer's Blackbird	32	4.2
House Finch	27	5.3	Song Sparrow	30	3.9
American Goldfinch	24	4.7	California Quail	23	3.0
Mourning Dove	23	4.5	Unidentified Sparrow	21	2.7
Brown-headed Cowbird	20	3.9	Northern Flicker	10	1.3
Red-winged Blackbird	20	3.9	House Sparrow	9	1.2
Western Meadowlark	17	3.4	Lincoln's Sparrow	9	1.2
Killdeer	16	3.2	American Crow	8	1.0
Violet-green Swallow	14	2.8	Mourning Dove	8	1.0
Bullock's Oriole	12	2.4	Red-winged Blackbird	8	1.0
Eastern Kingbird	10	2.0	Savannah Sparrow	7	0.9
Ring-necked Pheasant	10	2.0	Unidentified Duck Species	7	0.9
American Crow	8	1.6	Yellow-rumped Warbler	7	0.9
Barn Swallow	8	1.6	American Goldfinch	6	0.8
Northern Flicker	8	1.6	Red-tailed Hawk	5	0.6
Western Wood Pee-wee	7	1.4	Black-billed Magpie	4	0.5
Total	507	88.4		770	95.7

Of the 20 avian species most frequently detected in agricultural habitat, the white-crowned sparrow was the most abundant. This species occurred in large con-specific and mixed species flocks. Notably, the Lincoln's sparrow (*Melospiza lincolnii*), song sparrow, and savannah sparrow (*Passerculus sandwichensis*) are also included in the 20 most abundant bird species found in agricultural habitat during the fall.

Idle Agricultural Habitat

Due to limited availability, idle agricultural habitat represented only a small proportion of lands included in point count surveys. Thus, only a very small proportion of birds detected during breeding season point count surveys (2%) were noted in association with idle agricultural areas (Figure 5.1-1); fall detections were only slightly higher.

Relative abundance of in-plot bird detections (a measure reflecting the specific use of plots in idle agricultural lands) was 8.0 ± 5.3 birds/plot/survey lower than all other habitat except agriculture and shrub steppe during the breeding season (Table 5.1-3). Only 21 species were

detected in idle agricultural plots during the breeding season (Table 5.1-3), likely reflecting the homogeneity of this habitat, which consists mostly of non-native grasslands.

Relative abundance in idle agricultural plots increased substantially during the fall (13.6 ± 19.9 birds/plot/survey) and exceeded that recorded in other habitat types, but species richness remained relatively low. These results are likely influenced by the large sparrow and mixed-species flocks occurring in idle agricultural areas during the fall. However, because so little idle agricultural habitat was available in the study area (approximately 5% of the Project), the validity of comparisons with other habitat types is limited.

Open Water Habitat

During surveys of avian plots within each of the five primary cover types—agriculture, idle agriculture, wetland, riparian, and shrub steppe—detections of birds were often recorded in the open water habitats associated with each plot. The open water habitats included the reservoir and the portions of the Okanogan and Methow rivers that are within the Project Boundary. Approximately 20% of all birds detected during breeding season point count surveys were recorded in open water habitat. During the fall point count surveys, more than 50% of all avian detections were in open water.

To more accurately determine avian use of Wells Reservoir during the fall, two comprehensive open water surveys were conducted by boat. The surveys covered all accessible study area aquatic habitats on the Wells Reservoir and the Okanogan River up to the Monse Bridge. Results of these surveys are presented in Table 5.1-10. Reservoir survey results included a total of 18,517 avian detections across a total of 28 species.

Open water survey results were largely influenced by a large abundance of three species: American coot, American wigeon, and scaup (including both greater and lesser species although lesser scaup are the most common), that combined accounted for more than 91% of detections within the open water habitat surveyed. Coots accounted for 69% of all avian detections, followed by wigeon (12%) and scaup (10%). All three were found to occur in large, mixed species rafts, especially in study area Zones 1, 2, and 3. Waterfowl/waterbirds were particularly abundant in Zone 3, off of the mouth of the Okanogan River; this area accounted for nearly 70% of all birds detected during reservoir surveys. Large rafts of waterfowl/waterbirds were also found in Zone 1, just upstream of the Wells Dam. When standardized by area of open water, Zone 3 was found to have nearly doubled the relative abundance of Zone 2, and three times that of Zone 1 (Table 5.1-10). Zones 4 and 5 had much lower values at 0.23 and 0.29, respectively (Table 5.1-10).

The American white pelican (*Pelecanus erythrorhynchos*), a species that was noted in small numbers during the breeding season surveys, numbered approximately 200 during the fall. The individuals present during the breeding season were non-breeding birds. The nearest breeding population of pelicans occurred less than 100 miles north of the study area. While foraging for fish on the Wells Reservoir, they often roost on the sand bar located near Cassimer Bar in Zone 3. Other common waterbirds detected on the reservoir during fall reservoir surveys included the western grebe (*Aechmophorus occidentalis*), red-necked grebe (*Podiceps grisegena*), horned grebe (*Podiceps auritus*), and pied-billed grebe (*Podilymbus podiceps*). The pied-billed grebe

may breed in small numbers in suitable wetland ponds in the study area, while the other grebe species return to the reservoir in the fall.

Table 5.1-10. Number of Avian Detections During Two Fall Reservoir Surveys by Study Area Zone.

Species	Study Area Zone					Total
	1	2	3	4	5	
American Coot	1,645	1,735	9,450		13	12,843
American Wigeon	683	308	1,199	4	40	2,234
Scaup Species	205	55	1,550		21	1,831
Canada Goose	78	57	158	20	48	361
Ring-billed Gull	35	27	118	28	12	220
Mallard	37	57	34	10	79	217
American White Pelican	7	2	133	38		180
Horned Grebe	10	26	91	9	1	137
Double-crested Cormorant	17	4	59	33	2	115
Western Grebe	56	14	33	2	1	106
Common Loon	13	11	22	15	1	62
Common Merganser	10			27		37
Unknown Waterfowl			35			35
Pied-billed Grebe		8	3		11	22
Unknown Duck	20			2		22
Great Blue Heron	1			11	4	16
California Gull	1	4	6	2	1	14
Gadwall	5		5		4	14
Ruddy Duck			7	2		9
Blue-winged Teal	8					8
Red-necked Grebe	2		5			7
Belted Kingfisher				2	3	5
Cinnamon Teal					4	4
Turkey Vulture			1		3	4
Great Egret		2		1		3
Killdeer			2	1		3
Osprey				3		3
Wood Duck		2			1	3
Northern Harrier					1	1
Red-tailed Hawk		1				1
Totals	2,833	2,313	12,911	210	250	18,517

5.2 Amphibian and Reptile Surveys

Surveys conducted at the 34 wetland and pond sites, 76 avian point count stations, and 19 rocky habitat survey sites documented four amphibian and seven reptile species in the Wells Hydroelectric Project study area. Amphibians were documented primarily during the May and June surveys at or near ponds and wetlands used as breeding habitats. Reptiles were recorded during the various surveys in shrub steppe, wetland, riparian, and idle agriculture habitats and at several of the rocky upland areas.

5.2.1 Amphibians

The four amphibian species documented in the Wells study area include: Pacific treefrog (*Pseudacris* [*Hyla*] *regilla*), Great Basin spadefoot toad (*Scaphiopus* [*Spea*] *intermontanus*), bullfrog (*Rana catesbeiana*), and long-toed salamander (*Ambystoma macrodactylum*). According to the predicted range presented by Dvornich et al. (1997), the study area is also within geographic range of three other species: tiger salamander (*A. tigrinum*), Columbia spotted frog (*Rana luteiventris*) (reported record at Entiat, McAllister 1995), and western toad (*Bufo boreas*) (documented at Rocky Reach Reservoir by Duke Engineering [2000]). The treefrog, spadefoot toad, and long-toed salamander were also documented in habitats at Rocky Reach Reservoir (Duke Engineering 2000).

One or more amphibian species was detected at 17 of 34 (50%) breeding habitat survey sites during the May-June amphibian breeding season. Seven of the sites had more than one amphibian species present. The number of individual adults, juveniles, tadpoles/larvae, or egg masses at any one site was typically less than 10. The largest number of individuals detected at one site was a pond on Bridgeport Bar, which had 13 adult/juvenile and 28 tadpole bullfrogs, along with two painted turtles (*Chrysemys picta*). Twenty treefrog tadpoles were noted on Kirk Island ponds.

The treefrog was detected at 10 survey locations and was the most commonly observed native amphibian species. Direct evidence of treefrog breeding was confirmed at five wetlands/ponds (Table 5.2-1). However, the most common amphibian species overall was the bullfrog, which is an introduced non-native species. Bullfrogs were detected at 11 sites throughout the study area and appeared to be particularly common in ponds on Cassimer Bar and at Bridgeport Bar that are connected hydraulically to the main reservoir (Appendix E). Although larval or juvenile bullfrogs were only noted at three locations, it is likely that bullfrogs breed in most of the ponds and wetlands in the study area. Bullfrog populations are particularly large where the levees maintain more stable water levels in the ponds to allow for the species' multi-year larval development. The presence of what appears to be a sizable bullfrog population may lower native

amphibian populations in the area. Also, as was noted by Duke Engineering (2000), amphibian breeding distribution is inversely related to fish abundance.



Spadefoot toad. Photo by Bob Donnor © 2005 used with permission

(Corkran and Thoms 1996). Spadefoot toads successfully breed in small ephemeral pools because

Spadefoot toads were detected at two survey sites—on the westernmost Kirk Island located between Brewster and Pateros, and in riparian habitat along the Okanogan River. The study area is within mapped core habitat for the spadefoot toad (Dvornich et al. 1997). This species can occur in many different habitats including sagebrush, grassland, or open forests

larvae develop rapidly and can cannibalize each other under crowded conditions. Therefore, there are likely many locations within the study area where spadefoot toads may occur.



Long-toed salamander eggs

The long-toed salamander was documented at only one site, the emergent wetland located just south of State Highway 153 near the mouth of the Methow River. Several egg masses were found among the cattail-dominated emergent wetland. The study area is located at the boundary of peripheral habitat mapped for this species in Washington (Dvornich et al. 1997). Within steppe habitats of eastern Washington, long-toed salamanders breed in shallow and often seasonal pools (Corkran and Thoms 1996). Given that long-toed salamander eggs are very inconspicuous, it is very likely that other wetlands in the study area support breeding sites.

No evidence of amphibian breeding was noted in wetlands that lack a natural berm or man-made levee as separation from the reservoir. So, although there are 287 ac of emergent wetland mapped in the Wells study area (EDAW 2006), only a relatively small percentage of this area is likely suitable for native amphibian breeding.

5.2.2 Reptiles

Ten individual reptiles were recorded in the 34 amphibian breeding survey areas, while nine reptiles were found in the 19 reptile-specific survey areas, three were found during surveys at 76 avian point count plots, and two were noted incidentally. When standardized by level of survey effort, the reptile detection rate was quite low. The nine reptiles detected during 43.8 person-hours of survey in the 19 reptile survey areas results in an index of 0.21 detections per person-hour (Table 5.2-2). Detection rates at shrub steppe avian point count survey plots were 0.36 detections per person-hour, while the August surveys of all 76 avian point count survey plots had 0.04 detections per person-hour.

Seven reptile species were detected during the 2005 surveys: painted turtle (*Chrysemys picta*), gopher snake (*Pituophis catenifer*), yellow-bellied racer (*Coluber constrictor*), sagebrush lizard (*Sceloporus graciosus*), western terrestrial garter snake (*Thamnophis elegans*), common garter snake (*Thamnophis sirtalis*), and western rattlesnake (*Crotalus viridis*).

- **Painted Turtles** - Painted turtles were observed at four sites: (1) in the protected areas near Washburn Island (Zone 3), (2) at a wetland 3 miles south of Pateros (Zone 1), (3) at a wetland mid-way between Pateros and Brewster (Zone 2), and (4) near Park Island (Zone 4). It is likely that a sizable painted turtle population exists in suitable wetland areas throughout the study area.

Table 5.2-1. Amphibian and Reptile Detections at Wetland and Pond Survey Locations, May-June 2005.

Site No. ¹	Method	Observations	Comments
1	VES	1 western terrestrial garter snake	
2	VES	no observations	heavily impacted by grazing
3	VES	8 bullfrog adults	heavily impacted by grazing
3	Auditory	1 treefrog in distance	
3	Funnel trap	2 adult bullfrogs on 6/2	
4	VES	no observations	
5	VES	5 treefrog egg masses, unidentified snake dead in water	
6	VES	none	
7	VES	spadefoot toad vocalization, treefrog adults + eggs	heard toad at west end
8	VES	no observations	poor quality habitat--dense cattail, water body accessible to fish
14	VES	common garter snake, gopher snake skin	
15	VES	bullfrog adult (auditory)	
16	VES	13 adult/juvenile bullfrogs and 28 tadpoles, painted turtle--2" carapace	
16	Auditory	bullfrogs and treefrogs	
17	VES	bullfrog--5 juveniles 1 treefrog (auditory)	
18	VES	2 bullfrog juveniles 1 treefrog tadpole	
19	VES	no observations	no emergent, dense reed canarygrass
20	VES	no observations	
21	VES	no observations	
21	Auditory	several treefrogs	calling from downstream of pond
22	VES	no observations	
23	VES	bullfrog	
24	VES	1 turtle	
25	VES	no observations	no surface water-- patches of cattail, mostly weedy spp.
26	VES	no observations	cattail is dewatered
27	VES	long-toed salamander eggs, treefrog eggs	very little surface water
27	Funnel traps	no observations	only 4-6" water in traps
28	VES	3 western terrestrial garter snakes	Methow River islands
29	VES	1 turtle	water dropped 12-16" overnight; thousands of small fish
29	Auditory	bullfrog + treefrog (in distance)	
30	VES	no observations	surveyed 1/3 of shoreline + ditch
30	Auditory	no observations	
31	VES	no observations	
32	VES	bullfrog	
33	Funnel traps	3 adult bullfrogs on 6/8	
34/35	VES	1 dead juvenile painted turtle	numerous small fish in wetland
36	VES	no observations	
37	VES	no observations	
38	VES	no observations	
39	VES	6 treefrog tadpoles	

¹ See Appendix E for site locations.

Table 5.2-2. Survey Results at Reptile Survey Areas, May-August 2005.

Site ¹	Date	Survey Time (pers-hrs)	Observations
Rept 1	5/25/05	1.0	2 rattlesnakes
Rept 1	6/20/05	2.0	no observations
Rept 10	8/4/05	1.5	no observations
Rept 12	8/9/05	2.7	1 common garter snake
Rept 13	6/9/05	2.0	no observations
Rept 14	6/21/05	1.3	no observations
Rept 15	6/3/05	1.5	no observations
Rept 16	6/9/05	2.0	no observations
Rept 17	6/2/05	2.0	no observations
Rept 18	6/7/05	2.0	1 spadefoot toad
Rept 19	6/21/05	2.0	no observations
Rept 2	6/20/05	0.7	no observations
Rept 3	5/25/05	4.0	1 rattlesnake, 1 sagebrush lizard, 1 racer
Rept 4	6/20/05	4.0	1 rattlesnake
Rept 5	8/4/05	0.7	no observations
Rept 6	8/4/05	0.3	no observations
Rept 6	8/9/05	0.8	no observations
Rept 7	6/21/05	6.3	racer
Rept 9	8/4/05	0.8	dry gopher snake skin
Rept 9	6/21/05	1.0	no observations
Rept 8	6/21/05	5.2	bullfrog
Reptile Area Total		43.8	9 reptile detections (0.21 detections/person-hour)
June surveys at 17 shrub steppe avian survey stations	6/20-24/05	5.61	1 gopher snake in Zone 5 shrub steppe station and 1 gopher snake in Zone 1 shrub steppe station
		June Subtotal	2 reptile detections (0.36 detections per person-hour)
August reptile surveys at 76 avian survey stations	8/2-6/05	25.33	1 racer in Zone 2 shrub steppe station
		August Subtotal	1 reptile detection (0.04 detections per person-hour)
Incidental sighting in Pateros	8/9/05	--	2 common garter snake
Incidental sighting at avian point count survey station (wetland plot)	10/7/05	--	1 gopher snake (dead)

¹ See Appendix F for site locations.

- **Garter Snakes** - Common garter and western terrestrial garter snakes were found at one and two wetland/pond breeding survey sites, respectively (Table 5.2-1). Common garter snakes were also detected at one of the reptile survey locations and incidentally in the town of Pateros (Table 5.2-2).
- **Gopher Snake** - The gopher snake was observed at five locations in the study area. One observation was in a wetland located between Brewster and Pateros (Amphibian Survey Site #14) (Table 5.2-1, Appendix E) during the amphibian VES surveys. One gopher snake was detected in one of the 19 reptile survey locations near Washburn Island (Reptile Site 9) (Appendix F). Two gopher snake detections were in shrub steppe habitat at two of the avian survey stations in Zones 1 and 5 (Table 5.2-2), and the other gopher snake detection was a skin found on a road adjacent to one of the avian point count stations in wetland habitat.
- **Yellow-bellied Racer** - Three racers were observed at three different shrub steppe sites along the lower and upper portions of the study area (Zones 1, 2, and 4).
- **Northern Sagebrush Lizard** - The northern sagebrush lizard is a federal Species of Concern that is relatively rare in Washington (Nussbaum et al. 1983, McAllister 1995, Storm and Leonard 1995). Sagebrush lizards occur in open, arid habitats, including shrub steppe and open conifer woodlands. One northern sagebrush lizard was observed incidentally just north of the Wells Dam outside the Project Boundary. At Rocky Reach Reservoir, the sagebrush lizard was documented at four locations by Duke Engineering (2000). The study area is located near the perimeter of what is mapped as core zone for this species (Dvornich et al. 1997).
- **Western Rattlesnake** - Four individual rattlesnakes were detected at three different sites, all on the eastern side of the reservoir in Zone 1 (Table 5.2-2). Undoubtedly, other sites in the study area support rattlesnake populations, but this area of Zone 1 appears particularly suitable.

Other reptile species with ranges that overlap the study area include: short-horned lizard (*Phrynosoma douglasii*), western fence lizard (*Sceloporus occidentalis*), western skink (*Eumeces skiltonianus*), rubber boa (*Charina bottae*), and night snake (*Hypsiglena torquata*). Of these species, only the western fence lizard was found at Rocky Reach (Duke Engineering 2000).

5.3 Small Mammal Surveys

Small mammal surveys resulted in 160 captures using live trapping methods. Survey effort included 3,000 Sherman trap-nights, 150 Havahart trap-nights, and 150 pitfall trap-nights. Captures included 128 first-time captures and 32 recaptures. Twelve small mammal species were represented in the captures, including four mice, two shrew, and three vole species, and the bushy-tailed woodrat (*Neotoma cinerea*), cottontail rabbit (*Sylvilagus nuttallii*), and long-tailed weasel (*Mustela frenata*). Sherman live traps accounted for 94% of all captures. Only one capture was made with the Havahart traps—a cottontail rabbit in idle agriculture habitat in Zone 4. Pitfall traps resulted in eight captures of shrews plus several spadefoot toads. Overall, there

were 4.3 captures per 100 Sherman trap-nights. This value is lower than the 10.4 captures per 100 Sherman trap-nights reported at Rocky Reach Reservoir (Duke Engineering 2000).



Deer Mouse. Photo by Bob Donnor © 2005 used with permission

The deer mouse (*Peromyscus maniculatus*) was the most common small mammal species captured during the surveys, representing nearly 58% of the first-time captures (Table 5.3-1). Deer mice were captured at 6 of the 10 sampling sites in the study area, including at least one site in each of the five primary habitat types. The second most abundant species was the western harvest mouse (*Reithrodontomys megalotis*), which accounted for 16.4% of the captures (Table 5.3-1). Western harvest mice were documented in three habitats: idle agriculture, riparian, and wetland. The meadow vole (*Microtus pennsylvanicus*)

was the next most common species, with 10 captures (7.8%) (one other specimen appeared to be a montane vole [*Microtus montanus*]). All of the meadow voles were found in wetland or riparian sampling sites, while the one potential montane vole was trapped in the idle agriculture site sampled in Zone 4.

Table 5.3-1. Relative Proportion of First-time Captures by Species.

Species	Percent of First-time Captures
Deer Mouse	57.8
Great Basin Pocket Mouse	1.6
Western Harvest Mouse	16.4
Sagebrush Vole	0.8
Montane Vole	0.8
Meadow Vole	7.8
Vagrant/Masked Shrew	6.3
Bushy-tailed Woodrat	1.6
House Mouse	3.9
Cottontail Rabbit	0.8
Long-tailed Weasel	2.3
Total	100.0

In total, eight shrews were captured during the sampling; seven were in pitfall traps, while one was in a Sherman trap. Seven of the shrews most closely resembled vagrant shrews (*Sorex vagrans*), but one appeared to be a masked shrew (*S. cinereus*) based on external morphological features. However, it is virtually impossible to distinguish between these two species without dissecting scope and reference specimens. Therefore, we combined all of the shrews into a vagrant/masked shrew category. Shrews were caught in all habitat types except shrub steppe.

Five captures of the house mouse (*Mus musculus*) were recorded at two sites along the Okanogan River: an agricultural site and a riparian site. The Great Basin pocket mouse (*Perognathus parvus*) was found in only one plot, the shrub steppe site on Bridgeport Bar in the WWA. Three long-tailed weasels were captured in adjacent Sherman traps on the same night in the riparian site sampled along the Okanogan River. One sagebrush vole (*Lagurus curtatus*) was captured in the idle agriculture plot sampled in Zone 4, the same site that two bushytailed woodrats were caught near slash piles of fruit trees that had been cut down.

Incidental mammal detections during April-October, 2005 include:

- Mule deer (*Odocoileus hemionus*) in Zones 3, 4, and 5
- Black bear (*Ursus americanus*) (killed by vehicle near Wells Dam)
- Beaver (*Castor canadensis*) sign at various locations along the reservoir in all 5 zones
- Muskrats (*Ondatra zibethicus*) and sign in Zones 3, 4, and 5
- Mink (*Lutreola lutreola*) in Zone 3
- Raccoon (*Procyon lotor*) in Zone 5
- Coyote (*Canis latrans*) sign in Zones 3, 4, and 5
- Striped skunk (*Mephitis mephitis*) in Zone 3

Riparian sites accounted for 62 of the 128 (48%) first-time small mammal captures. Wetland, idle agriculture, agriculture, and shrub steppe habitat types followed in order of decreasing captures (Table 5.3-2). The following sections describe the results in each of the five habitat types.

5.3.1 Agricultural Habitat

There were 15 first-time captures and six recaptures in the two agriculture sampling sites (Table 5.3-2). Four species were documented in this habitat type: deer mouse (40% of original captures), vagrant/masked shrews (36%), house mouse (13%), and meadow vole (13%). In terms of first-time captures per unit effort, agriculture had 2.27 captures per 100 trap-nights (Table 5.3-3). Deer mice were caught at approximately 0.95 captures per 100 trap-nights, followed by shrews at 0.79 (Table 5.3-3). The Shannon-Weiner Diversity Index for agriculture was higher than any other habitat type and nearly identical to that found in wetland sites, even though the species richness was greater in both riparian and idle agriculture plots (Table 5.3-4). The overall small mammal Lincoln-Peterson Index was estimated to be approximately 20, which was three times greater than shrub steppe but only one third of the next highest habitat type, idle agriculture (Table 5.3-4). The Lincoln-Peterson Index allows for comparison of relative abundance estimates that are calculated based on captures of marked and unmarked individuals in a population over a period of time.

Table 5.3-2. Relative Abundance¹ of Small Mammal Species in Five Habitat Types in the Wells Study Area.

Species	Wrens Study Area.											
	Habitat Type										Total	
	Shrub Steppe		Agric.		Idle Agric.		Riparian		Wetland			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CAPTURE RATES (UNMARKED ANIMALS)												
Deer Mouse	3	60	6	40.0	1	5.3	53	85.5	11	42.3	74	57.8
Great Basin Pocket Mouse	2	40	0	--	0	--	0	--	0	--	2	1.6
Western Harvest Mouse	0	--	0	--	13	68.4	1	1.6	7	26.9	21	16.4
Sagebrush Vole	0	--	0	--	1	5.3	0	--	0	--	1	0.8
Montane Vole	0	--	0	--	1	5.3	0	--	0	--	1	0.8
Meadow Vole	0	--	2	13.3	0	--	2	3.2	6	23.1	10	7.8
Vagrant/Masked Shrew	0	--	5	35.7	0	--	1	1.6	2	7.7	8	6.3
Bushy-tailed Woodrat	0	--	0	--	2	10.0	0	--	0	--	2	1.6
House Mouse	0	--	2	13.3	1	5.3	2	3.2	0	--	5	3.9
Cottontail Rabbit	0	--	0	--	1	5.3	0	--	0	--	1	0.8
Long-tailed Weasel	0	--	0	--	0	--	3	4.8	0	--	3	2.3
Totals	5	100.0	15	100.0	19	100	62	100	26	100	128	100
CAPTURE-RECAPTURE RATES (ALL SPECIES)												
Unmarked Captures	5	100	15	71.4	20	90.9	62	72.1	26	100.0	128	80.0
Marked Captures	0	0	6	28.6	2	9.1	24	27.9	0	0.0	32	20.0
Totals	5	100	21	100	22	100	86	100	26	100	160	100

¹ Relative abundance is defined in terms of capture rate. There were 600 Sherman trap-nights, 30 pitfall trap-nights, and 30 Havahart trap-nights per habitat type.

Table 5.3-3. Small Mammal Capture Rates (No. per 100 trap-nights) During Wells Wildlife Surveys.

Species	Habitat Type					Total
	Agriculture	Idle Agriculture	Shrub Steppe	Wetland	Riparian	
Deer Mouse	0.95	0.16	0.48	1.75	8.41	2.35
Great Basin Pocket Mouse	0.00	0.00	0.32	0.00	0.00	0.06
Western Harvest Mouse	0.00	2.06	0.00	1.11	0.16	0.67
Sagebrush Vole	0.00	0.16	0.00	0.00	0.00	0.03
Montane Vole	0.00	0.16	0.00	0.00	0.00	0.03
Meadow Vole	0.32	0.00	0.00	0.95	0.32	0.32
Vagrant/Masked Shrew	0.79	0.00	0.00	0.32	0.16	0.25
Bushy-tailed Woodrat	0.00	0.32	0.00	0.00	0.00	0.06
House Mouse	0.32	0.16	0.00	0.00	0.32	0.16
Cottontail Rabbit	0.00	3.33	0.00	0.00	0.00	0.03
Long-tailed Weasel	0.00	0.00	0.00	0.00	0.48	0.10
Totals	2.27	3.03	0.76	3.94	9.39	4.06

Table 5.3-4. Small Mammal Population Index Values (number/trapping grid) and Diversity Parameters in Five Habitat Types in the Wells Study Area.

Parameter ¹	Habitat Type					Total
	Agriculture	Idle Agric.	Shrub Steppe	Wetland	Riparian	
Lincoln-Peterson Index (day 1)	17.0	23.5	3.0	63.0	114.0	--
95 percent Confidence Interval (day 1)	9.3-30.9	10.1--54.6	1.2--7.6	18.4--216.0	104.3--124.7	--
Lincoln-Peterson Index (day 2)	20.6	59.0	7.0	96.5	83.6	--
95 percent Confidence Interval (day 2)	13.4--31.6	23.14--151.0	2.7--18.5	36.3--256.9	56.0--124.8	--
Shannon-Wiener Diversity Index	1.27	1.26	0.67	1.25	0.64	1.41
Evenness	0.92	0.65	0.97	0.90	0.35	0.61
Simpson's Dominance	0.31	0.44	0.52	0.31	0.74	0.38
Total Individuals	15	20	5	26	62	128
Species Richness	4	7	2	4	6	10

¹See Section 4.1 for calculation formulas.

5.3.2 Idle Agriculture Habitat

Twenty-two total captures occurred in the two idle agriculture sites. Western harvest mice accounted for 68% of the first-time captures (Table 5.3-2); six other species were documented in these two plots, resulting in the greatest species richness of the five habitat types sampled (Table 5.3-4). The Lincoln-Peterson Index for this habitat type was in the middle of the five habitat type values, while the Shannon-Weiner Diversity was 1.26, essentially the same as agriculture and wetland (Table 5.3-4). The one cottontail rabbit caught equated to 3.33 captures per 100 Havahart trap-nights, while the harvest mouse capture rate was 2.06 per 100 Sherman live trap-nights (Table 5.3-3). These results should be interpreted with caution because of the sample sizes. Other species captured in idle agriculture sites were the house mouse, deer mouse, montane vole, sagebrush vole, and bushy-tailed woodrat.

Idle agriculture was the only habitat type in which the sagebrush vole and bushy-tailed woodrat were captured, although it is very probable that woodrats also occur in riparian habitats, while sagebrush voles would be more abundant in suitable shrub steppe habitats. The two idle agriculture plots differed greatly in vegetation composition and current land use, which likely led to the large differences in species abundance at the two sites. The Zone 4 site was bordered by shrub steppe and had brush piles and dense herbaceous vegetation that grew to over 3 ft in height.

In comparison, the Zone 5 idle agriculture site, although also characterized by recently removed fruit trees, lacked brush piles and was actively grazed by horses, which substantially reduced the herbaceous vegetation cover and height. Both were about the same distance from the river and associated riparian habitats.

5.3.3 Shrub Steppe Habitat

Sampling in shrub steppe documented only two species—the deer mouse and Great Basin pocket mouse (Table 5.3-2). Only five captures were made, which equates to 0.76 captures per 100 trap-nights (Table 5.3-3). This capture rate is three times lower than what was found in the next

lowest habitat type, agriculture. Similarly, the Lincoln-Peterson Index was 7.0 after all trapping dates, which is substantially lower than other habitat types (Table 5.3-4). The Shannon-Weiner Diversity Index was the second lowest—0.67—with only riparian being slightly lower (Table 5.3-4). The two shrub steppe areas that were sampled—one on Bridgeport Bar and one next to Wells Dam—were both in good condition and relatively large, so it is not known why so few captures were recorded in these areas. During the small mammal sampling at the Wishbone Wind Power Demonstration Project, located approximately 30 miles south, six species were documented in sagebrush shrub steppe habitat (EDAW and Mark Stalmaster & Associates 2002). There, the Great Basin pocket mouse and deer mouse were the dominant species encountered in sagebrush habitats. The Great Basin pocket mouse was the dominant species in sagebrush sampling sites at Rocky Reach (Duke Engineering 2000).

5.3.4 Riparian Habitat

A total of 86 captures were made in the two riparian sampling sites (Table 5.3-2). Although six different species were captured, riparian habitat type had a low diversity index of 0.64 (Table 5.3-4). This is probably because the deer mouse accounted for more than 85% of the first-time captures (Table 5.3-2). The capture rate of deer mice was 8.4 captures per 100 trap-nights (Table 5.3-3). The overall capture rate was nearly 10 per 100 trap-nights, which was nearly three times the capture rate in wetlands and nearly four times the rate in agricultural sites. The Lincoln-Peterson Index was 83.6 after the entire trapping effort, which was nearly as high as the wetland index (Table 5.3-4).

5.3.5 Wetland Habitat

The 26 captures in wetland sites were dominated by deer mice, western harvest mice, and meadow voles (Table 5.3-2). Due to the lack of recaptures, the Lincoln-Peterson Index is greater in this habitat than in riparian habitat, which had more captures but a substantial number of recaptures as well. Having three species relatively evenly represented resulted in a high diversity index and low dominance index (Table 5.3-4).



Beaver sign

5.4 RTE SPECIES

For the Wells Hydroelectric Project, RTE species are defined to include all wildlife species with a Washington State or federal protective status designated by WDFW or the U.S. Fish and Wildlife Service (USFWS) that are not solely designated as game species. Table 5.4-1 lists the RTE species potentially occurring in the Project vicinity, including the following:

- Those species that are known to occur in the study area;
- Species for which suitable habitat exists in the study area;
- Species whose North American range includes the Project vicinity though no suitable habitat exists in the study area; and
- Species specifically identified in correspondence with the USFWS as potentially occurring in the Project vicinity (see Appendix B).

Table 5.4-2 describes RTE status designations included for the Wells Hydroelectric Project with a description of potential implications for species management, monitoring, and protection.

Based on review of species range and habitat requirements documented in existing information and databases, 52 RTE species, including 39 avian, three reptile, two amphibian, and eight mammal species, were identified as potentially occurring in the Project vicinity prior to the initiation of wildlife field studies (Table 5.4-1). However, there are seven RTE species for which no suitable habitat occurs in the Project study area.

Twenty-five RTE species were detected in the Wells Hydroelectric Project study area during 2005 wildlife field studies (Table 5.4-3). In general, RTE species detected in the study area during 2005 field studies, with the exception of the bald eagle (*Haliaeetus leucocephalus*), were limited to species with relatively minor status designations and associated minimal requirements for species monitoring, management, and protection. Of the 25 RTE species detected during the 2005 wildlife inventory, only one species is designated as a federal threatened or endangered species, the bald eagle. The American white pelican was also documented in the Project area. This species is listed as being a state endangered and priority species (Table 5.4-3). As mentioned previously, a flock of approximately 200 American white pelicans uses the Wells Reservoir during the summer and fall. There are two active bald eagle nests located within 0.5 mile of the study area. One nest is within the Project Boundary near the town of Bridgeport while the other nest that was active in 2005 is located outside of the Project Boundary in a wooded draw northwest of Wells Dam.

Table 5.4-1. RTE Wildlife Species Potentially Occurring in the Wells Hydroelectric Project Study Area.

Common Name	Scientific Name	RTE Status	Known to Occur	Potential Habitat Present	In Range But No Habitat In Study Area
Federally Listed Species					
Pygmy Rabbit*	<i>Brachylagus idahoensis</i>	FE SE SP		X	
Bald Eagle*	<i>Haliaeetus leucocephalus</i>	FT ST SP	X		
Lynx*	<i>Lynx canadensis</i>	FT ST SP			X
Gray Wolf*	<i>Canis lupus</i>	FT SE SP			X
Federal Candidate Species					
Sage Grouse*	<i>Centrocercus urophasianus</i>	FC ST SP		X	
Yellow-billed Cuckoo*	<i>Coccyzus americanus</i>	FC SC SP		X	
Washington Ground Squirrel	<i>Spermophilus washingtoni</i>	FC SC		X	
Federal Species of Concern					
Northern Goshawk	<i>Accipiter gentilis</i>	FCo SC			X
Ferruginous Hawk	<i>Buteo regalis</i>	FCo ST		X	
Peregrine Falcon	<i>Falco peregrinus</i>	FCo SS SP		X	
	<i>Tympanuchus phasianellus</i>	FCo ST SP		X	
Sharp-tailed Grouse					
Black Tern	<i>Chlidonias niger</i>	FCo SM		X	
Burrowing Owl	<i>Athene cunicularia</i>	FCo SC SP			X
Loggerhead Shrike	<i>Lanius ludovicianus</i>	FCo SC SP	X		
Sagebrush Lizard	<i>Sceloporus graciosus</i>	FCo SC	X		
Western Toad	<i>Bufo boreas</i>	FCo SC		X	
Columbia Spotted Frog	<i>Rana luteiventris</i>	FCo SC		X	
Western Gray Squirrel	<i>Sciurus griseus</i>	FCo ST	X		
State Endangered Species					
American White Pelican	<i>Pelecanus erythrorhynchos</i>	SE SP	X		
State Candidate Species					
Golden Eagle	<i>Aquila chrysaetos</i>	SC SP	X		
Merlin	<i>Falco columbarius</i>	SC SP		X	
Vaux's Swift	<i>Chaetura vauxi</i>	SC SP		X	
White-headed Woodpecker	<i>Picoides albolarvatus</i>	SC SP			X
Lewis's Woodpecker	<i>Melanerpes lewis</i>	SC SP			X
Pileated Woodpecker	<i>Dryocopus pileatus</i>	SC SP			X
Purple Martin	<i>Progne subis</i>	SC SP		X	
Sage Thrasher	<i>Oreoscoptes montanus</i>	SC SP		X	
Sage Sparrow	<i>Amphispiza belli</i>	SC SP		X	
Merriam's Shrew	<i>Sorex merriami</i>	SC		X	
State Monitor Species					
Great Egret	<i>Ardea alba</i>	SM		X	
Turkey Vulture	<i>Cathartes aura</i>	SM	X		
Osprey	<i>Pandion haliaetus</i>	SM	X		
Caspian Tern	<i>Sterna caspia</i>	SM		X	
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	SM		X	

Table 5.4-1. RTE Wildlife Species Potentially Occurring in the Wells Hydroelectric Project Study Area.

Common Name	Scientific Name	RTE Status	Known to Occur	Potential Habitat Present	In Range But No Habitat In Study Area
Pacific Gopher Snake	<i>Pituophis catenifer</i>	SM	X		
Night Snake	<i>Hypsiglena torquata</i>	SM		X	
Sagebrush Vole	<i>Lemmyscus curtatus</i>	SM		X	
State Priority Species					
Horned Grebe	<i>Podiceps auritus</i>	SP	X		
Red-necked Grebe	<i>Podiceps grisegena</i>	SP	X		
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	SP	X		
Black Crowned Night Heron	<i>Nycticorax nycticorax</i>	SP SM		X	
Great Blue Heron	<i>Ardea herodias</i>	SP SM	X		
Wood Duck	<i>Aix sponsa</i>	SP	X		
Barrow's Goldeneye	<i>Bucephala islandica</i>	SP	X		
Bufflehead	<i>Bucephala albeola</i>	SP	X		
Hooded Merganser	<i>Lophodytes cucullatus</i>	SP	X		
Swainson's Hawk	<i>Buteo swainsoni</i>	SP SM		X	
Prairie Falcon	<i>Falco mexicanus</i>	SP		X	
Wilson's Phalarope	<i>Phalaropus tricolor</i>	SP		X	
	<i>Eremophila alpestris</i>	SP		X	
Streaked Horned Lark	<i>strigata</i>				
State Sensitive Species					
Common Loon	<i>Gavia immer</i>	SS SP	X		
Colonial Roosting Bats	Various species	Various		X	

Species Status: FT=Federal Threatened; FCo=Federal Species of Concern; SE=State Endangered; ST=State Threatened; SC=State Candidate; SS=State Sensitive; SP=State Priority; SM=State Monitor. Definitions provided in Table 5.4-2.

* Identified through correspondence with the USFWS (see Appendix B) as potentially occurring in the Project vicinity.

Table 5.4-2. Wells Hydroelectric Project RTE Status Designations.

RTE Status Designations	Abbrev.	Designating Agency	Status Definition
Federal Endangered	FE	USFWS	An “endangered” species is one that is in danger of extinction throughout all or a significant portion of its range.
Federal Threatened	FT	USFWS	A “threatened” species is one that is likely to become endangered in the foreseeable future.
Federal Candidate	FC	USFWS	A species with a USFWS or National Marine Fisheries Service (NMFS) published “notice of review” that identifies it as potentially meeting the definition of threatened or endangered. Through the notice of review, additional biological information is sought to complete a status review for listing.
Federal Species of Concern	FCo	USFWS	Species and subspecies that are not officially listed under the Endangered Species Act (ESA) but warrant special attention to ensure their conservation.
State Endangered	SE	WDFW	Defined in WAC 232-12-297, Section 2.4, to include "any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state."
State Threatened	ST	WDFW	Defined in WAC 232-12-297, Section 2.5, to include "any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats."
State Candidate	SC	WDFW	Defined in WDFW Policy M-6001 to include fish and wildlife species that the Department will review for possible listing as State Endangered, Threatened, or Sensitive. A species will be considered for designation as a State Candidate if sufficient evidence suggests that its status may meet the listing criteria defined for State Endangered, Threatened, or Sensitive.
State Sensitive	SS	WDFW	Defined in WAC 232-12-297, Section 2.6, to include "any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats."
State Species of Concern	SCo	WDFW	Include those species listed as State Endangered, State Threatened, State Sensitive, or State Candidate, as well as species listed or proposed for listing by the USFWS or NMFS.
State Priority Species	SP	WDFW	Species requiring protective measures and/or management guidelines to ensure their perpetuation. Priority species are identified by WDFW based on the following three criteria: (1) State Listed and Candidate Species; (2) Vulnerable Aggregations; and (3) Species of Recreational, Commercial, and/or Tribal Importance that are Vulnerable.
State Monitor Species	SM	WDFW	Those that require management, survey, or data emphasis for one or more of the following reasons: (a) They were classified as endangered, threatened, or sensitive within the previous 5 years; (b) They require habitat that is of limited availability during some portion of their lifecycle; (c) They are indicators of environmental quality; and (d) There are unresolved taxonomic questions that may affect their candidacy for listing as endangered, threatened, or sensitive species.

Source: Developed by EDAW.

Table 5.4-3. Number of RTE Wildlife Detections in the Wells Hydroelectric Project Study Area During 2005 Wildlife Studies.¹

Common Name	Scientific Name	RTE Status ²	Zone					Notes on Detections:
			1	2	3	4	5	
Federally Listed Species								
Bald Eagle	<i>Haliaeetus leucocephalus</i>	FT ST SP	3	0	0	X ³	0	Repeated sightings of individuals in lower study area zones and near nest in Zone 4
Federal Species of Concern								
Sagebrush Lizard	<i>Sceloporus graciosus</i>	FCo SC	1	0	0	0	0	Observed outside of Project Boundary at one location near Zone 1
Black Tern	<i>Chlidonias niger</i>	FCo SM	0	0	2	0	0	Pair observed during spring in sand bar of Zone 3
Peregrine Falcon	<i>Falco peregrinus</i>	FCo SS SP	0	0	0	0	1	Single individual noted in Zone 5
State Listed Species								
American White Pelican	<i>Pelecanus erythrorhynchos</i>	SE SP	32	2	168	42	0	Occurrence generally limited to the non-breeding season. Roost on sand bar in Zone 3
State Candidate Species								
Golden Eagle	<i>Aquila chrysaetos</i>	SC SP	1	0	0	0	0	Single individual noted in Zone 1
State Monitor Species								
Great Egret	<i>Ardea alba</i>	SM	1	1	1	3	1	Occasional detections in study area wetlands
Turkey Vulture	<i>Cathartes aura</i>	SM	0	0	35	1	0	Increased numbers noted during migration
Osprey	<i>Pandion haliaetus</i>	SM	1	5	13	5	3	Artificial nest structures located throughout study area
Caspian Tern	<i>Sterna caspia</i>	SM	X	X	X	1	X	Non-breeding birds noted in all study area zones.
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	SM	0	0	0	0	1	One individual detected in Zone 5 grassland
Pacific Gopher Snake	<i>Pituophis catenifer catenifer</i>	SM	0	1	0	0	2	Limited detections in shrub steppe habitat of Zones 2 and 5
Sagebrush Vole	<i>Lagurus curtatus</i>	SM	0	0	0	1	0	Single individual trapped in idle agriculture of Zone 4
State Priority Species								
Horned Grebe	<i>Podiceps auritus</i>	SP	12	26	96	9	1	Detected on the reservoir and in suitable habitat in all zones
Red-necked Grebe	<i>Podiceps grisegena</i>	SP	X	X	X	X	X	Detected on the reservoir and in suitable habitat in all zones
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	SP	4	4	11	8	40	Breeding colony in poplars near mouth of Okanogan River
Wood Duck	<i>Aix sponsa</i>	SP	0	12	4	3	2	Occasional detections around WWA and in the Okanogan
Barrow's Goldeneye	<i>Bucephala islandica</i>	SP	0	0	4	0	0	Small numbers in Zone 3
Bufflehead	<i>Bucephala albeola</i>	SP	X	X	X	X	X	Small numbers detected in all study area zones
Hooded Merganser	<i>Lophodytes cucullatus</i>	SP	0	0	0	3	0	Single small raft detected off WWA

Table 5.4-3. Number of RTE Wildlife Detections in the Wells Hydroelectric Project Study Area During 2005 Wildlife Studies.¹

Common Name	Scientific Name	RTE Status ²	Zone					Notes on Detections:
			1	2	3	4	5	
Prairie Falcon	<i>Falco mexicanus</i>	SP	0	0	0	0	3	Few repeated sightings in Zone 5
Wilson's Phalarope	<i>Phalaropus tricolor</i>	SP	0	0	1	0	0	Breeding bird observed in wetland habitat off Cassimer Bar
Great Blue Heron	<i>Ardea Herodias</i>	SP SM	2	8	6	1	5	Detected in wetland habitat in all study area zones
Common Loon	<i>Gavia immer</i>	SS SP	24	17	28	16	2	Detected on the reservoir and in suitable habitat in all zones
Colonial Roosting Bats	Various species	Various	X	X	X	X	X	Observed in wetland, riparian, agricultural, and developed locations

¹ Includes observations from point count surveys, reservoir surveys, and incidental sightings.

² **RTE Species:** FT=Federal Threatened; FCo=Federal Species of Concern; SE=State Endangered; ST=State Threatened; SC=State Candidate; SS=State Sensitive; SP=State Priority; SM=State Monitor.

³ **X:** Denotes that species was observed incidentally but not quantified.

6.0 DISCUSSION

Development and agricultural land uses within and adjacent to the Wells Hydroelectric Project study area affect habitat availability and suitability for amphibians, reptiles, small mammals, and birds. Nonetheless, there are many locations within the study area that provide quality habitat for a variety of wildlife species. Primarily, these areas include the WWA parcels scattered along the reservoir and river shorelines, Cassimer Bar, Washburn and Park islands, and along much of the Okanogan River. Vegetation composition and structure varied greatly among and within habitat types. Areas that support a diversity of habitats, especially a mixture of upland types with wetland and riparian communities, tended to have greater avian species diversity. Conversely low diversity was noted in the relatively large blocks of shrub steppe habitat. However, the shrub steppe habitats do provide habitat for several avian species that require native shrubland habitat. Appendix J presents a summary of habitat characteristics measured at avian point count stations. EDAW (2006) provides additional detail on the acreage of habitat types and the botanical composition of the habitat types in the each of the five study area zones.

A summary of some of the more notable results of the avian, amphibian and reptile, and small mammal surveys and presence of RTE species is provided below.

- **Birds** - Two distinct large-scale trends substantially influenced point count survey results and the proportion of birds detected in different study area habitats. First, large single- and mixed-species flocks of sparrows formed in and dominated suitable open grassland and agricultural areas in the fall. These flocks included sparrow species such as the white-crowned sparrow and Lincoln's sparrow, which do not nest in the study area and were not detected during point count surveys in the breeding season. Second, large rafts of waterbirds began congregating in open water habitat in the study area during the fall.

In general, relative avian abundance was higher in the fall than in the breeding season, and abundant bird species were found to be far more prevalent than less abundant species, resulting in lower evenness but greater species dominance.

Study area riparian habitat does not typically support colonial nesting birds – with few specific notable exceptions (e.g., the double-crested cormorant [*Phalacrocorax auritus*] and great-blue heron [*Ardea herodias*] colonies located in riparian habitat along the Cassimer Bar shoreline)

- **Amphibians** – Only four amphibian species were documented in the study area—Pacific treefrog, Great Basin spadefoot toad, long-toed salamander, and the non-native bullfrog. None of the wetlands that lack a protective berm or levee are suitable for amphibian breeding. Nearly all of the wetlands within the study area are degraded in terms of providing amphibian breeding habitat due to: (1) relatively high proportions of non-native invasive plant species, (2) periodic water level fluctuations during the breeding season, and (3) the presence of predatory fish and non-native bullfrogs that prey on native amphibian species.

Wetlands with a diversity of water depths and vegetation zones represent the most important sites in the study area for breeding amphibians. Most of these sites are

associated with Cassimer Bar and Bridgeport Bar. However, there are also several diverse wetlands along the Okanogan River, especially where beaver activity has created levies to control water fluctuations. Maintaining undeveloped upland habitat surrounding these wetlands is also important for species such as the long-toed salamander and spadefoot toad.

- **Reptiles** – The presence of development and agricultural land and the small amount (0.6%) of rocky terrain within the study are likely help to explain the relatively low species abundance and diversity of reptiles found during this inventory. The mostly isolated eastern shoreline in Zone 1 supports some of the most intact shrub steppe habitat and includes many areas of rocky terrain separated by steep draws and canyons that have dense riparian vegetation. This portion of the study area was the only location where rattlesnakes were detected. It is very likely that rattlesnakes in more developed areas of the study area suffer high mortality rates because people kill them, either intentionally or unintentionally. The lack of native vegetation and use of pesticides in orchards may reduce the available habitat and prey base for many of the reptile species that are native to the area.

Reptile abundance appears to be quite low in the study area. The reasons for this are unknown but could be related to the lack of rocky terrain, low abundance of prey organisms, and impacts from adjacent land uses.

- **Small Mammals** – Small mammal communities in the study area appear to be composed of species typical of shrub steppe, wetland, riparian, and agricultural habitats of central Washington. Most of the species encountered during this study are the same as those that were captured at Rocky Reach.
- **RTE Species** – During the 2005 wildlife field studies, 25 RTE species were detected in the Wells Hydroelectric Project study area. This total includes 16 of the 19 RTE species previously documented or known to occur in the study area. In general, RTE species detected in the study area during 2005 field studies were limited to species with relatively minor status designations. Only one federally listed species was documented, the bald eagle, and only one state listed species was documented, the American white pelican.

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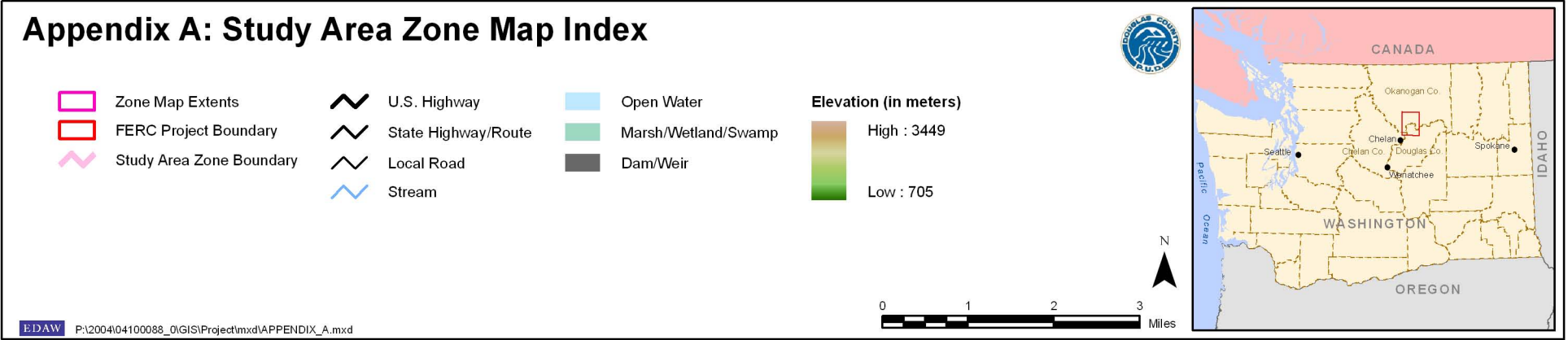
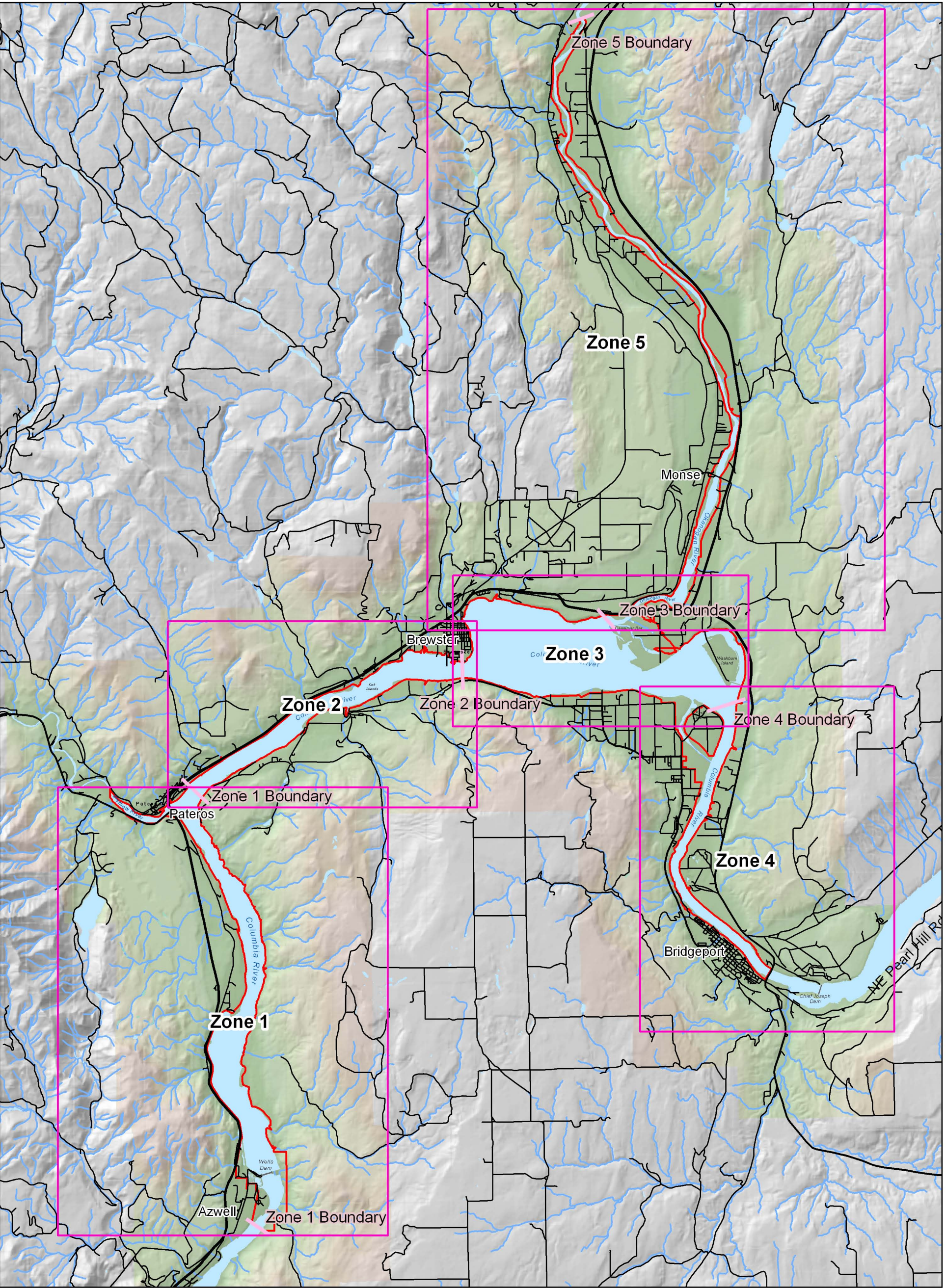
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APPENDIX A

Study Area Zone Map



APPENDIX B

Agency Correspondence



March 21, 2005

EDAW INC

815 WESTERN AVENUE

SUITE 300

SEATTLE WASHINGTON

98104

TEL 206 622 1176

FAX 206 343 9809

www.edaw.com

Mr. Joe Peone
Fish and Wildlife Director
Colville Confederated Tribes
P.O. Box 150, Nespelem, WA 99155

Mr. Peone:

EDAW, Inc. is under contract to Douglas County Public Utility District to conduct vegetation and wildlife studies along Wells Reservoir on the Columbia River. The Wells Reservoir is extends 30 miles along the mainstem, 2 miles up the Methow River and 15.5 miles up the Okanogan River. EDAW would like to request permission from the Colville Confederated Tribes to conduct some of the sampling on its lands. We have not selected the exact sampling sites as of yet but a draft study plan that describes the proposed wildlife studies is attached.

Please contact me at my direct phone number of (206) 267-7741 if you have any questions or concerns. If at all possible, we would like to begin some of our surveys (amphibians) in mid-April so we would greatly appreciate your response before then.

Sincerely,

Ronald W. Tressler
Wildlife Biologist

Enclosure: Wells Hydro Wildlife Study Plan

March 14, 2005

Kemper McMaster, State Supervisor
U.S. Fish and Wildlife Service
USFWS-ES
2600 SE 98th Avenue, Suite 100
Portland, OR 97266

Re: Wildlife and Plant Species List

Dear Mr. McMaster:

Douglas County Public Utilities District No. 1 (Douglas PUD) is preparing to conduct baseline surveys for rare, threatened and endangered wildlife and plants in the vicinity of Wells Hydroelectric Project. The nearest towns are Brewster, Pateros and Bridgeport, Washington. The Wells Project area includes Wells Reservoir pool along 30 miles of the Columbia River. It also includes two major tributaries, the Methow and Okanogan Rivers within Wells Reservoir. The Wells Project area extends approximately 2 miles up the Methow River and approximately 16 miles up the Okanogan River.

EDAW Inc. is assisting Douglas PUD in conducting ground surveys to collect baseline data for listed plant and wildlife species in 2005. A list of rare plant and wildlife species occurring within the Wells Project boundary and within an area of approximately 2-miles buffering the boundary would be greatly appreciated.

The Wells Project area map is attached to this letter. The legal description for the Wells Project area including the buffer is provided below:

If you have any questions regarding this request, please contact me by phone at 206 267-7722 or email at dwerlkotter@edaw.com. Thank you.

Sincerely,



Richard Dwerlkotte - Botanist
EDAW Inc.
815 Western Avenue, Suite 300
Seattle, Washington 98104

March 11, 2005

Florence Caplow
Washington Natural Heritage Program, Dept. of Natural Resources
PO Box 47014, Olympia, WA 98504-7014

Re: Plant Species List

Dear Florence,

In 2005, Douglas County Public Utilities District No. 1 (Douglas PUD) will commence the relicensing process for the Wells Hydroelectric Project (Wells Project) using the Integrated Licensing Process (ILP) as required by Federal Energy Regulatory Commission (FERC) regulations issued July 23, 2003 (18 CFR Part 5). As part of the ILP various studies to provide information on wildlife and botanical resources likely will be necessary on Wells Project lands. As part of the preparation for completing the Preliminary Application Document (PAD) in November 2006, Douglas PUD will be collecting baseline data on wildlife and botanical resource within the Wells Hydroelectric Project boundary in 2005.

The Wells Project is located in Douglas County approximately 7 miles down river of the town of Patros, Washington, along the Columbia River. The Wells Project area includes Wells Reservoir pool along 30 miles of the Columbia River. It also includes two major tributaries, the Methow and Okanogan Rivers within Wells Reservoir. The Wells Project boundary extends approximately 2 miles up the Methow River and approximately 16 miles up the Okanogan River.

EDAW Inc. is assisting Douglas PUD in conducting ground surveys to collect baseline data for listed plant and wildlife species in 2005. A list of rare plant and wildlife species occurring within the Wells Project boundary (see legal description provided below and attached map) and within an area of approximately 2-miles buffering the boundary would be greatly appreciated.

The legal description for the Wells Project area is provided below:

If you have any questions regarding this request, please contact me by phone at 206 267-7722 or email at dwerlkotter@edaw.com. Thank you.

Sincerely,

Richard Dwerlkotte - Botanist
EDAW Inc.
815 Western Avenue, Suite 300
Seattle, Washington 98104



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Central Washington Field Office
215 Melody Lane, Suite 119
Wenatchee, Washington 98801



April 4, 2005

In Reply Refer To:

USFWS Reference: 1-9-2005-SP-0178

Hydrologic Unit Codes: 17-02-00-06, 17-02-00-10

Re: Wells Hydroelectric Project Wildlife and Plant Survey

Richard Dwerlkotte
EDAW Inc.
815 Western Avenue, Suite 300
Seattle, Washington 98104

Dear Mr. Dwerlkotte:

We have received your request for information on endangered and threatened species and their habitats that may be present near the Wells Hydroelectric project in Chelan and Douglas Counties, Washington. The following threatened and endangered species, and candidate species may be present:

Endangered

Gray wolf (*Canis lupus*)

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

Threatened

Bald eagle (*Haliaeetus leucocephalus*)

Bull trout (*Salvelinus confluentus*) – Columbia River distinct population segment

Canada lynx (*Lynx canadensis*)

Spiranthes diluvialis (Ute ladies'-tresses)

Candidate

Greater sage grouse (*Centrocercus urophasianus*) – Columbia Basin distinct population segment

Yellow-billed cuckoo (*Coccyzus americanus*)

This list fulfills the requirements of the U. S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act of 1973, as amended (Act).

Preparation of a Biological Assessment (BA) would be prudent when listed or proposed species, or designated or proposed critical habitat, occur within the project area. Should the BA

Mr. Richard Dwerlkotte

determine that a listed species is likely to be affected by the project, the involved federal agency should request section 7 consultation with the Service. If a proposed species is likely to be jeopardized by the project, or proposed critical habitat is likely to be adversely modified or destroyed, regulations require conferencing between the involved federal agency and the Service.

If the BA concludes that the project will have no effect on any listed or proposed species, we would appreciate receiving a copy for our information.

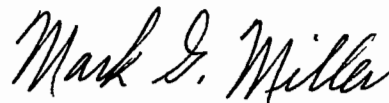
Candidate species receive no protection under the Act, but are included for your use during planning of the project. Candidate species could be formally proposed and listed during project planning, thereby falling within the scope of section 7 of the Act. Protection provided to candidate species now may preclude possible listing in the future. If evaluation of the subject project indicates that it is likely to adversely impact a candidate species, we encourage you to modify the project to minimize/avoid these impacts.

Several species of anadromous fishes that have been listed by NOAA Fisheries (NOAA) may occur in the project area. Please contact NOAA in Ellensburg, Washington; at (509) 962-8911 to request a list of those listed species.

If you would like information concerning State listed species or species of concern, you may contact the Washington Department of Fish and Wildlife, at (360) 902-2543, for fish and wildlife species; or the Washington Department of Natural Resources, at (360) 902-1667, for plant species.

Should the project plans change significantly, or if the project is delayed more than 90 days, you should request an update to this response. Thank you for your efforts to protect our nation's species and their habitats. If you have any questions concerning the above information, please contact Tim McCracken at (509) 665-3508, extension 17.

Sincerely,

A handwritten signature in black ink that reads "Mark G. Miller". The signature is written in a cursive, flowing style.

Mark G. Miller, Project Leader
Central Washington Field Office



March 30, 2005

Richard Dwerlkotte
EDAW Inc
815 Western Ave – Ste 300
Seattle WA 98104

**SUBJECT: Wells Hydroelectric Project, Douglas County
(T28-30N R23E; T28-32N R24E; T29-32N R25E; T29N R26E)**

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) 902-1667 if you have any questions.

Sincerely,

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



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 HYDROELECTRIC PROJECT, DOUGLAS COUNTY
 REQUESTED BY EDAW INC

Data Current as of March 2005
 Page 1 of 2

<u>TOWNSHIP, RANGE AND SECTION</u>	<u>ELEMENT NAME</u>	<u>STATE STATUS</u>	<u>FEDERAL STATUS</u>
T28N R23E S23 S26 SEofNW	<i>Schizachyrium scoparium</i> var. <i>scoparium</i> (little bluestem)	T	
T28N R23E S35 SEofNW	<i>Spiranthes diluvialis</i> (Ute ladies' tresses)	E	LT
T28N R23E S35 T27N R23E S02	<i>Sisyrinchium montanum</i> (strict blue-eyed grass)	T	
T29N R23E S10 SEofNW	<i>Carex sychnocephala</i> (many-headed sedge)	S	
T29N R24E S07 W2ofSW S18 W2	PURSHIA TRIDENTATA / PSEUDOROEGERIA SPICATA SHRUB HERBACEOUS VEGETATION		
T29N R23E S01 S2 S12 E2 S13 E2ofE2	(BITTERBRUSH / BLUEBUNCH WHEATGRASS)		
T29N R23E S01 SWofSE S12 NWofNE	RHUS GLABRA / PSEUDOROEGERIA SPICATA SHRUB HERBACEOUS VEGETATION (SMOOTH SUMAC / BLUEBUNCH WHEATGRASS)		
T29N R24E S07 SW S18 NWofNW	PURSHIA TRIDENTATA / PSEUDOROEGERIA SPICATA SHRUB HERBACEOUS VEGETATION (BITTERBRUSH / BLUEBUNCH WHEATGRASS)		
T32N R25E S04 SWofSW	ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS / PSEUDOROEGERIA SPICATA SHRUB HERBACEOUS VEGETATION (WYOMING BIG SAGEBRUSH / BLUEBUNCH WHEATGRASS)		
T32N R24E S25 SWofNE	PINUS PONDEROSA / PURSHIA TRIDENTATA WOODLAND (PONDEROSA PINE / BITTERBRUSH)		
T32N R24E S25 NWofSW	ARTEMISIA TRIPARTITA / FESTUCA IDAHOENSIS SHRUB HERBACEOUS VEGETATION (THREETIP SAGEBRUSH / IDAHO FESCUE)		
T32N R24E S26 E2 S25 SWofNE	PURSHIA TRIDENTATA / PSEUDOROEGERIA SPICATA SHRUB HERBACEOUS VEGETATION (BITTERBRUSH / BLUEBUNCH WHEATGRASS)		

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 HYDROELECTRIC PROJECT, DOUGLAS COUNTY
 REQUESTED BY EDAS INC

Data Current as of March 2005
 Page 2 of 2

<u>TOWNSHIP, RANGE</u> <u>AND SECTION</u>	<u>ELEMENT NAME</u>	<u>STATE</u> <u>STATUS</u>	<u>FEDERAL</u> <u>STATUS</u>
T32N R24E S26 E2	PURSHIA TRIDENTATA / FESTUCA		
S25 SWofNE	IDAHOENSIS SHRUB HERBACEOUS VEGETATION		
S36 NW	(BITTERBRUSH / IDAHO FESCUE)		
T32N R24E S25 SWofNE	ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS		
	/ STIPA COMATA SHRUBLAND		
	(WYOMING BIG SAGEBRUSH /		
	NEEDLE-AND-THREAD)		

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 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.

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.

COPY

STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES
FED ID: 91-6012771

* INVOICE *

Agreement Id: 89 004149
Invoice No : IB30052

Page 1
Invoice Date: 03/30/05
Due Date : 04/29/05

EDAW INC
815 WESTERN AVE SUITE 300
SEATTLE WA 98104

LINE	QUANTITY	UOM	UNIT PRICE	VALUE
001	NATURAL HERITAGE DATA RETRIEVAL			
	1.0000	\$	30.00000	\$ 30.00
	WELLS HYDROELECTRIC PROJECT, DOUGLAS COUNTY REQUESTED BY RICHARD DWERLKOTTE			

TOTAL - PLEASE PAY THIS AMOUNT \$ 30.00
THE DEPARTMENT ASSESSES INTEREST ON PAST DUE ACCOUNTS

If you have any questions, call SANDY MOODY (360) 902-1667
Keep this portion for your records

Agreement Id: 89 004149
Invoice No : IB30052
Customer Id : DNR 000 025 090
NAME: EDAW INC

Acct Mgr: FR
Group : NHDS
Due Date: 04/29/05

REMIT CHECKS TO:
DEPARTMENT OF NATURAL RESOURCES
FINANCIAL MGMT DIVISION
PO BOX 47041
OLYMPIA, WA 98504-7041

TOTAL - Please pay this amount
\$ 30.00

RETURN THIS PORTION FOR PROPER CREDIT TO YOUR ACCOUNT.

HRTGPTS_	HRTGPTS_ID	QUADNAME	TRS	CLASS	CRIT	DATE	ST	STAT	FEDSTAT	PHCLASS	PRIOR	COMNAME	SCINAME
1	20469	CHILIWIST VALLEY	T32N R24E S02 NWOFNW	SA	LEK	19780417	ST		FCo	B	3	SHARP-TAILED GROUSE	TYMPANUCHUS PHASIANELLUS 1014
2	4654	MALOTT 7.5	T32N R25E S05 NEOFNW	SA	B	19830000	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0362
3	28218	CHILIWIST VALLEY	T32N R24E S02 SWOFSE	SA	IO	19980529	SC		FCo	M	7	WOLVERINE	GULO GULO 0183
4	4655	MALOTT 7.5	T32N R25E S05 SWOFNW	SA	B	19830000	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0362
5	7333	MALOTT 7.5	T32N R25E S08 NWOFNW	SA	CR	19870000	ST		FT	B	3	BALD EAGLE	HALIAEETUS LEUCOCEPHALUS 0930
6	19223	MALOTT 7.5	T32N R25E S17 SW	SA	IO	19880000	SC		FCo	I	7	GIANT COLUMBIA SPIRE SN.	FLUMINICOLA COLUMBIANA 0002
7	19213	MALOTT 7.5	T32N R25E S17 SW	SA	IO	19880000	SC			I	7	GIANT COLUMBIA RIVER LIM	FISHEROLA NUTTALLI 0002
8	4353	LOUP LOUP 15	T32N R24E S23 NEOFNW	SA	B	19840404	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0171
9	4354	LOUP LOUP 15	T32N R24E S23 NEOFNW	SA	B	19840404	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0171
10	4350	LOUP LOUP 15	T32N R24E S23 NEOFNW	SA	B	19840404	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0171
11	4352	LOUP LOUP 15	T32N R24E S23 NEOFNW	SA	B	19840404	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0171
12	4351	LOUP LOUP 15	T32N R24E S23 NEOFNW	SA	B	19840404	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0171
13	4617	LOUP LOUP 15	T32N R24E S24 C OF N	SA	B	20000616	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0349
14	4618	LOUP LOUP 15	T32N R24E S24 C OF N	SA	B	19860402	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0349
15	4619	LOUP LOUP 15	T32N R24E S24	SA	B	19880408	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0349
16	7334	MALOTT 7.5	T32N R25E S19 C	SA	CR	19870000	ST		FT	B	3	BALD EAGLE	HALIAEETUS LEUCOCEPHALUS 0931
17	19214	MALOTT 7.5	T32N R25E S19 SE	SA	IO	19880000	SC			I	7	GIANT COLUMBIA RIVER LIM	FISHEROLA NUTTALLI 0002
18	19224	MALOTT 7.5	T32N R25E S19 SE	SA	IO	19880000	SC		FCo	I	7	GIANT COLUMBIA SPIRE SN.	FLUMINICOLA COLUMBIANA 0002
19	4616	LOUP LOUP 15	T32N R24E S24 SWOFSE	SA	B	19860402	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0349
20	4615	LOUP LOUP 15	T32N R24E S24 SWOFSE	SA	B	19860402	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0349
21	4620	BREWSTER 15	T32N R24E S26 SWOFSE	SA	B	19880408	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0350
22	4621	BREWSTER 15	T32N R24E S35 SWOFNE	SA	B	19860319	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0350
23	13299	BREWSTER 15	T32N R24E S36 W	SA	BOX	19820427	SM			B	9	WESTERN BLUEBIRD	SIALIA MEXICANA 0045
24	13013	MONSE 7.5	T31N R25E S09	SA	B	19810700	SC			B	7	LEWIS' WOODPECKER	MELANERPES LEWIS 0021
25	12573	MONSE 7.5	T31N R25E S13 E OFSW	SA	B	19860000	SC		FCo	B	7	BURROWING OWL	ATHENE CUNICULARIA 0113
26	12574	MONSE 7.5	T31N R25E S16 SWOFNW	SA	B	19860000	SC		FCo	B	7	BURROWING OWL	ATHENE CUNICULARIA 0114
27	12522	BREWSTER 15	T31N R24E S24	SA	B	19800300	SC		FCo	B	7	BURROWING OWL	ATHENE CUNICULARIA 0062
28	12359	BREWSTER 15	T31N R24E S36 SWOFSE	SA	B	19780700	SM			B	9	LONG-BILLED CURLEW	NUMENIUS AMERICANUS 0010
29	12572	MONSE 7.5	T30N R25E S04 NWOF	SA	B	19860000	SC		FCo	B	7	BURROWING OWL	ATHENE CUNICULARIA 0112
30	4329	BREWSTER 15	T30N R24E S02 NEOFNW	SA	B	20000616	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0152
31	4331	BREWSTER 15	T30N R24E S02 NEOFNW	SA	B	19860401	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0152
32	12506	MONSE 7.5	T30N R25E S05	SA	B	19790500	SC		FCo	B	7	BURROWING OWL	ATHENE CUNICULARIA 0045
33	7846	MONSE 7.5	T30N R25E S03 E2	SA	B	19920720	SM			B	9	OSPREY	PANDION HALIAETUS 0178
34	4330	BREWSTER 15	T30N R24E S03 SWOFSE	SA	B	19860401	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0152
35	4333	BREWSTER 15	T30N R24E S02 SWOFNW	SA	B	19860401	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0152
36	12570	BRIDGEPORT 7.5	T30N R25E S10 NWOFNE	SA	B	19860000	SC		FCo	B	7	BURROWING OWL	ATHENE CUNICULARIA 0110
37	4332	BREWSTER 15	T30N R24E S11 NWOFNW	SA	B	19860401	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0152
38	1975	BREWSTER 15	T30N R24E S07	SA	IO	19780700	SM			A	9	TIGER SALAMANDER	AMBYSTOMA TIGRINUM 0020
39	12473	BRIDGEPORT 7.5	T30N R25E S09	SA	B	19800400	SC		FCo	B	7	BURROWING OWL	ATHENE CUNICULARIA 0011
40	15522	BRIDGEPORT	T30N R25E S16 NEOFNE	SA	IO	19950909	ST		FCo	M	3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 0844
41	12471	BRIDGEPORT 7.5	T30N R25E S15	SA	B	19820500	SC		FCo	B	7	BURROWING OWL	ATHENE CUNICULARIA 0009
42	12552	BRIDGEPORT 7.5	T30N R25E S17	SA	B	19820300	SC		FCo	B	7	BURROWING OWL	ATHENE CUNICULARIA 0092
43	4169	BRIDGEPORT 7.5	T30N R25E S17 SWOFNE	SA	CR	19850900	SM			B	9	TURKEY VULTURE	CATHARTES AURA 0015
44	13428	BREWSTER 7.5	T30N R24E S17 OFSE	SA	B	19920000	SC		FCo	B	7	LOGGERHEAD SHRIKE	LANIUS LUDOVICIANUS 0020
45	6799	BRIDGEPORT 7.5	T30N R25E S20 NEOFNE	SA	B	20010628	ST		FT	B	3	BALD EAGLE	HALIAEETUS LEUCOCEPHALUS 0641
46	12571	BRIDGEPORT 7.5	T30N R25E S21 NW	SA	B	19860000	SC		FCo	B	7	BURROWING OWL	ATHENE CUNICULARIA 0111
47	12246	BRIDGEPORT 7.5	T30N R25E S22	SA	B	19920000	SM			B	9	BLACK-CROWNED NIGHT-H	NYCTICORAX NYCTICORAX 0036
48	8762	BREWSTER	T30N R24E S24	SA	B	19920828	SM			B	9	OSPREY	PANDION HALIAETUS 1036
49	8239	BREWSTER 15	T30N R24E S24 SWOFNE	SA	B	19890630	SM			B	9	OSPREY	PANDION HALIAETUS 0531
50	12235	BRIDGEPORT 7.5	T30N R25E S22	SA	B	19920000	SM			B	9	BLACK-CROWNED NIGHT-H	NYCTICORAX NYCTICORAX 0025
51	8301	BRIDGEPORT 7.5	T30N R25E S20 NEOFSE	SA	B	19920711	SM			B	9	OSPREY	PANDION HALIAETUS 0582
52	8053	BRIDGEPORT 7.5	T30N R25E S20	SA	B	19920711	SM			B	9	OSPREY	PANDION HALIAETUS 0373
53	8242	BRIDGEPORT 7.5	T30N R25E S22 SWSWSW	SA	B	19890611	SM			B	9	OSPREY	PANDION HALIAETUS 0533
54	4663	BREWSTER 15	T30N R24E S24 SWOFSE	SA	B	19860320	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0367
55	8302	BRIDGEPORT 7.5	T30N R25E S19 SWOFNW	SA	B	19880000	SM			B	9	OSPREY	PANDION HALIAETUS 0583
56	6798	BRIDGEPORT 7.5	T30N R25E S30 NWOFNW	SA	B	20000621	ST		FT	B	3	BALD EAGLE	HALIAEETUS LEUCOCEPHALUS 0641
57	19231	BREWSTER 15	T30N R23E S28 NWOFNW	SA	IO	19880000	SC		FCo	I	7	GIANT COLUMBIA SPIRE SN.	FLUMINICOLA COLUMBIANA 0008
58	19218	BREWSTER 15	T30N R23E S28 NWOFNW	SA	IO	19880000	SC			I	7	GIANT COLUMBIA RIVER LIM	FISHEROLA NUTTALLI 0005

HRTGPTS_	HRTGPTS_ID	QUADNAME	TRS	CLASS	CRIT	DATE	ST	STAT	FEDSTAT	PHCLASS	PRIORT	COMNAME	SCINAME
59	6609	BRIDGEPORT 7.5	T30N R25E S30	SA	CR	19930409	ST	FT	B		3	BALD EAGLE	HALIAEETUS LEUCOCEPHALUS 0520
60	14909	PATEROS	T30N R23E S29 NWOFFNW	SA	IO	19931030	ST	FCo	M		3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 0187
61	10972	BREWSTER	T30N R24E S27 NWOFFNW	SA	IO	19940109	ST	FCo	B		3	SHARP-TAILED GROUSE	TYMPANUCHUS PHASIANELLUS 0056
62	4662	BRIDGEPORT 7.5	T30N R25E S30 NWOFFNW	SA	B	19880408	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0367
63	12528	BRIDGEPORT 7.5	T30N R25E S27	SA	B	19800300	SC	FCo	B		7	BURROWING OWL	ATHENE CUNICULARIA 0068
64	16518	PATEROS	T30N R23E S28 NWOFFNE	SA	IO	19960919	ST	FCo	M		3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 1992
65	19232	BREWSTER 15	T30N R23E S28 NWOFFNE	SA	IO	19880000	SC	FCo	I		7	GIANT COLUMBIA SPIRE SN.FLUMINICOLA COLUMBIANA 0008	
66	19219	BREWSTER 15	T30N R23E S28 NWOFFNE	SA	IO	19880000	SC		I		7	GIANT COLUMBIA RIVER LIM FISHEROLA NUTTALLI 0005	
67	14839	BREWSTER 15	T30N R23E S28	SA	IO	19791200	ST	FCo	M		3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 0115
68	27304	PATEROS	T30N R23E S29 NEOFNW	SA	IO	19990326	ST	FCo	M		3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 3007
69	8760	BREWSTER	T30N R24E S29	SA	B	19920828	SM		B		9	OSPREY	PANDION HALIAETUS 1031
70	28929	PATEROS	T30N R23E S28 SWOFFNE	SA	IO	20031115	ST	FCo	M		3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 3117
71	12491	BRIDGEPORT 7.5	T30N R25E S28	SA	B	19800400	SC	FCo	B		7	BURROWING OWL	ATHENE CUNICULARIA 0029
72	8630	BREWSTER	T30N R24E S29 SWOFFNE	SA	B	19890000	SM		B		9	OSPREY	PANDION HALIAETUS 0887
73	19242	BRIDGEPORT	T30N R25E S30	SA	IO	19930701	SM		I		9	BONNEVILLE SKIPPER	OCHLODES SYLVANOIDES BONNEVILLE 0001
74	19217	BREWSTER 15	T30N R23E S28 SE	SA	IO	19880000	SC		I		7	GIANT COLUMBIA RIVER LIM FISHEROLA NUTTALLI 0005	
75	19230	BREWSTER 15	T30N R23E S28 SE	SA	IO	19880000	SC	FCo	I		7	GIANT COLUMBIA SPIRE SN.FLUMINICOLA COLUMBIANA 0008	
76	27516	BRIDGEPORT	T30N R25E S29 SEOFNW	SA	B	20020425	ST	FT	B		3	BALD EAGLE	HALIAEETUS LEUCOCEPHALUS 1450
77	7248	BRIDGEPORT 7.5	T30N R25E S29 SEOFNW	SA	CR	19920409	ST	FT	B		3	BALD EAGLE	HALIAEETUS LEUCOCEPHALUS 0887
78	8309	BREWSTER 7.5	T30N R24E S30 SEOFSE	SA	B	19920720	SM		B		9	OSPREY	PANDION HALIAETUS 0594
79	8303	BRIDGEPORT 7.5	T30N R25E S34 NEOFNW	SA	B	19920720	SM		B		9	OSPREY	PANDION HALIAETUS 0584
80	27008	PATEROS	T30N R23E S34 SWOFNW	SA	IO	20011217	ST	FCo	M		3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 2972
81	4588	BREWSTER 15	T30N R23E S33 NWOFFSE	SA	B	19850403	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0335
82	3945	BREWSTER 15	T30N R23E S36	SA	IO	19790800	SM		R		9	NIGHT SNAKE	HYPsiglena TORQUATA 0009
83	26964	BRIDGEPORT	T29N R25E S04 NEOFNW	SA	B	20020513	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0359
84	4645	BRIDGEPORT 7.5	T29N R25E S04 NEOFNW	SA	B	19990526	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0359
85	4646	BRIDGEPORT 7.5	T29N R25E S04 NEOFNW	SA	B	20040525	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0359
86	29108	BREWSTER	T29N R24E S05 NEOFNW	SA	B	20040525	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0360
87	4587	BREWSTER 15	T29N R23E S04 NEOFNE	SA	B	20000616	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0335
88	4648	BREWSTER 15	T29N R24E S06 SWOFFNE	SA	B	19990525	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0360
89	20563	BREWSTER	T29N R24E S02 NWOFFSE	SA	LEK	19950326	ST	FCo	B		3	SHARP-TAILED GROUSE	TYMPANUCHUS PHASIANELLUS 1090
90	20556	BREWSTER	T29N R24E S03 SEOFSE	SA	LEK	19900413	ST	FCo	B		3	SHARP-TAILED GROUSE	TYMPANUCHUS PHASIANELLUS 1085
91	20557	BREWSTER	T29N R24E S03 SEOFSE	SA	LEK	19960331	ST	FCo	B		3	SHARP-TAILED GROUSE	TYMPANUCHUS PHASIANELLUS 1085
92	4420	BREWSTER 15	T29N R23E S10 NWOFFNW	SA	B	19810000	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0234
93	16087	PATEROS	T29N R23E S24 SW	SA	IO	19951224	ST	FCo	M		3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 1559
94	28845	PATEROS	T29N R23E S24 SEOFNW	SA	IO	20040318	ST	FCo	M		3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 3090
95	14745	BREWSTER 15	T29N R23E S10	SA	IO	19790300	ST	FCo	M		3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 0020
96	4421	BREWSTER 15	T29N R23E S10 SWOFNW	SA	B	19810000	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0234
97	26724	PATEROS	T29N R23E S10 SWOFNW	SA	IO	20020615	ST	FCo	M		3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 2964
98	20573	BREWSTER	T29N R24E S16 NEOFNW	SA	LEK	19910331	ST	FCo	B		3	SHARP-TAILED GROUSE	TYMPANUCHUS PHASIANELLUS 1098
99	4416	BREWSTER 15	T29N R23E S16 NEOFNE	SA	B	19810000	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0234
100	4423	BREWSTER 15	T29N R23E S16 NEOFNE	SA	B	19810000	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0234
101	4424	BREWSTER 15	T29N R23E S16 NEOFNE	SA	B	19810000	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0234
102	4419	BREWSTER 15	T29N R23E S16 NEOFSE	SA	B	19810000	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0234
103	4422	BREWSTER 15	T29N R23E S16 NEOFSE	SA	B	19810000	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0234
104	14969	PATEROS	T29N R23E S15 SEOFNW	SA	IO	19920412	ST	FCo	M		3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 0247
105	4418	BREWSTER 15	T29N R23E S22 NWOFFNW	SA	B	19810000	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0234
106	4417	AZWELL 7.5	T29N R23E S22 NE	SA	B	19810000	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0234
107	14659	COLEMAN HILL	T29N R26E S19	SA	IO	19800000	SC		M		7	WHITE-TAILED JACK RABBIT	LEPUS TOWNSENDII 0105
108	17112	COLEMAN HILL 7.5	T29N R26E S19	SA	IO	19800000	SM		M		9	SAGEBRUSH VOLE	LAGURUS CURTATUS 0067
109	14634	CHIEF JOSEPH DAM	T29N R25E S23	SA	IO	19801126	SC		M		7	WHITE-TAILED JACK RABBIT	LEPUS TOWNSENDII 0072
110	20565	CHIEF JOSEPH DAM	T29N R25E S29 NWOFFNW	SA	LEK	19900402	ST	FCo	B		3	SHARP-TAILED GROUSE	TYMPANUCHUS PHASIANELLUS 1091
111	20566	CHIEF JOSEPH DAM	T29N R25E S29 NEOFNE	SA	LEK	19920414	ST	FCo	B		3	SHARP-TAILED GROUSE	TYMPANUCHUS PHASIANELLUS 1092
112	11003	CHIEF JOSEPH DAM	T29N R25E S26 SEOFNW	SA	IO	19931019	ST	FCo	B		3	SHARP-TAILED GROUSE	TYMPANUCHUS PHASIANELLUS 0087
113	29115	AZWELL	T29N R23E S27 NWOFFNW	SA	B	20040616	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0157
114	8240	AZWELL 7.5	T29N R23E S25 SESESE	SA	B	19890511	SM		B		9	OSPREY	PANDION HALIAETUS 0532
115	8241	AZWELL 7.5	T29N R23E S36 NENENE	SA	B	19890000	SM		B		9	OSPREY	PANDION HALIAETUS 0532
116	4334	AZWELL 7.5	T29N R23E S34 NWOFFNW	SA	B	19850621	SC		B		7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0157

HRTGPTS_	HRTGPTS_ID	QUADNAME	TRS	CLASS	CRIT	DATE	ST	STAT	FEDSTAT	PHCLASS	PRIORT	COMNAME	SCINAME
117	4335	AZWELL 7.5	T29N R23E S34 NWOFNW	SA	B	19880622	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0157
118	4336	AZWELL 7.5	T29N R23E S34 NWOFNW	SA	B	19850403	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0157
119	6846	AZWELL	T29N R23E S36 SEOFNE	SA	B	20000616	ST	FT		B	3	BALD EAGLE	HALIAEETUS LEUCOCEPHALUS 0672
120	14636	CHIEF JOSEPH DAM	T29N R25E S32	SA	IO	19800321	SC			M	7	WHITE-TAILED JACK RABBIT	LEPUS TOWNSENDII 0077
121	4342	AZWELL 7.5	T29N R23E S36 SEOFNW	SA	B	19860325	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0167
122	4343	AZWELL 7.5	T29N R23E S36 SEOFNW	SA	B	19860325	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0167
123	4345	AZWELL 7.5	T29N R23E S36 SEOFNW	SA	B	19860325	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0167
124	4344	AZWELL 7.5	T29N R23E S36 SEOFNW	SA	B	19860325	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0167
125	28171	AZWELL	T29N R23E S36 NEOFSE	SA	B	20030606	ST	FT		B	3	BALD EAGLE	HALIAEETUS LEUCOCEPHALUS 0672
126	29116	AZWELL	T29N R23E S36 NEOFNW	SA	B	20040410	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0167
127	6181	AZWELL 7.5	T29N R23E S36	SA	CR	19790100	ST	FT		B	3	BALD EAGLE	HALIAEETUS LEUCOCEPHALUS 0277
128	4341	AZWELL 7.5	T29N R23E S36 SEOFSE	SA	B	19860325	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0167
129	5380	COLEMAN HILL 7.5	T28N R26E S06 NEOFNW	SA	B	19920712	SM			B	9	SWAINSON'S HAWK	BUTEO SWAINSONI 0455
130	6180	AZWELL	T28N R23E S01 NEOFNW	SA	CR	19810100	ST	FT		B	3	BALD EAGLE	HALIAEETUS LEUCOCEPHALUS 0277
131	27493	COLEMAN HILL	T28N R26E S05 SEOFNW	SA	IO	20021020	SC			M	7	WHITE-TAILED JACK RABBIT	LEPUS TOWNSENDII 0274
132	11014	CHIEF JOSEPH DAM	T28N R25E S02	SA	IO	19791231	ST	FCo		B	3	SHARP-TAILED GROUSE	TYMPANUCHUS PHASIANELLUS 0099
133	25201	AZWELL	T28N R23E S04 SEOFNE	SA	IO	20000831	ST	FCo		M	3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 2758
134	14682	CHIEF JOSEPH DAM	T28N R25E S02	SA	IO	19790612	SC			M	7	WHITE-TAILED JACK RABBIT	LEPUS TOWNSENDII 0131
135	20579	CHIEF JOSEPH DAM	T28N R25E S02 SEOFNW	SA	LEK	19880400	ST	FCo		B	3	SHARP-TAILED GROUSE	TYMPANUCHUS PHASIANELLUS 1103
136	20560	WELLS DAM	T28N R24E S09 NEOFNE	SA	LEK	19910307	ST	FCo		B	3	SHARP-TAILED GROUSE	TYMPANUCHUS PHASIANELLUS 1088
137	4346	AZWELL 7.5	T28N R23E S22 NE	SA	B	19900424	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0169
138	4348	AZWELL 7.5	T28N R23E S22 NE	SA	B	19900424	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0169
139	4347	AZWELL 7.5	T28N R23E S22 NE	SA	B	19900424	SC			B	7	GOLDEN EAGLE	AQUILA CHRYSAETOS 0169
140	27009	AZWELL	T28N R23E S22 NWOFNW	SA	IO	20020524	ST	FCo		M	3	WESTERN GRAY SQUIRREL	SCIURUS GRISEUS 2973

SITENAME	Description
AZWELL	BALD EAGLE COMMUNAL NIGHT ROOST.
OKANOGAN AND SIMILKAMEEN RIVER RIPARIAN AREA	RIPARIAN-IMPORTANT RIPARIAN AREA WITH DIVERSE HABITAT AND WILDLIFE DIVERSITY LARGE RIVER SYSTEM AREAS WITH DIVERSE VEGETATIVE SPECIES AND STRUCTURE INCLUDING STANDS OF LARGE DECIDUOUS TREES-USED BY WIDE VARIETY OF WILDLIFE SPECIES
MULE DEER TRANSITION HABITAT-OKANOGAN	MULE DEER TRANSITION ZONE-DEER STAY IN THESE AREAS DURING SPRING AND FALL PERIODS BUT MAY NOT HOLD HERE IN THE DEAD OF WINTER, FOREST PRACTICES ARE IMPORTANT HERE TO TRANSITION HEALTHY DEER TO SUMMER OR WINTER RANGE
MULE DEER WINTER RANGE OKANOGAN	MULE DEER WINTER RANGE, TRADITIONAL WINTER USE AREA, DEER USE LOWER ELEVATION SITES DURING HEAVY SNOW. HIGHER ELEVATION SOUTH ASPECTS ARE IMPORTANT-CLOSED CANOPY NORTH ASPECTS ARE IMPORTANT DURING SEVERE WINTER PERIODS 50-100 DEER/MI 2
WHITETAIL DEER, OKANOGAN	WHITETAIL DEER WINTER RANGE-GENERALLY RIPARIAN AREAS WITH DENSE AND DIVERSE VEGETATION, BUT CONIFER STANDS ARE IMPORTANT FOR THERMAL COVER
OKANOGAN CAVITY NESTING DUCK HABITAT	CAVITY NESTING DUCKS - BOTH ARTIFICIAL AND NATURAL NESTING SITES-ADULTS WITH YOUNG ARE NOTED IN SPRING-WOOD DUCKS, HOODED MERGANSERS BARROW'S GOLDENEYE
POGUE MOUNTAIN-OCC#314	GOLDEN EAGLE BREEDING SITE
ALTA COULEE	CLIFF HABITATS ASSOCIATED WITH ALTA COULEE AND ALTA LAKE; IMPORTANT RAPTOR NESTHABITAT: GOLDEN EATLE, RED-TAIL HAWK, KESTRELS, ETC. AND NONGAME BIRDS: ROCK ANDCANON WREN, W-T SWIFTS, SWALLOWS; CHUKARS
ALTA COULEE	TALUS ASSOCIATED WITH CLIFFS OF ALTA COULEE AND LAKE PROVIDES HABITAT FOR NONGAME BIRDS, REPTILES, AND SMALL MAMMALS: Y-B MARMOT, NUTALLIS CTN-RABBIT
ALTA LAKE RD-OCC#335	GOLDEN EAGLE NESTING SITE
ALTA LAKE-OCC#234	GOLDEN EAGLE BREEDING SITE
ALTA COULEE-OCC#157	GOLDEN EAGLE BREEDING SITE
AZWELL-OCC#167	GOLDEN EAGLE NESTING SITE
LOWER OKANOGAN RIVER	BALD EAGLE WINTERING HABITAT ALONG THE LOWER OKANOGAN RIVER. MOSTLY USE SHORELINE COTTONWOOD TREES FOR PERCHING. FORAGE ON FISH, WATERFOWL, AND WINTER-KILLED DEER.
METHOW VALLEY WINTER RANGE - KEY -MULE DEER	METHOW VALLEY KEY MULE DEER WINTER RANGE - ALL WINTER RANGE USED BY MULE DEER 1-200 DEER PER SQ MI. SIGNIFICANTLY HIGHER CONCENTRATIONS THAN IN THE SUMMER
METHOW VALLEY CRITICAL WINTER RANGE-MULE DEER	CRITICAL MULE DEER WINTER RANGE - METHOW VALLEY USED BY A HIGHTER CONCENTRATIONOF DEER THAN KEY WINTER RANGE - THESE AREAS ARE PARTICULARILY IMPORTANT DURING ALL BUT THE MILDEST WINTERS 50-200 DEER PER SQ. MI.
METHOW VALLEY BALD EAGLE WINTER USE SITES	BALD EAGLE WINTER CONCENTRATION AREA
LOWER OKANOGAN RIVER	CLIFF HABITATS ASSOCIATED WITH RANGES WEST OF LOWER OKANOGAN RIVER; PROVIDE QUALITY HABITAT FOR RAPTOR, NONGAME BIRDS AND SMALL MAMMALS
CHILIWIST BUTTE-OCC#362	GOLDEN EAGLE BREEDING AREA
RATTLESNAKE POINT	BALD EAGLE COMMUNAL ROOST

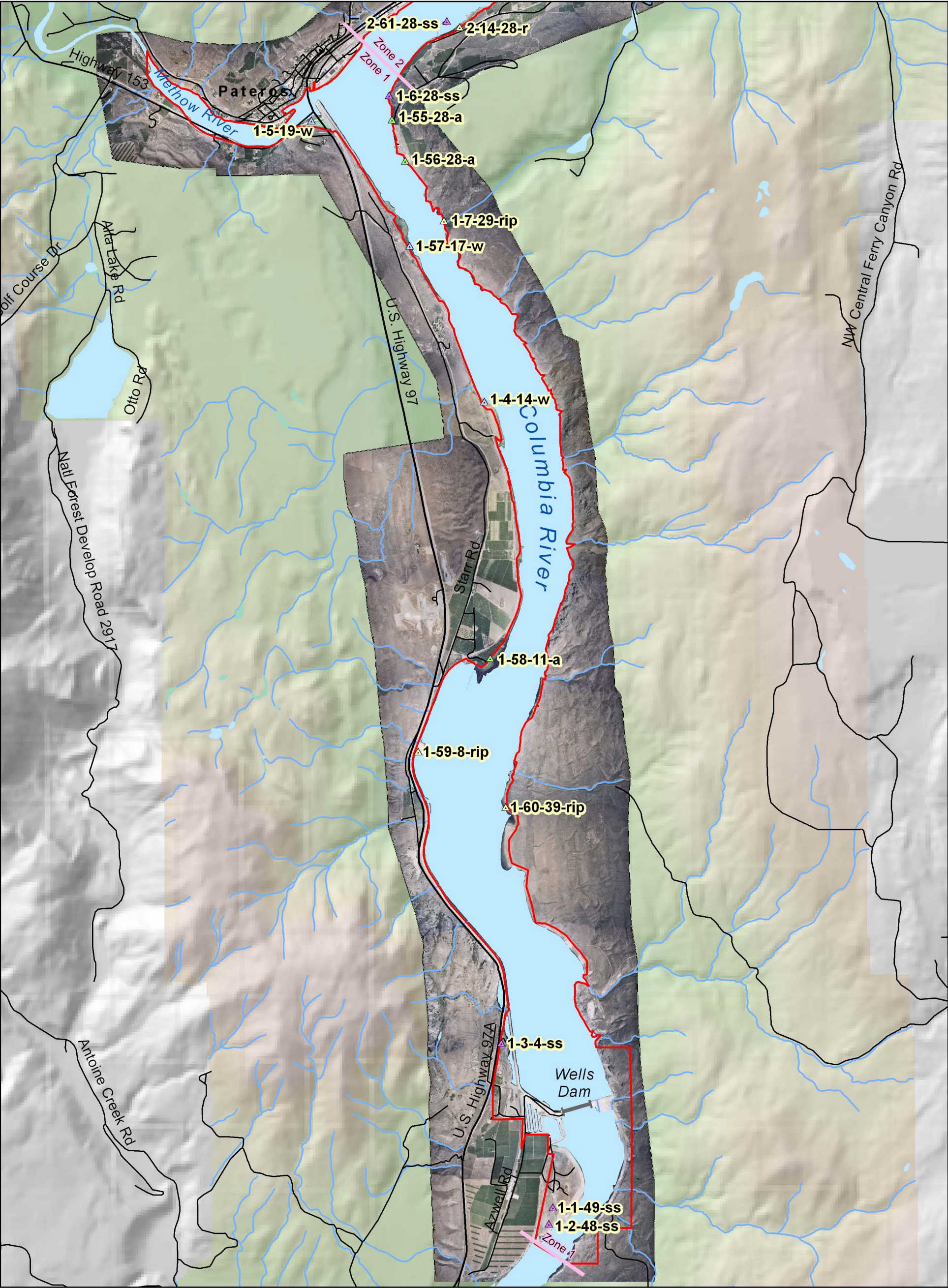
CHILIWIST	BALD EAGLE COMMUNAL ROOST
DAVIS CANYON-OCC#349	GOLDEN EAGLE BREEDING AREA
DENT MTN.-OCC#171	GOLDEN EAGLE BREEDING AREA
STARZMAN LAKE-OCC#350	GOLDEN EAGLE BREEDING AREA
BREWSTER-OCC#152	GOLDEN EAGLE BREEDING AREA
COLUMBIA RIVER-DOUGLAS CO.	BALD EAGLE WINTERING AREAS ALONG DOUGLAS CO. SIDE OF COLUMBIA RIVER; USE SHORELINE TREES MOSTLY COTTONWOOD AND PONDEROSA PINE; FORAGE ON WATERFOWL, COOTS, AND CARRION
METHOW VALLEY HARLEQUIN DUCKS	LOCATIONS OF HARLEQUIN DUCKS DURING BREEDING SEASON
LOWER METHOW VALLEY WESTERN GRAY SQUIRREL	WESTERN GRAY SQUIRREL AREAS
FOSTER CREEK RIPARIAN HABITAT	RIPARIAN HABITAT COMPOSED WATER BIRCH CLEMATIS, RED-OSIER DOGWOOD, WILDROSE WILLOW HAWTHORN-PRIMARY WILDLIFE USE WINTERING SHARP-TAILED GROUSE AREA, QUAIL, DOVEHUNGARIAN PARTRIDGE, CHUKARS
RIPARIAN DRAINAGE ZONES DOUGLAS/OKANOGAN COUNTY	RIPARIAN HABITAT COMPOSED OF WILLOW, RED OSIER DOGWOOD, CLEMATIS, ROSE, UTILIZEDBY QUAIL, CHUKAR HUNS, DOVES, RUFOUS-SIDED TOWEE
GEBBERS WETLAND	MAN MADE WETLANDS -UTILIZED BY DABBING DUCK FOR NESTING
CHELAN COUNTY DEER WINTER RANGES-HISTORIC	MULE DEER HISTORIC WINTER RANGE-LOST TO ALTERNATE LAND USE
ANTIONE CREEK DEER WINTER RANGE	MULE DEER WINTER RANGE, WINTERS 200-300 DEER, CONTAINS SEVERAL ORCHARDS AND DAMAGE AREAS AND SOME LOCAL FENCES, EXTENDS INTO REGION 2
UNION VALLEY DEER WINTER RANGE	MULE DEER WINTER RANGE
ANTOINE CREEK GOLDEN EAGLE TERRITORY	GOLDEN EAGLE TERRITORY - ANTOINE CREEK
WELLS POOL	WATERFOWL WINTERING AREA 20000 DIVING DUCKS +4000 MALLARD, 6+ WIGEON, 1000-10000CANADA GEESE, 1000-10000 REDHEADS 2000-8000 RINGNECK DUCKS- SUMMER USE 100-1500CANADA GEESE UTILIZE, 1000-1500 NESTING DABBING DUCKS
MOUTH OKANOGAN RIVER-COLUMBIA RIVER	WINTERING WATERFOWL CONCENTRATION AREA-100-200 MALLARD, 150 WIGEONS
RUFOUS WOODS POOL SHORELINES	WINTERING WATERFOWL CONCENTRATIONS IN SHELTERED COVES 1500 MALLARD 500 GREEN-WINGED TEAL, 1500-3000 CANADA GEESE, 2000 SCAUP 4000 GOLDENEYE 2000 COMMON MERGANSERS 200 BUFFLEHEAD 2500 WIGEON 500 PINTAILS
CHELAN/DOUGLAS COUNTY COLUMBIA RIVER SHORELINES	WINTERING WATERFOWL CONCENTRATION AREA IN SHELTERED COVES 300 MALLARDS, 1000 WIGEON, 300 GOLDENEYE, 300 CANADA GEESE, 500 SCAUP
INDIAN DAN-PATEROS-DEER WINTER RANGE	MULE DEER WINTER RANGE PRIMARILY RESIDENT HEARD SOME MIGRATORY MULE DEER USE, PROBABLY FROM METHOW VALLEY
BECKETT POINT	ROOKERY

AZWELL RIPARIAN STRIP	RIPARIAN-COLUMBIA RIVER SHORELINE DOWNSTREAM FROM WELLS DAM; WINTERING BALD EAGLES; UPLAND GAME; WINTERING WATERFOWL; GALLEGAR FLAT INCLUDES WETLANDS AND MITIGATION FEATURES
NORTH HOWARD FLAT CLIFF COMPLEX	CLIFF-NORTH HOWARD FLATT CLIFF COMPLEX; NESTING GOLDEN EAGLES AND OTHER RAPTORS
METHOW VALLEY RIPARIAN	RIPARIAN AREA COMPOSED COTTONWOOD OVERSTORY RED OSIER DOGWOOD,WILLOWS,SNOWBERRYMOCK-ORANGE ROSE CLEMANTIS-UTILIZED RESIDENT WHITE-TAILED DEER USE MULE DEER FAWN.NG,FOREST GROUSE YEAR ROUND,QUAIL,TREE SWALLOWS,KINGFISHER-WOODPECKERS FURBEAR
COLUMBIA RIVER-WELLS POOL BALE EAGLE WINTER AREA	BALD EAGLE WINTER CONCENTRATION AREA-USED BY 40+ EAGLES.
COLUMBIA RIVER ISLANDS-GOOSE NESTING AREA	CANADA GOOSE BREEDING/NESTING-NATURAL NESTING SITES 50-60 PAIRS.
COLUMBIA RIVER WATERFOWL BREEDING AREA, METHOW	WATERFOWL BREEDING AND MIGRATION AREAS-PRIMARILY DABBLERS,MALLARD,WIGEON,CINNAMON TEAL,WILSON OHALOROPES UTILIZE THIS AREA DURING MIGRATION.
BREWSTER BALD EAGLE ROOST	BALD EAGLE WINTER COMMUNAL ROOST ON NORTH ASPECT OF DYER HILL. STEEP SLOPE COVERED WITH A MATURE PONDEROSA PINE/DOUGLAS FIR FOREST. OVER 50 EAGLES USE ROOST DURING SEVERE WINTERS & LESSER NUMBERS DURING MORE MILD WINTERING.
COLUMBIA RIVER AND METHOW RIVER	CAVITY NESTING DUCKS-WOOD DUCK GOLDENEYE
COLUMBIA RIVER-WELLS POOL	WHITE PELICAN CONCENTRATION AREA - UP TO ABOUT 200
COLUMBIA RIVER	WATERFOWL CONCENTRATIONS-2000 DIVERS, 1500 MALLARDS, 3000 WIGEON, 500 GREEN TEAL600 CANADA GEESE
COLUMBIA RIVER AND TRIBUTARIES RIPARIAN AREAS	COLUMBIA RIVER RIPARIAN AREAS COMPOSED PRIMARILY OF BLACKCOTTON WOODS, WILLOWS,WILD ROSE, DOGWOOD, PRIMARY, WILDUSE DOVES, MUSKRATS, BEAVER POSSIBLY MINK, FLICKERS, LEWIS WOODPECKERS, PHEASANTS QUAIL,POTENTIAL SHARPTAILED GROUSE HAB CHUKAR
UPPER COLUMBIA/OKANOGAN RIVER CONFLUENCE	UPPER COLUMBIA/OKANOGANU RIVER CONFLUENCE-WETLAND IS FLUSHER WITH RAISE FALL OFPOOL/COMPOSED
COLUMBIA RIVER BREAKS OKANOGAN DOUGLAS CO.	TALUS CLIFF-CHUKARS
SHRUB STEPPE OKANOGAN DOUGLAS CO	SHRUB STEPPE-UTILIZED MULE DEER, CHUKAR, HUNS, QUAIL, PHEASANTS DOVE
DAVIS CANYON	SHARP-TAILED GROUSE RANGE BY SIGHTINGS OVER SEVERAL YEARS. BIRDS LAST OBSERVEDIN 1987
WEST FOSTER CREEK	SHARP-TAILED GROUSE WINTER AREA-ANNUAL WINTER USE
WICK MT.	HISTORIC SHARP-TAILED GROUSE LEK LAST OBSERVED 1982
CENTRAL FERRY CANYON	SHARP-TAILED GROUSE WINTER AREA-OBSERVED UP TO 60 GROUSE IN ONE FLOCK IN THE EARLY 1980'S
BREWSTER TRANSECT SITE	SHRUB STEPPE: FAIR CONDITION, MODERATE BIG SAGE COVER (11%), BLUEBUNCH WHEATGRASS 16%, SOME PURSHIA. ANNUAL GRASS LT 4%
BREWSTER FLATS BREEDING AREA	LONG BILLED CURLEW BREEDING AREAS
OKANOGAN VALLEY CHUKAR RANGE	CHUKAR RANGE-YEAR ROUND

OKANOGAN VALLEY QUAIL RANGE	QUAIL RANGE-YEAR ROUND
JORDAN CREEK	RING-NECKED PHEASANT REGULAR SMALL WINTER CONCENTRATIONS-LIMITED TO LAND AREAS
	CALIFORNIA QUAIL-SMALL OR LARGE WINTER CONCENTRATIONS-LIMITED TO LAND AREAS
	CHUKAR PARTRIDGE
COLUMBIA RIVER	COMMON LOONSMALL WINTER CONCENTRATION AREAS FOR FORAGING
CENTRAL FERRY CANYON	SHARP-TAILED GROUSE SUMMER BROODING AREAS.
COLUMBIA RIVER	ISLAND
NORTH DOUGLAS COUNTY	MAJOR MULE DEER RANGE INCLUDING WINTER RANGE AND FAWNING HABITAT . COMPOSED OF STEEP TERRAIN, RICH RIPARIAN ZONES, CONIFEROUS FORESTS AND BITTERBRUSH SLOPES AND BENCHES, WINTER WHEAT FIELDS ADD IMPORTANT FOOD SOURCES. USED BY 500-1000 DEER
CHILWIST VALLEY	GENERAL RANGE OF WILD TURKIES IN CHILWIST VALLEY AND ASSOCIATED AREAS. POPULATION ESTIMATED AT 250-300.
WATSON DRAW SHARP-TAILED GROUSE RANGE	SHARP-TAILED GROUSE RANGE DETERMINED BY LEK COUNTS AND HISTORIC SIGHTINGS
LOWER METHOW CHUKAR RANGE	CHUKAR RANGE YEAR-ROUND
RUFIOUS WOODS LAKE	BALD EAGLE WINTERING AREA; USED BY 25-40 EAGLES DURING MOST WINTERS; PRIMARILY PERCH IN RIVERSIDE PONDEROSA PINE
RUFIOUS WOODS LAKE	RIPIARIAN HABITAT ASSOCIATED WITH RUFIOUS WOODS LAKE (COL. R.) DRYER TYPE DOMINATED WITH PONDEROSA PINE AND SERVICEBERRY PROVIDES EXCELLENT HABITAT FOR EAGLES, MULE DEER, MORNING DOVES AND MANY SPECIES OF NONGAME BIRDS INCLUDING LEWIS WOODPECKER
FOSTER CREEK DEER RANGE	MAJOR DEER HABITAT ASSOC. WITH FOSTER CK DRAINAGE. VARIED TOPOGRAPHY, SAGEBRUSH AND BITTERBRUSH COMMUNITIES, RIPARIAN ZONES AND WINTER WHEAT PROVIDES QUALITY WINTER RANGE AND FAWNING HABITAT. LOWER PORTION PROVIDES CRITICAL WINTER RANGE
NORTH CENTRAL WASHINGTON	LYNX HABITAT LODGEPOLE PINE, SUB-ALPINE FIR AND ENGELMANN SPRUCE THICKETS ABOVE 4200 FOOT ELEVATION.
NW DOUGLAS CO. SHARP-TAILED GROUSE RANGE	PRIMARY SHARP-TAILED GROUSE RANGE IN NORTHWEST DOUGLAS CO. AREAS OF SUITABLE HABITAT OCCUR MOSTLY IN BREAKS OF COLUMBIA R. AND W. FOSTER CK. POPULATION ASSOC. WITH FOUR MAJOR LEKS. (W. FOSTER CK, DYER HILL, BEARD LK. AND CENTRAL FERRY C.
DYER HILL DEER RANGE	MAJOR HABITAT AREA FOR MULE DEER ASSOC. WITH DYER HILL-USED BY EST. 300-400 HEAD. PROVIDES YEAR-ROUND HABITAT WITH WINTER HABITAT IN PINE-BITTERBRUSH DRAWS ABOVE COLUMBIA R. WINTER WHEAT AND CRP PROVIDE IMPORTANT FORAGE AREA. SEVERAL RIP
COLD SPRING BASIN	DIVERSE WOODY RIPARIAN HABITAT DOMINATED BY WATER BIRCH AND ASPEN. PROVIDES HABITAT FOR MULE DEER, SHARP-TAILED GROUSE, BEAVER AND NONGAME BIRDS.
CORNEHL LAKE	VERY PRODUCTIVE WETLANDS DOMINATED BY TALL EMERGENTS; PROVIDE EXCELLENT HABITAT FOR DEER, FUR BEARERS, DUCKS AND SONG BIRDS.
BANKS LAKE AND MOSES LAKE - DOUGLAS COUNTY	SAGE GROUSE REGULAR USE AREAS; SMALL AND LARGE USE AREAS BREEDING GROUNDS AND WINTER USE AREAS
N. COLUMBIA - E. FOSTER CREEK	PRIMARY MULE DEER WINTER RANGE ALONG RUFIOUS WOODS LAKE AND LOWER EAST FOSTER CREEK. DURING MODERATE TO SEVERE WINTER 1000 OR MORE DEER UTILIZE AREA.

APPENDIX C

Avian Point Count Survey Stations



Appendix C: Avian Point Count Survey Locations

- FERC Project Boundary

Study Area Zone Boundary

U.S. Highway

State Highway/Route

Local Road

Stream

Open Water

Marsh/Wetland/Swamp

Dam/Weir

Agriculture

Idle Agriculture

Riparian

Shrub-Steppe

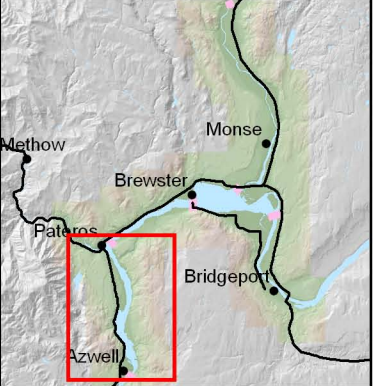
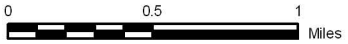
Wetland
- Agriculture

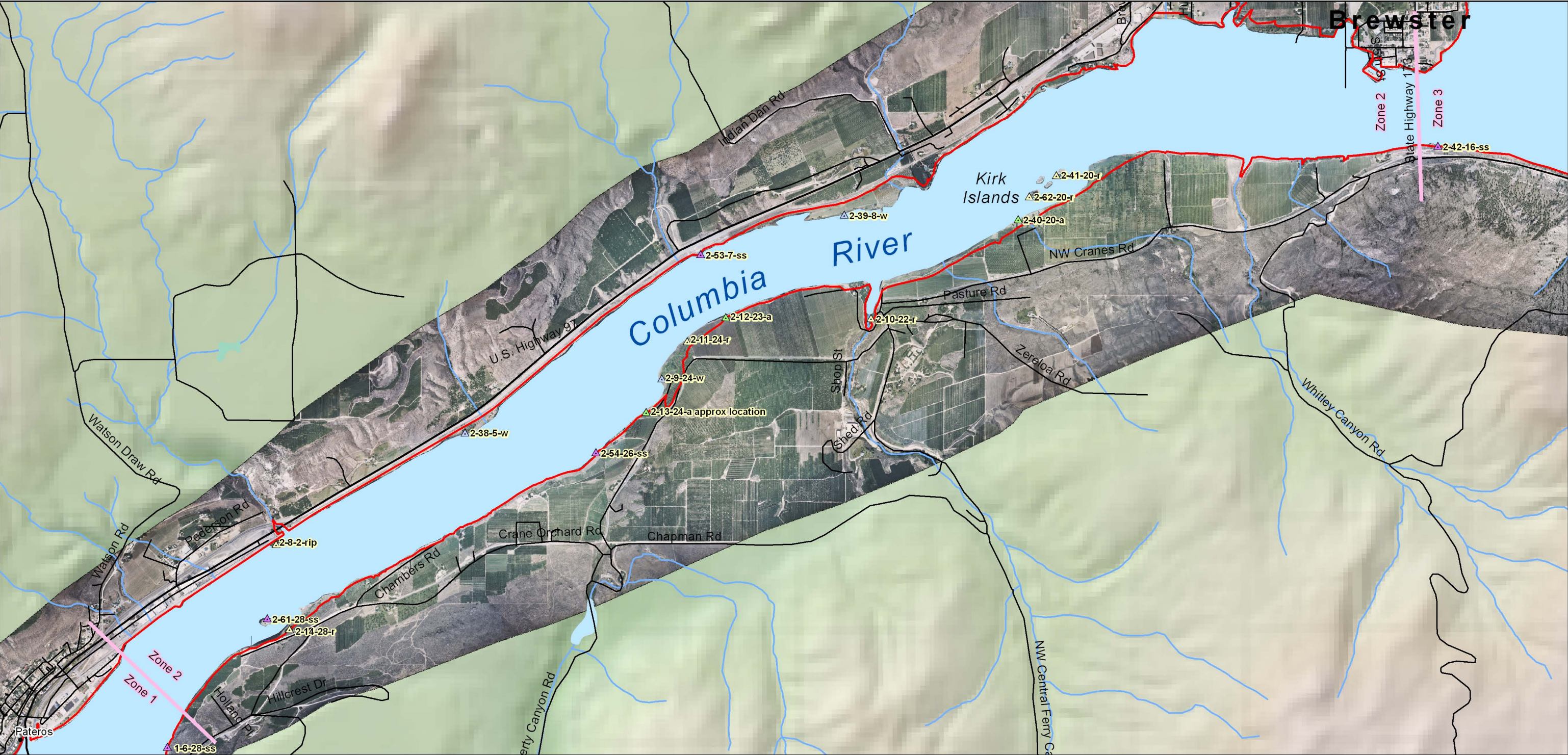
Idle Agriculture

Riparian

Shrub-Steppe

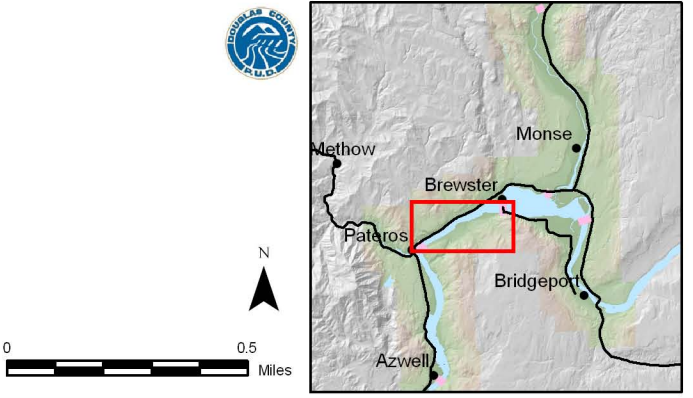
Wetland

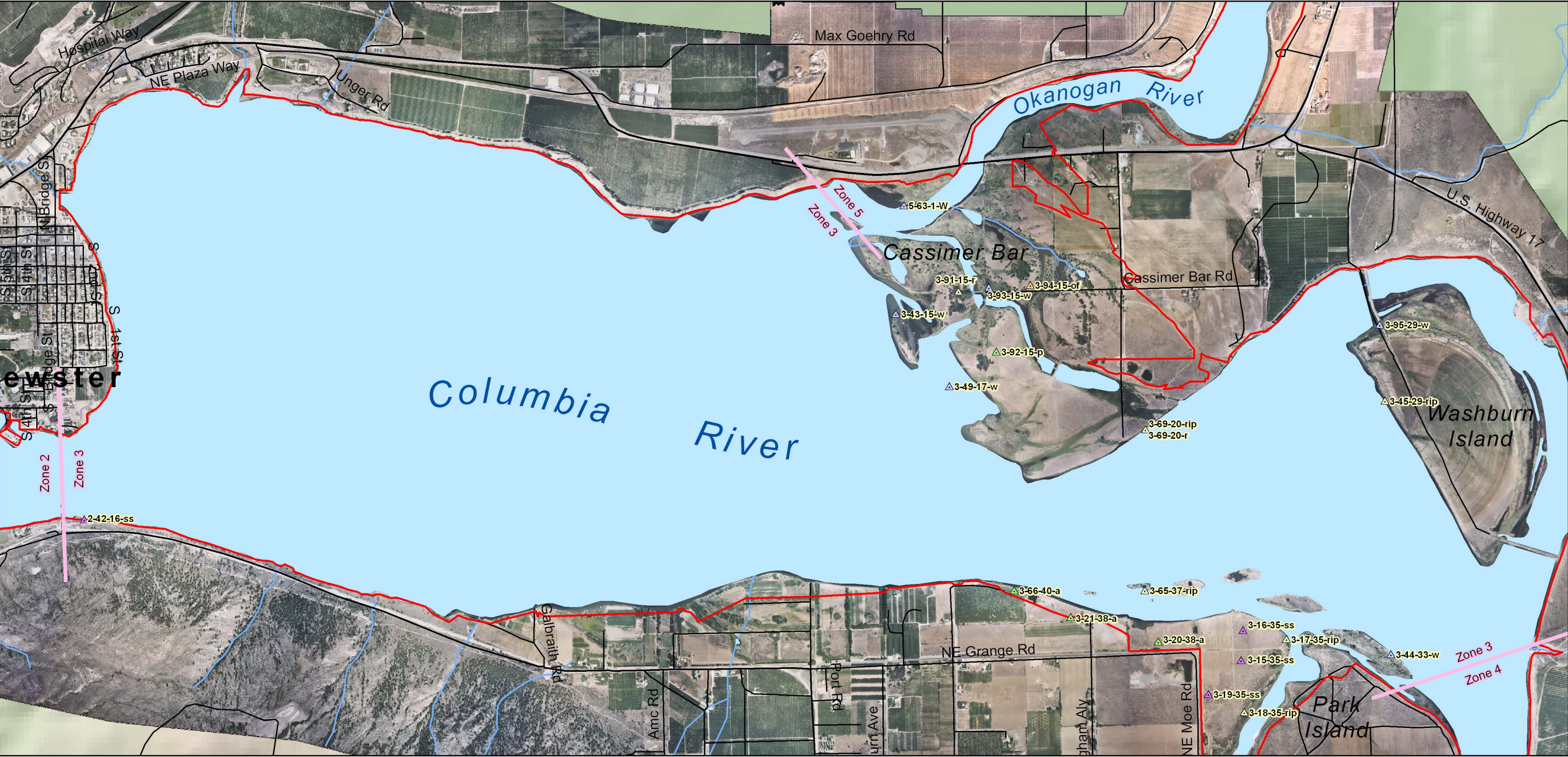




Appendix C: Avian Point Count Survey Locations

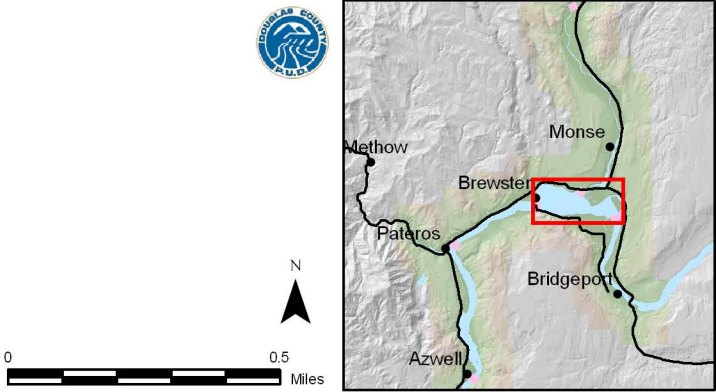
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|--------------------------|---------------------|---------------------|-----------------------------------|--------------|
| FERC Project Boundary | U.S. Highway | Open Water | Avian point count stations | Riparian |
| Study Area Zone Boundary | State Highway/Route | Marsh/Wetland/Swamp | Agriculture | Shrub-Steppe |
| | Local Road | Dam/Weir | Idle Agriculture | Wetland |
| | Stream | | | |

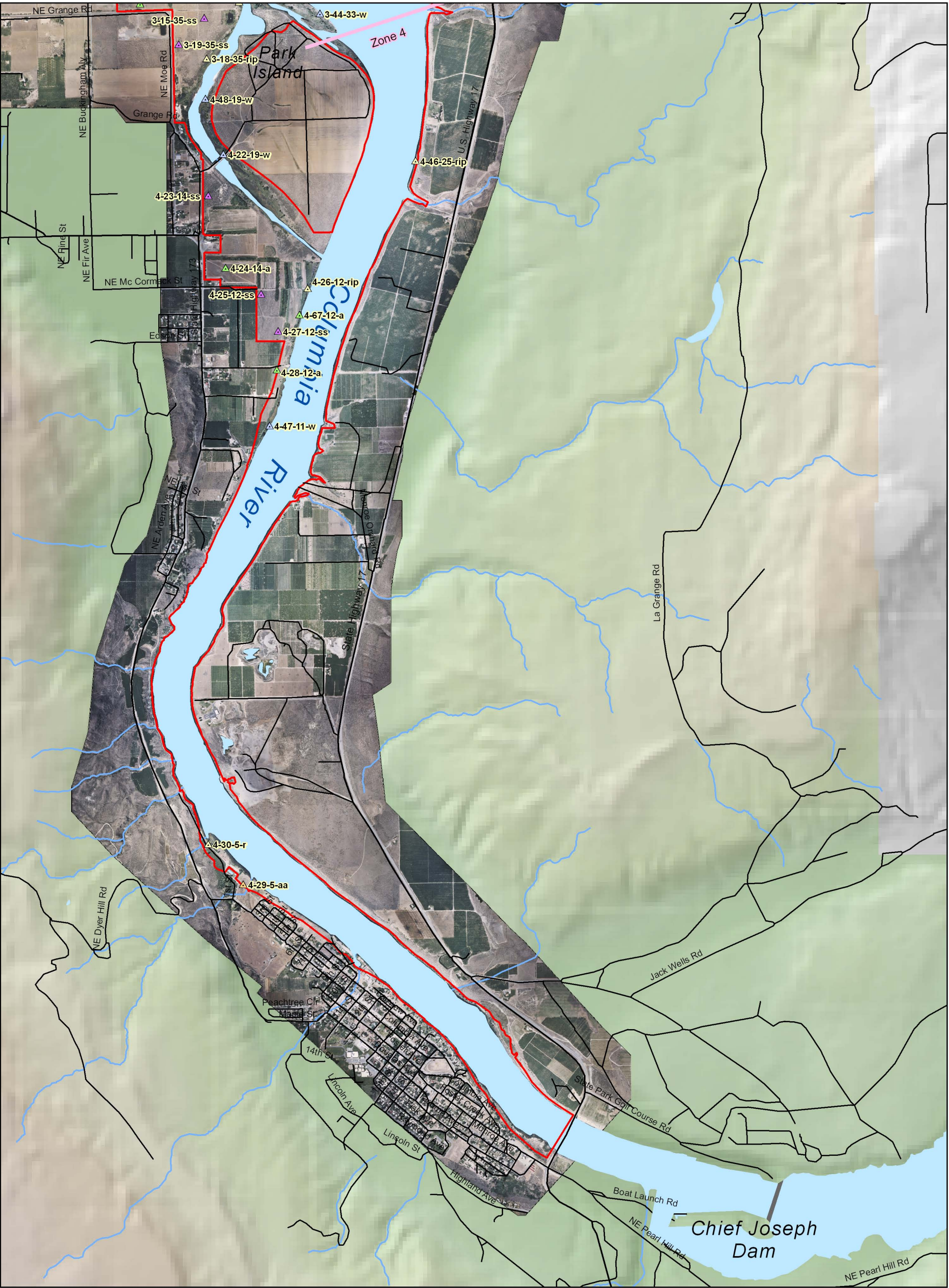




Appendix C: Avian Point Count Survey Locations

- | | | | | |
|--------------------------|---------------------|---------------------|-----------------------------------|--------------|
| FERC Project Boundary | U.S. Highway | Open Water | Avian point count stations | Shrub-Steppe |
| Study Area Zone Boundary | State Highway/Route | Marsh/Wetland/Swamp | Agriculture | Wetland |
| | Local Road | Dam/Weir | Idle Agriculture | |
| | Stream | | Riparian | |





Appendix C: Avian Point Count Survey Locations

- FERC Project Boundary

Study Area Zone Boundary

U.S. Highway

State Highway/Route

Local Road

Stream

Open Water

Marsh/Wetland/Swamp

Dam/Weir

Avian point count stations

Agriculture

Idle Agriculture

Riparian

Shrub-Steppe

Wetland

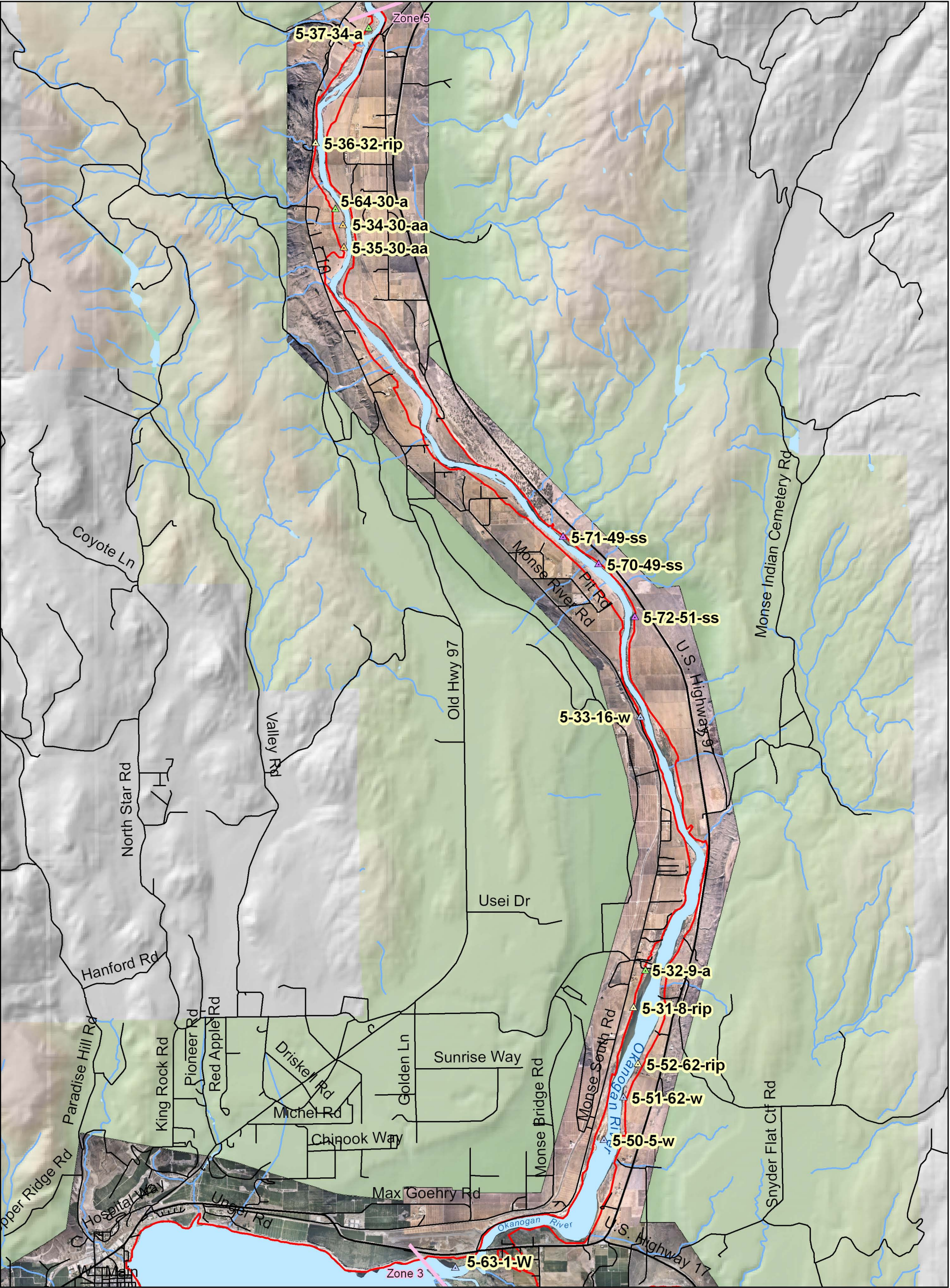
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Miles

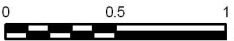
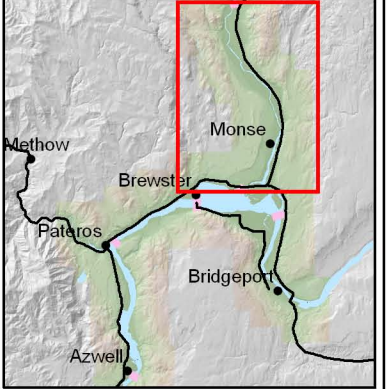
Zone 4
Page 4 of 5

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Appendix C: Avian Point Count Survey Locations

- | | | | | |
|--------------------------|---------------------|---------------------|-----------------------------------|--------------|
| FERC Project Boundary | U.S. Highway | Open Water | Avian point count stations | Riparian |
| Study Area Zone Boundary | State Highway/Route | Marsh/Wetland/Swamp | Agriculture | Shrub-Steppe |
| | Local Road | Dam/Weir | Idle Agriculture | Wetland |
| | Stream | | | |



APPENDIX D

Blank Data Forms

Pitfall/Mammal Trapping Data Form

Page ____ of ____

Entered By: _____ on _____ Checked By: _____ on _____

Date: _____

Air Temp:_____

[illegible]

[illegible]

Transect Number: _____ Project Section: _____
Survey Start Time: _____
Weather: _____ Air Temp: _____

Entered By: _____ on _____ Checked By: _____ on _____

S song
C Call
V Visual
N nesting/nest building
Notes:
♂ or ♀ if possible
Age if possible

[illegible]

[illegible]

Survey Type (rept., amph., etc.) _____

Habitat: _____

GPS:

Location: _____ Project Section: _____

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

Survey Start Time:

Survey Stop Time:

Weather: _____ **Air Temp:** _____

Water Temp:_____ **Wind Speed:**_____

[illegible]

Survey Type (rept., amph., etc.) _____

Habitat: _____

GPS:

Location:_____ **Project Section:**_____

Date:_____ Observer(s):_____

Survey Start Time:

Survey Stop Time:

Weather: _____ Air Temp: _____

Water Temp:_____ **Wind Speed:**_____

[illegible]

Survey Type (rept., amph., etc.) _____

Habitat: _____

GPS:

Location:_____ **Project Section:**_____

Date: _____ Observer(s): _____

Survey Start Time: _____

Survey Stop Time: _____

Weather: _____ **Air Temp:** _____

Water Temp:_____ **Wind Speed:**_____

[illegible]

GPS:

Observer(s): _____

Survey Stop Time:

Wind Speed:_____

Observer(s):_____

Survey Stop Time:

Wind Speed:

Observer(s):_____

Survey Stop Time:

Wind Speed:_____

[illegible]

Wells Hydroelectric Project

Species/Habitat Observations

Field Dates: from ____ to ____

Page ____ of ____

Entered By: ____ on ____ Checked By: ____ on ____

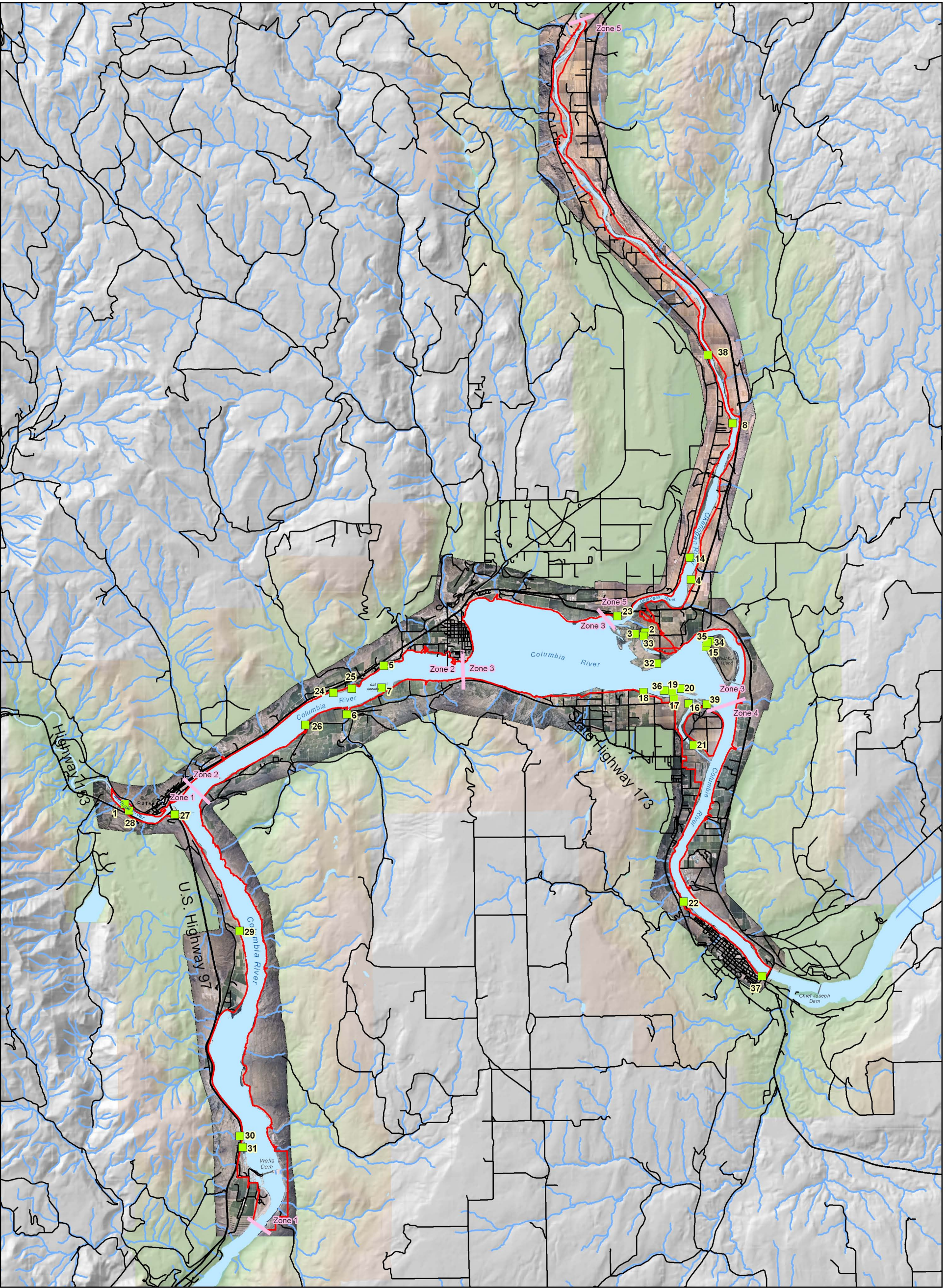
(In habitat column indicate project section as follows: U=upper, M=mid, L=lower, W=Methow, O=Okanagon, T=Tailrace)

BIRDS								
Species	Sci Name	Op. Wat.	Wetlnd	Ripar.	Shrub St.	Ag.	Ab. Ag.	Notes:
Canada Goose	<i>Branta canadensis</i>							
Wood Duck	<i>Aix sponsa</i>							
Gadwall	<i>Anas strepera</i>							
American Wigeon	<i>Anas americana</i>							
Mallard	<i>Anas platyrhynchos</i>							
Northern Shoveler	<i>Anas clypeata</i>							
Canvasback	<i>Aythya valisineria</i>							
Redhead	<i>Aythya americana</i>							
Scaup spp.	<i>Aythya spp.</i>							
Bufflehead	<i>Bucephala albeola</i>							
Hooded Merganser	<i>Lophodytes cucullatus</i>							
Common Merganser	<i>Mergus merganser</i>							
California Quail	<i>Callipepla californica</i>							
Pied-billed Grebe	<i>Podilymbus podiceps</i>							
Western Grebe	<i>Aechmophorus occidentalis</i>							
Double-crested Cormorant	<i>Phalacrocorax auritus</i>							
Great Blue Heron	<i>Ardea herodias</i>							
Sandhill Crane	<i>Grus canadensis</i>							
Turkey Vulture	<i>Cathartes aura</i>							
Osprey	<i>Pandion haliaetus</i>							
Bald Eagle	<i>Haliaeetus leucocephalus</i>							
Northern Harrier	<i>Circus cyaneus</i>							
Red-tailed Hawk	<i>Buteo jamaicensis</i>							
American Kestrel	<i>Falco sparverius</i>							
American Coot	<i>Fulica americana</i>							
Killdeer	<i>Charadrius vociferus</i>							
Spotted Sandpiper	<i>Actitis macularius</i>							
Ring-billed Gull	<i>Larus delawarensis</i>							
California Gull	<i>Larus californicus</i>							
Caspian Tern	<i>Sterna caspia</i>							
Common Tern	<i>Sterna hirundo</i>							
Forster's Tern	<i>Sterna forsteri</i>							
Black Tern	<i>Chlidonias niger</i>							
Rock Dove	<i>Columba livia</i>							
Mourning Dove	<i>Zenaida macroura</i>							
Common Nighthawk	<i>Chordeiles minor</i>							
Vaux's Swift	<i>Chaetura vauxi</i>							
Calliope Hummingbird	<i>Stellula calliope</i>							
Rufous Hummingbird	<i>Selasphorus rufus</i>							
Belted Kingfisher	<i>Ceryle alcyon</i>							
Downy Woodpecker	<i>Picoides pubescens</i>							
Hairy Woodpecker	<i>Picoides villosus</i>							
Northern Flicker	<i>Colaptes auratus</i>							
Pileated Woodpecker	<i>Dryocopus pileatus</i>							
Olive-sided Flycatcher	<i>Contopus cooperi</i>							
Western Wood-Pewee	<i>Contopus sordidulus</i>							
Willow Flycatcher	<i>Empidonax traillii</i>							
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>							
Say's Phoebe	<i>Sayornis saya</i>							
Western Kingbird	<i>Tyrannus verticalis</i>							
Loggerhead Shrike	<i>Lanius ludovicianus</i>							
Warbling Vireo	<i>Vireo gilvus</i>							
Steller's Jay	<i>Cyanocitta stelleri</i>							
Black-billed Magpie	<i>Pica pica</i>							
American Crow	<i>Corvus brachyrhynchos</i>							
Common Raven	<i>Corvus corax</i>							
Tree Swallow	<i>Tachycineta bicolor</i>							
Violet-green Swallow	<i>Tachycineta thalassina</i>							
N. Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>							
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>							
Barn Swallow	<i>Hirundo rustica</i>							
Black-capped Chickadee	<i>Parus atricapilla</i>							
Red-breasted Nuthatch	<i>Sitta canadensis</i>							
White-breasted Nuthatch	<i>Sitta carolinensis</i>							
Brown Creeper	<i>Certhia americana</i>							
Rock Wren	<i>Salpinctes obsoletus</i>							
Canyon Wren	<i>Catherpes mexicanus</i>							
House Wren	<i>Troglodytes aedon</i>							
Marsh Wren	<i>Cistothorus palustris</i>							
Golden-crowned Kinglet	<i>Regulus satrapa</i>							
Ruby-crowned Kinglet	<i>Regulus calendula</i>							
Western Bluebird	<i>Sialia mexicana</i>							
Swainson's Thrush	<i>Catharus ustulatus</i>							
Hermit Thrush	<i>Catharus guttatus</i>							
American Robin	<i>Turdus migratorius</i>							
Varied Thrush	<i>Ixoreus naevius</i>							
Gray Catbird	<i>Dumetella carolinensis</i>							
European Starling	<i>Sturnus vulgaris</i>							
Cedar Waxwing	<i>Bombycilla cedrorum</i>							
Orange-crowned Warbler	<i>Vermivora celata</i>							
Nashville Warbler	<i>Vermivora ruficapilla</i>							
Yellow Warbler	<i>Dendroica petechia</i>							
Yellow-rumped Warbler	<i>Dendroica coronata</i>							
Townsend's Warbler	<i>Dendroica townsendi</i>							
MacGillivray's Warbler	<i>Oporornis tolmiei</i>							
Common Yellowthroat	<i>Geothlypis trichas</i>							
Wilson's Warbler	<i>Wilsonia pusilla</i>							
Yellow-breasted Chat	<i>Icteria virens</i>							
Western Tanager	<i>Piranga ludoviciana</i>							
Spotted Towhee	<i>Pipilo maculatus</i>							
Chipping Sparrow	<i>Spizella passerina</i>							
Song Sparrow	<i>Melospiza melodia</i>							

BIRDS (cont.)								
Species	Sci Name	Op. Wat.	Wetlnd	Ripar.	Shrub St.	Ag.	Ab. Ag.	Notes:
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>							
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>							
Dark-eyed Junco	<i>Junco hyemalis</i>							
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>							
Lazuli Bunting	<i>Passerina amoena</i>							
Red-winged Blackbird	<i>Agelaius phoeniceus</i>							
Western Meadowlark	<i>Sturnella neglecta</i>							
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>							
Brown-headed Cowbird	<i>Molothrus ater</i>							
Bullock's Oriole	<i>Icterus bullockii</i>							
House Finch	<i>Carpodacus mexicanus</i>							
Pine Siskin	<i>Carduelis pinus</i>							
American Goldfinch	<i>Carduelis tristis</i>							
Evening Grosbeak	<i>Coccothraustes vespertinus</i>							
House Sparrow	<i>Passer domesticus</i>							
Additional bird species (include habitat and project section for each observation):								
HERPS								
Species	Sci Name	Op. Wat.	Wetlnd	Ripar.	Shrub St.	Ag.	Ab. Ag.	Notes:
Pacific Giant Salamander								
Western Toad								
Treefrog								
Long-toed Salamander								
Bullfrog								
Painted Turtle								
Southern Alligator Lizard								
Northern Sagebrush Lizard								
Western Fence Lizard								
Side-blotched Lizard								
Yellow-Bellied Racer								
Western Skink								
Night Snake								
Sharptail Snake								
Ringneck Snake								
Common Kingsnake								
Striped Whipsnake								
Gopher Snake								
W. Terrestrial Garter Snake								
Rubber Boa								
Common Garter Snake								
Western Rattlesnake								
Additional herp species (include habitat and project section for each observation):								
MAMMALS								
Species	Sci Name	Op. Wat.	Wetlnd	Ripar.	Shrub St.	Ag.	Ab. Ag.	Notes:
Black Bear								
Raccoon								
Long-Tailed Weasel								
Mink								
River Otter								
Striped Skunk								
Badger								
Coyote								
Gray Fox								
Mountain Lion								
Bobcat								
Yellow-Pine Chipmunk								
Least Chipmunk								
Yellow-Bellied Marmot								
California Ground Squirrel								
Beaver								
Kangaroo Rat (sp.)								
Western Harvest Mouse								
Deer Mouse								
Canyon Mouse								
Pinyon Mouse								
Dusky-Footed Woodrat								
Bushy-Tailed Woodrat								
Montane Vole								
Muskrat								
Black-Tailed Jackrabbit								
Roosevelt Elk								
Yuma Bat*								
Black-Tailed Deer								
Additional mammal species (include habitat and project section for each observation):								

APPENDIX E

Amphibian Survey Locations



Appendix E: Amphibian Survey Locations

- FERC Project Boundary

Study Area Zone Boundary
- U.S. Highway

State Highway/Route

Local Road

Stream
- Open Water

Marsh/Wetland/Swamp

Dam/Weir
- Amphibian Survey Site

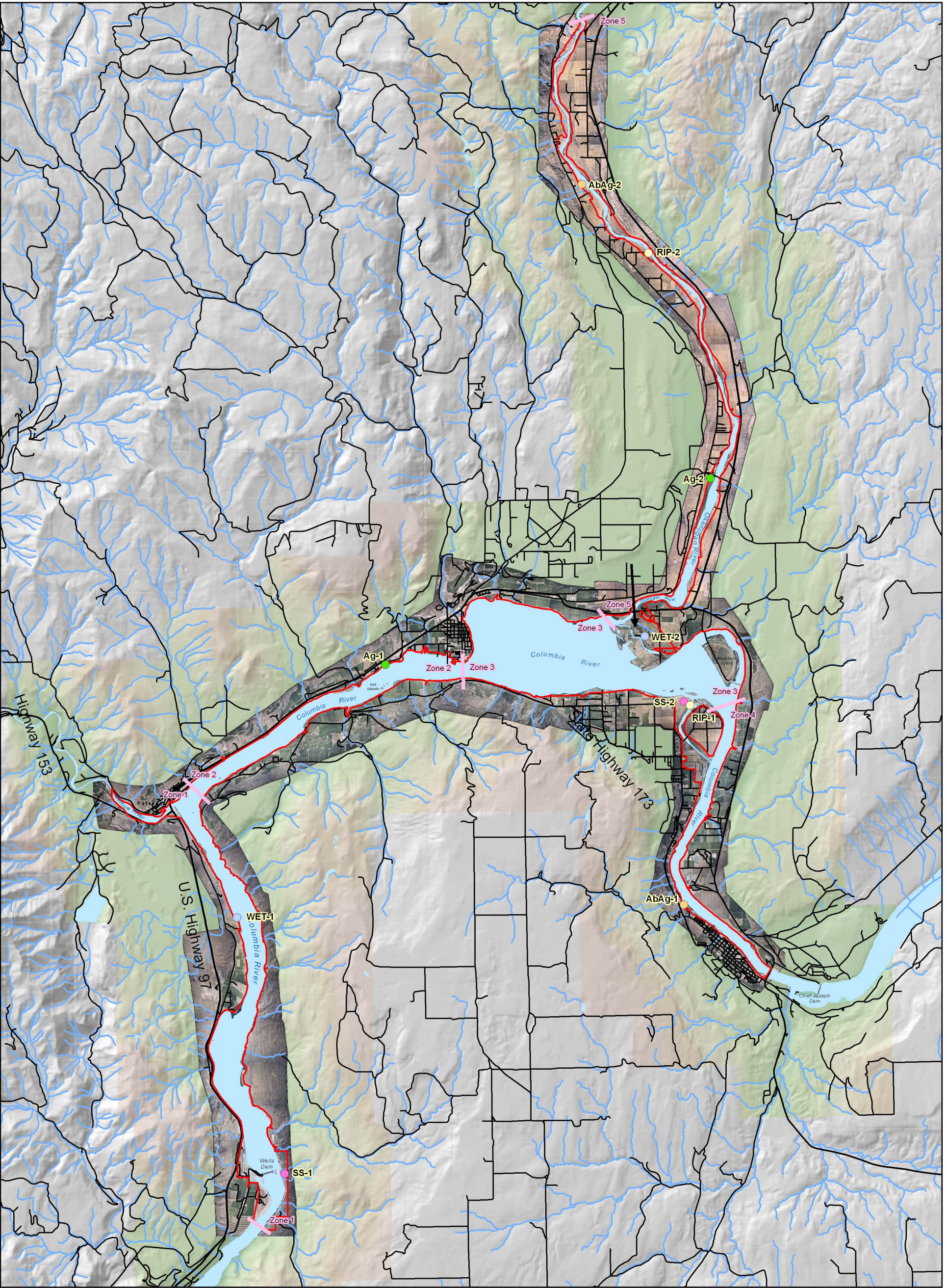


APPENDIX F

Reptile Survey Locations

APPENDIX G

Wells Small Mammal Survey Locations



Appendix G: Wells Small Mammal Survey Locations

- FERC Project Boundary

Study Area Zone Boundary

U.S. Highway

State Highway/Route

Local Road

Stream

Open Water

Marsh/Wetland/Swamp

Dam/Weir

Small mammal surveys by cover type

Agriculture

Idle Agriculture

Riparian

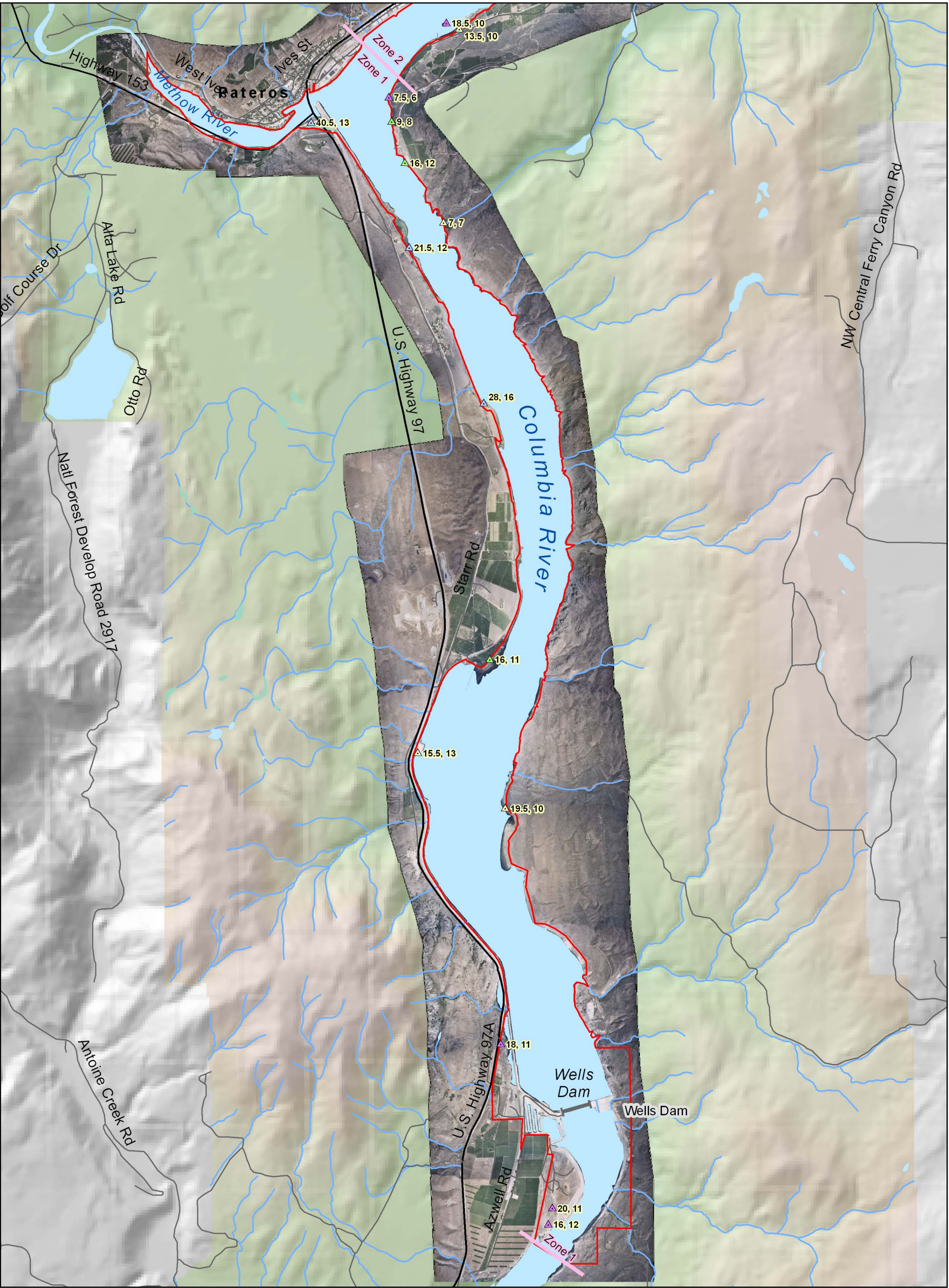
Shrub-Steppe

Wetland

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APPENDIX H

Breeding Season Avian Survey Results Map



Appendix H: Breeding Season Avian Survey* Results Maps

- FERC Project Boundary

Study Area Zone Boundary

U.S. Highway

State Highway/Route

Local Road

Stream

Open Water

Marsh/Wetland/Swamp

Dam/Weir

Avian point count stations

Agriculture

Idle Agriculture

Riparian

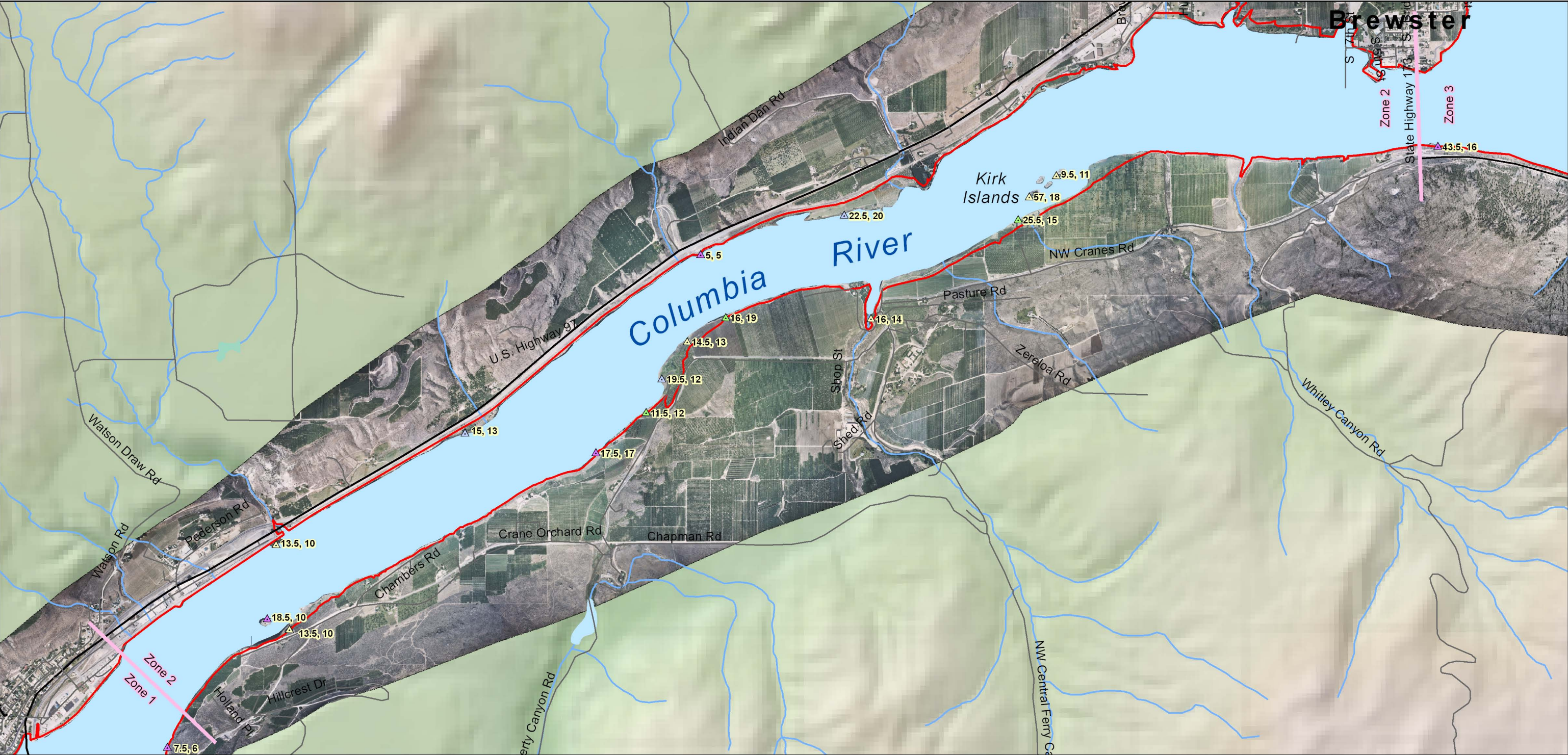
Shrub-Steppe

Wetland

* Avian relative abundance and species richness during breeding season surveys in 2005. Labels for the avian survey locations indicate the number of birds per survey, followed by the number of species detected at the site.

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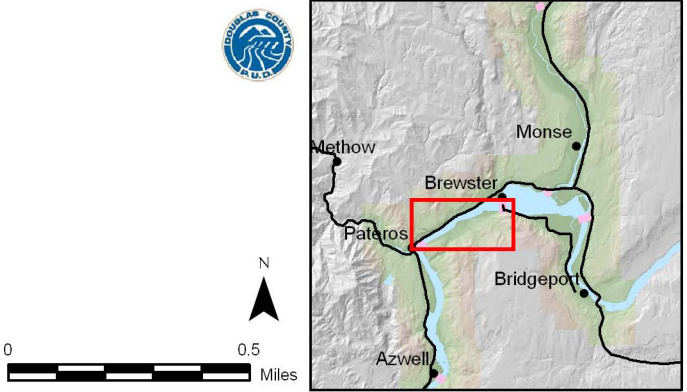
Zone 1
Page 1 of 5

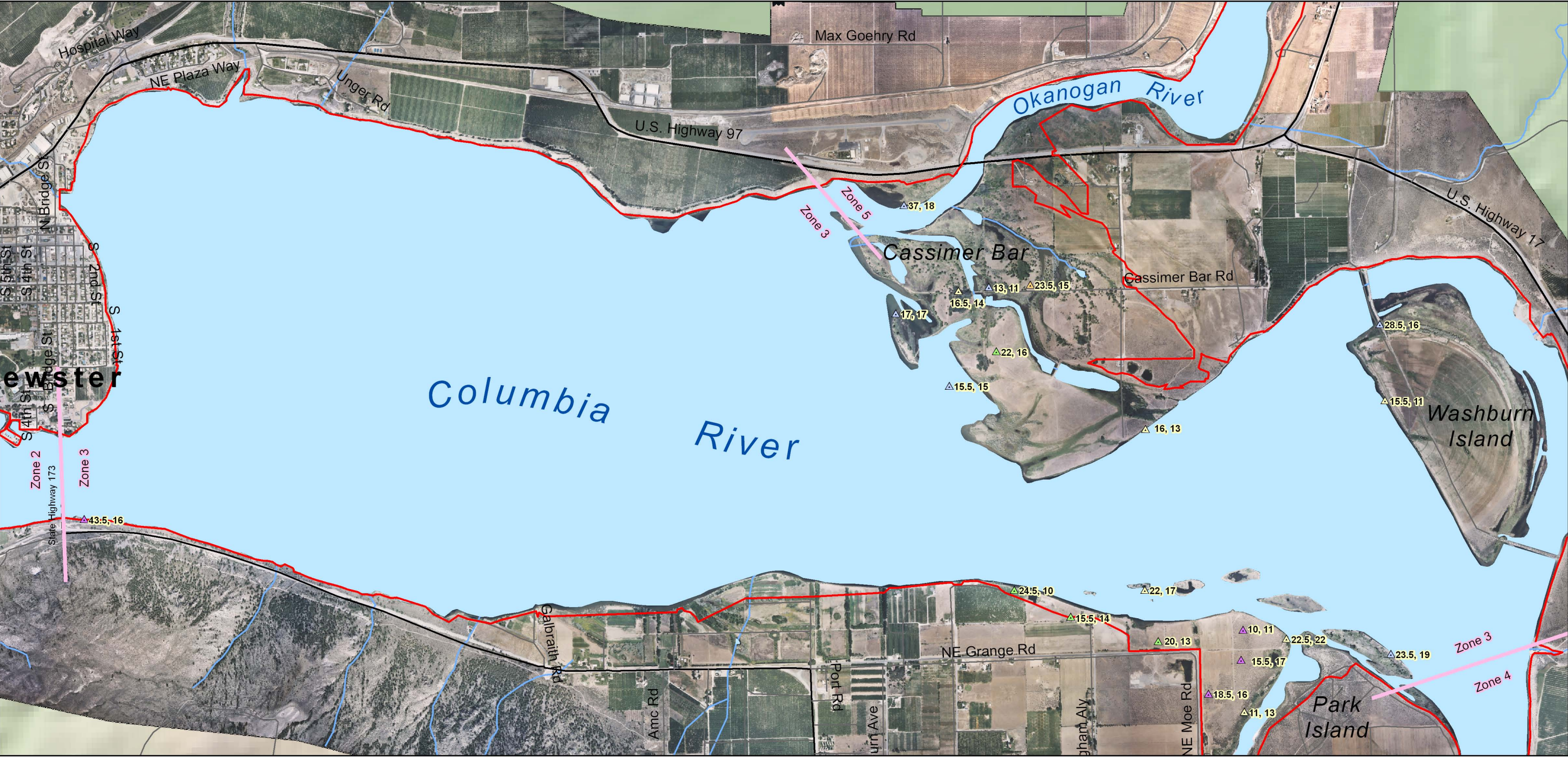


Appendix H: Breeding Season Avian Survey* Results Maps

- | | | | | |
|--------------------------|---------------------|---------------------|-----------------------------------|--------------|
| FERC Project Boundary | U.S. Highway | Open Water | Avian point count stations | Riparian |
| Study Area Zone Boundary | State Highway/Route | Marsh/Wetland/Swamp | Agriculture | Shrub-Steppe |
| | Local Road | Dam/Weir | Idle Agriculture | Wetland |
| | Stream | | | |

* Avian relative abundance and species richness during breeding season surveys in 2005. Labels for the avian survey locations indicate the number of birds per survey, followed by the number of species detected at the site.

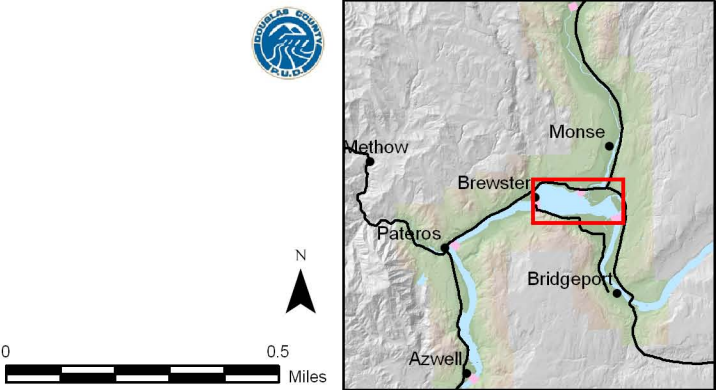


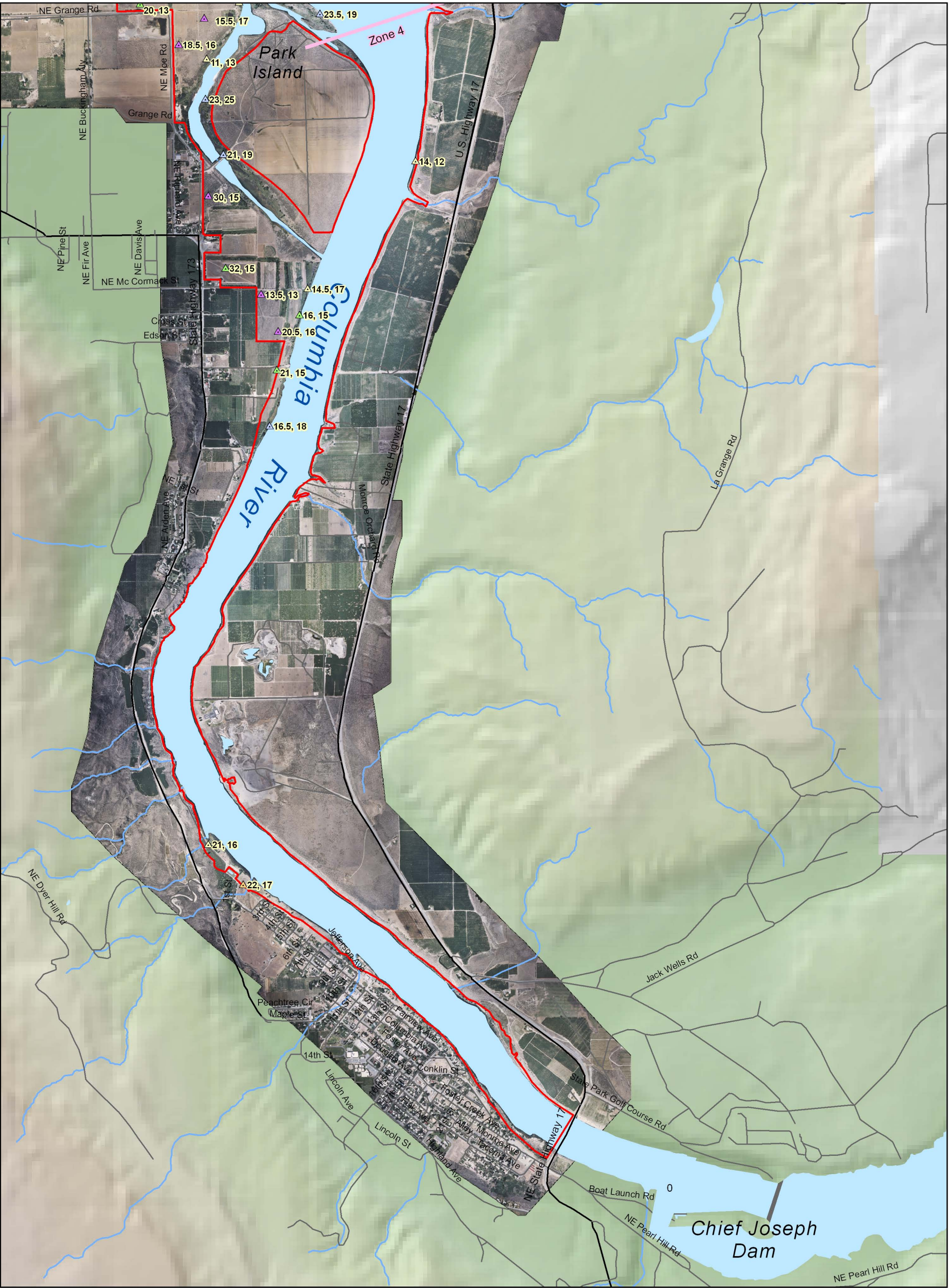


Appendix H: Breeding Season Avian Survey* Results Maps

- | | | | | |
|--------------------------|---------------------|---------------------|-----------------------------------|--------------|
| FERC Project Boundary | U.S. Highway | Open Water | Avian point count stations | Riparian |
| Study Area Zone Boundary | State Highway/Route | Marsh/Wetland/Swamp | Agriculture | Shrub-Steppe |
| | Local Road | Dam/Weir | Idle Agriculture | Wetland |
| | Stream | | | |

* Avian relative abundance and species richness during breeding season surveys in 2005. Labels for the avian survey locations indicate the number of birds per survey, followed by the number of species detected at the site.





Appendix H: Breeding Season Avian Survey* Results Maps

- FERC Project Boundary

Study Area Zone Boundary

U.S. Highway

State Highway/Route

Local Road

Stream

Open Water

Marsh/Wetland/Swamp

Dam/Weir

Avian point count stations

Agriculture

Idle Agriculture

Riparian

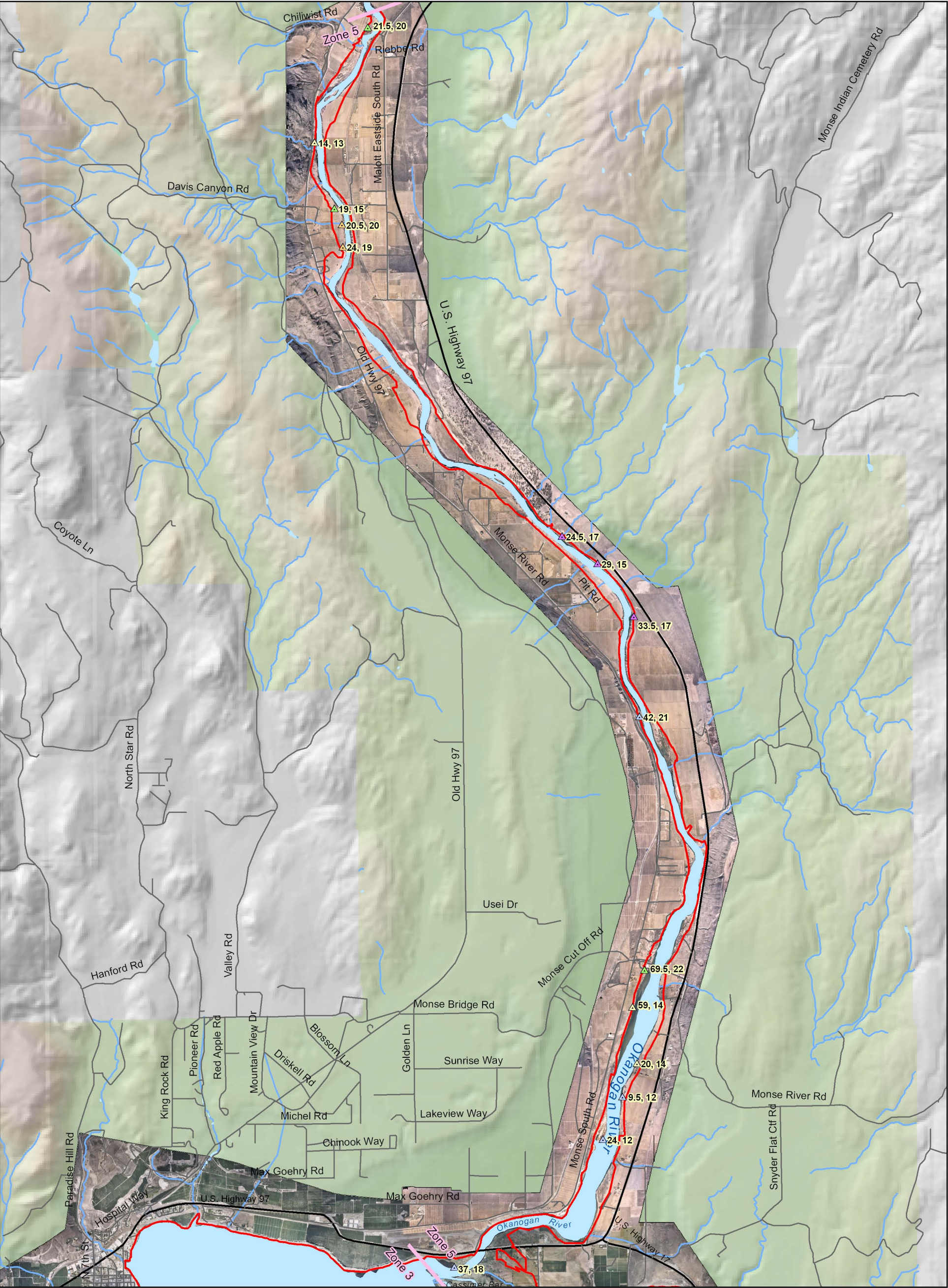
Shrub-Steppe

Wetland

* Avian relative abundance and species richness during breeding season surveys in 2005. Labels for the avian survey locations indicate the number of birds per survey, followed by the number of species detected at the site.

Zone 4
Page 4 of 5

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Appendix H: Breeding Season Avian Survey* Results Maps

- FERC Project Boundary

Study Area Zone Boundary

U.S. Highway

State Highway/Route

Local Road

Stream

Open Water

Marsh/Wetland/Swamp

Dam/Weir

Avian point count stations

Riparian

Shrub-Steppe

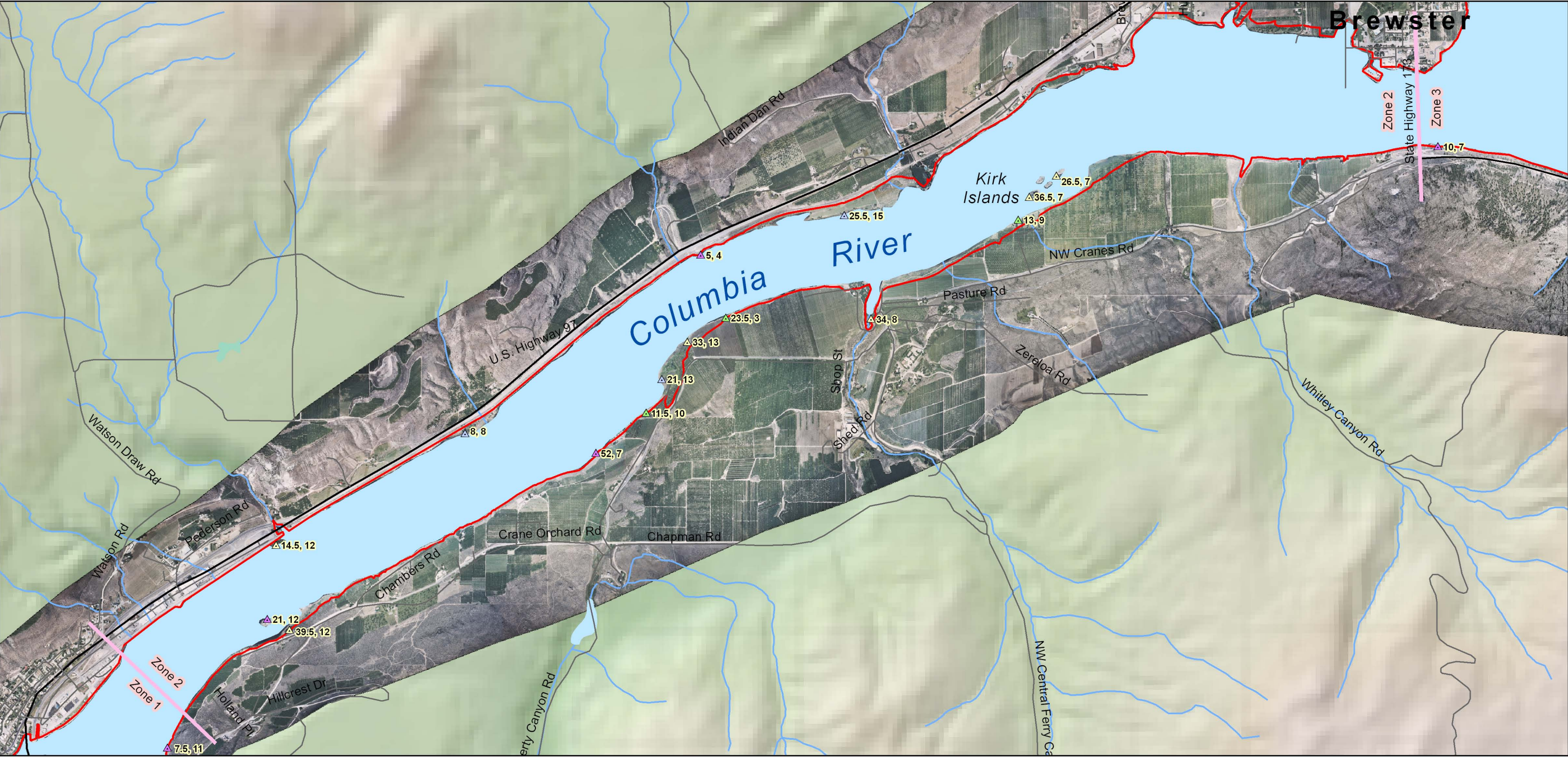
Wetland

Agriculture

Idle Agriculture
- * Avian relative abundance and species richness during breeding season surveys in 2005. Labels for the avian survey locations indicate the number of birds per survey, followed by the number of species detected at the site.
- Zone 5
Page 5 of 5
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-
-
- EDAW P:\2004\04100088_01\GIS\Project\mxd\Avian_survey_summer_abund_zone_5.mxd

APPENDIX I

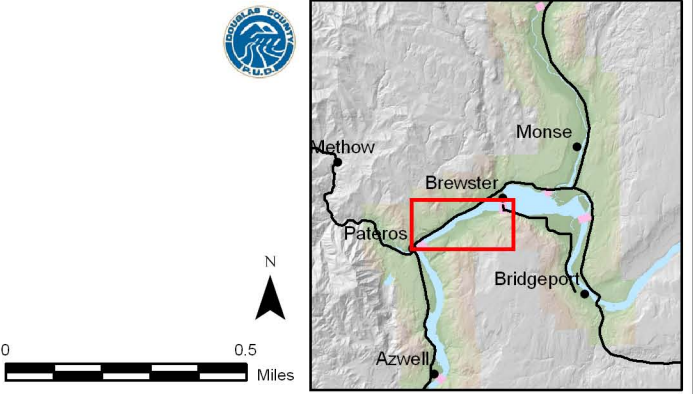
Fall Avian Survey Results Map

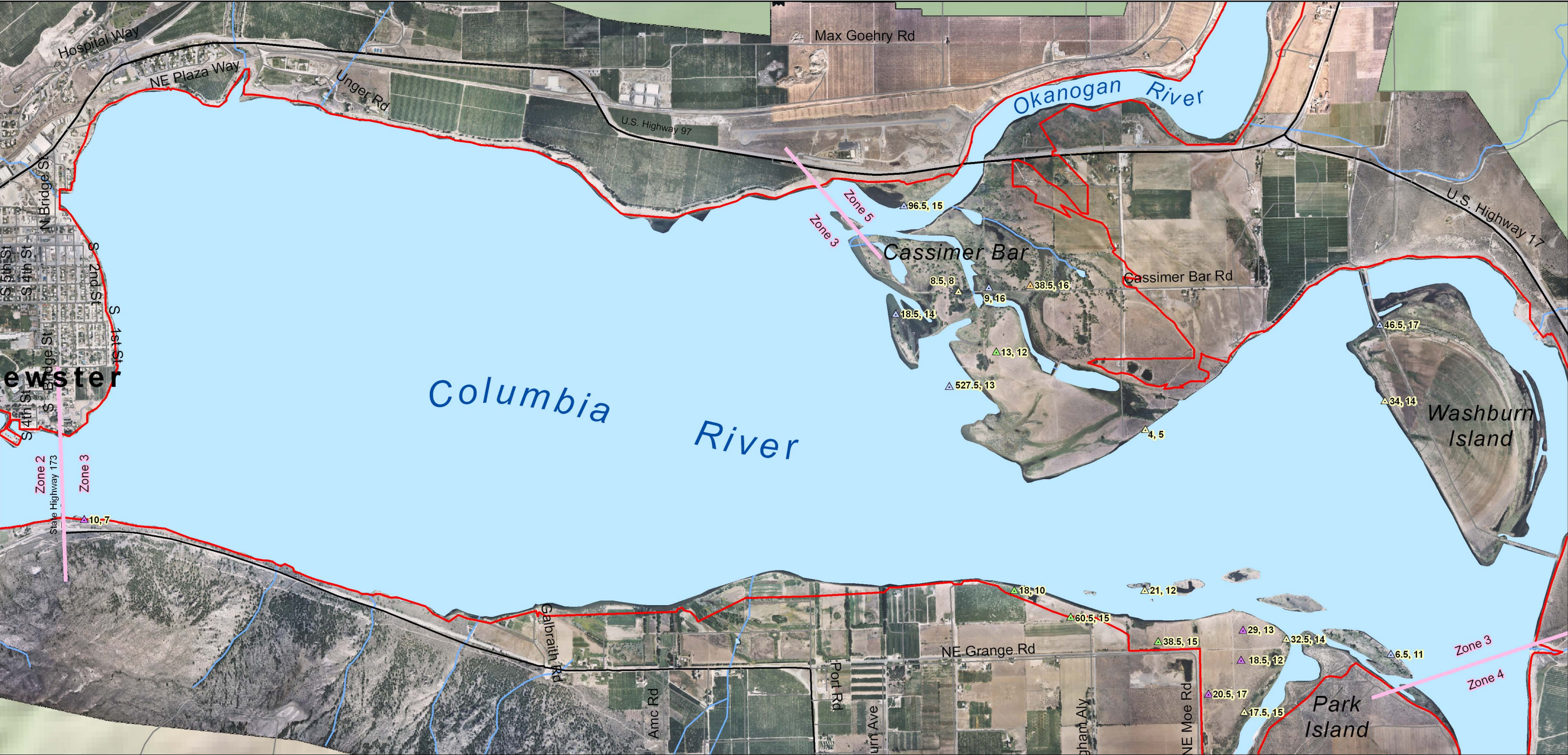


Appendix I: Fall Avian Survey* Results Maps

- | | | | | |
|--------------------------|---------------------|---------------------|------------------|--------------|
| FERC Project Boundary | U.S. Highway | Open Water | Agriculture | Shrub-Steppe |
| Study Area Zone Boundary | State Highway/Route | Marsh/Wetland/Swamp | Idle Agriculture | Wetland |
| | Local Road | Dam/Weir | Riparian | |
| | Stream | | | |

* Avian relative abundance and species richness during fall surveys in 2005. Labels for the avian survey locations indicate the number of birds per survey, followed by the number of species detected at the site.





Appendix I: Fall Avian Survey* Results Maps

- FERC Project Boundary

Study Area Zone Boundary

U.S. Highway

State Highway/Route

Local Road

Stream

Open Water

Marsh/Wetland/Swamp

Dam/Weir

Avian point count stations

Agriculture

Abandoned agriculture

Riparian

Shrub Steppe

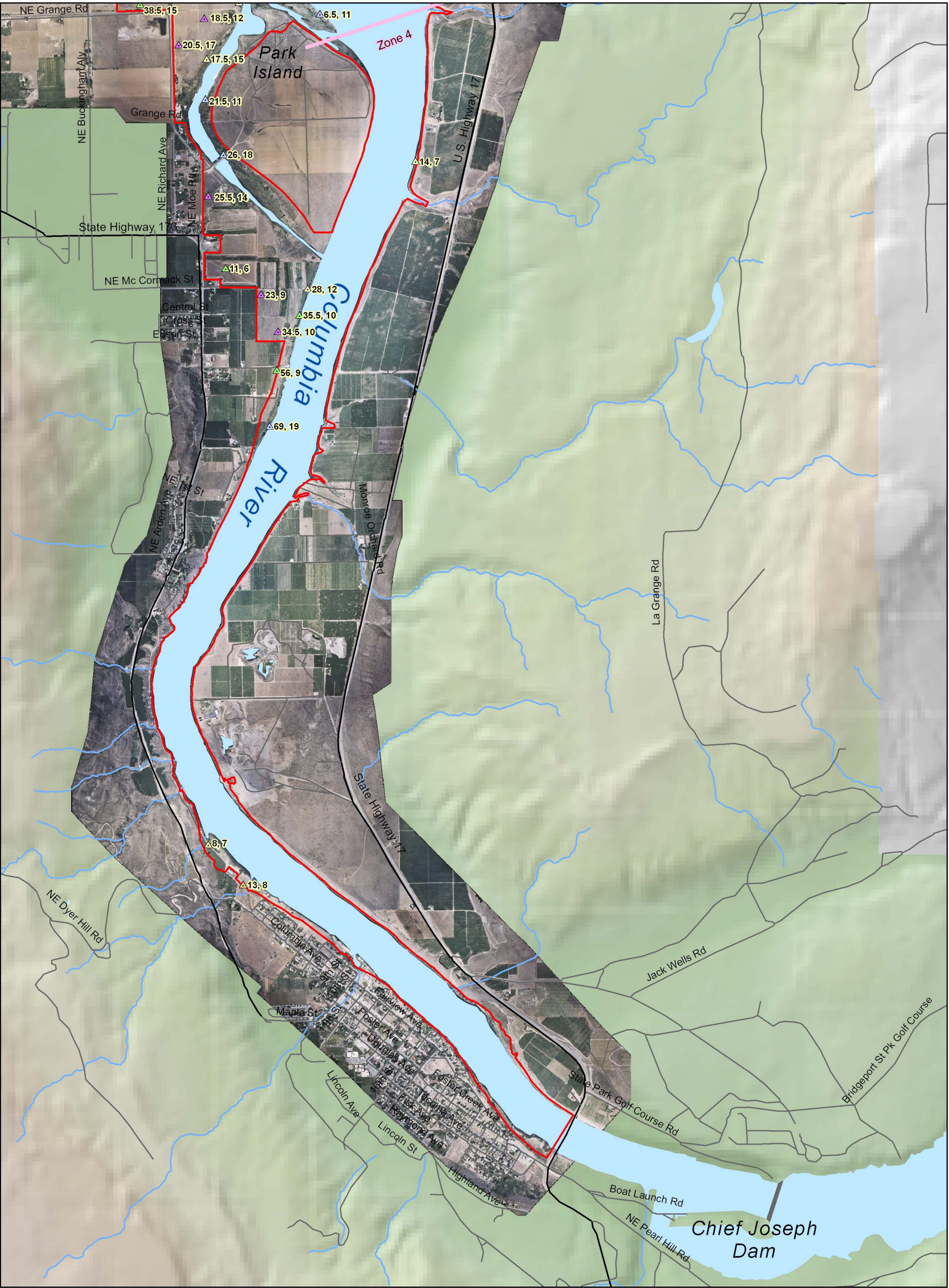
Wetland

* Avian relative abundance and species richness during fall surveys in 2005. Labels for the avian survey locations indicate the number of birds per survey, followed by the number of species detected at the site.

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Zone 3
Page 3 of 5

Inset Map Labels: Methow, Monse, Brewster, Pateros, Bridgeport, Azwell

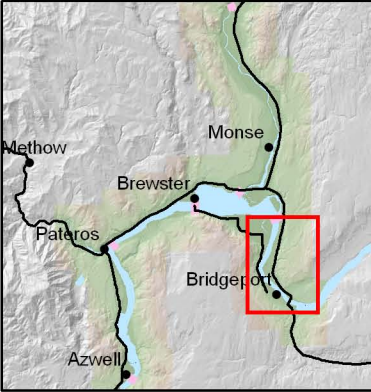


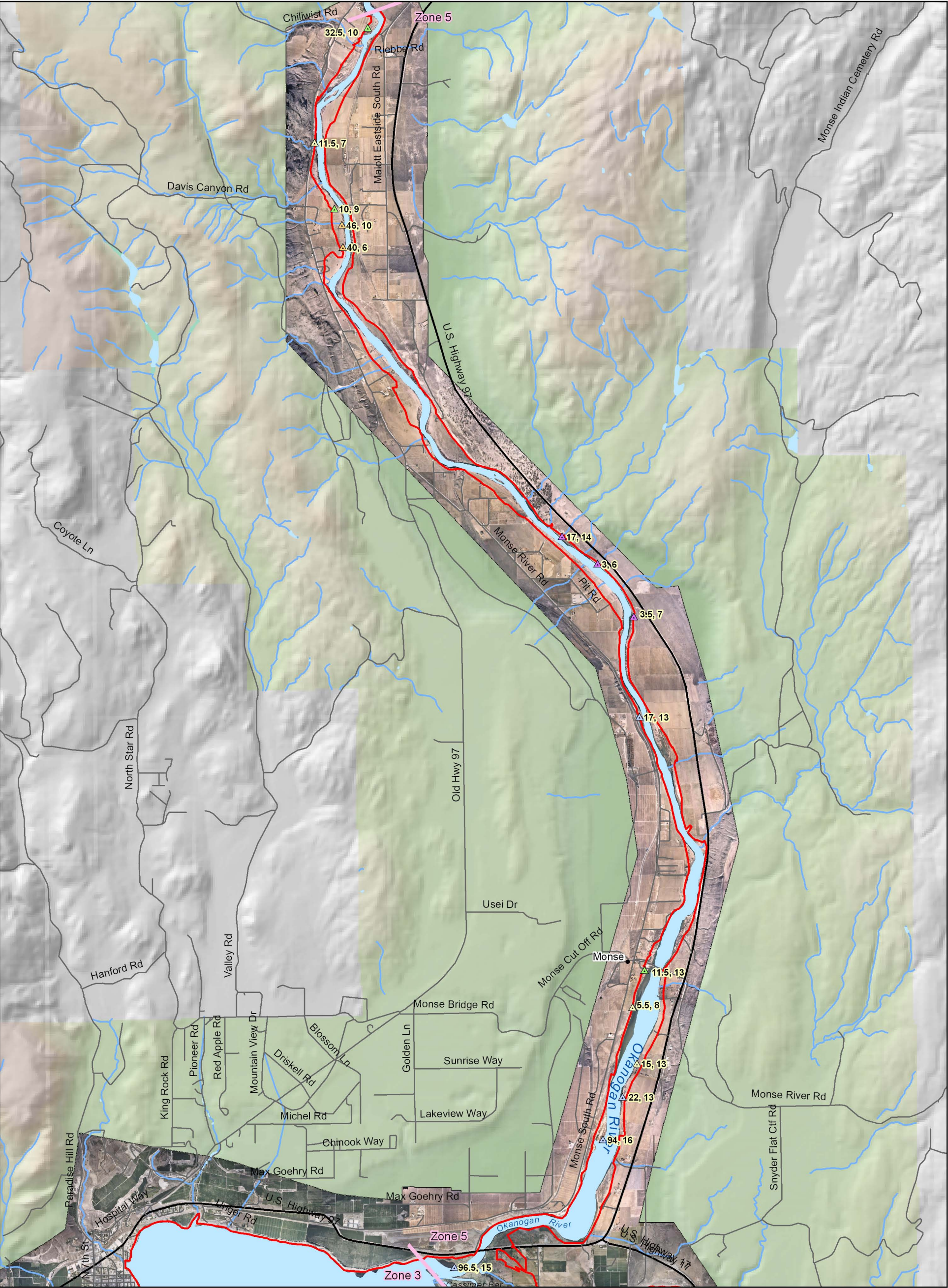
Appendix I: Fall Avian Survey* Results Maps

- | | | | | |
|--------------------------|---------------------|---------------------|-----------------------------------|--------------|
| FERC Project Boundary | U.S. Highway | Open Water | Avian point count stations | Shrub-Steppe |
| Study Area Zone Boundary | State Highway/Route | Marsh/Wetland/Swamp | Agriculture | Wetland |
| | Local Road | Dam/Weir | Idle Agriculture | |
| | Stream | | Riparian | |

* Avian relative abundance and species richness during fall surveys in 2005. Labels for the avian survey locations indicate the number of birds per survey, followed by the number of species detected at the site.

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Appendix I: Fall Avian Survey* Results Maps

- FERC Project Boundary

Project Area Zone Boundary

U.S. Highway

State Highway/Route

Local Road

Stream

Open Water

Marsh/Wetland/Swamp

Dam/Weir

Avian point count stations

Agriculture

Idle Agriculture

Riparian

Shrub-Steppe

Wetland
- * Avian relative abundance and species richness during fall surveys in 2005. Labels for the avian survey locations indicate the number of birds per survey, followed by the number of species detected at the site.
- Zone 5
Page 5 of 5
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APPENDIX J

Vegetation Data at Avian Survey Stations

Appendix J: Vegetation Data at Avian Survey Stations

Data	Ag	Idle Ag.	Riparian	Wetland	Shrub Steppe
Tree Cover					
Average	24.7	0.4	44.3	6.9	1.0
Std Dev	29.4	0.9	26.6	7.4	2.0
Minimum	0.0	0.0	10.0	0.0	0.0
Maximum	85.0	2.0	90.0	25.0	5.0
Shrub Cover					
Average	4.8	6.0	34.5	15.7	30.6
Std Dev	5.6	5.5	20.5	13.2	12.5
Minimum	0.0	0.0	10.0	0.0	10.0
Maximum	15.0	15.0	70.0	40.0	50.0
Grass Cover					
Average	60.6	77.0	21.6	9.8	29.2
Std Dev	28.4	18.6	21.0	21.3	15.2
Minimum	0.4	50.0	0.0	0.0	2.0
Maximum	100.0	90.0	85.0	90.0	50.0
Forb Cover					
Average	16.9	36.0	13.5	51.5	11.2
Std Dev	15.1	19.2	7.7	19.8	7.7
Minimum	0.3	15.0	2.0	10.0	3.0
Maximum	40.0	60.0	30.0	80.0	30.0

Data	Ag	Idle Ag	Riparian	Wetland	Shrub Steppe
Herbaceous Height					
Average	24.7	0.4	44.3	6.9	1.0
Std Dev	29.4	0.9	26.6	7.4	2.0
Minimum	0.0	0.0	10.0	0.0	0.0
Maximum	85.0	2.0	90.0	25.0	5.0
Shrub Height					
Average	4.8	6.0	34.5	15.7	30.6
Std Dev	5.6	5.5	20.5	13.2	12.5
Minimum	0.0	0.0	10.0	0.0	10.0
Maximum	15.0	15.0	70.0	40.0	50.0
Tree Height					
Average	60.6	77.0	21.6	9.8	29.2
Std Dev	28.4	18.6	21.0	21.3	15.2
Minimum	0.4	50.0	0.0	0.0	2.0
Maximum	100.0	90.0	85.0	90.0	50.0