ATTACHMENT G: 2021 WILDLIFE AND HABITAT SURVEY REPORT

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Badger Mountain Solar Energy Project
2021 Wildlife and Habitat Survey Report

Prepared for:

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Acronyms and Abbreviations

Avangrid	Avangrid Renewables
DCC	Douglas County Code
GIS	Geographic Information System
GPS	Global Positioning System
HCA	habitat concentration area
IBA	Important Bird Area
IPaC	Information for Planning and Consultation
PHS	Priority Habitats and Species
Project	Badger Mountain Solar Energy Project
Report	Wildlife and Habitat Survey Report
Tetra Tech	Tetra Tech, Inc.
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WAGS	Washington ground squirrel
WDFW	Washington Department of Fish and Wildlife

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1.0 Introduction

This summary report presents the methods and results for the 2021 wildlife and habitat surveys conducted by Tetra Tech, Inc. (Tetra Tech) for the Badger Mountain Solar Energy Project (Project), performed for Aurora Solar, LLC, a wholly owned subsidiary of Avangrid Renewables (Avangrid). The Project is generally located 3.5 miles northeast of the city of East Wenatchee in Douglas County, Washington (Figure 1). The purpose of the wildlife and habitat survey was to document the presence of special status and other wildlife species as well as map and characterize habitat in the approximately 2,390-acre Project area.

Wildlife and habitat surveys were conducted in early May 2021, which generally overlaps with the activity and/or breeding periods of the special status wildlife species identified as having the potential to occur in the Project area (e.g., Washington ground squirrel, burrowing owl, sage thrasher; see Appendix A). Early May is also an appropriate time of year to identify plant species in order to accurately characterize habitat in the Project area.

This Wildlife and Habitat Survey Report (Report) was developed to support Project permitting through the State of Washington Energy Facility Site Evaluation Council. The Report was developed consistent with applicable criteria under Douglas County Code (DCC) Chapter 19.18C and Washington Administrative Code (WAC) 463-60-332, and in consideration of applicable guidelines such as the Washington Department of Fish and Wildlife (WDFW) Mitigation (M-5002) Policy.

2.0 Agency Coordination

Prior to conducting field surveys and finalizing the background review, Tetra Tech met with WDFW to discuss field survey methods, survey timing, survey extent, and special status species with potential to occur at the Project. A summary of this meeting is provided in Appendix B. The input from WDFW provided during this meeting was used to inform the wildlife and habitat background review and field surveys.

3.0 Methods

3.1 Survey Area

The Survey Area consists of the approximately 2,390-acre Project area, which includes an approximately 2,274-acre Solar Array Micrositing Area and 116-acre Gen-tie Micrositing Corridor (Figures 1 and 2). Site access was not available to approximately 34 acres of the Survey Area along the Gen-tie Micrositing Corridor (Figures 2 and 3). While these areas were not traversed on foot during surveys, they were viewed from adjacent accessible parcels and public roads.

3.2 Background Review

3.2.1 Habitat

Prior to conducting field surveys, Tetra Tech conducted a desktop evaluation to preliminarily identify potential habitat types within the Survey Area. Sources used for the preliminary habitat classification are presented in Table 1.

Table 1. Sources Utilized for Preliminary Desktop Habitat Classification

Source and Citation	Information Provided in Dataset
Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species database (WDFW 2021a, 2021b)	Locations of Priority Habitats[1] within and adjacent to the Survey Area
National Land Cover Database land cover data (Homer et al. 2020)	Land cover types (e.g., shrub/scrub, cultivated crops, grassland/herbaceous), based on land cover modeling, mapped within and adjacent to the Survey Area.
U.S. Fish and Wildlife Service National Wetlands Inventory (USFWS 2021a)	Locations of known or potential wetlands within the Survey Area.
U.S. Geological Survey National Hydrography Dataset (USGS 2021)	Locations of known or potential rivers, streams, drainages, ponds, canals, or lakes within the Survey Area.
Google Earth Pro (Google Earth Pro 2021);	Aerial imagery used to determine potential boundaries between land cover and vegetation types within the Survey Area based on aerial signatures of land cover and vegetation types.
Management Recommendations for Washington's Priority Habitats (Azerrad et al. 2011)	Provides protocols for identifying and mapping shrub-steppe over broad landscapes.
Wildlife-Habitat Relationships in Oregon and Washington (Johnson and O'Neil 2001)	Provides descriptions of habitat types found in Oregon and Washington, including those found in the Columbia Plateau ecoregion
Ecological Systems of Washington State, A Guide to Identification (Rocchio and Crawford 2015)	Provides descriptions of ecological systems and vegetation types found within Washington.
WDFW Wildlife Wind Power Guideline habitat types (WDFW 2009)	Provides descriptions of various habitat types found within Eastern Washington.
Washington Large Fires 1973-2019 (DNR 2021)	Provides the locations and boundaries of large (typically over 100 acres) fires in Washington State between 1973-2019. Used to determine locations of past fires within and adjacent to the Survey Area that may have resulted in changes to vegetation within the Survey Area.
SAGEMAP Sagebrush Habitat (USGS 2011)	Locations of potential sagebrush habitat within and adjacent to the Survey Area.

Preliminary habitat boundaries within the Survey Area were delineated based on review of the sources noted in Table 1, as well as knowledge of eastern Washington Columbia Plateau Ecoregion habitats. In general, habitat types were based on habitat classifications and descriptions from the

[1] Priority Habitats are habitat types or elements with unique or significant value to a diverse assemblage of species; a Priority Habitat may consist of a unique vegetation type (e.g., shrub-steppe) or dominant plant species (e.g., juniper savannah), a described successional stage (e.g., old-growth forest), or a specific habitat feature (e.g., cliffs)(WDFW 2008). Priority Habitats are identified by WDFW in their Priority Habitats and Species list, which is updated periodically (WDFW 2008, 2021d).

following sources: Wildlife-Habitat Relationships in Oregon and Washington (Johnson and O'Neil 2001), the Priority Habitats and Species List (WDFW 2008), and the WDFW Wind Power Guidelines (WDFW 2009); which are standard systems use to identify and classify habitats in this region. These preliminary habitat boundaries were uploaded to Samsung Galaxy tablets using ArcGIS Collector mapping software for field verification of habitat types during field surveys.

3.2.2 Wildlife

Prior to conducting field surveys, Tetra Tech conducted a review of existing information to identify special status wildlife species with the potential to occur at the Project, including federal and state endangered, threatened, proposed, and candidate species; species of concern; birds of conservation concern; and state sensitive and Priority Species[2]. Tetra Tech reviewed habitat and range information for special status wildlife species known to occur in Douglas County and the Columbia Plateau Ecoregion to develop the list of species that had the potential to occur at the Project. Species were eliminated from consideration if their habitat was absent from the Survey Area (e.g., perennial streams and riparian vegetation as determined via desktop sources and confirmed during April 2021 wetlands and waters surveys) or their range did not overlap with the Project (e.g., pygmy rabbit), but were included if they have the potential for vagrancy at the Project (e.g., gray wolf). Tetra Tech also reviewed special status species information recorded during previous surveys at the Project.

Specific sources of information that were reviewed prior to conducting field surveys included:

- 2019 Raptor Nest Survey Results for the Wenatchee Solar Project (WEST 2019);
- Great Northern Landscape Conservation Cooperative Habitat Occupancy and Movements by Greater Sage-Grouse in Washington State (WHCWG 2015);
- StreamNet Mapper, fish distribution data for the Pacific Northwest (StreamNet 2021);
- U.S. Fish and Wildlife Service (USFWS) federally listed species list for Project location in Douglas County (USFWS 2021b);
- USFWS Birds of Conservation Concern (USFWS 2008);
- Washington State Listed and Candidate Species (WDFW 2020a);
- WDFW Priority Habitats and Species (PHS) List (WDFW 2008);
- WDFW PHS on the Web (WDFW 2021a);
- WDFW Threatened and Endangered Species Profiles (WDFW 2021c); and
- WDFW PHS Distribution by County (WDFW 2021d).

[2] Priority Species include State Endangered, Threatened, Sensitive, and Candidate species; animal aggregations (e.g., heron colonies, bat colonies) considered vulnerable; and species of recreational, commercial, or tribal importance that are vulnerable. Priority Species are identified by WDFW in their Priority Habitats and Species list, which is updated periodically (WDFW 2008, 2021d).

In addition to reviewing publicly available sources, Tetra Tech submitted a formal request to the WDFW to obtain site-specific records of PHS within 5 miles of the Survey Area for raptor nests and within 1 mile of the Survey Area for all other resources (WDFW 2021b). Based on review of the above sources, Tetra Tech compiled a list of special status wildlife species known to occur or with the potential to occur at the Project (Appendix A). This list was reviewed prior to conducting field surveys to ensure surveyor familiarity with the relevant species.

3.3 Field Surveys

3.3.1 Habitat

Tetra Tech conducted habitat surveys concurrently with wildlife and rare plant surveys (rare plant surveys are addressed under separate cover [Tetra Tech 2021a]), which consisted of biologists walking meandering transects within the Survey Area. Field surveys were conducted by a team of two biologists familiar with Eastern Washington Columbia Plateau Ecoregion habitats, WDFW Priority Habitats (WDFW 2008), and the WDFW Wind Power Guidelines habitat categories[3] (WDFW 2009).

During field surveys, habitat types within the Survey Area were documented, mapped, and characterized. In general, habitat types were based on habitat descriptions in the *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil 2001), the PHS List (WDFW 2008), and the WDFW Wind Power Guidelines (WDFW 2009). Preliminary habitat classifications identified during the desktop evaluation (see Section 3.2.1) were revised either by modifying habitat boundaries in the field using the tablets and ArcGIS Collector mapping software and/or drawing revised boundaries (based on field data collection and observations described below) in Google Earth that were then digitized following the field surveys.

Biologists also collected Global Positioning System (GPS) points at each change in habitat type encountered. Dominant plant species observed at these habitat points were recorded to accurately classify and describe habitat types. In addition, the biologists scanned the adjacent landscape from vantage points that allowed views across the landscape to help map habitat boundaries.

Biologists mapped tracts of relatively homogenous vegetation where present, which typically consisted of altered (e.g., agricultural) habitats. Biologists mapped areas of more heterogenous vegetation, which typically consisted of multiple native-dominated habitats (e.g., dwarf shrub-steppe, shrub-steppe, talus), as separate habitat types using a minimum mapping unit of approximately 0.5 acre (patches of habitat less than approximately 0.5 acre were not differentiated from the dominant surrounding habitat unless readily distinguishable [e.g., a patch of shrub-steppe in the middle of an agricultural field]). The biologists also documented special habitats and unique features when encountered. These included cliffs, rimrock, rock outcrops, and talus.

[3] The WDFW Wind Power Guidelines (WDFW 2009) provide specific management recommendations, alternatives for site assessment, and mitigation options and construction alternatives for avoiding impacts to Washington's wildlife resources and habitat for proposed wind power projects. Currently, there are no similar guidelines for solar power projects.

3.3.2 Wildlife

Tetra Tech conducted wildlife surveys concurrently with habitat and rare plant surveys (rare plant surveys are addressed under separate cover [Tetra Tech 2021a]). Field surveys were conducted by a team of two biologists familiar with Eastern Washington Columbia Plateau Ecoregion wildlife species. Biologists walked meandering transects within non-cultivated land throughout the Survey Area. The biologists alternately scanned the landscape, the sky, and the ground looking for wildlife species and recognizable sign. Surveys began early in the morning and went through late afternoon to capture optimal wildlife activity levels. Areas unlikely to support special status species (i.e., cultivated land and developed areas) were surveyed primarily from vehicles, by driving paved, gravel, and two-track roads. These areas were surveyed on foot if the full extent was not visible from the vehicle, if areas of potential habitat or nesting opportunities for special status species were identified, or if areas of adjacent habitat required categorization.

The biologists focused on species occurrences and habitat suitability for special status wildlife species with the potential to occur at the Project (Appendix A; i.e., species with ranges overlapping the Survey Area and suitable habitat potentially present, as well as species with some potential to pass through the Project based on movement patterns and habitat presence in the Project vicinity), and prioritized surveys and habitat suitability evaluations for the following special status species identified by WDFW during pre-survey coordination: state listed and candidate bird species (burrowing owl *[Athene cunicularia]*, loggerhead shrike *[Lanius ludovicianus]*, greater sage-grouse [*Centrocercus urophasianus],* sage thrasher [*Oreoscoptes montanus]*, and sagebrush sparrow *[Amphispiza belli]);* state candidate mammal species (black-tailed jackrabbit *[Lepus californicus],* white-tailed jackrabbit *[Lepus townsendii],* and Washington ground squirrel [WAGS; *Urocitellus washingtoni*]), and state candidate reptile species (sagebrush lizard *[Sceloporus graciosus]*) (personal communication from M. Ritter of WDFW, email to M. DeRuyter of Avangrid, March 8, 2021; Appendix B). Tetra Tech and Avangrid met with WDFW staff on March 3, 2021, prior to conducting field surveys, and received concurrence that the wildlife surveys as proposed, including methods, timing, and extent, were appropriate (Appendix B).

The biologists kept a running list of all wildlife species observed and, when a special status wildlife species (or recognizable sign) was encountered, they recorded the GPS location of the wildlife or sign with a Samsung Galaxy tablet using ArcGIS Collector software, and recorded information on the number of individuals and their behavior as applicable. Following field surveys, the digitized data were downloaded and processed in a Geographic Information System (GIS), and were reviewed for quality control and assurance.

4.0 Results

4.1 Background Review

4.1.1 Habitat

The desktop review confirmed the absence of USFWS Critical Habitat within the Survey Area (USFWS 2021b). The PHS query identified one Priority Habitat within 1 mile of the Survey Area, a talus slope located within and along the western edge of the Solar Array Micrositing Area. The National Hydrography Dataset maps 10 intermittent streams and 16 perennial streams within the Survey Area (USGS 2021). The National Wetlands Inventory maps two freshwater emergent wetlands and 17 riverine wetlands within the Survey Area (USFWS 2021a). Terrestrial habitat types identified as potentially occurring in the Survey Area included agriculture, developed, non-native grassland and forbland, planted grassland, shrub-steppe, and talus. One fire complex was identified as having occurred within the Survey Area; the 2008 Badger Mountain Fire Complex occurred within a portion of the Gen-tie Micrositing Corridor (DNR 2021). SAGEMAP data identified sagebrush habitat as present primarily west of the Solar Array Micrositing Area and scattered along the Gen-tie Micrositing Corridor (USGS 2011).

4.1.2 Wildlife

Tetra Tech identified 23 special status species with potential to occur at the Project, including 14 birds, 8 mammals, and 1 reptile (Appendix C). Of these 23 species, 4 species are state listed as threatened and endangered as designated in WAC 220-610-010 or 220-200-100 and none are federally listed as threatened or endangered under the federal Endangered Species Act. A query of USFWS Information for Planning and Consultation (IPaC) data identified two federally listed species with potential to occur on or near the Project (yellow-billed cuckoo *[Coccyzus americanus]* and bull trout *[Salvelinus confluent]*) (USFWS 2021b); however, these species were eliminated from consideration based on a lack of suitable habitat within the Survey Area (i.e., perennial streams and riparian vegetation). The desktop review also identified bald eagle *(Haliaeetus leucocephalus)* and golden eagle *(Aquila chrysaetos)* as having potential to occur at the Project (USFWS 2021b); these species are federally protected under the Bald and Golden Eagle Protection Act.

The results of the PHS query identified records of four species within 1 mile of the Survey Area, of which one species occurrence record (a WAGS colony) occurs within the Survey Area, located along the northwestern edge of the Solar Array Micrositing Area and documented in 2002 (WDFW 2021b). One additional WAGS colony record is located approximately 0.9 mile north of the Solar Array Micrositing Area. One greater sage-grouse location was identified approximately 0.4 mile west of the southern terminus of the Gen-tie Micrositing Corridor, in an area that has been converted to residential use. This record is based on a visual observation of sage grouse feeding in 1994. Based on historic imagery, this observation occurred prior to the conversion of this area to the current residential use, which occurred circa 2006 (Google Earth Pro 2021). WDFW provided

additional input regarding the Project's proximity to the Badger Mountain lek site, which is located approximately 5 miles east of the Project. According to WDFW (personal communication from M. Ritter of WDFW, email to M. DeRuyter of Avangrid, March 8, 2021), the Badger Mountain lek is one of the most well-attended leks in the state. WDFW recorded 27 male sage grouse at this lek in 2020 (WDFW 2020b). The WDFW provided the Applicant with a map of 2016-2017 telemetry locations from two collared male sage-grouse that showed recorded occurrences of sage grouse within 1 mile of the Survey Area; however, there were no recorded occurrences within the Survey Area (personal communication from M. Ritter of WDFW, email to M. DeRuyter of Avangrid, March 8, 2021).

Rainbow trout (*Oncorhynchus mykiss*) have been documented in Beaver Creek, approximately 0.6 mile northeast of the Solar Array Micrositing Area. The PHS query identified one golden eagle nest located in the talus and cliffs along the western edge of the Solar Array Micrositing Area; this nest was also documented during raptor nest surveys conducted within a 2-mile Project buffer, in addition to another nest located near the southern boundary of the Project (WEST 2019).

The PHS query also identified two Priority Areas[4] for Priority Species within 1 mile of the Survey Area, including mule deer (*Odocoileus hemionus*) winter range, which covers the entirety of the Survey Area, and chukar *(Alectoris chukar)* range, which occurs southeast of the Solar Array Micrositing Area (WDFW 2021b). Additionally, the Project lies approximately 3 miles west of the 528,407-acre Leahy Junction Moses Coulee Audubon Important Bird Area (IBA). This IBA is recognized as a global priority for the most critical and most contiguous habitat for shrub-steppe birds, including the greater sage-grouse (Audubon 2021).

4.2 Field Surveys

Tetra Tech conducted wildlife and habitat surveys within the Survey Area from May 3 through May 7 and on May 12, 2021. Results of the wildlife and habitat field surveys are provided in the following sections. Weather conditions were optimal for detecting wildlife during surveys, with no rain and low wind.

4.2.1 Habitat

Biologists mapped seven habitat types within the Survey Area: agriculture, developed, dwarf shrub-steppe, non-native grassland and forbland, planted grassland, shrub-steppe, and talus. Table 2 lists the acres of each habitat type found within the Survey Area and Figure 2 displays the location of the habitat types mapped within the Survey Area. Each of these habitat types is briefly described below. Representative photos of select habitat types are provided in Appendix D.

[4] Species are often considered a priority only within known limiting habitats (e.g., breeding areas) or within areas that support a relatively high number of individuals (e.g., regular concentrations). These important areas are identified in the PHS List under the heading Priority Area. For example, great blue herons are often found feeding along shorelines, but they are considered a priority only in areas used for breeding. If limiting habitats are not known, or if a species is so rare that any occurrence is important in land use decisions, then the Priority Area is described as any occurrence. Priority Areas include (but are not limited to) areas of "Regular Concentration," defined as areas that are commonly or traditionally used by a group of animals on a seasonal or year-round basis (WDFW 2008).

In general, habitat types were based on habitat descriptions in Johnson and O'Neil (2001), WDFW (2008), and WDFW (2009). Appendix E provides further information regarding each of these habitat classification systems as well as a crosswalk between these classification systems and the habitats mapped within the Survey Area. In addition to the seven habitat types listed in Table 2, several ephemeral drainages are located within the Survey Area. These drainages are discussed in the Wetland Delineation Report prepared for the Project (Tetra Tech 2021b). No wetlands or intermittent or perennial streams were mapped within the Survey Area during the 2021 wetlands and waters survey (Tetra Tech 2021b).

Table 2. Habitat Types Mapped Within the Survey Area, Solar Array Micrositing Area, and Gen-tie Micrositing Corridor

Habitat Type	Acres (%) in Survey Area	Acres (%) in Solar Array Micrositing Area	Acres (%) in Gen-tie Micrositing Corridor
Agriculture	2,076.7 (86.9%)	2,014.4 (88.6%)	62.4 (53.9%)
Developed	15.5 (0.7%)	14.9 (0.7%)	0.7 (0.6%)
Dwarf shrub-steppe[1]	15.5 (0.7%)	15.5 (0.7%)	--
Non-native grassland and forbland	13.4 (0.6%)	11.7 (0.5%)	1.7 (1.4%)
Planted grassland	12.3 (0.5%)	--	12.3 (10.7%)
Shrub-steppe[1]	246.8 (10.3%)	209.8 (9.2%)	36.9 (31.9%)
Talus[1]	10.0 (0.4%)	8.3 (0.4%)	1.8 (1.5%)
Total[2]	**2,390.3 (100.0%)**	**2,274.5 (100.0%)**	**115.7 (100.0%)**

1. Listed as a Priority Habitat by the WDFW (WDFW 2008).
2. Totals may not sum exactly due to rounding.

4.2.1.1 Agricultural Land

Agricultural land was the most prevalent habitat type mapped within the Survey Area. Agricultural land within the Survey Area consists primarily of wheat fields that are typically grown on a 2-year wheat-fallow cycle.

4.2.1.2 Developed

Developed habitat identified within the Survey Area included roads, structures associated with agricultural production, and gravel/borrow pits. The majority of the areas mapped as developed were unvegetated or sparsely vegetated. However, where present, vegetation within developed areas was dominated by non-native invasive species such as cheatgrass (*Bromus tectorum*), common mullein (*Verbascum thapsus*), crested wheatgrass (*Agropyron cristatum*), and smooth brome (*Bromus inermis*).

4.2.1.3 Dwarf Shrub-steppe

The dwarf shrub-steppe habitat type occurs on lithosol soils, which are shallow, rocky soils typically composed of unweathered or partly weathered rock fragments and lacking well-defined soil horizons. Due to the unique characteristics of lithosol soils, vegetation communities in these areas are often distinguishable from nearby shrub-steppe communities (see Section 4.2.1.6). This habitat type was primarily found in the western portion of the Survey Area associated with the

Solar Array Micrositing Area and was typically intermingled with shrub-steppe habitat (Figure 2). Areas large enough to be delineated solely as dwarf shrub-steppe were located near the western edge of the plateau within the Solar Array Micrositing Area (Figure 2).

Vegetation cover in this habitat type consisted of small shrubs and subshrubs, including scabland sagebrush (*Artemisia rigida*), buckwheats (*E. heracleoides, E. niveum, E. sphaerocephalum, E. strictum* ssp. *proliferum, E. thymoides*), Hood's phlox (*Phlox hoodii*), and narrowleaf goldenweed (*Nestotus stenophyllus*), interspersed with grasses and forbs. Composition of shrub species was variable in dwarf shrub-steppe habitat. In some areas, buckwheat species and narrowleaf goldenweed were the dominant species and scabland sagebrush was not present. In other areas, scabland sagebrush was the dominant shrub present with lesser amounts of buckwheat species. Shrub cover in dwarf shrub-steppe habitat typically ranged between 15 and 50 percent cover.

Native grasses and forbs commonly observed in dwarf shrub-steppe habitat included Sandberg bluegrass (*Poa secunda*) and bulbous bluegrass (*Poa bulbosa*), desert yellow daisy (*Erigeron linearis*), lomatiums (*Lomatium* spp.), penstemons (*Penstemon gairdneri, P. pruinosus*), purple cushion fleabane (*Erigeron poliospermus*), pussytoes (*Antennaria* spp.), Rainer violet (*Viola trinervata*), Thompson's paintbrush (*Castilleja thompsonii*), and upland larkspur (*Delphinium nuttalianum*). Although non-native species, such as cheatgrass and bulbous bluegrass, as well as signs of light grazing were observed, dwarf shrub-steppe habitat in the Survey Area was generally relatively intact and dominated by native species.

4.2.1.4 Non-Native Grassland and Forbland

The non-native grassland and forbland habitat type was found in scattered locations within the Survey Area. However, it was primarily noted in the central and eastern portions of the Survey Area near or within agricultural fields (Figure 2). Dominant species in this habitat type included non-native invasive grasses, such as bulbous bluegrass, cheatgrass, and smooth brome, and non-native forbs including blue mustard (*Chorispora tenella*), clasping pepperweed (*Lepidium perfoliatum*), flixweed (*Descurainia sophia*), prickly lettuce (*Lactuca serriola*), Russian thistle (*Salsola tragus*), and tall tumble mustard (*Sisymbrium altissimum*). Although native grasses and forbs, including Sandberg bluegrass, great basin wildrye (*Leymus cinereus*), hawksbeard (*Crepis* spp.), horseweed (*Conyza canadensis*), and yarrow (*Achillea millefolium*), also occurred in this habitat type, they typically represented a relatively small percentage of the overall vegetative cover.

4.2.1.5 Planted Grassland

One small area located along the Gen-tie Micrositing Corridor was planted grassland (Figure 2). During field surveys, this area was presumed to be planted grassland due to uniform rows of dead bunchgrasses and lupine (*Lupinus* spp.) and past use as agricultural land (based on review of historic aerial imagery). Approximately 10.6 of the 12.3 acres mapped as planted grassland within the Survey Area occur on parcels where site access was not available during surveys (Figure 2). However, this parcel was viewed from the adjacent accessible parcel and determined to consist of planted grassland habitat. Following field surveys, areas mapped as planted grassland were identified as potentially enrolled in the Conservation Reserve Program (WSDA 2021). As noted

above, all of the bunchgrasses observed in this habitat type were dead and therefore unidentifiable (Photo 15, Appendix D).

4.2.1.6 Shrub-steppe

Shrub-steppe habitat occurs primarily in the northwest and northeast corners of the Survey Area associated with the Solar Array Micrositing Area and is interspersed with dwarf shrub-steppe habitat on the western perimeter of the Solar Array Micrositing Area around the dominant presence of active agriculture. Shrub-steppe habitat is also interspersed in the Survey Area within the Gen-tie Micrositing Corridor between agricultural lands. The shrub-steppe habitat type is characterized by an open to relatively dense (5 to 50 percent) cover of native shrubs. Big sagebrush (*Artemisia tridentata*) was the most dominant shrub species in this habitat type. Other shrub species observed within sagebrush shrub-steppe habitat included green rabbitbrush (*Chrysothamnus viscidiflorus*), rubber/gray rabbitbrush (*Ericameria canescens*), purple sage (*Salvia dorrii*), and spineless horsebrush (*Tetradymia canescens*).

Grasses commonly observed in shrub-steppe habitat included the native bluebunch wheatgrass (*Pseudoroegneria spicata*) and Sandberg bluegrass, as well as the non-native bulbous bluegrass and cheatgrass. A wide diversity of native forbs was also observed within this habitat type, and the intermingled dwarf shrub-steppe habitat (as discussed in Section 4.2.1.3). Native forbs commonly observed included common yarrow, arrowleaf balsamroot (*Balsamorhiza sagittata*), Douglas' brodiaea (*Triteleia grandiflora* var. *grandiflora*), Douglas's dustymaiden (*Chaenactis douglasii*), lomatiums, lupine (*Lupinus saxosus, L. sulphureus* var. *bingenensis*), parsnipflower buckwheat (*Eriogonum heracleoides*), phlox (*Phlox longifolia, P. speciosa*), upland larkspur, and western groundsel (*Senecio integerrimus*). In general, shrub-steppe habitat within the Survey Area associated with the Solar Array Micrositing Area was less disturbed (i.e., lower cover of non-native species such as cheatgrass and bulbous bluegrass) than shrub-steppe habitat along the Gen-tie Micrositing Corridor. Similar to dwarf shrub-steppe habitat, signs of grazing were observed within shrub-steppe habitat within the Solar Array Micrositing Area.

Approximately 5.6 acres of the 246.8 acres mapped as shrub-steppe habitat within the Survey Area occur on parcels along the Gen-tie Micrositing Corridor where site access was not available during surveys (Figure 2). However, areas mapped as shrub-steppe within these areas were viewed from adjacent accessible parcels and public roads.

4.2.1.7 Talus

Approximately 10.0 acres of talus habitat were mapped in the northern portion of the Survey Area (Figure 2). Additional talus was noted west of the Survey Area, based on observations from within the Survey Area. This habitat type includes sparsely vegetated steep cliff faces and unstable scree and talus. Vegetation observed within this habitat type consisted primarily native species, including serviceberry (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana*), golden currant (*Ribes aureum*), wax currant (*Ribes cereum*), snowberry (*Symphoricarpos albus*), western giant hyssop (*Agastache occidentalis*), and silverleaf phacelia (*Phacelia hastata*). In general, and similar to dwarf

shrub-steppe habitat, talus habitat was typically intermingled with shrub-steppe habitat (Photo 20, Appendix D). Therefore, areas mapped as talus likely contain small patches of shrub-steppe habitat.

As noted in Section 4.1.1, the results of the PHS query identified talus habitat located within and along the western edge of the Solar Array Micrositing Area. During field surveys, many areas mapped as talus in the PHS query were determined to consist of other habitat types (primarily shrub-steppe habitat). Photo 17 in Appendix D displays an area mapped as talus in the PHS query that was determined to partially consist of shrub-steppe habitat during field surveys.

4.2.2 Wildlife

Tetra Tech observed 30 bird species, 4 mammal species, and 1 reptile species during surveys (Appendix C). Of these 35 species, 7 bird species and 2 mammal species are special status species (Appendix C). No federally threatened or endangered species were observed. Most individual special-status species recorded were chukars (approximately 20), followed by Brewer's sparrows (*Spizella breweri*) (5), ring-necked pheasants *(Phasianus colchicus)* (3), prairie falcons *(Falco mexicanus)* (2), sage thrashers (3), and ferruginous hawks (*Buteo regalis*) (2). A complete list of wildlife species observed at the Project during these surveys is included as Appendix C.

4.2.2.1 Birds

Most of the bird (especially raptor) species observed during surveys were located along the western boundary of the Survey Area associated with the Solar Array Micrositing Area, which contains the largest area of contiguous shrub-steppe and dwarf shrub-steppe habitat in and adjacent to the Survey Area and is adjacent to cliff/talus habitat farther to the west (Figures 2 and 3). A golden eagle, two ferruginous hawks, a prairie falcon, and a red-tailed hawk *(Buteo jamaicensis)* were observed flying along this cliff/talus and shrub-steppe and dwarf shrub-steppe habitat that runs primarily north/south within and west of the Solar Array Micrositing Area; ferruginous hawk, golden eagle, and prairie falcon typically occur in open habitat such as shrub-steppe, where prey species are often abundant, while red-tailed hawks are habitat generalists (Hays and Dobler 2004; Ng et al. 2020; Preston and Beane 2020; Katzner et al. 2020). Red-tailed hawks were seen throughout the Survey Area and two northern harriers *(Circus hudsonius)* were observed hunting over agricultural fields. One American kestrel *(Falco sparverius)* was observed on utility lines adjacent to a road in the northwest portion of the Survey Area associated with the Solar Array Micrositing Area.

Biologists found one new active, occupied bird nest that had not been identified previously (WEST 2019), located outside the Survey Area: a red-tailed hawk nest approximately ¼ mile from the Solar Array Micrositing Area in a ponderosa pine tree (Figure 3). Two red-tailed hawks flushed from the nest in the presence of the surveyors and subsequently returned to the nest. To avoid further disturbance, the biologists did not approach the nest and thus did not determine reproduction status. A pair of prairie falcons were observed on a fence post adjacent to collapsing barn-like structures in the southeast portion of the Survey Area associated with the Solar Array Micrositing Area. Birds had been roosting on the structures as evidenced by an abundance of bird excrement.

These structures are suitable nesting habitat for prairie falcons, and they may nest in or on these structures. Potential burrowing owl burrows were located within the Gen-tie Micrositing Corridor but there was no evidence of burrowing owls.

The biologists did not observe greater sage-grouse activity or find sage-grouse pellets during surveys. Greater sage-grouse require large areas of shrub-steppe habitat dominated by sagebrush with a variety of forbs (Connelly et al. 2004; WDFW 2021e). However, the appropriate patch size needed for winter and breeding habitats used by greater sage-grouse is uncertain; it is likely that this patch size is not a fixed amount but depends on various factors including migration patterns and productivity of the habitat (Connelly et al. 2004). Some degraded habitat that lacks the grass and forb understory needed for nesting and brood rearing is suitable for wintering grouse, and greater sage-grouse will also use edges of wheat and alfalfa fields near shrub-steppe habitat (WDFW 2021e). Shrub-steppe habitat constitutes a small portion of the Survey Area (i.e., approximately 11 percent; see Section 4.2.1), while degraded habitats including non-native grassland and forbland and planted grassland constitute an even smaller portion of the Survey Area (i.e., approximately 1 percent; see Section 4.2.1).

Greater sage-grouse are a landscape species that have large home ranges, are capable of extensive movements, and use a mosaic of habitat patch sizes within the sagebrush ecosystem (Connelly et al. 2004). As a result of this, Tetra Tech reviewed landscape-level habitat and occurrence information for greater sage-grouse developed by the Washington Wildlife Habitat Connectivity Working Group in conjunction with local field data to provide context for greater sage-grouse potential use of habitat at the Project. The Washington Connected Landscapes Project modeled greater sage-grouse habitat, habitat concentration areas (HCA), and movement corridors (e.g., least-cost pathways) between habitats in an effort to understand habitat connectivity and inform conservation opportunities in the Columbia Plateau Ecoregion (WHCWG 2012). HCAs are defined as significant habitat areas that are expected or known to be important for focal species (e.g., greater sage-grouse) based on survey data or habitat association modeling (WHCWG 2012). Least-cost pathways consist of modeled paths between two HCAs that represent the most likely travel corridor the species may use based on habitat connectivity and other inputs (e.g., barriers or mortality risks encounter as animals move outward from habitat blocks) as defined in WHCWG (2012). At its closest location, the Project is approximately 6 miles[5] west of the nearest HCA for greater sage-grouse, and 7 miles west of the nearest least-cost pathway, which connects HCA 2 in Douglas County with HCA 4 in Yakima and Kittitas counties (WHCWG 2012). Therefore, there is some potential for greater sage-grouse to occur within the Survey Area based on the presence of potentially suitable nesting and wintering habitat and known lek activities 5 miles to the east. However, the Survey Area does not contain high-quality habitat for this species (i.e., large areas of shrub-steppe) and the surveys did not identify any greater sage-grouse activity or pellets in the Survey Area.

[5] Maps provided by WDFW (personal communication from M. Ritter of WDFW, email to M. DeRuyter of Avangrid, March 8, 2021) depict the Badger Mountain lek site west of (and outside) HCA 2 mapped by WHCWG (2012).

4.2.2.2 Mammals

Tetra Tech observed several groups of mule deer along the western boundary of the Solar Array Micrositing Area, as well as in the northern portion of the Survey Area associated with the Solar Array Micrositing Area (Figure 3). Mule deer and elk scat were observed throughout the Survey Area although most of the scat was found along the western boundary of the Solar Array Micrositing Area. None of the elk scat observed was fresh.

Biologists found two in-use mammal burrows along the drainage in the northwest portion of the Survey Area, within the Gen-tie Micrositing Corridor. Small mammal prints were observed outside two of the burrows, but no scat was found. The soil was dry and powdery and not conducive for discerning prints. A biologist observed a burrow with American badger *(Taxidea taxus)* scat in the northeast portion of the Survey Area associated with the Solar Array Micrositing Area. Many inactive burrows were present along the Gen-tie Micrositing Corridor that appeared to be abandoned badger dens.

Tetra Tech did not detect WAGS or their sign (e.g., scat or fresh burrow activity) during surveys. Biologists visited a known historic PHS colony location in the Survey Area and did not observe WAGS or WAGS sign. During surveys, there were very few potential burrows observed, and these had no evidence of use or were old and had cobwebs over the entrance. However, suitable habitat was determined to be present for WAGS based on the presence of shrub-steppe habitat and deep silty loam soils within the Survey Area. Food availability and soil characteristics are the most important factors in determining where WAGS colonies are located within the habitats currently available to them (Betts 1990). As described in Section 4.2.1, shrub-steppe habitat mapped within the Survey Area included an abundance and diversity of native shrubs, grasses, and forbs, particularly within the Solar Array Micrositing Area, and thus this habitat likely provides relatively high-quality forage for WAGS. Approximately 210 acres of shrub-steppe were mapped within the Solar Array Micrositing Area, primarily on the western and northern edges of the Solar Array Micrositing Area; approximately 37 acres of shrub-steppe were mapped along the Gen-tie Micrositing Corridor (Figure 2). However, soils are rocky and thin in the largest contiguous patch of shrub-steppe and dwarf shrub-steppe habitat on the west side of the Survey Area associated with the Solar Array Micrositing Area, which likely limits burrowing, which is essential to this species' life history. A WHCWG (2012) modeled WAGS HCA overlaps with the Survey Area along the northwestern corner of the Solar Array Micrositing Area and eastern portion of the Gen-tie Micrositing Corridor, indicating this area likely provides the highest quality habitat within the Survey Area.

During pre-survey coordination, WDFW noted the potential for Townsend's big-eared bat (*Corynorhinus townsendii)*, pallid bat (*Antrozous pallidus*), and likely spotted bat (*Euderma maculatum*) to occur at the Project due to the range overlap of these species with the Survey Area (Appendix B). As noted in Appendix A, Townsend's big-eared bat is a state candidate species, but no state or federal threatened or endangered bat species have potential to occur at the Project. Townsend's big-eared bat favors roosting in open, subterranean areas like caves and mines for reproduction and hibernation, not cracks and crevices (WDFW 2021f). The Survey Area and

adjacent habitat contain talus and cliff features with cracks and crevices, but do not appear to provide large, open caverns preferred by Townsend's big-eared bat. Abandoned buildings suitable for day and maternity roosts are present within the Survey Area. Two clusters of abandoned wood structures may provide suitable bat habitat; one is in the southeast portion of the Survey Area associated with the Solar Array Micrositing Area and the other is approximately midway through the Solar Array Micrositing Area. A small stone building was observed in the latter cluster and provides the best roosting potential. The Project is on the western edge of pallid bat range in Washington (WDFW 2004). Pallid bats are more flexible in their habitat use than Townsend's big-eared bat and spotted bat, and could roost in the rocky outcrops and talus within and west of the Solar Array Micrositing Area and forage within the Survey Area. Spotted bats could also use the Survey Area for foraging, but spotted bat roosting habitat (i.e., approximately 100-foot tall steep/sheer cliffs; WDFW 2021g) is absent from the Survey Area. Other bats (e.g., *Myotis* sp.) may roost in the talus slopes primarily west of the Solar Array Micrositing Area.

4.2.2.3 Reptiles

Tetra Tech observed one western rattlesnake (*Crotalus oreganus)* along the southwestern edge of the Survey Area associated with the Solar Array Micrositing Area (i.e., above the talus slope), but no special status reptiles (i.e., sagebrush lizards).

5.0 Summary

Biologists observed 30 bird species, 4 mammal species, and 1 reptile species during surveys, including 7 special status bird species and 2 special status mammal species (Appendix C). A red-tailed hawk active nest was documented approximately ¼ mile from the Survey Area. During surveys, potentially suitable habitat for several special status species was documented, including potentially suitable habitat for greater sage-grouse, WAGS, and Townsend's big-eared bat. Potentially suitable habitat for these species is generally limited to portions of the Survey Area that occur outside of agricultural land.

Biologists mapped seven habitat types within the Survey Area. The vast majority (approximately 86.9 percent) of the Survey Area was found to consist of agricultural land. Shrub-steppe, including patches of dwarf shrub-steppe that were too small or intermingled to map separately, composed another approximately 11 percent of the Survey Area. The other five habitat types composed the remaining approximately 2.2 percent of the Survey Area.

Three of the seven habitat types mapped within the Survey Area are considered Priority Habitats by the WDFW: dwarf shrub-steppe, sagebrush shrub-steppe, and talus (WDFW 2008). A total of approximately 272.3 acres (11.4 percent of the Survey Area) consisted of Priority Habitats.

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Figures

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Badger Mountain Solar Energy Project

Figure 1
Project Location

DOUGLAS COUNTY, WASHINGTON

Project Area (2,390 acres)

- Solar Array Micrositing Area (2,274 acres)
- Gen-tie Micrositing Corridor (116 acres)

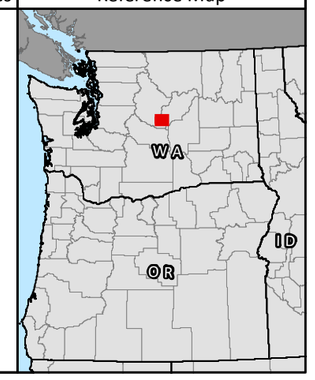
TETRA TECH

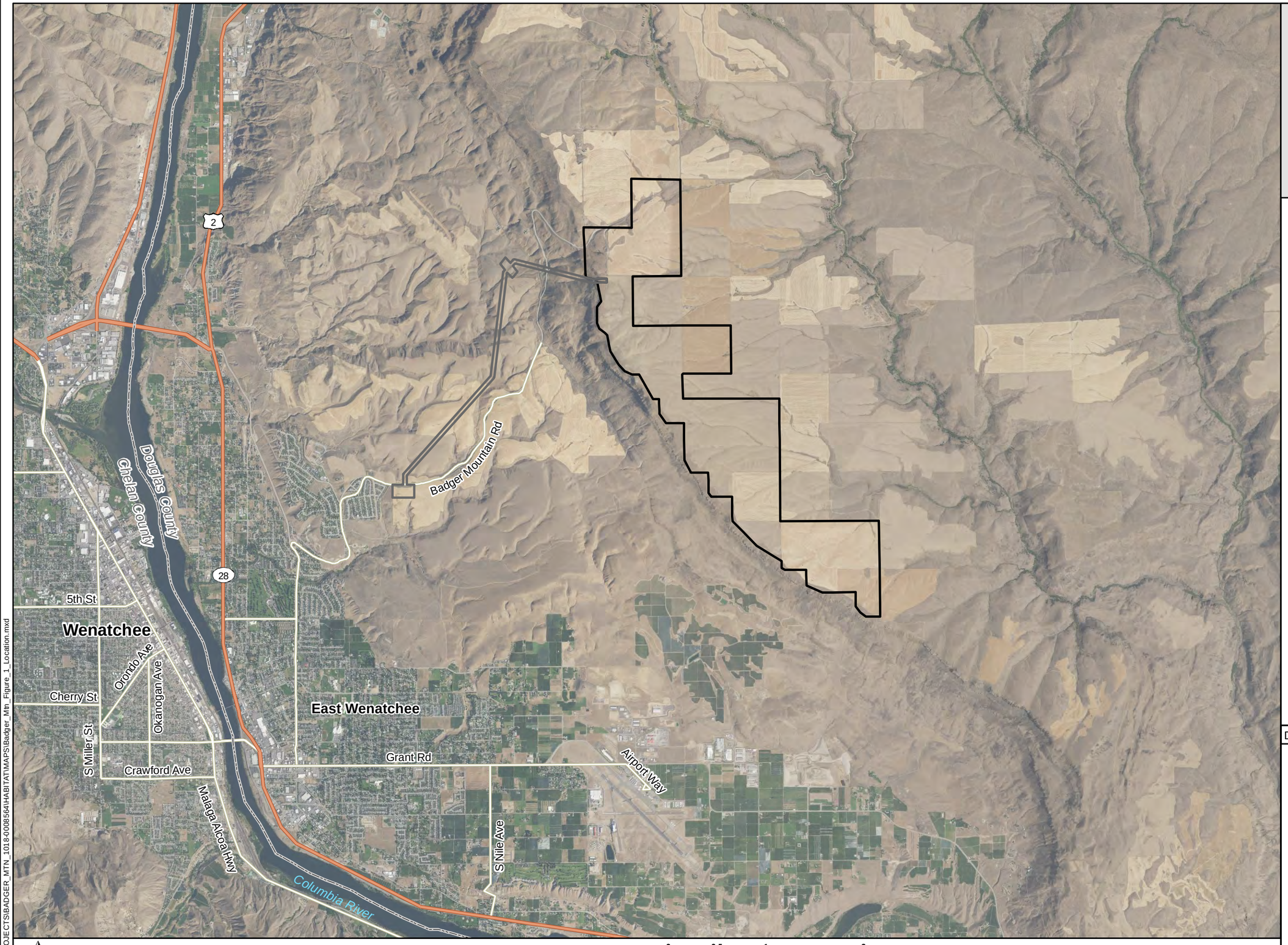
AVANGRID RENEWABLES

Data Sources

Avangrid-Project Boundary;
USDA-NAIP Imagery

Reference Map





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Badger Mountain Solar Energy Project

Figure 2
Habitat Types within the Survey Area

DOUGLAS COUNTY, WASHINGTON

- Survey Area
- Area not Accessible*

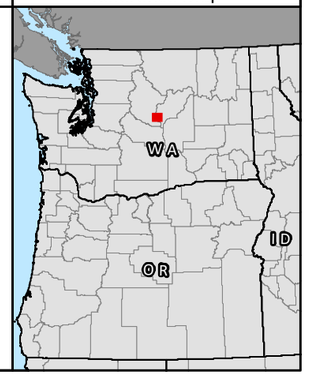
Habitat Type

- Agriculture
- Developed
- Dwarf Shrub-steppe
- Non-native Grassland and Forbland
- Planted Grassland
- Shrub-steppe
- Talus

* Site access was not available during the 2021 survey season. While these areas were not visited on foot in 2021, they were viewed from adjacent accessible parcels and public roads.

TETRA TECH

AVANGRID RENEWABLES

Data Sources	Reference Map
Avangrid-Project Boundary; USDA-NAIP Imagery	

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Badger Mountain Solar Energy Project

Figure 3
Special-Status Species and Nest Observations

DOUGLAS COUNTY, WASHINGTON

Survey Area

Area not Accessible*

Special-Status Species Observation

- Brewer's Sparrow
- Chukar
- Ferruginous Hawk
- Golden Eagle
- Mule Deer Observation and/or Sign
- Prairie Falcon
- Ring-Necked Pheasant
- Rocky Mountain Elk Sign
- Sage Thrasher

Active Nest Observation

- Red-tailed Hawk

* Site access was not available during the 2021 survey season. While these areas were not visited on foot in 2021, they were viewed from adjacent accessible parcels and public roads.

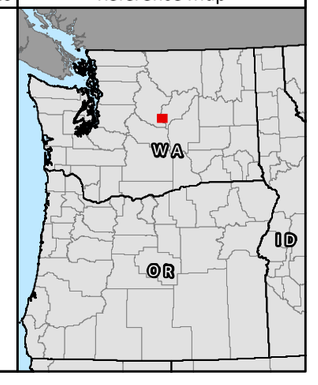
TETRA TECH

AVANGRID RENEWABLES

Data Sources

Avangrid-Project Boundary;
USDA-NAIP Imagery

Reference Map



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Appendix A. Special Status Wildlife Species With Potential to Occur at the Project

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Common Name	Scientific Name	Federal Status[1]	State Status[2]
Birds			
bald eagle	*Haliaeetus leucocephalus*	BGEPA, BCC	PS
Brewer's sparrow	*Spizella breweri*	BCC	-
burrowing owl	*Athene cunicularia*	SOC	C, PS
chukar	*Alectoris chukar*	-	PS
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	SOC	E, PS
dusky grouse	*Dendragapus obscurus*	-	PS
ferruginous hawk	*Buteo regalis*	SOC, BCC	T, PS
golden eagle	*Aquila chrysaetos*	BGEPA, BCC	PS
greater sage-grouse (Columbia Basin DPS)	*Centrocercus urophasianus*	BCC	E, PS
loggerhead shrike	*Lanius ludovicianus*	BCC	C, PS
prairie falcon	*Falco mexicanus*	BCC	PS
ring-necked pheasant	*Phasianus colchicus*	-	PS
sagebrush sparrow	*Artemisiospiza nevadensis*	-	C, PS
sage thrasher	*Oreoscoptes montanus*	BCC	C, PS
Mammals			
black-tailed jackrabbit	*Lepus californicus*	-	C, PS
elk	*Cervus elaphus*	-	PS
Townsend's big-eared bat	*Corynorhinus townsendii*	-	C, PS
gray wolf	*Canis lupus*	-	E, PS
mule deer	*Odocoileus hemionus hemionus*	-	PS
northwest white-tailed deer	*Odocoileus virginianus ochrourus*	-	PS
Washington ground squirrel	*Urocitellus washingtoni*	-	C, PS
white-tailed jackrabbit	*Lepus townsendii*	-	C, PS
Reptiles & Amphibians			
sagebrush lizard	*Sceloporus graciosus*	-	C, PS

Sources: USFWS 2008, 2021b; WDFW 2008, 2020, 2021a, 2021b, 2021c, 2021d

1. U.S. Fish and Wildlife Service: SOC = Species of Concern, BCC = Bird of Conservation Concern, BGEPA = Bald and Golden Eagle Protection Act

2. Washington Department of Fish and Wildlife: E = Endangered, T = Threatened, C = Candidate, PS = Priority Species

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Appendix B. WDFW Meeting Summary

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TETRA TECH

Introduction Summary

To:	Michael Ritter / Washington Department of Fish and Wildlife Eric Pentico / Washington Department of Fish and Wildlife
Cc:	Mike Deruyter / Avangrid Renewables, LLC Kristen Goland / Avangrid Renewables, LLC Scott Kringen / Avangrid Renewables, LLC Linnea Fossum / Tetra Tech
From:	Amy Bensted / Tetra Tech Paul Hicks / Tetra Tech
Meeting Date:	March 3, 2021
Subject:	Badger Mountain WDFW – Introduction Summary

A summary of the meeting to introduce the Badger Mountain Solar Energy Project (Project) to the Washington Department of Fish and Wildlife (WDFW) is included with discussion items and follow-up:

Project Overview. The Project is a proposed 200-megawatt solar energy facility located in unincorporated Douglas County, Washington. Avangrid has opted to permit the Project through the Washington Energy Facility Site Evaluation Council (EFSEC).

- The Project includes an approximately 2,160-acre Solar Array Area, 230-kilovolt overhead generation-tie (gen-tie) line, 500-foot-wide gen-tie corridor, and optional battery energy storage system within the Solar Array Area.
- The Project Siting Area currently shows leased/land control boundaries and the gen-tie easement corridor, not all of which will be developed.
- Submittal of the Application for Site Certification (ASC) to EFSEC is planned for July 2021.
- Mike Ritter/WDFW confirmed that once the ASC is filed, EFSEC would provide the ASC and associated survey reports to WDFW for review.

Overview of Previous Surveys and Findings. Tetra Tech described previously conducted surveys which consisted primarily of a wildlife/habitat desktop assessment and field reconnaissance. Tetra Tech will update previous habitat assessments based on field survey verification.

- Special status species identified as potentially occurring in the Project vicinity in the 2018 and 2019 desktop reviews included: gray wolf, mule deer (winter range), golden eagle, Washington ground squirrel (WGS), sticky phacelia, bald eagle, ferruginous hawk, and sage grouse. Mike Ritter's review did not show WGS in the project area.

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- The talus slope located within and adjacent to the Project Siting Area is considered a priority habitat by WDFW.
- Avangrid described ongoing raptor nest surveys, which were conducted in 2019, 2020, and will be conducted in 2021.

Planned Wildlife, Habitat, and Rare Plant Surveys. Tetra Tech will complete wildlife, habitat, and rare plant surveys in spring 2021.

- Surveys will be conducted within the Solar Array Area and 500-foot wide gen-tie corridor.
- The surveyors will refine the habitat mapping consistent with Johnson and O'Neil (2001), WDFW priority habitats (WDFW 2008), and WDFW Wind Guideline habitat types/subtypes/categories (WDFW 2009) as applicable, rather than relying on GAP data.
- The surveys will determine habitat quality (e.g., disturbance, noxious weed presence).
- Surveys will be conducted during the rare plant identification period(s): one survey in April-May (initial survey period), followed by one survey in June-July (second survey period) if potential habitat for late-bloom species is present.
- The April or May survey (initial survey period) also overlaps with the peak breeding bird activity in the Columbia Basin as well as WGS activity; surveyors will document special status wildlife species if observed.
- Surveyors will use intuitive meander transect methods.

Summary of Discussion and Follow-up. WDFW generally recommends siting on active agricultural land, degraded habitat, or lands with low habitat classifications to the extent feasible. Mike Ritter/WDFW concurred that the planned surveys are appropriate and sent Avangrid an email during the meeting with WDFW's general recommended solar survey protocols for reference (Attachment 1). The following is a list of the survey types provided by WDFW, and a description of how Avangrid plans to address these survey needs:

1. <u>Wildlife Surveys</u>
    a. Raptor Nest Surveys
        - Raptor nest surveys were conducted in 2019, 2020, and eagle monitoring surveys will be conducted in 2021, consistent with WDFW recommendations.
    b. General Wildlife Surveys
        - Tetra Tech will conduct one general wildlife survey concurrent with the habitat survey in the Spring (April or May) to record Priority Habitats and Species (PHS) using intuitive meander transect methods. A list of which PHS species may be present has been prepared and was discussed with WDFW during the introductory call, and will be updated as needed prior to surveys.
    c. Bat Surveys
        - Site-specific bat surveys are not anticipated for the project. Avangrid may review known data to determine if use of the project site by bat species is estimated to be high.
    d. Threatened, Endangered, and Sensitive Species Surveys

- Prior to conducting the general wildlife survey, Tetra Tech will review existing information to determine the probable occurrence of state/federal threatened or endangered or sensitive-status species on the project site. Additional focused analysis may be incorporated if appropriate.

2. Wildlife Habitat Connectivity
    - Tetra Tech will review WDFW's recommended documentation to determine if the project is within a connectivity corridor.
3. Rare Plant Surveys
    - Tetra Tech will conduct rare plant surveys in spring and summer 2021 consistent with WDFW's recommended protocols.

WDFW noted that there are no "Eastside (Interior) Grasslands" (as referenced in the WDFW wind guidelines) in Douglas County, per PHS (2008), which calls this habitat type "Eastside Steppe." WDFW identifies Shrub-steppe as Class II regardless of value (e.g., level of disturbance or isolation). However, WDFW generally recommended siting on active agricultural land, degraded habitat, or lands with low habitat classifications to the extent feasible.

Follow-up Communications. WDFW provided additional email communications to Avangrid on March 8 and 9, 2021. These communications are provided as Attachment 1 to this meeting summary (along with the email sent during the March 3, 2021 meeting, which is addressed above). Sensitive maps provided by WDFW in these emails are not attached but are available to EFSEC upon request. Avangrid's approach to addressing WDFW's March 8 and 9 emailed comments in the Application for Site Certification are provided in Attachment 2 to this meeting summary.

ATTACHMENT 1

From: Goland, Kristen
To: Bensted, Amy; Fossum, Linnea; Hicks, Paul; Kringen, Scott; DERUYTER, MICHAEL
Subject: FW: EXTERNAL:
Date: Wednesday, March 3, 2021 10:48:11 AM

Kristen Goland
Telephone 503.478.6360
Cell 508.397.6130
Kristen.Goland@Avangrid.com

Internal Use

From: Ritter, Michael W (DFW) <Michael.Ritter@dfw.wa.gov>
Sent: Wednesday, March 3, 2021 10:44 AM
To: Goland, Kristen <Kristen.Goland@avangrid.com>
Subject: EXTERNAL:

1. **Wildlife Surveys**

   a. **Raptor Nest Surveys**

   At a minimum, one raptor nest survey during breeding season of the project site within 0.5mile of the project site should be conducted to assess nesting activity and to implement nest buffers if needed during construction. Raptor nest surveys should be conducted when most species are likely occupying nest sites, such as April or May.

   b. **General Wildlife Surveys**

   At a minimum, two general wildlife surveys should be conducted in the Spring (April and May; one in each month) to record Priority Habitats and Species (PHS) wildlife (bird, herptile and mammal) species. Prior to on the ground surveys, existing PHS data products should be consulted and analyzed. The project developer and their biologist should develop a list of which PHS species may be present on the project area and tailor emphasis species for the surveys to target, especially those species listed as sensitive, threatened , or endangered and consult with the local WDFW habitat biologist on that list prior to surveys.

   The survey method should include the entire project site and walking transects of ~60 meters apart during good weather conditions (low-moderate wind and little-no rain). Certain times of day may be preferable for locating animals moving to and from food and water sources. All PHS species locations should be recorded (GPS). A comprehensive wildlife list should also be kept of all species seen. If species are identifiable via scat or tracks, they should also be noted.

c. Bat Surveys

Appropriate methods, including species-discriminating bat detectors and radar, survey periods and locations depend on local habitat, environmental conditions and elevation, and vary by species and/or life stage.

Site-specific bat surveys are recommended when use of the site by bat species is estimated to be high; based on known data and/or consultation with WDFW biologist.

For the Black Rock solar project site, we do not recommend bat surveys as it is highly unlikely that there is/are hibernacula or a maternity colony on site. While we may see a pulse in bat activity during the Fall migration and virtually no activity the remainder of the year (this is typical in arid shrubsteppe environments) through the project site, it is unlikely any useful information would be collected to inform project siting and operation.

d. Threatened, Endangered and Sensitive Species Surveys

If existing information suggests the probable occurrence of state and/or federal threatened or endangered or sensitive-status species on the project site, focused surveys are recommended during the appropriate seasons to determine the presence or likelihood of presence of the species.

2. **Wildlife Habitat Connectivity**

Documents such as the Washington Wildlife Habitat Connectivity Statewide Analysis, Columbia Plateau Ecoregion Analysis, Arid Lands Initiative Conservation Priorities and recovery plans for species such as Greater Sage Grouse should be consulted early in the project scoping analysis to determine if the project is within a connectivity corridor.

3. **Rare Plant Surveys**

State and Federal listed and plant species of special concern should be included in pre-project review of a site. Review should include a query of known populations of rare plants, information available through Department of Natural Resources (DNR) Natural Heritage Program and whether the existing habitat contains potential for the species if the area has not been surveyed previously. For areas that have not been previously surveyed but contain suitable habitat, field surveys should be done at the appropriate time of year for that species.

Michael Ritter
Fish and Wildlife Area Habitat Biologist
Statewide Technical Lead: Wind and Solar
Washington Department of Fish and Wildlife
2620 N. Commercial Ave
Pasco, WA 99301
509-380-3028 (cell)

DERUYTER, MICHAEL

From: Ritter, Michael W (DFW) <Michael.Ritter@dfw.wa.gov>
Sent: Monday, March 8, 2021 2:34 PM
To: DERUYTER, MICHAEL
Subject: EXTERNAL:sage grouse

We don't have any more recent information on the eagle nest, however I did want to also raise the concern about the proximity of this project to a sage-grouse lek, which is within 10k of the project boundary and recent telemetry data from male sage-grouse show some potential use of the area. Any converted rangeland represents a potential loss of nesting or winter habitat. Permanent loss of agriculture lands and the associated infrastructure and road developments for a solar project represent significant threats for sage-grouse. I would highly recommend including sage-grouse surveys for this project (if not already considered).

I included a map of GPS telemetry relocations from two collared male sage grouse from 2016/17 and a multiring buffer (in kilometers) from the Badger Mountain lek site. This is one of the largest lek sites in the state.

Michael Ritter
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DERUYTER, MICHAEL

From: Ritter, Michael W (DFW) <Michael.Ritter@dfw.wa.gov>
Sent: Monday, March 8, 2021 3:43 PM
To: DERUYTER, MICHAEL
Subject: EXTERNAL:Additional survey considerations

Great talking with you,

Just an FYI, WDFW biologists agree that there is concern about the project's proximity to what is likely the biggest (most well-attended) greater sage-grouse lek in Washington, especially given the clear data that sage-grouse occur within the project area itself.

I just received additional info regarding species to consider / survey for:

> We encourge bat acoustic surveys for this project occurs as it occurs the range of a number of bat species, including Townsend's big-eared bat, pallid bat, and likely spotted bat. Some recent limited PUD surveys found spotted bats on the west side of the Columbia River above Rocky Reach dam.
>
> Raptor surveys and general nesting bird surveys are crucial due to the number of State Candidate bird species in Douglas County, including burrowing owl, sagebrush sparrow, sage thrasher, and loggerhead shrike.
>
> The project should also consider surveys for State Candidate reptile and mammal species, as well. Specifically, sagebrush lizard, black-tailed and white-tailed jackrabbits, and Washington ground squirrel come to mind.

Michael Ritter
Fish and Wildlife Area Habitat Biologist
Statewide Technical Lead: Wind and Solar
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2620 N. Commercial Ave
Pasco, WA 99301
509-380-3028 (cell)

DERUYTER, MICHAEL

From: Ritter, Michael W (DFW) <Michael.Ritter@dfw.wa.gov>
Sent: Monday, March 8, 2021 4:02 PM
To: DERUYTER, MICHAEL
Subject: EXTERNAL:Eagles

Just got word from Jim Watson, our raptor research scientist. He will be providing some eagle survey recommendations this week.

Michael Ritter
Fish and Wildlife Area Habitat Biologist
Statewide Technical Lead: Wind and Solar
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2620 N. Commercial Ave
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DERUYTER, MICHAEL

From: Ritter, Michael W (DFW) <Michael.Ritter@dfw.wa.gov>
Sent: Tuesday, March 9, 2021 8:51 PM
To: DERUYTER, MICHAEL
Subject: EXTERNAL:Golden Eagle
Attachments: Bromley Point buffers.jpg; Bromley_Point_GOEA_recommendations.docx

Michael,
Attached are some data and information to consider regarding golden eagle surveys. Let me know if you have any questions.

Mike

Michael Ritter
Fish and Wildlife Area Habitat Biologist
Statewide Technical Lead: Wind and Solar
Washington Department of Fish and Wildlife
2620 N. Commercial Ave
Pasco, WA 99301
509-380-3028 (cell)

- The attached map shows generic home range and core area buffers applied to the Bromley Point golden eagle territory (WDFW #576) around the only documented nest on the territory. The generic buffers are based on mean range sizes of eagles analyzed in our 2014 paper (Watson et al. 2014). The buffers are mean to provide some context for the potential size of area the Bromley Point eagles likely use, but lack without telemetry data the exact size and shape of the buffers is unknown. I suspect, for example, the birds make little regular use of the home range area overlapping expansive monocultures of cropland on the east side of the nest draw, whereas some of those drainages bisecting cropland to the west might be used regularly for hunting. However, for cropland within the diagrammatic core area proposed activity needs evaluation because of the proximity to the nest. I would be concerned about human activities above (elevation-wise) and visible from the nest and potential effects of heat from the solar farm (I don't know enough about heat from the solar project to comment on that). I suspect the eagles use the entire ridgeline along the length of the diagrammatic home range for lift and hunting, and likely spend a great deal of time on that range land south of the nest.

- All the above is based on my experience but would obviously benefit from additional information that would at minimum identify any alternative nests along the ridgeline and provide data on their intensity of use in the areas described in the above bullet. This would better inform the designation of buffers. I'm not sure how much information from focal monitoring without telemetry would provide (always depends on access and visibility of not only the nest but the larger range since the birds are only followed visually), but telemetry of the adult male would answer those questions. Telemetry might also provide pre-construction movement data to see how birds respond to project construction (this is a novel situation and would therefore provide some very useful information beyond this project). Any capture of the birds would need to happen after the breeding season, assuming they are now nesting, between September through March. If the proponents are interested in the telemetry option we can discuss further details (transmitter cost and type, my involvement, etc.).

- Checking nest activity to avoid construction disturbance is important but is really only a bandage on the larger impact which is land use change and resulting long-term changes in occupancy and reproduction at this territory. As we've discussed, the species is a candidate for listing statewide with a declining population so protecting each productive territory is important.

ATTACHMENT 2

Consideration of WDFW Comments from March 8-9, 2021 Regarding Surveys

Bat acoustic surveys

- WDFW comment: *We encourage bat acoustic surveys for this project occurs as it occurs the range of a number of bat species, including Townsend's big-eared bat, pallid bat, and likely spotted bat. Some recent limited PUD surveys found spotted bats on the west side of the Columbia River above Rocky Reach dam.*
- Avangrid response:
    - Bat species presence would be assumed if the species range overlaps with the project and suitable habitat exists in the area. Avangrid will review known data to determine the likely use of the project site by bat species assumed to be present, and document potentially suitable bat roosting and foraging habitat during wildlife surveys. The Project area is not associated with high quality roosting habitat for the bat species identified above and Avangrid does not anticipate the need to conduct site-specific bat surveys.

Raptor surveys and general nesting bird surveys

- WDFW comment: *Raptor surveys and general nesting bird surveys are crucial due to the number of State Candidate bird species in Douglas County, including burrowing owl, sagebrush sparrow, sage thrasher, and loggerhead shrike.*
- Avangrid response: Avangrid will conduct wildlife surveys concurrent with habitat surveys. If needed, Avangrid will conduct nest clearance surveys prior to vegetation clearing.
    - Raptor nest surveys were conducted in 2019 and 2020, and eagle monitoring surveys will be conducted in 2021, consistent with WDFW recommendations.
    - If construction occurs during nesting season, nest clearance surveys would be conducted prior to site disturbance, as feasible.
    - State Candidate bird species (such as burrowing owl, sagebrush sparrow, sage thrasher, and loggerhead shrike) would be documented during general wildlife surveys in early May if present.

State candidate reptile and mammal species surveys

- WDFW comment: *The project should also consider surveys for State Candidate reptile and mammal species, as well. Specifically, sagebrush lizard, black-tailed and white-tailed jackrabbits, and Washington ground squirrel come to mind.*
- Avangrid response: Avangrid will conduct wildlife surveys (including reptiles and mammals) concurrent with habitat surveys.
    - State candidate reptiles and mammals (such as sagebrush lizard, black-tailed and white-tailed jackrabbits, and Washington ground squirrel) would be documented during general wildlife surveys in early May if present. Surveyors would record any Priority Habitats and Species (PHS) observed while walking intuitive meander transects. PHS may additionally be recorded incidentally during other Project surveys (e.g., during spring wetland surveys).
    - A list of which PHS species may be present has been prepared and was discussed with WDFW during the introductory call, and will be updated as needed prior to surveys. The wildlife survey would document PHS if present, and also determine the likelihood of occurrence of species such as Washington ground squirrel based on the factors such as the presence of suitable habitat.

Sage Grouse surveys

- WDFW comment: *WDFW biologists agree that there is concern about the project's proximity to what is likely the biggest (most well-attended) greater sage-grouse lek in Washington, especially given the clear data that sage-grouse occur within the project area itself.*
- Avangrid response: The Project area is not located within the Badger Mountain lek site and is not within mapped GPS telemetry relocations from two collared male sage grouse from 2016/17 provided by WDFW on March 8, 2021. The sensitive map provided by WDFW is not attached but is available to EFSEC upon request. Avangrid will conduct surveys for sage-grouse incidentally with other wildlife surveys in the area (i.e., biologists will identify and record any sage-grouse presence or scat found incidentally during other ground-based wildlife surveys) and review desktop resources (e.g., PHS database, Washington Habitat Connectivity Working Group habitat suitability and connectivity modelling) to determine if sage-grouse use the project area. This field and desktop work will be completed during and following the general wildlife surveys in early May, respectively. Avangrid does not anticipate the need to conduct aerial sage grouse lek surveys for the Project area.

Eagle Telemetry survey

- WDFW comment: *The attached map shows generic home range and core area buffers applied to the Bromley Point golden eagle territory (WDFW #576) around the only documented nest on the territory. The generic buffers are based on mean range sizes of eagles analyzed in our 2014 paper (Watson et al. 2014). The buffers are mean to provide some context for the potential size of area the Bromley Point eagles likely use, but lack without telemetry data the exact size and shape of the buffers is unknown… All the above is based on my experience but would obviously benefit from additional information that would at minimum identify any alternative nests along the ridgeline and provide data on their intensity of use in the areas described in the above bullet. This would better inform the designation of buffers. I'm not sure how much information from focal monitoring without telemetry would provide (always depends on access and visibility of not only the nest but the larger range since the birds are only followed visually), but telemetry of the adult male would answer those questions. Telemetry might also provide pre-construction movement data to see how birds respond to project construction (this is a novel situation and would therefore provide some very useful information beyond this project).*
- Avangrid response: Avangrid conducted raptor nest surveys in 2019 and 2020 and will conduct eagle monitoring surveys in 2021 to identify alternative nests along the ridgeline and determine nesting status. Eagles will also be recorded during May 2021 wildlife surveys, if observed. The sensitive map provided by WDFW is not attached but is available to EFSEC upon request. Avangrid does not anticipate the need to conduct eagle telemetry surveys.

Where applicable, WDFW comments will be addressed in appropriate sections of the Project streamlined solar Application for Site Certification to Washington EFSEC.

Appendix C. Wildlife Species and Sign Observed During 2021 Field Surveys

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Common Name	Scientific Name	Individual Observed	Sign Observed	Federal Status[1]	State Status[2]
Birds					
American crow	*Corvus brachyrhynchos*	X	-	-	-
American kestrel	*Falco sparverious*	X	-	-	-
American robin	*Turdus migratorious*	X	-	-	-
barn swallow	*Hirundo rustica*	X	-	-	-
black-billed magpie	*Pica hudsonia*	X	-	-	-
Brewer's sparrow	*Spizella breweri*	X	-	BCC	-
California quail	*Callipepla californica*	X	-	-	-
chukar	*Alectoris chukar*	X	-	-	PS
common raven	*Corvus corax*	X	-	-	-
ferruginous hawk	*Buteo regalis*	X	-	SOC, BCC	T, PS
golden eagle	*Aquila chrysaetos*	X	-	BGEPA, BCC	PS
horned lark	*Eremophila alpestris*	X	-	-	-
grey partridge	*Perdix perdix*	X	-	-	-
killdeer	*Charadrius vociferus*	X	-	-	-
mountain bluebird	*Sialia currucoides*	X	-	-	-
mourning dove	*Zenaida macroura*	X	-	-	-
northern harrier	*Circus cyaneus*	X	-	-	-
prairie falcon	*Falco mexicanus*	X	-	BCC	PS
red-tailed hawk	*Buteo jamaicensis*	X	-	-	-
ring-necked pheasant	*Phasianus colchicus*	X	-	-	PS
sage thrasher	*Oreoscoptes montanus*	X	-	BCC	C, PS
savannah sparrow	*Passerculus sandwichensis*	X	-	-	-
Say's phoebe	*Sayornis saya*	X	-	-	-
Townsend's solitaire	*Myadestes townsendi*	X	-	-	-
wild turkey	*Meleagris gallopavo*	-	X	-	-
vesper sparrow	*Pooecetes gramineus*	X	-	-	-
western bluebird	*Sialia Mexicana*	X	-	-	-
western kingbird	*Tyrannus verticalis*	X	-	-	-
western meadowlark	*Sturnella neglecta*	X	-	-	-
white-crowned sparrow	*Zonotrichia leucophrys*	X	-	-	-
Mammals					
American badger	*Taxidea taxus*		X		
coyote	*Canis latrans*	-	X	-	-
Rocky Mountain elk	*Cervus canadensis nelsoni*	-	X	-	PS

Common Name	Scientific Name	Individual Observed	Sign Observed	Federal Status[1]	State Status[2]
mule deer	*Odocoileus hemionus*	X	X	-	PS
Reptiles					
western rattlesnake	*Crotalus oreganus*	X	-	-	-

1. Federal Status: BGEPA = Bald and Golden Eagle Protection Act, BCC = Bird of Conservation Concern, SOC = Species of Concern.
2. Washington Department of Fish and Wildlife: T = Threatened, C= Candidate, PS = Priority Species.

Appendix D. Site Photographs

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Photo 1. View southwest over cliff/talus Priority Habitat from wesern boundary of Project.

Photo 2. Potential badger burrow observed in the northern portion of the Project.

Photo 3. Active unknown active mammal burrow along the transmission line corridor. Burrow is typical of the inactive and active burrows found.

Photo 4. View east of mule deer from western boundary of Project.

Photo 5. Potential bat roost in abandoned structure in southeastern portion of Project.

Photo 6. View north over known past Washington ground squirrel colony.

Photo 7. Wheat field along gen-tie line corridor.

Photo 8. Wheat field and shrub-steppe habitat within western portion of Project.

Photo 9. Rock/borrow pit in northern portion of Project Area.

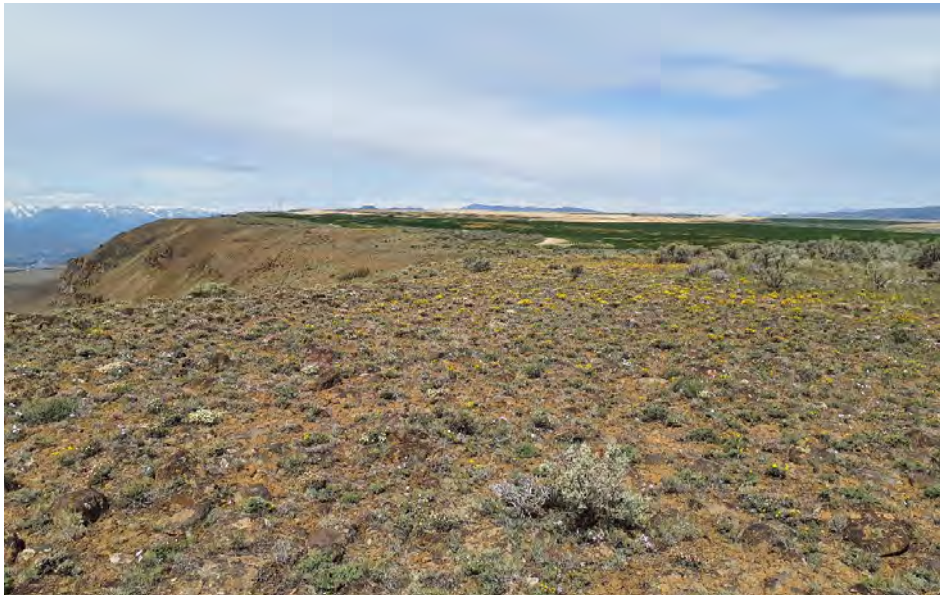

Photo 10. Dwarf shrub-steppe habitat in the western portion of the Project.

Photo 11. Dwarf shrub-steppe habitat with high cover of scabland sagebrush (*Artemisia rigida*).

Photo 12. Intermingled shrub-steppe and dwarf shrub-steppe habitat in northwest portion of Project.

Photo 13. Intermingled shrub-steppe and dwarf shrub-steppe habitat in western portion of Project.

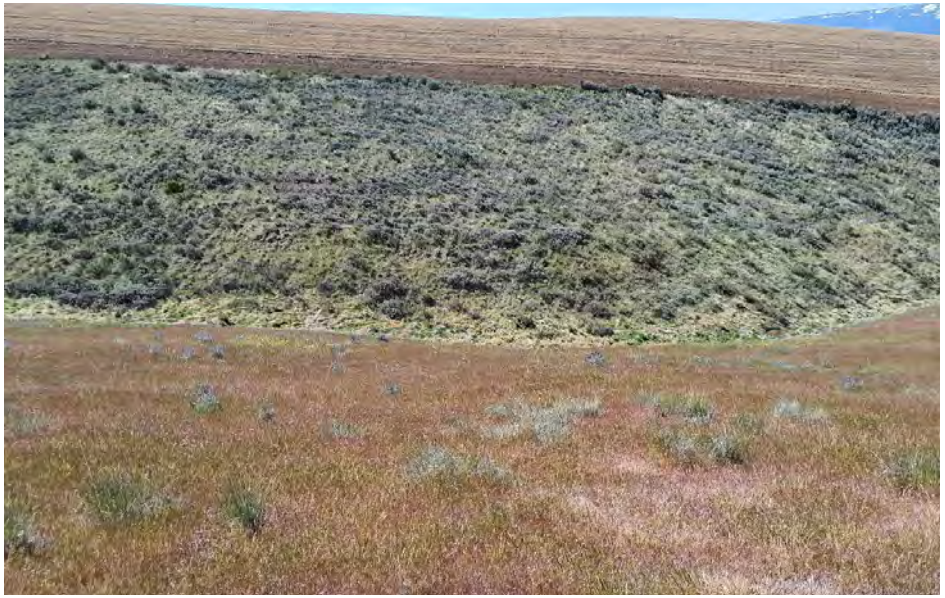

Photo 14. Non-native grassland and forbland (foreground) and shrub-steppe (background) habitat along gen-tie line corridor.

Photo 15. Area of planted grassland along gen-tie line corridor.

Photo 16. Shrub-steppe habitat in southwestern portion of Project.

Photo 17. Shrub-steppe habitat along steep slopes within and adjacent to the northwestern portion of Project.

Photo 18. Talus slopes in central western portion of Project.

Photo 19. Talus slopes in central western portion of Project.

Photo 20. Talus slopes and shrub-steppe habitat within and adjacent to northwestern portion of Project. WDFW's PHS database maps this entire area as talus slopes.

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Appendix E. Habitat Type and Classification System Reference

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Seven habitat types were mapped within the Survey Area during surveys conducted in 2021. In general, habitat types were adapted from habitat descriptions in Wildlife-habitat Relationships in Oregon and Washington (Johnson and O'Neil 2001), the WDFW Priority Habitats and Species List (WDFW 2008), and the WDFW Wind Power Guidelines (WDFW 2009). Table E-1 provides a crosswalk between these three sources and the habitat types mapped at the Project. Definitions of each Johnson and O'Neil (2001) and WDFW (2009), as well as the WDFW (2009) definitions for priority habitats and features listed in Table E-1 are provided below the table.

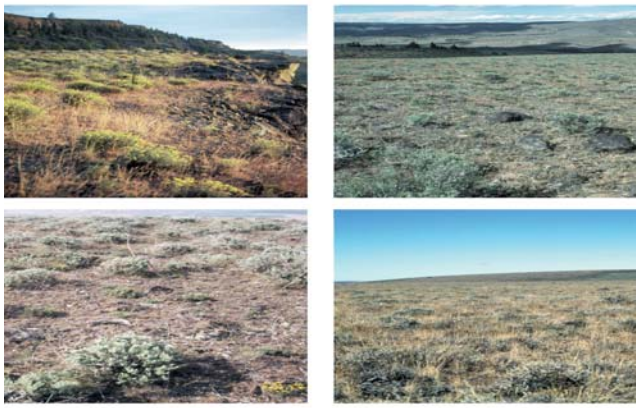
Table E-1. Habitat Type Crosswalk

<table>
<tr><th>Project Habitat Type</th><th>Johnson and O'Neil (2001) Habitat Type or Feature</th><th>WDFW (2008) Priority Habitat Type or Feature</th><th>WDFW (2009) Habitat Type</th><th>WDFW (2009) Classification</th></tr>
<tr><td>Dwarf shrub-steppe</td><td>Dwarf shrub-steppe</td><td rowspan="2">Shrub-steppe</td><td rowspan="2">Shrub-steppe</td><td rowspan="3">Class II</td></tr>
<tr><td>Shrub-steppe</td><td>Shrub-steppe</td></tr>
<tr><td>Talus</td><td>Talus</td><td>Talus</td><td>None</td></tr>
<tr><td>Planted grassland</td><td rowspan="3">Agriculture, Pastures, and Mixed Environs</td><td>Not a priority habitat or feature</td><td>Conservation Reserve Program</td><td>Class III</td></tr>
<tr><td>Non-native grassland and forbland</td><td>Not a priority habitat or feature</td><td>None</td><td rowspan="3">Class IV</td></tr>
<tr><td>Agriculture</td><td>Not a priority habitat or feature</td><td rowspan="2">Croplands, Pasture, Urban and Mixed Environs</td></tr>
<tr><td>Developed</td><td>Urban and Mixed Environs</td><td>Not a priority habitat or feature</td></tr>
</table>

Johnson and O'Neil (2001) Habitat Descriptions

17. Dwarf Shrub-steppe

Rex C. Crawford & Jimmy Kagan



Geographic Distribution. Dwarf-shrub and related scabland habitats are located throughout the Columbia Plateau and in adjacent woodland and forest habitats. They are more common in southern Oregon than in Washington.

Low sagebrush steppe is common in the Basin and Range and the Owyhee Uplands in eastern Lake, Harney, and Malheur counties and is a minor type in eastern Washington and northeastern Oregon. It usually occurs on low, scabby plateaus above lake basins. Stiff sagebrush/Sandberg bluegrass is a major type widely distributed in the Columbia Basin, particularly associated with the channeled scablands, High Lava Plains, and in isolated spots throughout the Blue Mountains and the Palouse. Black sagebrush steppe is not found in Washington and is rare in Oregon, occurring along the Nevada border in southern Lake, Harney, and Malheur counties, in the southern Basin and Range and Owyhee Uplands Physiographic Province.

Physical Setting. This habitat appears on sites with little soil development that often have extensive areas of exposed rock, gravel, or compacted soil. The habitat is characteristically associated with flats, plateaus, or gentle slopes although steep slopes with rock outcrops are common. Scabland types within the shrub-steppe area occur on barren, usually fairly young basalts or shallow loam over basalt <12 inches (30 cm) deep. In woodland or forest mosaics, scabland soils are deeper (still <26 inches [65 cm]) but too droughty or extreme soils for tree growth. Topoedaphic drought is the major process influencing these communities on ridge tops and gentle slopes around ridgetops. Spring flooding is characteristic of scablands in concave topographic positions. This habitat is found across a wide range of elevations from 500 to 7,000 ft (152 to 2,134 m).

Landscape Setting. These scabland habitats form a mosaic with Shrub-steppe habitat, Eastside Grasslands habitat, and with Western Juniper and Mountain Mahogany Woodland or Ponderosa Pine Forest and Woodland habitats. Low sagebrush stands are often extensive and occasionally occur in a mosaic with big sagebrush, stiff sagebrush, or black sagebrush steppe or within lower treeline woodlands. Stiff sagebrush stands may also be extensive, but usually occur in a mosaic with grassland, big sagebrush or occasionally in juniper (Juniperus occidentalis) or Ponderosa pine (Pinus ponderosa) woodlands. Black sagebrush stands are extensive and may occur in a mosaic with low sagebrush or mountain or Wyoming big sagebrush.

Structure. These low shrub (<1.6 ft [0.5 m] high) communities have an undergrowth of short grasses and forbs with extensive exposed rock and cryptogamic crusts. More productive sites have an open, native medium-tall bunchgrass layer with scattered low shrubs. Some scablands in the Columbia Basin have few to no dwarf shrubs and the habitat is entirely dominated by grasses and forbs. Total vegetation cover is open to sparse. Individual trees can appear among the low shrubs when this habitat appears in the forest matrix.

Composition. Several dwarf-shrub species characterize this habitat: low sagebrush (Artemisia arbuscula), black sagebrush (A. nova), stiff sagebrush (A. rigida), or several shrubby buckwheat species (Eriogonum douglasii, E. sphaerocephalum, E. strictum, E. thymoides, E. niveum, E. compositum). These dwarf-shrub species can be found as the sole shrub species or in combination with these or other low shrubs. Purple sage (Saliva dorrii) can dominate scablands on steep sites with rock outcrops.

Sandberg bluegrass (Poa sandbergii) is the characteristic and sometimes the dominant grass making up most of this habitat's sparse vegetative cover. Taller bluebunch wheatgrass (Pseudoroegneria spicata) or Idaho fescue (Festuca idahoensis) grasses may occur on the most productive sites with Sandberg bluegrass. Bottlebrush squirreltail (Elymus elymoides) and Thurber needlegrass (Stipa thurberiana) are typically found in low cover areas, although they can dominate some sites. One-spike oatgrass (Danthonia unispicata), prairie junegrass (Koeleria macrantha), and Henderson ricegrass (Achnatherum hendersonii) are occasionally important. Exotic annual grasses, commonly cheatgrass (Bromus tectorum), increase with heavy disturbance and can be locally abundant. Common forbs include serrate balsamroot (Balsamorhiza serrata), Oregon twinpod (Physaria oregana), Oregon bitterroot (Lewisia rediviva), big-head clover (Trifolium macrocephalum), and Rainier violet (Viola trinervata). Several other forbs (Arenaria, Collomia, Erigeron, Lomatium, and Phlox spp.) are characteristic, early blooming species. A diverse lichen and moss layer is a prominent component of these communities.

Medium-tall shrubs, such as big sagebrush (Artemisia tridentata), Silver sagebrush (A. cana), antelope bitterbrush (Purshia tridentata), and rabbitbrush (Chrysothamnus spp.) occasionally appear in these scablands.

Other Classifications and Key References. This habitat is called scabland, biscuit-swale topography, lithosolic steppe, or low shrub-steppe. Quigley and Arbelbide[181] called this habitat low sagebrush cover type and "Low

Sagebrush-Xeric" and "Low Sagebrush-Mesic" potential vegetation groups. The Oregon Gap II Project[126] and Oregon Vegetation Landscape-Level Cover Type[127] that would represent this type is low-dwarf sagebrush. Kuchler[136] did not distinguish this habitat but included it within Sagebrush Steppe. Franklin and Dyrness[88] discussed this habitat as lithosolic sites in steppe and shrub-steppe zones of Washington and as plant associations in steppe and shrub-steppe zones of central and southern Oregon. Other references describe this habitat.[60, 64, 122, 123, 207]

Natural Disturbance Regime. Scabland habitats often do not have enough vegetation cover to support wildfires. Bunchgrass sites with black or low sagebrush may burn enough to damage shrubs and decrease shrub cover with repetitive burns. Many scabland sites have poorly drained soil and because of shallow soil are prone to winter flooding. Freezing of saturated soil results in "frost-heaving" that churns the soil and is a major disturbance factor in vegetation patterns. Stiff sagebrush is a preferred browse for elk as well as livestock. Native ungulates use scablands in early spring and contribute to churning of the soil surface.

Succession and Stand Dynamics. Grazing reduces the cover of bunchgrasses and increases the abundance of common yarrow (Achillea millefolium), phlox species, bighead clover, serrate balsamroot, bottlebrush squirreltail and annual bromes on dwarf shrublands. Increased ground disturbing activities increases exotic plant abundance, particularly on deeper soil sites. All dwarf-shrub species are intolerant of fire and do not sprout. Consequently, redevelopment of dwarf shrub-steppe habitat is slow following fire or any disturbance that removes shrubs.

Effects of Management and Anthropogenic Impacts. Scabland habitats provide little forage and consequently are used only as a final resort by livestock. Heavy use by livestock or vehicles disrupts the moss/lichen layer and increases exposed rock and bare ground that create habitat for exotic plant invasion. Exotic annual bromes have become part of these habitats with natural soil churning disturbance.

Status and Trends. Quigley and Arbelbide[181] concluded that the low sagebrush cover type is as abundant as it was before 1900. They concluded that "Low Sagebrush-Xeric" successional pathways have experienced a high level of change from exotic invasions and that some pathways of "Low Sagebrush-Mesic" are unaltered. Twenty percent of Pacific Northwest dwarf shrub-steppe community types listed in the National Vegetation Classification are considered imperiled or critically imperiled.[10]

18. Desert Playa and Salt Scrub Shrublands

Rex C. Crawford & Jimmy Kagan

Geographic Distribution. The desert playa and salt scrub habitat centers on the Great Basin of Nevada and Utah. In the Pacific Northwest, it is most common and abundant in the larger, alkaline lake basins in southeastern Oregon, although it is represented throughout the Columbia Plateau, Basin and Range, and Owyhee Provinces.

Shadscale salt desert shrub and mixed salt desert shrub range from southeastern Oregon south into Utah and Nevada. Black greasewood salt desert scrub and alkaline/saline bottomland grasslands and wetlands appear throughout the Columbia Plateau of Washington and Oregon.

Physical Setting. This habitat typically occupies the lowest elevations in hydrologic basins in the driest regions of the Pacific Northwest. Elevation range is highly variable, from 3,000 to 7,500 ft (914 to 2.286 m) in southeastern Oregon to 500 to 5,500 ft (152-1,676 m) in central Washington. Structural and compositional variation in this habitat are related to changes in salinity and fluctuations in the water table. Areas with little or no vegetative cover have highly alkaline and saline soils and are poorly drained or irregularly flooded. Other arid soil types include desert pavement and barren ash. The wettest variants of the habitat are usually found at the mouth of stream drainages or in areas with some freshwater input into a playa. These have finer, deeper alluvial soils that occur in low alkaline dunes, around playas, on slopes above alkaline basins or in small, poorly drained basins in sagebrush steppe. Topographically, this habitat occurs on playas or desert pavement, or on low benches above playas with occasional low alkaline dune ridges.

Landscape Setting. This habitat is typically surrounded by shrub-steppe habitat. It forms a habitat mosaic of playas, salt grass meadows, salt desert shrublands and sagebrush shrublands. This habitat may be associated with Herbaceous Wetland habitat. Local land use can result in juxtaposition with Agriculture or Eastside Grasslands habitat. Most of this habitat provides rangeland for

16. Shrub-steppe

Rex. C. Crawford & Jimmy Kagan

Geographic Distribution. Shrub-steppe habitats are common across the Columbia Plateau of Washington, Oregon, Idaho, and adjacent Wyoming, Utah, and Nevada. They extend up into the cold, dry environments of surrounding mountains.

Basin big sagebrush shrub-steppe occurs along stream channels, in valley bottoms and flats throughout eastern Oregon and Washington. Wyoming sagebrush shrub-steppe is the most widespread habitat in eastern Oregon and Washington, occurring throughout the Columbia Plateau and the northern Great Basin. Mountain big sagebrush shrub-steppe occurs throughout the mountains of the eastern Oregon and Washington. Bitterbrush shrub-steppe appears primarily along the eastern slope of the Cascades, from north-central Washington to California and occasionally in the Blue Mountains. Three-tip sagebrush shrub-steppe occurs mostly along the northern and western Columbia Basin in Washington and occasionally appears in the lower valleys of the Blue Mountains and in the Owyhee Upland ecoregions of Oregon. Interior shrub dunes and sandy steppe and shrub-steppe is concentrated at low elevations near the Columbia River and in isolated pockets in the Northern Basin and Range and Owyhee Uplands. Bolander silver sagebrush shrub-steppe is common in southeastern Oregon. Mountain silver sagebrush is more prevalent in the Oregon East Cascades and in montane meadows in the southern Ochoco and Blue Mountains.

Physical Setting. Generally, this habitat is associated with dry, hot environments in the Pacific Northwest although variants are in cool, moist areas with some snow accumulation in climatically dry mountains. Elevation range is wide (300-9,000 ft [91-2,743 m]) with most habitat occurring between 2,000 and 6,000 ft (610-1,830 m). Habitat occurs on deep alluvial, loess, silty or sandy-silty soils, stony flats, ridges, mountain slopes, and slopes of lake beds with ash or pumice soils.

Landscape Setting. Shrub-steppe habitat defines a biogeographic region and is the major vegetation on average sites in the Columbia Plateau, usually below Ponderosa Pine Forest and Woodland, and Western Juniper and Mountain Mahogany Woodland habitats. It forms mosaic landscapes with these woodland habitats and Eastside Grasslands, Dwarf Shrub-steppe, and Desert Playa and Salt Scrub habitats. Mountain sagebrush shrub-steppe occurs at high elevations occasionally within the dry Eastside Mixed Conifer Forest and Montane Mixed Conifer Forest habitats. Shrub-steppe habitat can appear in large landscape patches. Livestock grazing is the primary land use in the shrub-steppe although much has been converted to irrigation or dry land agriculture. Large areas occur in military training areas and wildlife refuges.

Structure. This habitat is a shrub savanna or shrubland with shrub coverage of 10-60%. In an undisturbed condition, shrub cover varies between 10 and 30%. Shrubs are generally evergreen although deciduous shrubs are prominent in many habitats. Shrub height typically is medium-tall (1.6-3.3 ft [0.5-1.0 m]) although some sites support shrubs approaching 9 ft (2.7 m) tall. Vegetation structure in this habitat is characteristically an open shrub layer over a moderately open to closed bunchgrass layer. The more northern or productive sites generally have a denser grass layer and sparser shrub layer than southern or more xeric sites. In fact, the rare good-condition site is better characterized as grassland with shrubs than a shrubland. The bunchgrass layer may contain a variety of forbs. Good-condition habitat has very little exposed bare ground, and has mosses and lichens carpeting the area between taller plants. However, heavily grazed sites have dense shrubs making up >40% cover, with introduced annual grasses and little or no moss or lichen cover. Moist sites may support tall bunchgrasses (>3.3 ft [1 m]) or rhizomatous grasses. More southern shrub-steppe may have native low shrubs dominating with bunchgrasses.

Composition. Characteristic and dominant mid-tall shrubs in the shrub-steppe habitat include all three subspecies of big sagebrush, basin (Artemisia tridentata ssp. tridentata), Wyoming (A. t. ssp. wyomingensis) or mountain (A. t. ssp. vaseyana), antelope bitterbrush (Purshia tridentata), and two shorter sagebrushes, silver (A. cana) and three-tip (A. tripartita). Each of these species can be the only shrub or appear in complex seral conditions with other shrubs. Common shrub complexes are bitterbrush and Wyoming big sagebrush, bitterbrush and three-tip sagebrush, Wyoming big sagebrush and three-tip sagebrush, and mountain big sagebrush and silver sagebrush. Wyoming and mountain big sagebrush can codominate areas with tobacco brush (Ceanothus velutinus). Rabbitbrush (Chrysothamnus viscidiflorus) and short-spine horsebrush (Tetradymia spinosa) are common associates and often dominate sites after disturbance. Big sagebrush occurs with the shorter stiff sagebrush (A. rigida) or low sagebrush (A. arbuscula) on shallow soils or high elevation sites. Many sandy areas are shrub-free or are open to patchy shrublands of bitterbrush and/or rabbitbrush. Silver sagebrush is the dominant and characteristic shrub along the edges of stream courses, moist meadows, and ponds. Silver sagebrush and rabbitbrush are associates in disturbed areas.

When this habitat is in good or better ecological condition a bunchgrass steppe layer is characteristic. Diagnostic native bunchgrasses that often dominate different shrub-steppe habitats are (1) mid-grasses: bluebunch wheatgrass (Pseudoroegneria spicata), Idaho fescue (Festuca idahoensis), bottlebrush squirreltail (Elymus elymoides), and Thurber needlegrass (Stipa thurberiana); (2) short grasses: threadleaf sedge (Carex filifolia) and Sandberg bluegrass (Poa sandbergii); and (3) the tall grass, basin wildrye (Leymus cinereus). Idaho fescue is characteristic of the most productive shrub-steppe vegetation. Bluebunch wheatgrass is codominant at xeric locations, whereas western needlegrass (Stipa occidentalis), long-stolon (Carex inops) or Geyer's sedge (C. geyeri) increase in abundance in higher elevation shrub-steppe habitats. Needle-and-thread (Stipa comata) is the characteristic native bunchgrass on stabilized sandy soils. Indian ricegrass (Oryzopsis hymenoides) characterizes dunes. Grass layers on montane sites contain slender wheatgrass (Elymus trachycaulus), mountain fescue (F. brachyphylla), green fescue (F. viridula), Geyer's sedge, or tall bluegrasses (Poa spp.). Bottlebrush squirreltail can be locally important in the Columbia Basin, sand dropseed (Sporobolus cryptandrus) is important in the Basin and Range and basin wildrye is common in the more alkaline areas. Nevada bluegrass (Poa secunda), Richardson muhly (Muhlenbergia richardsonis), or alkali grass (Puccinella spp.) can dominate silver sagebrush flats. Many sites support non-native plants, primarily cheatgrass (Bromus tectorum) or crested wheatgrass (Agropyron cristatum) with or without native grasses. Shrub-steppe habitat, depending on site potential and disturbance history, can be rich in forbs or have little forb cover. Trees may be present in some shrub-steppe habitats, usually as isolated individuals from adjacent forest or woodland habitats.

Other Classifications and Key References. This habitat is called Sagebrush steppe and Great Basin sagebrush by Kuchler.[136] The Oregon Gap II Project[126] and Oregon Vegetation Landscape-Level Cover Types[127] that would represent this type are big sagebrush shrubland, sagebrush steppe, and bitterbrush-big sagebrush shrubland. Franklin and Dyrness[88] discussed this habitat in shrub-steppe zones of Washington and Oregon. Other references describe this habitat. [60, 116, 122, 123, 212, 224, 225]

Natural Disturbance Regime. Barrett et al.[22] concluded that the fire-return interval for this habitat is 25 years. The native shrub-steppe habitat apparently lacked extensive herds of large grazing and browsing animals until the late 1800s. Burrowing animals and their predators likely played important roles in creating small-scale patch patterns.

Succession and Stand Dynamics. With disturbance, mature stands of big sagebrush are reinvaded through soil-stored or windborne seeds. Invasion can be slow because sagebrush is not disseminated over long distances. Site dominance by big sagebrush usually takes a decade or more depending on fire severity and season, seed rain, postfire moisture, and plant competition. Three-tip sagebrush is a climax species that reestablishes (from seeds or commonly from sprouts) within 5-10 years following a disturbance. Certain disturbance regimes promote three-tip sagebrush and it can out-compete herbaceous species. Bitterbrush is a climax species that plays a seral role colonizing by seed onto rocky and/or pumice soils. Bitterbrush may be declining and may be replaced by woodlands in the absence of fire. Silver sagebrush is a climax species that establishes during early seral stages and coexists with later arriving species. Big sagebrush, rabbitbrush, and short-spine horsebrush invade and can form dense stands after fire or livestock grazing. Frequent or high-intensity fire can create a patchy shrub cover or can eliminate shrub cover and create Eastside Grasslands habitat.

Effects of Management and Anthropogenic Impacts. Shrub density and annual cover increase, whereas bunchgrass density decreases, with livestock use. Repeated or intense disturbance, particularly on drier sites, leads to cheatgrass dominance and replacement of native bunchgrasses. Dry and sandy soils are sensitive to grazing, with needle-and-thread replaced by cheatgrass at most sites. These disturbed sites can be converted to modified grasslands in the Agriculture habitat.

Status and Trends. Shrub-steppe habitat still dominates most of southeastern Oregon although half of its original distribution in the Columbia Basin has been converted to agriculture. Alteration of fire regimes, fragmentation, livestock grazing, and the addition of >800 exotic plant species have changed the character of shrub-steppe habitat. Quigley and Arbelbide[181] concluded that Big Sagebrush and Mountain Sagebrush cover types are significantly smaller in area than before 1900, and that Bitterbrush/Bluebunch Wheatgrass cover type is similar to the pre-1900 extent. They concluded that Basin Big Sagebrush and Big Sagebrush-Warm potential vegetation type's successional pathways are altered, that some pathways of Antelope Bitterbrush are altered and that most pathways for Big Sagebrush-Cool are unaltered. Overall this habitat has seen an increase in exotic plant importance and a decrease in native bunchgrasses. More than half of the Pacific Northwest shrub-steppe habitat community types listed in the National Vegetation Classification are considered imperiled or critically imperiled.[10]

2.3 Beaver/muskrat activity. The results of beaver activity including dams, lodges, and ponds, that are beneficial to other species.
2.4 Burrows. Aquatic or terrestrial cavities produced by burrowing animals that are beneficial to other species.

3. Non-Vegetative, Abiotic, Terrestrial Habitat Elements

Nonliving components found within any ecosystem. Primarily positive influences with a few exceptions as indicated.

3.1 Rocks. Solid mineral deposits.
3.1.1 Gravel. Particle size from 0.1-3.0 inches (0.2-7.6 cm) in diameter; gravel bars associated with streams and rivers are a separate category.
3.1.2 Talus. Accumulations of rocks at the base of cliffs or steep slopes; rock/boulder sizes varied and determine what species can inhabit the spaces between them.
3.1.3 Talus-like habitats. Refers to areas that contain many rocks and boulders but are not associated with cliffs or steep slopes.
3.2 Soils. Various soil characteristics.
3.2.1 Soil depth. The distance from the top layer of the soil to the bedrock or hardpan below.
3.2.2 Soil temperature. Any measure of soil temperature or range of temperatures that are key to the queried species.
3.2.3 Soil moisture. The amount of water contained within the soil.
3.2.4 Soil organic matter.The accumulation of decomposing plant and animal materials found within the soil.
3.2.5 Soil texture. Refers to size distribution and amount of mineral particles (sand, silt, and clay) in the soil; examples are sandy clay, sandy loam, silty clay, etc.
3.3 Rock substrates. Various rock formations.
3.3.1 Avalanche chute. An area where periodic snow or rock slides prevent the establishment of forest conditions; typically shrub and herb dominated (sitka alder [Alnus sinuata] and/or vine maple [Acer circinatum]).
3.3.2 Cliffs. A high, steep formation, usually of rock. Coastal cliffs are a separate category under Marine Habitat Elements.
3.3.3 Caves. An underground chamber open to the surface with varied opening diameters and depths; includes cliff-face caves, intact lava tubes, coastal caves, and mine shafts.
3.3.4 Rocky outcrops and ridges. Areas of exposed rock.
3.3.5 Rock crevices. Refers to the joint spaces in cliffs, and fissures and openings between slab rock; crevices among rocks and boulders in talus fields are a separate category (talus).
3.3.6 Barren ground. Bare exposed soil with >40% of area not vegetated; includes mineral licks and bare agricultural fields; natural bare exposed rock is under the rocky outcrop category.
3.3.7 Playa (alkaline, saline). Shallow desert basins that are without natural drainage-ways where water accumulates and evaporates seasonally.
3.4 Snow. Selected features of snow.
3.4.1 Snow depth. Any measure of the distance between the top layer of snow and the ground below.
3.4.2 Glaciers, snow field. Areas of permanent snow and ice.

4. Freshwater Riparian and Aquatic Bodies Habitat Elements

Includes selected forms and characteristics of any body of freshwater.

4.1Water characteristics. Includes various freshwater attributes. Ranges of continuous attributes that are key to the queried species, if known, will be in the comments.
4.1.1 Dissolved oxygen. Amount of oxygen passed into solution.
4.1.2 Water depth. Distance from the surface of the water to the bottom substrate.
4.1.3 Dissolved solids. A measure of dissolved minerals in water
4.1.4 Water pH. A measure of water acidity or alkalinity.
4.1.5 Water temperature. Water temperature range that is key to the queried species; if known, it is in the comments field.
4.1.6 Water velocity. Speed or momentum of water flow.
4.1.7 Water turbidity. Amount of roiled sediment within the water.
4.1.8 Free water. Water derived from any source.
4.1.9 Salinity and alkalinity. The presence of salts.
4.2 Rivers and streams. Various characteristics of streams and rivers.
4.2.1 Oxbows. A pond or wetland created when a river bend is cut off from the main channel of the river.
4.2.2 Order and class. Systems of stream classification.
4.2.2.1 Intermittent. Streams/rivers that contain nontidal flowing water for only part of the year; water may remain in isolated pools.
4.2.2.2 Upper perennial. Streams/rivers with a high gradient, fast water velocity, no tidal influence; some water flowing throughout the year, substrate consists of rock, cobbles, or gravel with occasional patches of sand; little floodplain development.
4.2.2.3 Lower perennial. Streams/rivers with a low gradient, slow water velocity, no tidal influence; some water flowing throughout the year, substrate consists mainly of sand and mud; floodplain is well developed.

19. Agriculture, Pastures, and Mixed Environs

W. Daniel Edge, Rex C. Crawford, & David H. Johnson

Geographic Distribution. Agricultural habitat is widely distributed at low to mid-elevations (<6,000 ft [1,830 m]) throughout both states. This habitat is most abundant in broad river valleys throughout both states and on gentle rolling terrain east of the Cascades.

Physical Setting. This habitat is maintained across a range of climatic conditions typical of both states. Climate constrains agricultural production at upper elevations where there are <90 frost-free days. Agricultural habitat in arid regions east of the Cascades with <10 inches (25 cm) of rainfall require supplemental irrigation or fallow fields for 1-2 years to accumulate sufficient soil moisture. Soils types are variable, but usually have a well developed A horizon. This habitat is found from 0 to 6,000 ft (0 to 1,830 m) elevation.

Landscape Setting. Agricultural habitat occurs within a matrix of other habitat types at low to mid-elevations, including Eastside grasslands, Shrub-steppe, Westside Lowlands Conifer-Deciduous Forest and other low- to mid-elevation forest and woodland habitats. This habitat often dominates the landscape in flat or gently rolling terrain, on well-developed soils, broad river valleys, and areas with access to abundant irrigation water. Unlike other habitat types, agricultural habitat is often characterized by regular landscape patterns (squares, rectangles, and circles) and straight borders because of ownership boundaries and multiple crops within a region. Edges can be abrupt along the habitat borders within agricultural habitat and with other adjacent habitats.

Structure. This habitat is structurally diverse because it includes several cover types ranging from low-stature annual grasses and row crops (<3.3 ft [1 m]) to mature orchards (>66 ft [20 m]). However, within any cover type, structural diversity is typically low because usually only one to a few species of similar height are cultivated. Depending on management intensity or cultivation method, agricultural habitat may vary substantially in structure annually; cultivated cropland and modified grasslands are typified by periods of bare soil and harvest whereas pastures are mowed, hayed, or grazed one or more times during the growing season. Structural diversity of agricultural habitat is increased at local scales by the presence of noncultivated or less intensively managed vegetation such as fencerows, roadsides, field borders, and shelterbelts.

Composition. Agricultural habitat varies substantially in composition among the cover types it includes. Cultivated cropland includes >50 species of annual and perennial plants in Oregon and Washington, and hundreds of varieties ranging from vegetables such as carrots, onions, and peas to annual grains such as wheat, oats, barley, and rye. Row crops of vegetables and herbs are characterized by bare soil, plants, and plant debris along bottomland areas of streams and rivers and areas having sufficient water for irrigation. Annual grains, such as barley, oats, and wheat are typically produced in almost continuous stands of vegetation on upland and rolling hill terrain without irrigation.

The orchard/vineyard/nursery cover type is composed of fruit and nut (apples, peaches, pears, and hazelnuts) trees, vineyards (grapes, Kiwi), berries (strawberries, blueberries, blackberries, and raspberries), Christmas trees, and nursery operations (ornamental container and greenhouses). This cover type is generally located on upland sites with access to abundant irrigation. Cultivation for most orchards, vineyards and Christmas tree farms includes an undergrowth of short-stature perennial grasses between the rows of trees, vines, or bushes. Christmas trees are typically produced without irrigation on upland sites with poorer soils.

Improved pastures are used to produce perennial herbaceous plants for grass seed and hay. Alfalfa and several species of fescue (Festuca spp.) and bluegrass (Poa spp.), orchardgrass (Dactylis glomerata), and timothy (Phleum pratensis) are commonly seeded in improved pastures. Grass seed fields are single-species stands, whereas pastures maintained for haying are typically composed of two to several species. The improved pasture cover type is one of the most common agricultural uses in both states and produced with and without irrigation.

Unimproved pastures are predominately grassland sites, often abandoned fields that have little or no active management such as irrigation, fertilization, or herbicide applications. These sites may or may not be grazed by livestock. Unimproved pastures include rangelands planted to exotic grasses that are found on private land, state wildlife areas, federal wildlife refuges and U.S. Department of Agriculture Conservation Reserve Program (CRP) sites. Grasses commonly planted on CRP sites are crested wheatgrass (Agropyron cristatum), tall fescue (F. arundinacea), perennial bromes (Bromus spp.) and wheatgrasses (Elytrigia spp.). Intensively grazed rangelands, which have been seeded to intermediate wheatgrass (Elytrigia intermedia), crested wheatgrass, or are dominated by increaser exotics such as Kentucky wheatgrass (Poa pratensis) or tall oatgrass (Arrhenatherum elatius) are unimproved pastures. Other unimproved

pastures have been cleared and intensively farmed in the past, but are allowed to convert to other vegetation. These sites may be composed of uncut hay, litter from previous seasons, standing dead grass and herbaceous material, invasive exotic plants (tansy ragwort [Senecio jacobea], thistle [Cirsium spp.], Himalaya blackberry [Rubus discolor], and Scot's broom [Cytisus scoparius]) with patches of native black hawthorn (Crataegus douglasii), snowberry (Symphoricarpos spp.), spirea (Spirea spp.), poison oak (Toxicodendron diversilobum), and encroachment of various tree species, depending on seed source and environment.

Modified grasslands are generally overgrazed habitats that formerly were native eastside grasslands or shrub-steppe but are now dominated by annual plants with only remnant individual plants of the native vegetation. Cheatgrass (Bromus tectorum), other annual bromes, medusahead (Taeniatherum caput-medusae), bulbous bluegrass (Poa bulbosa), and knapweeds (Centaurea spp.) are common increasers that form modified grasslands. Fire, following heavy grazing or repeated early season fires can create modified grassland monocultures of cheatgrass.

Agricultural habitat also contains scattered dwellings and outbuildings such as barns and silos, rural cemeteries, ditchbanks, windbreaks, and small inclusions of remnant native vegetation. These sites typically have a discontinuous tree layer or one to a few trees over a ground cover similar to improved or unimproved pastures.

Other Classifications and Key References. Quigley and Arbelbide[181] referred to this as agricultural and exotic forbs-annual grasses cover types. Csuti et al.[58] referred to this habitat as agricultural. The Oregon Gap II Project[126] and Oregon Vegetation Landscape-Level Cover Type[127] that would represent this type is agriculture. U.S. Department of Agriculture Conservation Reserve Program lands are included in this habitat.

Natural Disturbance Regime. Natural fires are almost totally suppressed in this habitat, except for unimproved pastures and modified grasslands, where fire-return intervals can resemble those of native grassland habitats. Fires are generally less frequent today than in the past, primarily because of fire suppression, construction of roads, and conversion of grass and forests to cropland.[159] Bottomland areas along streams and rivers are subject to periodic floods, which may remove or deposit large amounts of soil.

Succession and Stand Dynamics. Management practices disrupt natural succession and stand dynamics in most of the agricultural habitats. Abandoned eastside agricultural habitats may convert to other habitats, mostly grassland and shrub habitats from the surrounding native habitats. Some agricultural habitats that occur on highly erodible soils, especially east of the Cascades, have been enrolled in the U.S. Department of Agriculture Conservation Reserve Program. In the absence of fire or mowing, westside unimproved pastures have increasing amounts of hawthorn, snowberry, rose (Rosa spp.), Himalaya blackberry, spirea, Scot's broom, and poison oak. Douglas-fir or other trees can be primary invaders in some environments.

Effects of Management and Anthropogenic Impacts. The dominant characteristic of agricultural habitat is a regular pattern of management and vegetation disturbance. With the exception of the unimproved pasture cover type, most areas classified as agricultural habitat receive regular inputs of fertilizer and pesticides and have some form of vegetation harvest and manipulation. Management practices in cultivated cropland include different tillage systems, resulting in vegetation residues during the non-growing season that range from bare soil to 100% litter. Cultivation of some crops, especially in the arid eastern portions of both states, may require the land to remain fallow for 1-2 growing seasons in order to store sufficient soil moisture to grow another crop. Harvest in cultivated cropland, Christmas tree plantations, and nurseries, and mowing or haying in improved pasture cover types substantially change the structure of vegetation. Harvest in orchards and vineyards is typically less intrusive, but these crops as well as Christmas trees and some ornamental nurseries are regularly pruned. Improved pastures are often grazed after haying or during the nongrowing season. Livestock grazing is the dominant use of unimproved pastures. All of these practices prevent agricultural areas from reverting to native vegetation. Excessive grazing in unimproved pastures may increase the prevalence of weedy or exotic species.

Status and Trends. Agricultural habitat has steadily increased in amount and size in both states since Eurasian settlement of the region. Conversion to agricultural habitat threatens several native habitat types.[166] The greatest conversion of native habitats to agricultural production occurred between 1950 and 1985, primarily as a function of U.S. agricultural policy.[96] Since the 1985 Farm Bill and the economic downturn of the early to mid 1980s, the amount of land in agricultural habitat has stabilized and begun to decline.[164] The 1985 and subsequent Farm Bills contained conservation provisions encouraging farmers to convert agricultural land to native habitats.[96, 153] Clean farming practices and single-product farms have become prevalent since the 1960s, resulting in larger farms and widespread removal of fencerows, field borders, roadsides, and shelterbelts.[96, 153, 164] In Oregon, land-use planning laws prevent or slow urban encroachment and subdivisions into areas zoned as agriculture. Washington's growth management is currently controlled by counties and agricultural land conversion to urban development is much less regulated.

Agricultural Land Use/Land Cover Conditions

1. Cultivated Cropland

Farmland used for production of annual crops such as vegetables and herbs is characterized by bare soil, and plant debris either in the field or along the periphery. The location tends to be along bottomland areas of streams and rivers and areas with a sufficient source of irrigation. Farmland used for production of annual grasses such as wheat, oats, barley, and rye is characterized by upland and rolling hill terrain, generally without irrigation. This agricultural division has similar pesticide use and/or irrigation requirements. That is, row crops are treated the same way in regard to the general application of pesticides and cultural techniques in land preparation and harvest. There is a wide range of soil conservation practices in this category.

2. Improved Pasture

Farmland used for the production of perennial grass such as grass seed and hay. Perennial grass is generally grown without irrigation. Perennial crops are treated the same way in regard to the general application of pesticides and cultural techniques.

3. Orchards/Vineyards/Nursery

Farmland used for production of tree fruits (apples, peaches, pears, hazelnuts), vineyards (grapes), berries (strawberries, raspberries, blueberries, blackberries), Christmas trees, and nursery stock (ornamental container and greenhouse operations). This cover type is generally located in upland areas with access to a high volume of irrigation. Christmas trees are characterized by upland areas, poorer soils and no irrigation. The use of chemicals in non-food crops, such as Christmas trees and nursery stock, is considerably different both in materials and time of applications.

4. Modified Grasslands

Annual or introduced perennial grasslands, including cheatgrass (Bromus tectorum), medusahead (Taeniatherum caput-medusae), and other annual bromes; moist environments, including riparian bottomlands, are often dominated by Kentucky bluegrass. Annual grasslands (and areas of introduced forbs) are usually dominated by one or two introduced annuals which comprise most of the vegetation cover. Perennial grasslands are usually dominated by a single planted bunchgrass with introduced annuals and weedy forbs between the bunches. Some environments support rhizomatous perennial grasses. These areas occur mostly on uplands but also includes riparian bottomlands that are dominated by non-native grasses. Modified grasslands can be found throughout the steppe and grasslands areas of eastern Oregon and Washington and at low elevation sites in southwestern Oregon.

5. Unimproved Pasture

Farmland that seems to have no active management such as fertilizer application, irrigation or weed control. This land might be grazed by livestock, but shows no evidence of irrigation. It can also be characterized by uncut hay, organic debris from the previous season, uncut standing dead grass, exotic plants like tansy ragwort (Senecio jacobea), thistle (Cirsium spp.), Himalaya blackberry (Rubus discolor) and their debris, patches of shrubs such as hawthorn (Crataegus spp.), snowberry (Symphoricarpos spp.), spirea (Spirea spp.), poison oak (Rhus diversiloba), and encroachment by various tree species. This land has usually been cleared and farmed intensively in the past. This category also includes lands that are designated within the Conservation Reserve Program (CRP) and areas planted with crested wheatgrass (Agropyron cristatum). Land owners use unimproved pasture for grazing livestock, otherwise it lies dormant. Thus, those lands that are not grazed either revert to brushy field or volunteer forest.

Structural Conditions Data Matrix

To maximize the utility of wildlife-habitat relationship information, a digital database that links wildlife with its structural conditions can be found on the CD-ROM included with this book. Wildlife occurrence within a particular structural condition type was determined through an expert panel process held during the fall of 1998. Table 1 was created to assist the expert panel in identifying what wildlife habitats are associated with what structural conditions. The categories that depict a wildlife species occurrence with a particular structural condition are Y—Yes the species occurs, H—Historically occurred, and U—Unsure. Alongside the occurrence category, we identify the types of activity that the species does while using the structural condition. The activity codes for the wildlife species within a particular condition are: B—Both feeds and breeds, F/R-HE—Feeds and Reproduces when a specific habitat element is present, F—Feeds only, R—Reproduces only, and O—Other. The Other category reflects activities such as roosting/resting, hibernating, or using the habitat for cover (thermal and hiding) purposes.

Defining the Level of Associations Between Wildlife and Structural Conditions

As mentioned in Chapter 1, we continue to embrace the new concept of degree of association between wildlife species and their habitats.[19] For the purposes of this project, we used the following categories for characterizing the degree of association.

Closely Associated. A species is widely known to depend on a habitat or structural condition for part or all of its life history requirements. Identifying this association implies that the species has an essential need for this habitat or structural condition for its maintenance and viability. Some species may be closely associated with more than one habitat or structural condition, others may be closely associated with only one habitat or structural condition. Examples of species exhibiting close associations are red-winged blackbirds to wetland habitats, and spotted owls to mature and giant tree structural conditions.

20. Urban and Mixed Environs

Howard L. Ferguson

Geographic Distribution. Urban habitat occurs throughout Oregon and Washington. Most urban development is located west of the Cascades of both Oregon and Washington, with the exception of Spokane, Washington. However, urban growth is being felt in almost every small town throughout the Pacific Northwest.

Physical Setting. Urban development occurs in a variety of sites in the Pacific Northwest. It creates a physical setting unique to itself: temperatures are elevated and background lighting is increased; wind velocities are altered by the urban landscape, often reduced except around the tallest structures downtown, where high-velocity winds are funneled around the skyscrapers. Urban development often occurs in areas with little or no slope and frequently includes wetland habitats. Many of these wetlands have been filled in and eliminated. Today, ironically, many artificial "wetland" impoundments are being created for stormwater management, whose function is the same as the original wetland that was destroyed.

Landscape Setting. Urban development occurs within or adjacent to nearly every habitat type in Oregon and Washington, and often replaces habitats that are valuable for wildlife. The highest urban densities normally occur in lower elevations along natural or human-made transportation corridors, such as rivers, railroad lines, coastlines, or interstate highways. These areas often contain good soils with little or no slope and lush vegetation. Once level areas become crowded, growth continues along rivers or shores of lakes or oceans, and eventually up elevated sites with steep slopes or rocky outcrops. Because early settlers often modified the original landscape for agricultural purposes, many of our urban areas are surrounded by agricultural and grazing lands.

Structure. The original habitat is drastically altered in urban environments and is replaced by buildings, impermeable surfaces, bridges, dams, and planting of non-native species. Some human-made structures provide habitats similar to those of cavities, caves, fissures, cliffs, and ledges. With the onset of urban development, total crown cover and tree density are reduced to make way for the construction of buildings and associated infrastructure. Many structural features typical of the historical vegetation, such as snags, dead and downed wood, and brush piles, are often completely removed from the landscape. Understory vegetation may be completely absent, or if present, is diminutive and single-layered. Typically, three zones are characteristic of urban habitat.

High-density Zone

The high-density zone is the downtown area of the inner city. It also encompasses the heavy industrial and large commercial interests of the city in addition to high-density housing areas such as apartment buildings or high-rise condominiums. This zone has >60% of its total surface area covered by impervious surfaces. This zone has the smallest lot size, the tallest buildings, the least amount of total tree canopy cover, the lowest tree density, the highest percentage of exotics, the poorest understory and subcanopy, and the poorest vegetative structure.[4a, 116a, 185a] Human structures have replaced almost all vegetation.[23b, 148a] Road density is the highest of all zones. An example of road density can be seen from Washington's Growth Management Plan requiring Master Comprehensive Plans to set aside 20% of the identified urban growth area for roads and road rights-of-way. For example, Spokane's urban growth area is approximately 57,000 acres (23,077 ha); therefore >11,000 acres (4,453 ha) were set aside for road surfaces.

In the high-density zone, land-use practices have removed most of the native vegetation. Patch sizes of remaining natural areas often are so small that native interior species cannot be supported. Not only are remaining patches of native vegetation typically disconnected, but also they are frequently missing the full complement of vertical strata.[149] Stream corridors become heavily impacted and discontinuous. Most, if not all, wetlands have been filled or removed. Large buildings dominate the landscape and determine the placement of vegetation in this zone.[30a] This zone has the most street tree strips or sidewalk trees, most of which are exotics. There is virtually no natural tree replacement, and new trees are planted only when old ones die or are removed. Replacement trees are chosen for their small root systems and are generally short in stature with small diameters. Ground cover in this zone, if not synthetic or impervious, is typically exotic grasses or exotic annuals, most of which are rarely allowed to go to seed. Snags, woody debris, rock piles, and any other natural structures are essentially nonexistent. There are few tree cavities because of cosmetic pruning, cavity filling, snag removal, and tree thinning.[149]

Medium-density Zone

This zone, continuing out from the center of the continuum, is composed of light industry mixed with high-density residential areas. Housing density of 3-6 single-family homes per acre (7-15 per ha) is typical. Compared with the high-density zone, this zone has more potential wildlife habitat. With 30-59% impervious soil cover, this zone has 41-70% of the ground available for plants. Road density is less than the high-density zone.

Vegetation in this mid-zone is typically composed of non-native plant species. Native plants, when present, represent only a limited range of the natural diversity for the area. The shrub layer is typically clipped or minimal, even in heavily vegetated areas. Characteristic of this zone are manicured lawns, trimmed hedges, and topped trees. Lawns can be highly productive.[82a, 97a] Tree canopy is still discontinuous and consists of 1-2 levels, if present at all. Consequently, vertical vegetative diversity and total amount of understory are still low. Coarse and fine woody debris is minimal or absent; most snags and diseased live trees are still removed as hazards in this zone.[119a, 119b]

Isolated wetlands, stream corridors, open spaces, and greenbelts are more frequently retained in this zone than in the high-density zone. However, remnant wetland and upland areas are often widely separated by urban development.

Low-density Zone

The low-density zone is the outer zone of the urban-rural continuum. This zone contains only 10-29% impervious ground cover and normally contains only single-family homes. It has more natural ground cover than artificial surfaces. Vegetation is denser and more abundant than in the previous two zones. Typical housing densities are 0.4-1.6 single-family homes per acre (1-4 per ha). Road density is lowest of all three zones and consists of many secondary and tertiary roads. Although this zone may have large areas of native vegetation and is generally the least impacted of all three zones; it still has been significantly altered by human activities and associated disturbances.

Roads, fences, livestock paddocks, and pets are more abundant than in neighboring rural areas. With many animals and limited acreage, pasture conditions may be more overgrazed in this zone than in the rural zone; overgrazing can significantly affect shrub layers as well. Areas around home sites are often cleared for fire protection. Dogs are more likely to be loose and allowed to run free, increasing disturbance levels and wildlife harassment in this zone. Vegetable and flower gardens are widespread; fencing is prevalent.

Many wetlands remain and are less impacted. Water levels are more stable and peak flows are more typical of historical flows. Watertables are less impacted and vernal wetlands are more frequent; stream corridors are less impacted and more continuous.

This zone has the most vertical and horizontal structure and diversity of any of the three urban zones.[30a, 80a, 140a, 187a] In forested areas, tree conditions are semi-natural, although stand characteristics vary from parcel to parcel. The tree canopy is more continuous and may include multiple levels. Patch sizes are large enough to support native interior species. Large blocks of native vegetation may still be found, and some of these may be connected to large areas of native undeveloped land.[220a] In this zone, snags, diseased trees, coarse and fine woody debris, brush piles, and rock piles are widespread. Structural diversity approaches historical levels. Non-native hedges are nearly nonexistent and the native shrub layer, except for small areas around houses, is relatively intact. Lawns are fewer and native ground covers are more common than in the previous two zones.

Composition. Remnant isolated blocks of native vegetation may be found scattered throughout a town or city mixed with a multitude of introduced exotic vegetation. As urban development increases, these remnant native stands become fragmented and isolated. The dominant species in an urban setting may be exotic or native; for example, in Seattle, the dominant species in one area may be Douglas-fir (Pseudotsuga menziesii), whereas a few blocks away it may be the exotic silver maple (Acer saccharinum). Dominant species will not only vary from city to city but also within each city and within each of the three urban zones. Nowack[167] found that in the high-density urban zone, species richness is low, and in one case, four species made up almost 50% of the cover. In the same study, exotics made up 69% of the total species.

In urban and suburban areas, species richness is often increased because of the introduction of exotics. The juxtaposition of exotics interspersed with native vegetation produces a diverse mosaic with areas of extensive edge. Also, because of irrigation and the addition of fertilizers, the biomass in the urban communities is often increased.[149] Interest in the use of native plants for landscaping is rapidly expanding,[135, 172] particularly in the more arid sites where drought-resistant natives are the only plants able to survive without water.

Across the U.S., urban tree cover ranges from 1 to 55%.[167] As expected, tree cover tends to be highest in cities developed in naturally forested areas with an average of 32% cover in forested areas, 28% in grasslands, and 10% in arid areas. Yakima, Washington, has an overall city tree cover of 18%, ranging from 10% to 12% in the industrial/commercial area to 23% in the low-density residential zone.[167] Remnant blocks of native vegetation or native trees left standing in yards and parks will compositionally be related to whatever native habitat was on site prior to development. In the Puget Sound and Willamette Valley areas, Douglas-fir is a major constituent, whereas the Spokane area has a lot of ponderosa pina (Pinus ponderosa).

Other Classifications and Key References. Many attempts have been made to classify or describe the complex urban environment. The Washington GAP Analysis[37] classified urban environments as "developed" land cover using the same three zones as described above: (1) high density (>60% impervious surface); (2) medium density (30-60% impervious surface); and (3) low density (10-30% impervious surface). The Oregon Gap II Project[126] and Oregon Vegetation Landscape-Level Cover Types[127] represented this type as an urban class. Several other relevant strudies characterizing the urban environment have been reported. [182, 129, 34, 70, 151]

Natural Disturbance Regime. In many instances, natural disturbances are modified or prevented from occurring by humans over the landscape and this is particularly true of urban areas. However, disturbances such as ice, wind,

or firestorms still occur. The severity of these intermittent disturbances varies greatly in magnitude and their impact on the landscape varies accordingly. One of the differences between urban and nonurban landscapes is the lengthening of the disturbance cycles. Another is found in the aftermath of these disturbances. In urban areas, damaged trees are often entirely removed and if they are replaced, a shorter, smaller tree, often non-native, is selected. The natural fire disturbance interval is highly modified in the urban environment. Fire (mostly accidental or arson) still occurs, and is quickly suppressed. Another natural disturbance in many of our Pacific Northwest towns is flooding, which historically altered and rerouted many of our rivers and streams, and still scarifies fields and deposits soil on flood plains and potentially recharges local aquifers. Floods now are more frequent and more violent than in the past because of the many modifications made to our watersheds. Attempts to lessen flooding in urban areas often lead to channelization, paving, or diking of our waterways, most of which fail in their attempt to stem the flooding and usually result in increased flooding for the communities farther downstream.

Succession and Stand Dynamics. Due to anthropogenic influences found in the urban environment, succession differs in the urban area from that expected for a native stand. Rowntree[185] emphasized that urbanization is not in the same category as natural disturbance in affecting succession. He points out that urbanization is anthropogenic and acts to remove complete vegetation associations and creates new ones made of mixes of native residual vegetation and introduced vegetation. Much human effort in the city goes toward either completely removing native vegetation or sustaining or maintaining a specific vegetative type, e.g., lawns or hedges. Much of the vegetative community remains static. Understory and ground covers are constantly pruned or removed, seedlings are pulled and lawns are planted, fertilized, mowed, and meticulously maintained. Trees may be protected to maturity or even senescence, yet communities are so fragmented or modified that a genuine old-growth community never exists. However, a type of "urban succession" occurs across the urban landscape. The older neighborhoods with their mature stands are at a later seral stage than new developments; species diversity is characteristically higher in older neighborhoods as well. An oddity of the urban environment is the absence of typical structure generally found within the various seral stages. For example, the understory is often removed in a typical mid-seral stand to give it a "park-like" look. Or if the understory is allowed to remain, it is kept pruned to a consistent height. Lawns are the ever-present substitute for native ground covers. Multilayered habitat is often reduced to one or two heights. Vertical and horizontal structural diversity is drastically reduced.

Effects of Management and Anthropogenic Impacts. These additional, often irreversible, impacts include more impervious surfaces, more and larger human-made structures, large-scale storm and wastewater management, large-scale sewage treatment, water and air pollution, toxic chemicals, toxic chemical use on urban lawns and gardens, removal of species considered to be pests, predation and disturbance by pets and feral cats and dogs, and the extensive and continual removal of habitat due to expanding urbanization, and in some cases, uncontrolled development. Another significant impact is the introduction and cultivation of exotics in urban areas. Native vegetation is often completely replaced by exotics, leaving little trace of the native vegetative cover.

Status and Trends. From 1970 to 1990, >30,000 mile^2 (77,700 km^2) of rural lands in the U.S. became urban, as classified by the U.S. Census Bureau. That amount of land equals about one third of Oregon's total land area.[12] From 1940 to 1970, the population of the Portland urban region doubled and the amount of land occupied by that population quadrupled.[201] More than 300 new residents arrive in Washington each day, and each day, Washington loses 100 acres (41 ha) of forest to development.[215] Using satellite photos and GIS software, American Forests[9] discovered that nearly one third of Puget Sound's most heavily timbered land has disappeared since the early 1970s. The amount of land with few or no trees more than doubled, from 25% to 57%, an increase of >1 million acres (404,858 ha). Development and associated urban growth was blamed as the single biggest factor affecting the area's environment. This urban growth is predicted to continue to increase at an accelerated pace, at the expense of native habitat.

21. Open Water—Lakes, Rivers, and Streams

Eva L. Greda, David H. Johnson, & Thomas A. O'Neil

Lakes, Ponds, and Reservoirs

Geographic Distribution. Lakes in Oregon and Washington occur statewide and are found from near sea level to about 10,200 ft (3,110 m) above sea level. There are 3,887 lakes and reservoirs in western Washington and

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- A “lump-sum” up-front payment may be applied in-lieu of annual fees. To be determined by the number of acres impacted, both temporary and permanent multiplied by the life of the project, which is assumed to be the term of the permit for the project.

Default for Unresolved “By Fee” Mitigation

If the wind project developer, permitting authority and WDFW cannot agree on a mutually advantageous mitigation package under the “By Fee” mitigation option, acquisition of replacement habitat should be pursued to fulfill the mitigation requirements.

6.0 HABITAT TYPES

The following habitat types are found throughout the nine ecoregions in Washington (Appendix IV). These habitat descriptions are based upon the *Washington’s Comprehensive Wildlife Conservation Strategy (WDFW 2005)* and the *Wildlife-Habitat Relationships in Oregon and Washington (WHROW) (Johnson and O’Neil 2001)*. Useful information related to habitat and species for each ecoregion are listed in Appendix V.

6.1 EASTERN WASHINGTON HABITAT

Eastside (Interior) Grasslands

Eastside [Interior] Grasslands are primarily found in Washington at mid- to low elevations (500 to 6,000 feet) and on plateaus in the Blue Mountains. Most grassland habitat occurs in two distinct large landscapes: plateau and canyon grasslands. This habitat is dominated by short to medium-tall grasses (<3.3 ft). Total herbaceous cover can be closed to only sparsely vegetated. Annual plants are a common spring and early summer feature of this habitat. The soil surface between perennial plants can be covered with a diverse cryptogamic or microbiotic layer of mosses, lichens, various soil bacteria, and algae. Native perennial bunchgrasses can be common but degraded sites may have a residual native grass component dominated by annual non-native grasses and forbs.

Shrub-steppe (includes Dwarf Shrub-steppe and Eastside [interior] Canyon Shrublands, Wyoming Big Sagebrush and Three-tip Sagebrush)

Shrub-steppe habitat defines a biogeographic region and is the major vegetation on average sites in the Columbia Plateau. Elevation range is wide (300-9,000 ft with most habitats occurring between 2,000 and 6,000 feet). This habitat forms mosaic landscapes with woodland habitats and native perennial Eastside Grasslands, Dwarf Shrub-steppe. In an undisturbed condition, shrub cover varies between 10 to 30 percent and greater. Shrub height typically is medium tall (1.6-3.3 ft) although some sites support shrubs approaching 9 feet tall.

Dwarf shrub-steppe habitat is found across a wide range of elevations from 500 to 7,000 ft characterized by low shrub (<1.6 ft high) communities with undergrowth of short native perennial grasses and forbs with extensive exposed rock and cryptogamic crusts. Includes stiff sagebrush/Sandberg bluegrass. Dwarf shrub-steppe habitat is widely distributed in the Columbia Basin, particularly associated with the channeled scablands, High Lava Plains, and in isolated spots throughout the Blue Mountains and the Palouse.

Eastside [interior] Canyon Shrublands habitat occurs from 500 to 5,000 feet in elevation and primarily on steep canyon slopes in the Blue Mountains and along the margins and as isolated patches across the Columbia Basin. Sites are generally steep (>60%) on all aspects but most common on northerly aspects in deep, dry canyons. This habitat type is generally a mix of tall (5 feet) to medium (1.6 feet) deciduous shrublands in a mosaic with bunchgrass or annual grasslands. Shrub canopies are almost always closed (>60% cover).

Montane Mixed Conifer Forest

Montane Mixed Conifer Forests occur in mountains throughout Washington, including the Cascade Range, Olympic Mountains, Okanogan Highlands, Coast Range (rarely), and Blue Mountains. Elevation is middle to upper montane, as low as 2,000 feet in northern Washington. On the west side, it occupies an elevational zone of about 2,500 to 3,000 vertical feet, and on the eastside, it occupies a narrower zone of about 1,500 vertical feet. This is a forest, or rarely woodland, dominated by evergreen conifers. Mosses are a major ground cover and epiphytic lichens are typically abundant in the canopy.

Eastside (Interior) Mixed Conifer Forest

Eastside Mixed Conifer Forest habitat appears primarily in the Blue Mountains, East Cascades, and Okanogan Highland ecoregions of Washington. The Eastside Mixed Conifer Forest habitat is primarily mid-montane with an elevation range of between 1,000 and 7,000 feet, mostly between 3,000 and 5,500 feet.

Ponderosa Pine Forest and Woodlands (includes Oak Woodlands)

Ponderosa Pine Forests and Woodlands occur in much of eastern Washington, including the eastern slopes of the Cascades, the Blue Mountains and foothills, and the Okanogan Highlands. This habitat can be found at elevations of 100 feet in the Columbia River Gorge to dry, warm areas over 6,000 feet. This habitat is typically woodland or savanna with tree canopy coverage of 10-60 percent, although closed canopy stands are possible. Shrub-steppe shrubs may be prominent in some stands and create a distinct tree shrub-sparse-grassland habitat.

Lodgepole Pine Forest and Woodlands

Westside Oak and Dry Douglas-fir Forest and Woodlands

This habitat is common in and around the San Juan Islands and in parts of Thurston, Pierce and Mason counties. Elevation ranges from sea level to approximately 3,500 feet in the Olympic Mountains, but is mainly below 1,500 feet. This is a forest or woodland dominated by evergreen conifers, deciduous broadleaf trees, and evergreen broadleaf trees. Deciduous broadleaf shrubs are perhaps most typical as understory dominants in the existing landscape.

Coastal Headlands and Islets

Coastal Headland and Islet habitat occurs mainly on coastal headlands, bluffs, and islands with steep slopes or cliffs typically from sea level to about 500 feet. This habitat is always located adjacent to, or in the case of the rock islets ("sea stacks"), within the Marine Nearshore habitat.

Coastal Dunes

Coastal Dune habitat occurs primarily in wet, mild outer coastal climates at elevations at and very near sea level and only extending as high as the highest dunes. Topography is mildly to strongly undulating in the form of mostly north-south trending dune ridges and troughs. These dunes, spits, and berms are derived from sand carried by longshore drift and wind erosion. This habitat consists of a variable mosaic of structures ranging from open sand with sparse herbaceous vegetation to dense shrublands. Medium-tall grasslands, typically closed, are a major component in the current landscape. Coniferous evergreen trees and tall broadleaf evergreen shrubs, typically dense, are also a significant component of the mosaic.

Alpine Grassland and Shrublands

This habitat always occurs above the upper treeline in the mountains or a short distance below from 5000 feet to over 10,000 feet in elevation. It is the most predominant habitat type in the Cascade Mountains between 5000ft to 10,000ft and is the coldest of any habitat type.

6.3 COMMON HABITATS

Pasture and Mixed Environs

Pasture and Mixed Environ habitat is oftentimes, but is not exclusive to landscapes in flat or gently rolling terrain, on well-developed soils, broad river valleys, and generally in areas with access to irrigation water. Pastures are improved lands used to produce perennial herbaceous plants for grass seed and hay and unimproved pastures are predominately non-native grassland sites, often abandoned fields that have little or no active management such as irrigation, fertilization, or herbicide applications. These sites may or may not be grazed by livestock. Various out buildings, barns and isolated “brushy” fencerows are common. Pasture does not have a forest canopy.

Conservation Reserve Program (**CRP**)

CRP encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to perennial vegetative cover, such as native grasses, forbs and shrubs, wildlife plantings, trees, filterstrips, or riparian buffers. This program reduces soil erosion, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources. Farmers receive an annual rental payment for the term of the multi-year contract. Cost sharing is provided to establish the vegetative cover practices.

Urban and Mixed Environs

Urban habitat occurs throughout Washington and mostly on the west side of the Cascade Mountains, with the exception of Spokane in eastern Washington. Urban development occurs within or adjacent to nearly every habitat type in Washington, and often replaces habitats that are valuable for wildlife.

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8.2 HABITAT CLASSIFICATION MITIGATION CHART

Where a wind project will affect habitat in "excellent" condition (based on methods acceptable to WDFW) or Species of Greatest Conservation Need (SGCN) [8], wind project developers should engage in additional consultation with WDFW and the permitting authority regarding suitable mitigation requirements for such habitat.

CLASSIFICATION [1]	**HABITAT TYPE** [2,4]	**MITIGATION**	
		Temporary Impact	Permanent Impact
Class I West side	Westside Grasslands/ Herbaceous Balds, Westside Lowland Conifer-Hardwood (Mature) Forest, Westside Oak and Dry (Non-commercial) Douglas-fir Forest and Woodlands, Coastal Dunes	**CONSULTATION** [3]	**CONSULTATION**
Class I East side	Ponderosa Pine Forest and Woodlands (includes Eastside Oak Woodlands)		
Class II West side	Coastal Headlands and Islets, Subalpine Parkland	**0.5:1 MITIGATION/ RESTORATION**[7]	**2:1 ACQUISTION**
Class II East side	Eastside (Interior) Mixed Conifer Forest, Lodgepole Pine Forest and Woodlands, Montane Mixed Conifer Forest, Upland Aspen Forest, Shrub-steppe		
Class III West side	Alpine Grassland and Shrublands, Conservation Reserve Program (CRP) Lands	**0.1:1 MITIGATION/ RESTORATION**	**1:1 ACQUISTION**
Class III East side	Eastside (Interior) Grasslands, CRP Lands		
Class IV	Croplands [5], Pasture, Urban and Mixed Environs	**No Mitigation Required**	**No Mitigation Required**
FORESTRY	Conversion of Commercial Forest Lands [6]	**CONSULTATION**	**CONSULTATION**

[1] Class 1 and Class II habitats are considered the highest priorities for current statewide conservation action in Washington. Class I habitats have a greater number of associated Species of Greatest Conservation Need (SGCN) than the Class II habitats and Class II habitats have a greater number of associated Species of Greatest Conservation Need (SGCN) than the Class III habitats

[2] Habitat characteristics defined in Chapter 3, *Wildlife-Habitat Relationships in Oregon and Washington* (*WHROW*) (Johnson and O'Neil 2001) and habitats mapped by Ecoregion in Chapter VI, Washington's *Comprehensive Wildlife Conservation Strategy* (*CWCS*) (WDFW 2005).

[3] Non-regulatory meeting between industry, county, consultants, EFSEC, WDFW, etc. to discuss impacts to habitat and species and mitigation options. Regulatory compliance with terms of mitigation may be identified in permit issued by EFSEC or county.

[4] Class I-II (CWCS Priority One and Two) wetlands are not included as they are regulated under the authority of the Department of Ecology and Army Corps of Engineers, and other applicable regulations and policies.

[5] Short-rotation hardwoods as defined in Chapter 76.09 Revised Code of Washington (RCW), Christmas trees and lands farmed or cultivated by agricultural methods in growing cycles shorter than fifteen years and characterized are by a homogenous, cultivated, and maintained stand or are considered croplands. This does not include commercial Forests and state forest lands which are regulated under the Forest Practices Act [Chapter 76.09 RCW] and Forest Practice Rules [Title 222 Washington Administrative Code (WAC)].

[6] Commercial forests are defined and regulated under the Forest Practices Act (FPA) [Chapter 76.09 RCW]. Wind project developers should consult with WDFW when an FPA conversion is anticipated. Wind project developers are encouraged to minimize conversion.

[7] The mitigation ratio for temporary impacts to native shrub-steppe lithosols is 1:1 due to the increased length of time for restoration. A reduced mitigation ratio may be considered if restoration of native shrub-steppe lithosols results in a higher level of function than pre-construction conditions.

[8] SGSN includes only native Washington fish and wildlife species that are listed as endangered, threatened, or sensitive, or as candidates for these designations. The list also incorporates all federally listed threatened and endangered fish and wildlife species. Endangered, threatened, and sensitive species are legally established in Washington Administrative Codes. Candidate species are established by WDFW policy. Washington State monitor species are those that require management, survey, or data emphasis for one or more of the following reasons: 1) they were classified as endangered, threatened, or sensitive within the previous five years; 2) they require habitat that is of limited availability during some portion of their life cycle; 3) they are indicators of environmental quality; and 4) there are unresolved taxonomic questions that may affect their candidacy for listing as endangered, threatened or sensitive species.

WDFW (2008) Habitat Descriptions

Shrubsteppe

Washington Distribution by County

Priority Area Description:

A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs.

Although Big Sagebrush is the most widespread shrubsteppe shrub, other dominant (or co-dominant) shrubs include Antelope Bitterbrush, Threetip Sagebrush, Scabland Sagebrush, and Dwarf Sagebrush. Dominant bunchgrasses include (but are not limited to) Idaho Fescue, Bluebunch Wheatgrass, Sandberg Bluegrass, Thurber's Needlegrass, and Needle-and-Thread. Sites can also have a layer of algae, mosses, or lichens.

In areas with greater precipitation or on soils with higher moisture-holding capacity, shrubsteppe can also support a dense layer of forbs (i.e., broadleaf herbaceous flora). Shrubsteppe contains various habitat features, including diverse topography, riparian areas, and canyons. Another important component is habitat quality (i.e., degree to which a tract resembles a site potential natural community), which may be influenced by soil condition and erosion; and the distribution, coverage, and vigor of native shrubs, forbs, and grasses. At more disturbed sites, non-natives such as Cheatgrass or Crested Wheatgrass may be co-dominant species.

Talus

Washington Distribution by County

Priority Area Description:

Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.