Appendix E: Biological Resources Report

For Programmatic Environmental Impact Statement on Utility-Scale Solar Energy Facilities in Washington State

By

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For the

Shorelands and Environmental Assistance Program

Washington State Department of Ecology

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Acronyms and Abbreviations List

BESS	battery energy storage system
BMP	best management practice
CWA	Clean Water Act
DNR	Washington Department of Natural Resources
DPS	distinct population segment
Ecology	Washington State Department of Ecology
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	evolutionarily significant unit
GMA	Growth Management Act
HVAC	heating, ventilation, and air conditioning
IPaC	Information for Planning and Consultation
LiDAR	Light Detection and Ranging
MW	megawatt
NHD	National Hydrography Dataset
NOAA Fisheries	National Oceanic and Atmospheric Administration Fisheries
NWI	National Wetlands Inventory
PEIS	Programmatic Environmental Impact Statement
PHS	Priority Habitats and Species
RCW	Revised Code of Washington
ROW	right-of-way
SGCN	Species of Greatest Conservation Need
USC	*United States Code*
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WSNWCB	Washington State Noxious Weed Control Board
WSRRI	Washington Shrubsteppe Restoration and Resiliency Initiative

Executive Summary

As part of the Washington State Department of Ecology's State Environmental Policy Act Programmatic Environmental Impact Statement (PEIS) evaluating the impacts of utility-scale solar energy facilities, this resource report describes the biological resources conditions in the study area. It also describes the regulatory context, outlines methods for assessing impacts of potential types of facilities (alternatives) including a No Action Alternative, and assesses potential impacts and actions that could avoid or reduce impacts.

This resource report analyzes the following key features of biological resources in the discussions of the affected environment, potential impacts, and actions to avoid and reduce impacts:

- Terrestrial species and habitats, including:
  - Terrestrial species (including waterfowl) listed under the Endangered Species Act (ESA), Washington State species of concern (listed and candidate species), and those listed by county-specific code ordinances identifying species of local importance
  - Unique, priority, and culturally important terrestrial species and habitats
  - Wildlife migration routes
- Aquatic and amphibious species and habitats, including:
  - Aquatic and amphibious species listed under the ESA, Washington State species of concern (listed and candidate species), and those listed by county-specific codes or ordinances identifying species of local importance
  - Unique, priority, and culturally important aquatic and amphibious species and habitats
  - Salmonid and other fish migration routes
- Wetland habitats

Findings are summarized as follows:

- Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some construction, operation, and decommissioning activities of utility-scale solar energy facilities would result in **less than significant impacts** on terrestrial habitats, including special-status habitats. Activities that cause the permanent degradation, loss, or conversion of suitable habitat that is critical to species viability or disrupt habitat continuity along migration routes would result in **potentially significant adverse impacts** on terrestrial habitats.
- Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some construction, operation, and decommissioning activities of utility-scale solar energy facilities would result in **less than significant impacts** to terrestrial vegetation, including special-status plants. Activities that cause the permanent degradation, loss, or conversion of suitable habitat that is critical to species viability would result in **potentially significant adverse impacts** on terrestrial vegetation.

- Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some construction, operation, and decommissioning activities of some utility-scale solar energy facilities would result in **less than significant impacts** to terrestrial wildlife, including special-status species. Activities that affect species viability and the mortality of any individual species or disturbance that disrupts successful breeding and rearing behaviors would result in **potentially significant adverse impacts** on terrestrial wildlife.
- Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, utility-scale solar energy facilities would result in **less than significant impacts** to aquatic habitats and species.
- Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, utility-scale solar energy facilities would result in **less than significant impacts** to wetlands.

Construction, operation, and decommissioning of utility-scale solar facilities may result in **potentially significant and unavoidable adverse impacts** on terrestrial special-status habitats and species if activities cause the permanent degradation, loss, or conversion of suitable habitat that is critical to habitat or species viability; affect the mortality of any individual species or create a disturbance that disrupts successful breeding and rearing behaviors; or disrupt habitat continuity along migration routes. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site. Mitigation to reduce impacts below significance for terrestrial special-status habitats or species may not be feasible.

Crosswalk with Biological Resources Report for Utility-Scale Onshore Wind Energy

Two PEISs are being released at the same time, one for utility-scale solar energy facilities and one for utility-scale onshore wind energy facilities. This crosswalk identifies the areas with substantial differences between the biological resources reports for each PEIS.

Utility-Scale Solar Energy PEIS (this document)	**Utility-Scale Onshore Wind Energy PEIS**
• Differences in specific impact drivers associated with facilities • Some differences in actions to avoid and reduce impacts	• Larger study area includes consideration of additional ecoregions, marine and nearshore habitats and species, and estuarine wetlands • Differences in specific impact drivers associated with facilities • Some differences in actions to avoid and reduce impacts

1 Introduction

This resource report describes biological resources within the study area and assesses probable impacts associated with the types of facilities (alternatives) including a No Action Alternative. Chapter 2 of the State Environmental Policy Act Programmatic Environmental Impact Statement (PEIS) provides a description of the types of facilities evaluated (alternatives).

1.1 Resource description

Biological resources include both terrestrial and aquatic habitats and species. Each of these is described in the following sections. Wetlands are also discussed as a separate category due to the habitats they provide to terrestrial and aquatic species.

1.1.1 Terrestrial species and habitats

Terrestrial species habitats are places where animals and plants live that are found on land, including forests, grasslands, deserts, shorelines, and underground habitats like caves and burrow systems. Terrestrial species are the animals and plants that live in those habitats. Terrestrial animals typically include mammals, birds (including waterfowl), reptiles, insects, spiders, and other invertebrates. Terrestrial plants typically include various species of trees, shrubs, herbs, and mosses.

The following key features are analyzed in the affected environment, potential impacts, and actions to avoid and reduce impacts discussions:

- Terrestrial species (including waterfowl) listed under the Endangered Species Act (ESA), Washington State species of concern (listed and candidate species), and those listed by county-specific code ordinances identifying species of local importance
- Unique, priority, and culturally important terrestrial species and habitats
- Wildlife migration routes

1.1.2 Aquatic species and habitats

Aquatic and amphibious species habitats are areas that have surface water that may be rain or snowmelt dependent (ephemeral), seasonally intermittent (flowing during certain times of the year), or year-round (perennial) that provide spawning, rearing, foraging, and migration areas for aquatic and amphibious species. They include wetlands, which are often generally described as transitional areas that occur between aquatic and terrestrial habitats.

Aquatic species include fish, mollusks, aquatic invertebrates, and other organisms that live in water for the duration of their life cycle. Amphibious species (i.e., amphibians) are those that use both aquatic and terrestrial habitats in their life cycles and include frogs, toads, newts, and salamanders.

The following key features are analyzed in the affected environment, potential impacts, and actions to avoid and reduce impacts discussions:

- Aquatic and amphibious species listed under the ESA, Washington State species of concern (listed and candidate species), and those listed by county-specific codes or ordinances identifying species of local importance
- Unique, priority, and culturally important freshwater habitat for aquatic and amphibious species, including migration routes for salmonids and other highly migratory species
- Wetlands that provide habitat for aquatic and amphibious species

1.1.3 Wetlands

Wetlands are a specific type of habitat that often occur in transitional areas between terrestrial and aquatic systems. They are typically characterized as areas where the underlying water table is at or near the soil surface or where the ground is covered by shallow water for an extended duration during the growing season. Such conditions result in the development of anaerobic (i.e., low oxygen) conditions in the upper part of the soil column.[1] Soils formed under such conditions are known as hydric soils. Wetlands also typically support vegetation that is specifically adapted to growing in saturated or flooded soil conditions. Such vegetation is known as hydrophytic, or "water-loving" vegetation, and can include various species of herbs, shrubs, vines, and trees.

Wetlands in the study area can occur in stream and river channels, on floodplains, in low-lying areas and depressions, around the edges of ponds and lakes, and on slopes. They are typically distinguished from streams and rivers by the presence of rooted hydrophytic vegetation and the lack of a defined channel that conveys flowing water, although some wetlands can include channel-like features such as vegetated swales or drainages. Wetlands are primarily distinguished from deepwater aquatic habitats like lakes and ponds by water depth and the presence of vegetation. Deepwater aquatic habitats are typically permanently inundated with greater than 6.6 feet (2 meters) of water and do not support rooted-emergent or woody vegetation (Cowardin et al. 1979; Environmental Laboratory 1987). Estuarine wetlands, found in brackish water in estuaries where freshwater meets saltwater, do not occur in the solar study area.

Wetlands provide a number of important ecosystem functions, including habitat for terrestrial, aquatic, and amphibious species; water quality improvement; flood protection; shoreline stabilization; groundwater recharge; and stream flow maintenance (Ecology 2023). This resource report focuses on those wetland functions associated with the provision of habitat for aquatic and terrestrial species. The regulation and jurisdictional boundaries of wetlands and the potential effects of a facility on hydrological (e.g., water storage and delay) and water quality functions are addressed in the *Water Resources Report* for utility-scale solar energy facilities (ESA and Anchor QEA 2024).

[1] The upper part of the soil column is typically defined as the upper 12 inches.

1.2 Regulatory context

Table 1 provides the federal, state, and local regulations, statutes, and guidelines that potentially apply to the analysis for biological resources.

Table 1. Applicable laws, plans, and policies

Regulation, statute, guideline	Description
Federal	
United States Code (USC) 16.1531 et seq., Endangered Species Act	Provides for the conservation of species listed as threatened or endangered and the habitat upon which they depend. Section 7 requires consultation with the U.S. Fish and Wildlife Service (USFWS) and/or National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) when undertaking a federal action to ensure the conservation of any listed animal species and critical habitat so as not to jeopardize the continued existence of any listed species. NOAA Fisheries manages listed marine species while USFWS manages listed terrestrial and freshwater species.
16 USC 661, Fish and Wildlife Coordination Act	Requires equal consideration and coordination of wildlife conservation with other water resources development programs and provides authority to USFWS and NOAA Fisheries to evaluate impacts on fish and wildlife from federal actions that result in modifications to waterbodies.
USC 16.668 to 668c, Bald and Golden Eagle Protection Act of 1940, as amended	Prohibits the taking of bald eagles, including their parts, nests, or eggs, without a permit issued by USFWS, and provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle... [or any golden eagle], alive or dead, or any part, nest, or egg thereof."
USC 16.703 to 713, Migratory Bird Treaty Act of 1918, as amended	Makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations. Under the regulatory authority of USFWS.
67 *Code of Federal Regulations* 2343, Magnuson-Stevens Fishery Conservation and Management Act Provisions; Essential Fish Habitat (EFH)	Governs marine fisheries management in U.S. federal waters; federal agencies are required to consult with NOAA Fisheries on activities that may affect EFH.
Executive Order 11990, Protection of Wetlands	Provides the overall wetlands policy applicable to all agencies managing federal lands, sponsoring federal projects, or providing federal funds to state or local projects. Requires federal agencies to follow avoidance, mitigation, and preservation procedures and to obtain public input before new construction in wetlands. Consistency with the overall wetlands policy contained in Executive Order 11990 is achieved through Clean Water Act (CWA) Section 404 compliance requirements.

Regulation, statute, guideline	Description
State	
Chapter 220.610 Washington Administrative Code (WAC), Washington Department of Fish and Wildlife (WDFW) State and Protected Species; WDFW Priority Habitats and Species	Grants WDFW the responsibility to oversee the listing and recovery of state endangered, threatened, or sensitive species to ensure their survival as free-ranging populations in the state.
Washington State Wildlife Action Plan	Provides a comprehensive plan for conserving the state's fish and wildlife and its natural habitats as part of the State and Tribal Wildlife Grants Program. Identifies the Species of Greatest Conservation Need. Many species of uncertain conservation need are listed in the Washington State Wildlife Action Plan. Currently being updated to identify Habitats of Greatest Conservation Need.
Chapter 90.58 Revised Code of Washington (RCW), Washington State Shoreline Management Act	Requires all local jurisdictions with Shorelines of the State to adopt Shoreline Master Programs consistent with the Shoreline Management Act, which emphasizes appropriate shoreline land use, protection of shoreline environmental resources, and protection of the public's right to access and use state shorelines.
Chapter 36.70A RCW, Washington State Growth Management Act	Requires all cities and counties in Washington to adopt development regulations, according to the best available science, that protect critical areas as defined in RCW 36.70A.030(5), including fish and wildlife habitat conservation areas.
Chapter Title 77 RCW, Fish and Wildlife	Authorizes WDFW to regulate fish, shellfish, and wildlife species in the State of Washington. Includes the following chapters that are relevant to impacts on fish species and habitats: 77.44: Warmwater game fish enhancement program 77.55: Construction projects in state waters 77.57: Fishways, flow, and screening 77.85: Salmon recovery 77.95: Salmon enhancement program 77.105: Recreational salmon and marine fish enhancement program 77.110: Salmon and steelhead trout – Management of resources 77.135: Invasive species
Chapter 220.640 WAC, Invasive/Non-Native Species	Classifies prohibited and regulated species and regulates the introduction or possession of non-native and invasive aquatic species.
Chapter 17.10 RCW, Noxious Weeds	Includes the state Noxious Weed List (Class A, B, and C), definitions and descriptions of region boundaries for Class B weeds, and the schedule of monetary penalties.
Washington Department of Natural Resources (DNR) Natural Heritage Program (advisory)	Assigns conservation status to species and habitats to support federal, state, and local land management policies and listing decisions; has no direct regulatory authority and is advisory only.
DNR 2006 Policy for Sustainable Forests and 1997 Habitat Conservation Plan	Guides DNR's long-term sustainable management of forested state trust lands.

Regulation, statute, guideline	Description
Chapter 77.55 RCW; Chapter 220-660 WAC, Washington State Hydraulic Code	Implements Chapter 77.55 RCW (Construction Projects in State Waters), regulating projects that use, divert, obstruct, or change the natural flow or bed of any water of the state. Requires entities who are planning such projects to obtain a Hydraulic Project Approval from WDFW.
Chapter 90.48 RCW, Water Pollution Control Act	Grants the Washington State Department of Ecology (Ecology) the jurisdiction to control and prevent the pollution of streams, lakes, rivers, ponds, inland waters, salt waters, water courses, and other surface and groundwater in the state. Allows Ecology to regulate certain activities in wetlands and regulated waters that are non-jurisdictional under Section 404 of the CWA through the issuance of Administrative Orders.
Chapter 90.74 RCW, Aquatic Resource Mitigation	Requires state regulatory agencies to consider mitigation proposals for projects that are designed in a manner to provide equal or better biological functions compared to traditional on-site mitigation proposals.
Chapter 90.54 RCW, Water Resources Act of 1971	Provides fundamentals of water resource policy for the state to ensure that waters of the state are protected and fully utilized for the greatest benefit to the people of the State of Washington; provides direction to state and local governments in carrying out water and related resources programs.
Washington State Executive Order 89-10, Protection of Wetlands	Establishes statewide goals to achieve no overall net loss in function and acreage of wetlands and to increase the quality and quantity of Washington's wetlands.
Local	
County and municipal critical areas ordinances	As required under Washington's Growth Management Act, cities and counties have development regulations to protect critical areas. Critical areas can be related to public health and safety or public welfare (e.g., habitat protection).
County and municipal shoreline master programs	Local codes regulate development within shorelines of the state in accordance with Shoreline Master Programs and state Shoreline Management Act requirements.

2 Methodology

The purpose of this section is to provide the reader with an overview of the process for evaluating potential impacts to biological resources, and the criteria for determining the occurrence and degree of impact.

2.1 Study area

The study area for biological resources encompasses the overall solar geographic scope of study for the PEIS and includes large areas of land across Washington (Figure 1). Study areas specific to sub-elements of biological resources are described below.

2.1.1 Terrestrial

The study area for the analysis of terrestrial species and habitats includes the following:

- Any terrestrial habitat located within the study area, including U.S. Fish and Wildlife Service (USFWS) critical habitats; 75 National Audubon Society-defined Important Bird Areas; Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) priority habitats (e.g., Aspen Stands, Riparian, Biodiversity Areas and Corridors, Shrubsteppe); habitat features such as caves, cliffs, snags and logs, and taluses; and other terrestrial habitats that support priority species such as agricultural lands or disturbed grounds
- Non-wetland terrestrial and riparian habitat regulatory buffers required by counties and municipalities for the protection of critical areas as required by the Washington Growth Management Act (GMA)
- Vertical air space above ground that is typically used by bird, bat, and other flying species, and vertical depths below ground that may be used by burrowing species

2.1.2 Aquatic

The study area for the analysis of aquatic species and habitats includes the following:

- Any freshwater aquatic habitat located within the study area, including critical habitat determined by the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) and USFWS, and the following PHS priority habitats identified by WDFW: Instream, Freshwater Wetlands, and Fresh Deepwater habitat types

2.1.3 Wetlands

The analysis for impacts on wetland habitats from utility-scale solar energy facilities includes any wetlands located within the study area and their associated regulatory buffers. This includes buffers required by counties and municipalities for the protection of critical areas under the GMA.

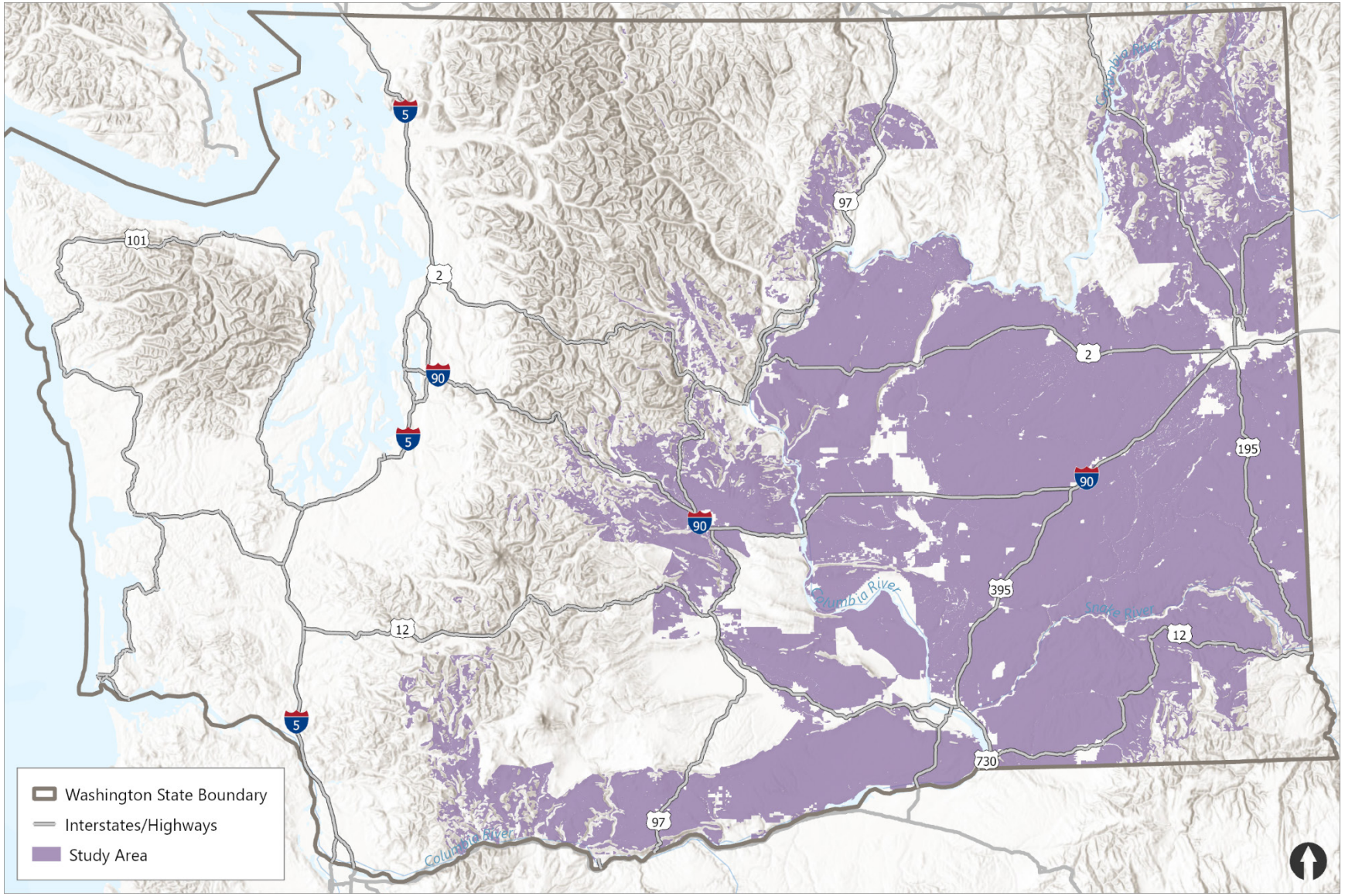

Figure 1. Solar Energy Facilities PEIS – geographic scope of study

2.2 Technical approach

The general approach for analyzing biological resources includes the following steps:

- Use existing data and information from publicly available sources to generally characterize key species and habitat conditions in the study area.
- Qualitatively evaluate biological resource impacts of the types and sizes of utility-scale solar energy facilities and range of activities that could be expected relative to baseline and predicted future conditions.
- Evaluate the impacts relative to applicable laws and regulations (e.g., "special-status species and habitats" which include ESA-listed species, Washington State-listed species [including those on the PHS list], Washington Department of Natural Resources [DNR] heritage species, and those defined in county code or ordinance as species of local importance).

The analyses of potential impacts on terrestrial (including waterfowl), aquatic (including amphibious), and wetlands species and habitat, from site characterization, construction, operations, and decommissioning of utility-scale solar energy facilities is qualitative and based on review of available information.

Impacts on biological resources would have a duration. Permanent impacts would result when terrestrial, aquatic, and amphibious species or habitats are removed or impaired to such a degree that they would not return to their pre-construction state. In addition, if wildlife are excluded from a site for an extended period of time, it is uncertain if those species will reoccupy the site after decommissioning and site restoration, resulting in a permanent impact. In recent project-level reviews, WDFW considered fenced areas at solar facilities to be a permanent impact because fences limit or prevent wildlife access and alter wildlife corridors. Temporary impacts would result when short-term disturbance of terrestrial, aquatic, and amphibious species or habitats would occur but would not prevent the re-establishment of conditions similar to those before a facility in the affected areas. The Washington State Department of Ecology (Ecology) defines short-term temporary wetland impacts as impacts that last for a limited time, and wetland functions return to pre-impact performance within about 1 year or within one growing season of the impact. Long-term temporary wetland impacts are defined by Ecology as impacts that affect wetland functions that would eventually be restored or recover over time, but not within a year or so (Ecology et al. 2021).

Sources analyzed included publicly available habitat and species occurrence mapping; species-specific studies and information; and lists of federal and state threatened, endangered, and other special-status species. Existing literature was used to characterize the affected habitats relative to natural processes, properly functioning habitat, and prevalence of invasive species. The magnitude of impacts was evaluated in the context of the health and uniqueness of species populations relative to proper habitat functions. Assumptions about the magnitude of impacts also relied on conclusions from other resource reports being prepared for the Draft PEIS (including the *Water Resources Report* and the *Land Use Resource Report* [Anchor QEA 2024a]

regarding potential changes to water resources and environmental conservation value, farmland value, and ranchland value). The conclusions of those reports define the natural processes that would be affected in the context of expected changes to the broader environment over time.

A project-level environmental review of impacts on terrestrial and aquatic habitats and species (including wetland habitats and regulatory buffers) would consider regional and local guidelines and regulations and site-specific assessments.

2.2.1 Terrestrial

This section describes the methods that were used to analyze the potential impacts on terrestrial habitats and species.

The analysis of impacts on terrestrial species and habitats addresses 1) impacts on terrestrial animals, including mortality due to facility activities; 2) impacts on their habitat; and 3) impacts to adjoining habitats or migration routes and wildlife corridors that may occur because of site characterization, construction, operation, and decommissioning activities, including habitat fragmentation of important wildlife migration routes. Habitat impacts may include changes to habitat quantity or habitat function, that is, changes to the natural processes that support that habitat. Impacts from construction and decommissioning were evaluated for their relatively short-term effects, as well as any longer-term effects that persist after the construction or decommissioning activities end. Impacts from operations are evaluated for the presence of the infrastructure and activities for the duration of the assumed operating period (30 years).

Impacts on terrestrial wildlife species consider construction and decommissioning effects, such as noise and vehicle traffic. Impacts on terrestrial plant species consider construction effects such as removal and erosion. Impacts from operations consider the removal, reduction, or alteration of resources (e.g., cover, foraging opportunities, prey). Impacts also consider effects on terrestrial plants and wildlife species in terms of potential long-term habitat changes from operations.

Publicly available information on existing terrestrial species and habitats from local, state, and federal agencies was used to make assumptions about the importance of the affected species and habitats in context of their uniqueness across Washington and the viability of their populations. Impacts to terrestrial species and habitat considered are those that have geographic overlap between the study areas.

2.2.2 Aquatic

This section describes the methods that were used to analyze the potential impacts on aquatic habitats and species.

The analysis of impacts on aquatic species and habitats addresses 1) impacts on aquatic animals, including mortality due to facility activities; and 2) impacts on their habitat. Habitat impacts may include changes to habitat quantity or habitat function, that is, changes to the

natural processes that support that habitat. Impacts from construction and decommissioning were evaluated for their relatively short-term effects, as well as any longer-term effects that persist after the construction or decommissioning activities end. Impacts from operations were evaluated for the presence of the infrastructure and activities for the duration of the assumed operating period (30 years).

Publicly available information on existing aquatic species and habitats from local, state, and federal agencies was used to make assumptions about the importance of the affected species and habitats in context of their uniqueness across Washington and the viability of their populations. Species that were considered are those that have geographic overlap between the study areas and these species' known habitats or their associated riparian or other buffer areas.

2.2.3 Wetlands

The existing conditions of wetlands in the study area were generally characterized using publicly available information on the potential occurrence of wetlands in the landscape including the USFWS National Wetlands Inventory (NWI), Ecology's Modeled Wetland Inventory, the U.S. Geological Survey (USGS) National Hydrography Dataset (NHD), local wetland datasets, and aerial photography. Because there are no comprehensive sources that identify, describe, and map the presence/absence, extent, and conditions of wetlands in Washington, future developers of utility-scale solar facilities would be expected to provide additional quantitative analyses and site surveys (e.g., wetland determinations/delineations, wetland rating and functions and values assessments, critical area assessments) to determine the amount, type, and category of wetlands and the width and condition of their associated buffers that would be altered, removed, or converted as a result of their facilities.

2.3 Impact assessment

Significant impacts would occur if development of a facility would result in the following:

- Construction actions would cause permanent degradation, loss, or conversion of terrestrial habitat function due to changes in habitat quantity, habitat quality, habitat connectivity, prey abundance, interactions with non-native species, or other key functional elements that are critical to species viability.
- Operations would cause ongoing or repeated disturbance of terrestrial habitat function due to changes in habitat quantity, habitat quality, habitat connectivity, prey abundance, interactions with non-native species, or other key functional elements that are critical to species viability.
- Actions like earthwork, or noise and vibration would produce disturbance, stranding, entanglement, permanent injury, or mortality to any species that occurs frequently, or single events affecting any special-status species, or events that increase the need for federal or state listing of a species or increases risk to species viability.
- Construction actions would cause permanent degradation, loss, or conversion of aquatic habitat function or reduction in aquatic habitat, including wetland habitat function, due to changes in surface water quantity or quality, riparian area condition, prey abundance,

interactions with non-native species, or other key functional elements that are critical to species viability or is rare or unique in Washington.
- Operations would cause ongoing or repeated disturbance of aquatic habitat, including wetland habitat function, due to changes in surface water quantity or quality, riparian area condition, prey abundance, interactions with non-native species, or other key functional elements that are critical to species viability.

2.3.1 Terrestrial

Impacts include any activities that result in the loss of terrestrial habitat or reduction in terrestrial habitat due to changes in habitat quantity, habitat quality, habitat connectivity, prey abundance, interactions with non-native species, or other key functional elements. Activities that disturb, strand, entangle, injure, or kill terrestrial species resulting from actions like earthwork, or noise and vibration are considered to be impacts. Frequent mortality or injury to any species, or single events affecting any special-status species, or events that increase the need for federal or state listing of a species or increases risk to species viability are considered to be impacts.

Impacts to terrestrial habitats or their regulatory buffers have a duration, affected area, and significance level. Activities that result in impacts to terrestrial habitats and regulatory buffers may include:

- Excavation
- Erosion
- Grading
- Vegetation removal or alteration
- Road and utility corridor construction
- Placement of lighting, fencing, and noise-generating structures/activities

Impacts related to excavation, erosion, or grading can be identified by overlaying the footprint of the proposed facilities on the resource mapping using geospatial software. Impacts would be further determined using field surveys to gather data and assess the potential effects.

2.3.2 Aquatic and wetlands

Impacts include any activities that result in the loss of aquatic habitat or reduction in aquatic habitat, including wetland habitat function due to changes in surface water quantity, surface water quality, riparian area condition, prey abundance, interactions with non-native species, or other key functional elements. Activities that disturb wetlands or their regulatory buffers, or that affect the continued existence of such a resource in its current form (e.g., hydrologic alteration) are considered to be impacts.

Impacts to aquatic habitats, wetlands, or their regulatory buffers have a duration, affected area, and significance level. Activities that result in impacts to aquatic habitats, wetlands, and regulatory buffers may include:

- Excavation
- Erosion
- Grading
- Draining or dewatering
- Discharging water or redirecting runoff
- Discharge of material to or removal from wetlands or their regulatory buffers
- Discharge of potential pollutants including sediments
- Vegetation (including large woody debris) removal or alteration
- Road crossing, culvert installation, or bridge construction
- Placement of lighting, fencing, and noise-generating structures/activities

Impacts related to excavation, grading, or fill placement in wetlands can be determined by overlaying the footprint of the proposed facilities on the resource mapping using geospatial software. Any mapped wetlands or regulatory buffers that occur within a facility footprint or impact area are considered impacts. Wetland impacts determined through these analyses are quantified by their Cowardin and hydrogeomorphic classification and their state wetland rating, which are determined using either the *Washington State Wetland Rating System for Eastern Washington* (Hruby 2014) or the *Washington State Wetland Rating System for Western Washington: 2014 Update (Version 2)* (Hruby and Yahnke 2023), depending on site location.

Impacts to other types of aquatic habitat can be determined by characterizing waterbody types within the study area (deep freshwater or freshwater instream habitat with ephemeral, intermittent, or perennial flow) and whether those waters are fish-bearing. Fish-bearing waters may be further characterized as spawning and rearing habitat, foraging habitat, or migratory corridors for the species that are present. Essential Fish Habitat (EFH) and critical habitat for special-status species can be identified using geospatial analysis.

If facilities are located in wetland areas or adjacent to other waterbodies, their placement would be subject to all applicable statutory requirements and associated regulations, such as Section 404 of the Clean Water Act (CWA) and local critical areas ordinances.

3 Technical Analysis and Results

3.1 Overview

This section describes the affected environment within the study area (Section 3.2) and discusses the probable impacts on terrestrial, aquatic, and wetland wildlife species, plant species, and habitats from the utility-scale solar energy facilities analyzed in the PEIS (Sections 3.4 to 3.7) and the No Action Alternative (Section 3.8). This section also evaluates actions that could avoid or reduce the identified impacts, along with potential unavoidable significant adverse impacts. Potentially required permits are addressed in Section 3.3.

3.2 Affected environment

The affected environment represents the current conditions within the study area and provides the baseline for evaluating how a specific natural or built environment resource could be affected by proposed facilities. Depending on the resource, and because the temporal scope of analysis includes 20 years within which potential facilities could be constructed and 30 years of potential facility operations (50 years total), the potential for the affected environment to change in that time must also be considered.

The solar energy development study area is bordered by the Cascade Range to the west, Canada to the north, Idaho to the east, and the Columbia River and Oregon to the south. Due to the size of the utility-scale solar study area, the characterization of the affected environment provided in this resource report is relatively general and based on the Level III Ecoregions identified for the state by the U.S. Environmental Protection Agency (USEPA; Table 2). The study area for this analysis includes portions within six ecoregions, as shown in Figure 2. Ecoregions are geographic areas where ecosystems, and the type, quality, and quantity of environmental resources that compose them, are generally similar (USEPA 2023). They are based on a framework derived from Omernik (1987) and were developed by grouping areas using patterns of similarity in the various biotic, abiotic, terrestrial, and aquatic ecosystem components of a landscape. Ecoregions typically include combinations of geology, landforms, soils, vegetation, wildlife, climate, and hydrology. Additional information of the typical landforms, climate, and water resources for each ecoregion in Washington were obtained from multiple sources including Omernik 1987, 2010; Bryce and Woods 2000; USEPA 2023; and LandScope America 2024.

Table 2. Level III Ecoregions within the Solar Energy Facilities PEIS geographic scope of study

Level III Ecoregion	Major habitat type	Description
Cascades	Cascade mountain range, volcanoes, glaciers, coniferous forests, subalpine meadows	Steep ridges and river valleys to the west and high plateau to the east. Mountainous region with active and dormant volcanoes. Rocky alpine zones and subalpine meadows occur at high elevations. Maritime weather brings mild conditions that support coniferous forests of Douglas fir, western hemlock, and western red cedar. Surface water systems typically include reservoirs and medium gradient rivers and streams occurring in u-shaped, glaciated valleys in the lowlands; high to medium gradient streams and glacial rock-basin lakes occurring in montane highlands; sinuous, medium gradient streams, glacial rock-basin lakes, small lakes on collapsed lava flows and wetlands in montane forested areas; and cascading streams and glacial tarns in subalpine/alpine areas. Major river systems in this ecoregion include the upper portions of the Cowlitz, Lewis, East Fork Lewis, Kalama, North Fork Toutle, and Cispus rivers, which flow to the Columbia River; and the Puyallup, Carbon, Green, White, Duwamish, and West Fork White rivers, which all flow toward Puget Sound.
Eastern Cascades Slopes and Foothills	Coniferous forest, sagebrush steppe, grassland	The region is in the rain shadow of the Cascade Range. The dry continental climate creates greater temperature extremes. Vegetation is highly susceptible to wildfire. This region is one of Washington's most heavily forested areas with open ponderosa and lodgepole pine forests. Surface water systems typically include medium to high gradient, permanent and intermittent streams and rivers running through canyons, with springs commonly occurring in the Yakima Plateau and associated slopes; high gradient, permanent streams and rivers with scattered glacial rock-basin lakes in areas dominated by grand fir mixed forests; and permanent and intermittent, mostly medium gradient streams and rivers in the eastern Cascades and Columbia foothills. Major river systems in this ecoregion include the Little White Salmon, White Salmon, and Klickitat rivers, and a small section of the Yakima River, which all flow to the Columbia River.

Level III Ecoregion	Major habitat type	Description
Columbia Plateau	Shrubsteppe, fertile agricultural lands, Palouse Hills	The Columbia Plateau is dominated by arid sagebrush steppe and grassland. The region is located within the rain shadow of the Cascade mountains. Summers are hot and dry with precipitation occurring mainly between late fall and early spring. Surface water systems typically include perennial, intermittent, and ephemeral streams, some of the larger of which flow through steep river canyons and coulees, that are tributary to the Columbia River. Multiple human-created reservoirs are present and primarily used to supply hydroelectric power and irrigation water for the extensive agricultural uses that occur throughout this ecoregion. Extensive emergent wetlands supported by irrigation runoff are present as are riparian wetlands. Major river systems in this ecoregion include a portion of the middle Columbia River, as well as portions of the Yakima, Snake, Clearwater, Spokane, Walla Walla, and Okanogan rivers, all of which flow to the Columbia River. Large human-created reservoirs are also present including multiple impoundments on both the Columbia River (Priest Rapids Lake, Lake Wanapum, Lake Entiat Rock Island Pool, Lake Pateros, Rufus Woods Lake, and part of Franklin Delano Roosevelt Lake) and the Snake River (Lake Sacajawea, Lake Herbert G. West, Lake Bryan). Other reservoirs such as Potholes Reservoir, Banks Lake, and Billy Clapp Lake have been created by flooding potholes and coulees that were originally carved out by multiple cataclysmic floods from Glacial Lake Missoula during the Pleistocene epoch.
Blue Mountains	High plateau, coniferous forest, Palouse prairie, rimrock canyons	Mountain ranges that are volcanic in origin and generally lower and more open than the neighboring Cascades region. Coniferous forests dominate the region consisting of species such as ponderosa pine, Douglas fir, western larch, and Engelmann spruce. Higher reaches of the mountains are cold and wet while lower elevations are hot and dry. Surface water systems include perennial streams and rivers that typically run down relatively steep slopes and through the bottom of moderately steep river valleys. Major river systems in this ecoregion include the Snake, Grande Ronde, and upper portion of the North Fork Touchet rivers, all of which drain to the Columbia River.
Northern Rockies	Boreal forest, alpine meadows, riparian woodlands, grasslands	Mountainous region with thick volcanic ash deposits. Alpine characteristics are found at the highest elevations. Boreal weather patterns influence the north while inland maritime patterns influence the south. Marine-influenced vegetation such as Douglas fir, ponderosa pine, and subalpine fir dominate. Major river systems in this ecoregion include the south-southeast flowing Columbia River, north-flowing Pend Oreille River, south-flowing Kettle River, and the west-northwest flowing Spokane River. Multiple glacial kettle lakes are also present, and a portion of the impounded Columbia River known as Franklin Delano Roosevelt Lake also extends into this ecoregion from the adjacent Columbia Plateau ecoregion.

Level III Ecoregion	Major habitat type	Description
North Cascades	Cascade mountain range, subalpine parklands, coniferous forests, deciduous forests	High rugged mountains with active alpine glaciers. Dry continental climate in the east and mild, maritime rainforest conditions in the west. Coniferous forests of western red cedar, Douglas fir, and western hemlock intermix with riparian areas that support broadleaf trees such as bigleaf maple and red alder. Surface water systems are highly variable and include perennial medium gradient, glacial-fed rivers and streams, reservoirs, and glacial lakes common in lowland forested areas; cascading glacial streams and glacial rock-basin lakes in highland forests; high gradient, sediment laden, glacial meltwater streams and glacial rock-basin lakes in alpine and subalpine areas; small glacial rock-basin lakes and both permanent and intermittent high gradient streams in the highlands around the Pasayten River and Sawtooth Mountain range; medium to high gradient, permanent and intermittent streams and rivers, with some alpine glacial rock-basin lakes and irrigation storage reservoirs in the Okanogan hills; medium to high gradient rivers and streams and glacial rock-basin lakes in the Chelan tephra hills; high gradient streams and rivers, with some glacial rock-basin lakes in the Wenatchee/Chelan highlands; steep gradient perennial and intermittent streams with high sediment loads and a general trellis-shaped drainage pattern in the Chiwaukum Hills and Lowlands region; and cascading glacier-fed streams and glacial rock-basin lakes in the high Olympic Mountain region. Major river systems in this ecoregion include the Skagit, Stillaguamish, Snohomish, and Nooksack rivers. Some drainages have been dammed for hydroelectric power, creating large reservoirs such as Ross and Baker lakes.

Sources: Omernik 1987, 2010; Bryce and Woods 2000; USEPA 2023; LandScope America 2024

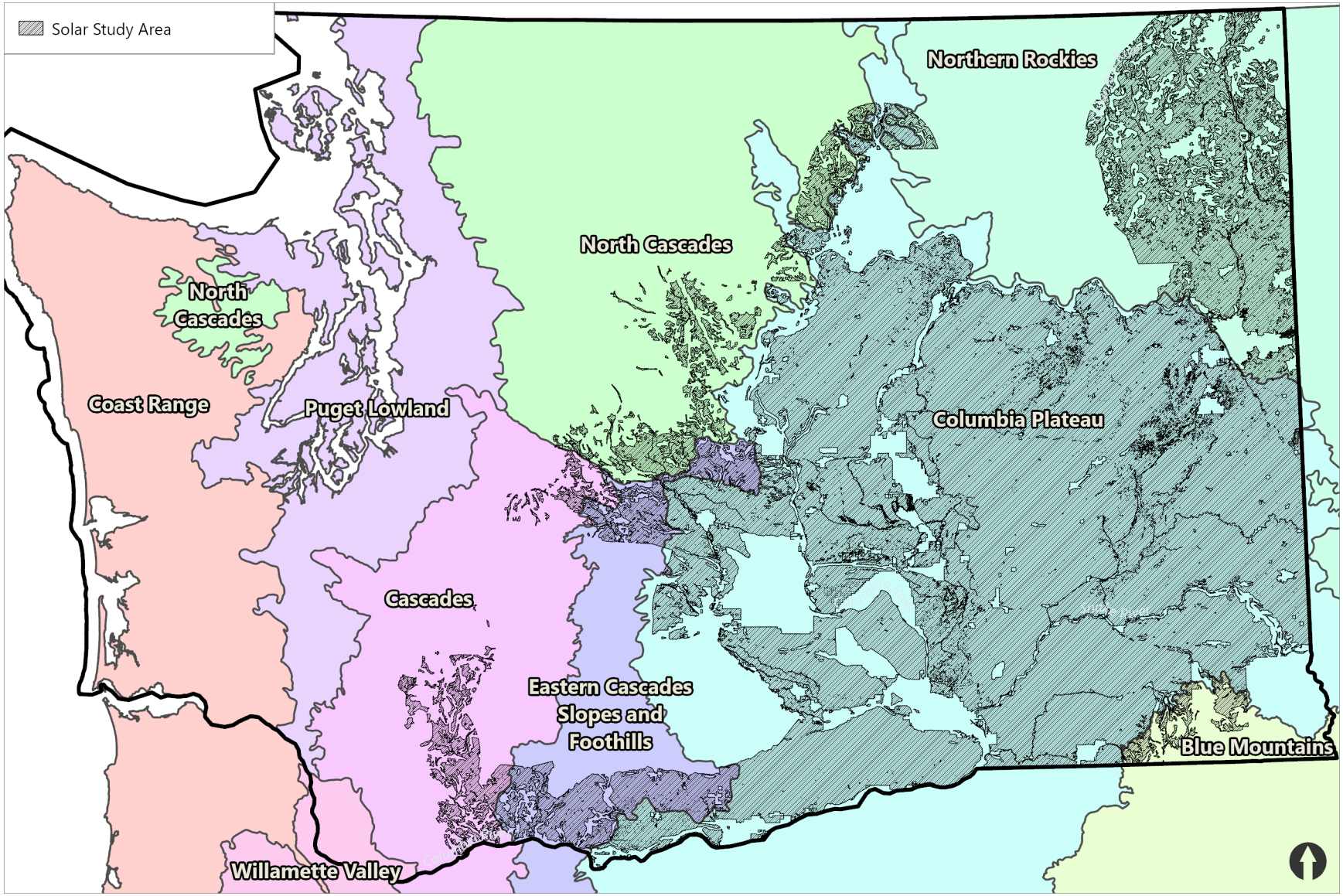

Figure 2. Level III Ecoregions

Source: USEPA 2024

3.2.1 Terrestrial habitats

The solar energy study area for terrestrial habitats occurs within six of the nine Level III Ecoregions of Washington state (Table 2, Figure 2). These Level III Ecoregions are delineated based on a general similarity in ecosystems, and throughout the state they are further characterized by a number of ecological systems or habitat types and vegetation communities (Level IV Ecoregions; LandScope America 2024). Table 2 also provides an overview of typical climatic conditions for each Level III Ecoregion. In more developed areas, vineyards, tree farms, orchards, pastures, croplands, and parks dominate the landscape.

The following sections describe specific terrestrial habitats within the affected environment.

3.2.1.1 Air habitat

The air habitat over the study area is used by bird and bat species for flying behaviors such as soaring, hunting, foraging, breeding, and migrating. The extent at which air habitat is used by birds and bats varies depending on behaviors, flight altitudes, and seasonal activities (e.g., breeding, migration). Air habitat is also important for flying and wind-dispersing invertebrates and for wind seed dispersal. Depending on the species, air habitat is bound by geographical limitations, such as mountain ridges, valleys, waterbodies, forestlands, and existing development. Soaring raptors, such as bald and golden eagles, rely on wind for lift to reduce energetic costs during flight (Johnston et al. 2014). Additionally, existing topographic features of ridgelines create vertically deflected air currents that provide lift for soaring birds. This type of vertical lift is usually strongest within the first thousand feet of the terrain surface (Johnston et al. 2014).

3.2.1.2 Bird and bat habitat

The study area contains a wide variety of diverse habitats for birds, including inland waters, mountain ranges, forests and woodlands, grasslands, and suburban areas. The availability of food, water, shelter, and space drives habitat use depending on the bird species and time of year. The study area also overlaps with 75 National Audubon Society-defined Important Bird Areas (Cullinan 2001). The Important Bird Areas are located in three regions: Western Lowlands, Cascade Mountains, and Columbia Basin.

Bat habitat in the study area includes a variety of forests, deserts, canyons, shrubsteppes, dry grasslands, meadows, riparian areas, alpine, agricultural areas, and suburban areas, depending on the species (WDFW 2024a). Bats utilize snags, trees, crevices in rocks, tunnels, buildings, bridges, caves, and mine shafts for roosting or hibernation.

3.2.1.3 Waterfowl habitat

Waterfowl depend on shallow waters such as ponds, flooded cropland, and seasonally inundated wetlands for habitat, food, shelter, and migration. Waterfowl use open water areas for feeding, resting, and socializing. They seek refuge from predators in secluded coves and densely vegetated areas. Their preferred habitat has an ample supply of natural foods, such as

submerged plants and aquatic invertebrates. Nesting may occur over water, in a tree cavity, or in upland habitat that consists of large expanses of grass.

3.2.1.4 Ungulate habitat

Ungulate (hooved mammal) species found in Washington state include elk, moose, various types of deer, bighorn sheep, mountain goat, pronghorn antelope, and woodland caribou. These species are further discussed in Section 3.2.2.3.2. Ungulates typically require temporally and spatially diverse habitat components to provide food and cover and have large home ranges across entire landscapes rather than isolated patches of habitat (Kie et al. 2003). In general, ungulates in Washington commonly occur in coniferous forests, including forests of redwood (*Sequoia sempervirens*), Douglas fir (*Pseudotsuga menziesii*), and Sitka spruce (*Picea sitchensis*). They thrive in forests at early successional stages after disturbance such as wildfire, prescribed burning, or logging (Kie et al. 2003). Many ungulates are considered well-adapted to habitat edges and do not need to travel far if sufficient food and cover are available over a smaller home range with large amounts of edge habitat (Kie et al. 2003). Many species also use areas that are highly managed for forestry and agricultural use, including dryland wheat fields, other types of cultivated fields, and former croplands such as those enrolled in the U.S. Department of Agriculture's Conservation Reserve Program.

Throughout Washington, ideal elk habitat includes productive grasslands, meadows, or clearcuts interspersed with closed-canopy forests (WDFW 2024b). These habitats can be found in interior mountain ranges, river valleys, and shrubsteppe habitats of eastern Washington. Moose habitat includes forests where there are lakes, marshes, and other wetlands, as well as the high desert country of the Columbia Basin (WDFW 2024c). From mountainous locations to lower elevations, deer habitat includes open areas such as meadows and clearcuts to forage in before retreating to more secure areas such as thickets and closed-canopy forests (WDFW 2024d). Deer habitat may also include wooded suburban environments, such as parks, greenbelts, golf courses, and roadsides for habitat. Bighorn sheep habit includes alpine meadows, grassy mountain slopes, canyonlands, and foothill country near rugged rocky cliffs and bluffs in southeast Washington and the eastern slopes of the Cascades (WDFW 2024e). Mountain goat habitat includes steep rocky cliffs, projecting pinnacles, ledges, and talus slides, as well as very wet forested areas in western Washington and some very dry open areas on the eastern side of the state (WDFW 1983). Pronghorn antelope habitat includes open, relatively flat grasslands and shrub lands (WDFW 2024f). Woodland caribou habitat includes rugged mountainous regions with old-growth forests of Engelmann spruce/subalpine fir and western red cedar/western hemlock that are generally more than 100 to 150 years old (WDFW 2024g).

3.2.1.5 Wildlife migration routes

Migration routes and wildlife corridors could be anywhere from 200 meters to several miles wide depending on the species (USGS 2024a). WDFW designates large, connected areas as Biodiversity Areas and Corridors and recognizes these areas as an agency-wide conservation priority. Further information and maps on Biodiversity Areas and Corridors can be found in *PHS Local Government User Guide: Biodiversity Areas and Corridors Map* published by WDFW (Azerrad et al. 2023).

All of Washington state, including the study area, is located in the Pacific Flyway, one of the four main north-south migratory routes in North America used by a variety of migratory game and nongame bird species. Flyway management plans are developed by the Pacific Flyway Council with an approximately 5-year planning horizon and are adopted to help state and federal agencies cooperatively manage migratory birds under common goals (Pacific Flyway Council 2024). Management plans typically focus on migratory bird species populations and habitat conditions that support those populations.

The Pacific Flyway spans approximately 21,301,891 square kilometers and extends from the arctic regions of Alaska and Canada to South America and is bounded on the west by the Pacific Ocean and on the east by the Rocky Mountains. Many bird species use the Pacific Flyway to migrate between breeding habitat in North America and wintering habitat in the tropics (BirdLife International 2024).

The study area contains broad landscapes that are used for ungulate winter range and migration routes. These areas are becoming increasingly fragmented due to human encroachment from agriculture, fencing, residential development and urban sprawl, roadway expansion, and natural resource extraction (WAFWA 2018). USGS collaborates with state, Tribal, and federal wildlife management agencies to map ungulate migration corridors across the western United States.

Maps and acreage of migration corridors as well as links to the latest and past *Ungulate Migrations of the Western United States* reports can be found on the USGS webpage "Mapping Ungulate Migrations Across the Western U.S." (USGS 2024b). Many ungulate herds migrate on a seasonal basis between distinct summer and winter ranges within their corridors to make the best use of various food sources and to avoid predation risks and adverse habitat conditions such as deep snow (USGS 2024a). USGS utilized GPS technology to analyze the migration patterns of the Chelan mule deer herd, the Klickitat mule deer, the Wenatchee Mountains mule deer herd, the Methow mule deer herd, the Colockum elk herd, the Selkirk white-tailed deer population, and the Pend Oreille elk subherd in Washington; determine their summer, winter, and typical stopover ranges; and map the footprint of their migratory corridors (USGS 2022a, 2022b, 2024b). In the study area, ungulate migration corridors can be found within the Northern Rockies, North Cascades, Eastern Cascades Slopes and Foothills, Cascades, and Columbia Plateau ecoregions (USGS 2022a, 2022b, 2024a).

The Klickitat mule deer herd inhabits the Columbia Hills and surrounding terrain to the north along the Columbia River. The Wenatchee Mountains mule deer herd inhabits a matrix of private and public lands along the eastern slope of the Cascade Range. The Chelan mule deer herd occupies a mix of private and public lands from the Columbia River to the crest of the Cascade Range in central Washington. The Methow mule deer subherd is part of the larger West Okanogan mule herd, the largest migratory mule deer herd in Washington. The Colockum elk herd inhabits a mix of public and private lands northeast of Ellensburg, between Blewett Pass of the Cascade Range and west of the Columbia River. The Selkirk white-tailed deer are

located in mostly private land in northeastern Washington. The Pend Oreille elk subherd is part of the larger Selkirk elk herd located in northeast Washington.

3.2.1.6 Special-status habitat

The state of Washington provides a variety of habitats that support many plant and animal species that are listed as threatened, endangered, proposed for listing (i.e., candidate), or otherwise deemed as species of special concern at the federal, state, and local levels. Special-status habitats include the following:

- Designated critical habitats for plant and animal species listed as endangered or threatened under the ESA
- Priority habitats deemed sensitive by WDFW
- Habitats identified as rare/high-quality ecological communities under the DNR Natural Heritage Program
- Habitats identified in county or municipal codes or associated ordinances as natural areas of local importance or concern

3.2.1.6.1 Critical habitat

Critical habitat includes geographic areas containing physical and biological features that are essential to the recovery of ESA-listed species. ESA-listed species that also have designated critical habitat in Washington state are summarized in Table 3 (Section 3.2.2.6.1). Attachment 1 includes the USFWS Information for Planning and Consultation (IPaC) resource list for the state of Washington and details the 15 terrestrial critical habitats that are in the terrestrial study area for solar energy development. The USFWS Critical Habitat for Threatened and Endangered Species online mapper can also be used to view designated critical habitat for ESA-listed species in Washington (USFWS 2024a).

3.2.1.6.2 Priority habitat

WDFW's PHS on the Web online mapping tool identifies priority habitat types and features for conservation within the state (WDFW 2024h). Not all priority habitats are PHS mapped and may include some wide-ranging habitats such as riparian, instream, and snags and logs. In addition, there may be non-priority designated habitats that support priority species such as agricultural lands and disturbed areas. The PHS list also includes Priority Areas for species that are within known limiting habitats (e.g., breeding areas, foraging areas, haul-outs) or within areas that support a relatively high number of individuals (e.g., migration corridors, regular concentrations) (WDFW 2023). WDFW defines priority habitat as habitat types or elements with unique or significant value to a large number of species, and has one or more of the following attributes:

- Comparatively high fish and wildlife density or species diversity
- Important fish and wildlife breeding habitat, seasonal ranges, or movement corridors
- Limited availability or high vulnerability to habitat alteration
- Unique or dependent species

WDFW (WDFW 2024h) lists the following 15 types of terrestrial priority habitats and features in the study area:

- Aspen Stands
- Biodiversity Areas and Corridors
- Eastside Steppe
- Herbaceous Balds
- Inland Dunes
- Juniper Savannah
- Old-Growth Mature Forest
- Oregon White Oak Woodlands
- Riparian
- Shrubsteppe
- Westside Prairie
- Caves
- Cliffs
- Snags and Logs
- Talus

Washington's shrubsteppe landscape is within the Columbia Plateau ecoregion and supports unique biological diversity and provides habitat for a wide range of species, including birds, mammals, reptiles, amphibians, insects, and plants (WDFW 2024i). Approximately 60% of the original shrubsteppe habitat in Washington has been converted to other landcover (Dobler et al. 1996). The Washington Shrubsteppe Restoration and Resiliency Initiative (WSRRI) is a collaborative effort between WDFW, DNR, and the Washington State Conservation Commission that was formed to help enhance the health and resiliency of shrubsteppe habitat in Washington to benefit shrubsteppe wildlife (WDFW 2024i). To facilitate a strategic approach for targeting investment, WSRRI mapped core areas, growth opportunity areas, corridors, and other habitat across the shrubsteppe landscape. WSRRI's spatial priority map portal provides a view of core areas and areas where cores can be expanded within Washington (WDFW 2024i).

There are many state and federal resources with maps and data on habitats and species. These are described here and in the *Cumulative Impacts Report* (Anchor QEA 2024b). Figure 3 includes an example of the type of information available about specific habitats, which should be considered during siting and design to avoid impacts and for evaluation in project-level reviews. The map in Figure 3 depicts priorities for xeric shrubsteppe habitat from the WSRRI.

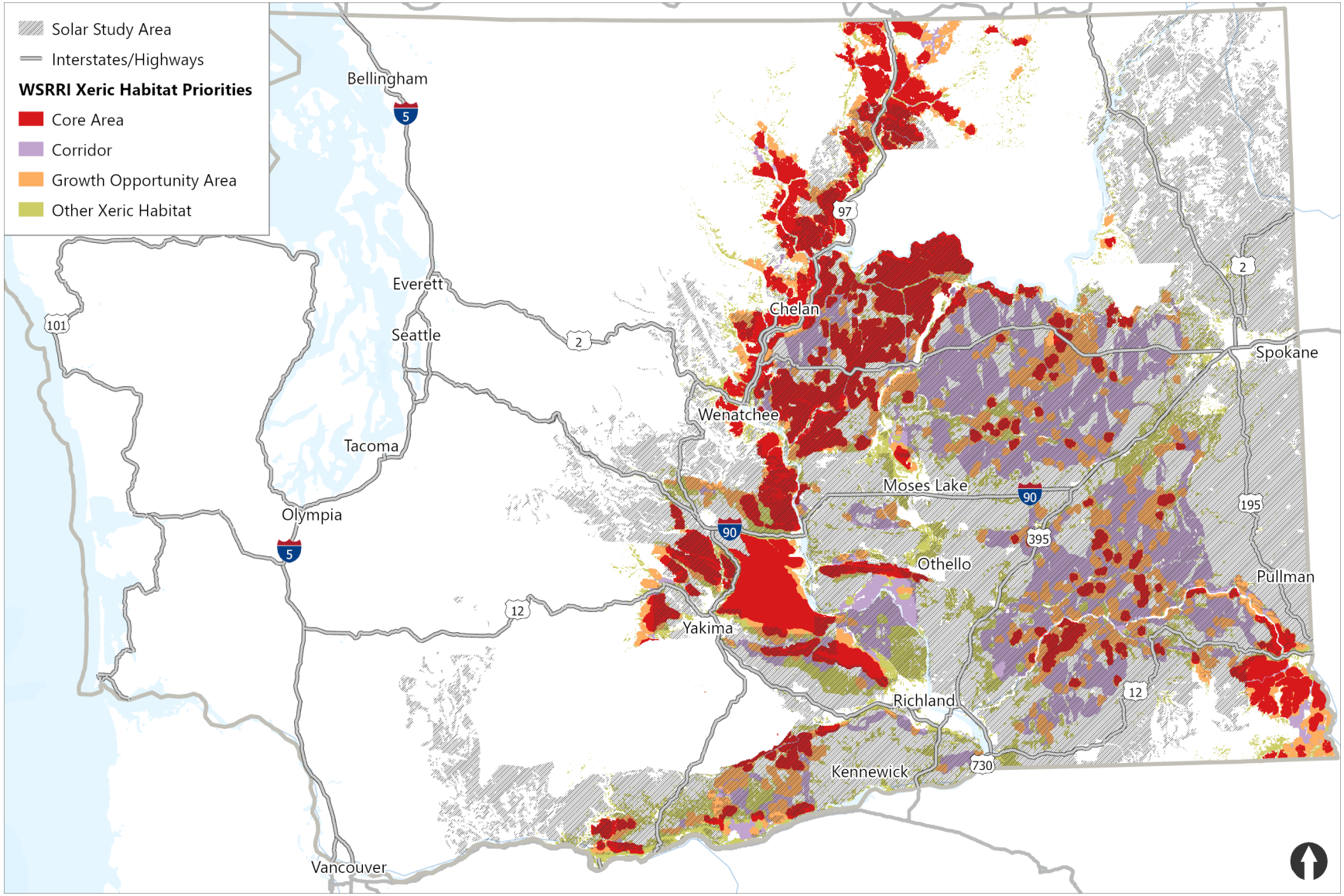

Figure 3. Example WSRRI priority map for a dry (xeric) ecosystem
Data source: WDFW 2024j

3.2.2 Terrestrial species

3.2.2.1 Vegetation

The six Level III Ecoregions within the study area (Table 2; Figure 2) support a variety of upland plant community types that are further characterized by Level IV Ecoregions (USEPA 2023). The North Cascade and Cascade ecoregions primarily support coniferous forests of Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and western red cedar (*Thuja plicata*), along with Pacific silver fir (*Abies amabilis*), mountain hemlock (*Tsuga mertensiana*), noble fir (*Abies procera*), subalpine fir (*Abies lasiocarpa*), silver fir (*Abies amabilis*), Sitka alder (*Alnus viridis*), and whitebark pine (*Pinus albicaulis*). Subalpine meadows and rocky alpine zones support species such as blueberries (*Vaccinium* spp.), common juniper (*Juniperus communis*), Sitka mountain-ash (*Sorbus sitchensis*), white rhododendron (*Rhododendron albiflorum*), along with a variety of wildflowers such as avalanche lily (*Erythronium montanum*), beargrass (*Xerophyllum tenax*), and broadleaf lupine (*Lupinus latifolius*).

The forests and open woodlands in the Eastern Cascades Slopes and Foothill ecoregion are dominated by ponderosa pine (*Pinus ponderosa*) and lodgepole pine (*Pinus contorta*), species that are adapted to wildfires which help shape this ecosystem. Grand fir (*Abies grandis*) mixed with Douglas fir and ponderosa pine are also common. Oregon white oak (*Quercus garryana*) mixed with Douglas fir/ponderosa pine forests, and western hemlock/Douglas fir forests create a mosaic with grasslands.

Dominant vegetation in the Columbia Plateau ecoregion is largely limited by precipitation and generally too dry to support trees. Sagebrush and grassland associations typify the landscape outside of agricultural and grazed areas. Common sagebrush species include big sagebrush (*Artemisia tridentata*) and threetip sagebrush (*Artemisia tripartita*). Common grassland species include Sandberg's bluegrass (*Poa secunda sandbergii*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Idaho fescue (*Festuca idahoensis*). The agricultural areas are extensively cultivated for wheat. At higher elevations with increasing moisture on the northeastern slopes of the Blue Mountains, shrubs such as rose (*Rosa* spp.) and common snowberry (*Symphoricarpos albus*) occur.

The Northern Rockies ecoregion vegetation varies greatly by elevation, slope aspect, and moisture regime, as well as by livestock grazing. Typical tree species found across these strata in varying combinations include Douglas fir, subalpine fir, Englemann spruce, ponderosa pine, lodgepole pine, grand fir, whitebark pine, western white pine (*Pinus monticola*), white pine (*Pinus strobus*), mountain hemlock, western larch (*Larix occidentalis*), alpine larch (*Larix lyallii*), western red cedar, western hemlock, paper birch (*Betula papyrifera*), quaking aspen (*Populus tremuloides*), and black cottonwood (*Populus trichocarpa*). Common shrub species in some stands include ninebark (*Physocarpus* spp.), oceanspray (*Holodiscus discolor*), common snowberry, and in more limited areas, antelope bitterbrush (*Purshia tridentata*). In grasslands, common species include Idaho fescue, rough fescue (*Festuca altaica*), bluebunch wheatgrass (*Pseudoroegneria spicata*), or needlegrasses (*Nassella* spp.).

Vegetation in the Blue Mountains ecoregion is influenced by marine weather systems moving east through the break in the Cascades at the Columbia River Gorge, as well as by grazing cattle. At lower elevations where moisture availability supports forests, ponderosa pine and Douglas fir dominate, along with a dense and diverse shrub layer. At higher elevations where moisture availability supports forests, subalpine fir, Engelmann spruce (*Picea engelmannii*), and whitebark pine (*Pinus albicaulis*) are common. Where moisture is more limited, grasslands dominate and include species such as bluebunch wheatgrass and Sandberg's bluegrass, along with the shrub spiny greenbush (*Grayia spinosa*). Vegetation in cattle grazed areas has reverted to seral or exotic species.

3.2.2.1.1 Noxious weeds

The Washington State Department of Agriculture works closely with the Washington State Noxious Weed Control Board (WSNWCB) and is responsible for noxious weed control in counties without weed boards (WSDA 2024). Through its actions and policy decisions, the WSNWCB coordinates and support control activities of the 38 county weed districts, county weed boards, and state and federal agencies, as well as provided educational materials to local weed boards, districts, and the public (WSNWCB 2024).

There are over 150 plant species that are considered invasive in Washington state, and the presence of these invasive species varies by county (WSNWCB 2024). Some terrestrial invasive species in the study area include purple loosestrife (*Lythrum salicaria*), herb-robert (*Geranium robertianum*), Canada thistle (*Cirsium arvense*), yellow starthistle (*Centaurea solstitialis*), cheatgrass (*Bromus tectorum*), reed canarygrass (*Phalaris arundinacea*), Japanese knotweed (*Polygonum cuspidatum*), English ivy (*Hedera helix*), Himalayan blackberry (*Rubus armeniacus*), butterfly bush (*Buddleja davidii*), and tree-of-heaven (*Ailanthus altissima*).

3.2.2.2 Birds

There are over 500 species of birds living in the diverse habitats in Washington, as described in Section 3.2.1. Washington's birds belong to 18 orders, which are large groupings of related families and species (Audubon Washington 2024; BirdWeb 2024; WDFW 2024k).

Many bird species found within Washington, including waterfowl, shorebirds, songbirds, and raptors, are seasonal residents, and migrate elsewhere for wintering or breeding. As noted in Section 3.2.1.2, the Pacific Flyway is a major migration route. Birds that migrate north in the spring are flying to breeding areas, and birds that migrate south in the fall are flying to wintering areas. During migration and nesting season, all habitat types in Washington can be used by hundreds of bird species. The following subsections describe important groups of bird species and management plans that address bird conservation within the study area. Threatened, endangered, and other special-status bird species are addressed in Section 3.2.2.6.

3.2.2.2.1 Songbirds

Songbirds, also referred to as passerines, are the largest and most diverse category of birds. In Washington there are 28 songbird families found, including species such as tyrant flycatchers, shrikes, vireos, crows, jays, larks, swallows, chickadees, bushtits, nuthatches, creepers, wrens,

dippers, kinglets, gnatcatchers, thrushes, mockingbirds, thrashers, starlings, accentors, wagtails, pipits, waxwings, silky-flycatchers, warblers, tanagers, sparrows, towhees, longspurs, grosbeaks, buntings, blackbirds, finches, and Old World sparrows (BirdWeb 2024). Passerines can be found all over the state, and they forage for a wide variety of food, including insects, arthropods, rodents and other small mammals, small birds, seeds, nuts, berries, fruit, carrion, aquatic macroinvertebrates, fish eggs, and small fish (BirdWeb 2024). Passerine habitats are diverse and can range from residential areas, riparian zones, mixed forests, boreal forests, grasslands, shrubsteppe, oak woodlands, prairies, dunes, agricultural lands, wetlands, coniferous forests, deciduous forests, near mountain streams, ponds, and lake edges (BirdWeb 2024).

3.2.2.2.2 Waterfowl, shorebirds, wading birds, and other waterbirds

Waterfowl (ducks, geese, and swans), shorebirds (e.g., plovers, oystercatchers, stilts, avocets, sandpipers, gulls, terns, skuas, jaegers, auks, murres, and puffins), wading birds (e.g., herons, egrets, ibises, rails, cranes, bitterns, and coots), and other waterbirds (e.g., loons, grebes, cormorants, pelicans, albatrosses, and petrels) represent some of the most abundant groups of birds in Washington that live on or near water (BirdWeb 2024). Some groups are migratory, and others remain residential.

The majority of these waterfowl and shorebirds nest on the ground, and many forage in flocks on the ground or water. Most waterfowl feed while on the water by submerging their heads to forage (BirdWeb 2024). Newly hatched waterfowl are precocial, meaning they are able to swim and eat independently almost immediately after hatching. Shorebirds are a large and varied group of birds that nest and feed on invertebrates or other small aquatic creatures. Wading birds typically nest and roost in trees, many in colonies, and feed on aquatic prey. Other waterbirds may nest on the ground, on rocks or reefs, in or atop trees, in marshes, on water, or at the water's edge in emergent vegetation (BirdWeb 2024).

The Washington State Trust Lands Habitat Conservation Plan is a long-term, multi-species, forest management plan developed for DNR to help protect habitat for at-risk species such as the marbled murrelet (DNR 1997).

3.2.2.2.3 Gallinaceous birds

Washington's gallinaceous birds (i.e., terrestrial game birds) include two families: *Phasinaidae* (chukar, partridges, grouse, wild turkeys, pheasants, and ptarmigan) and *Odontophoridae* (quail) (BirdWeb 2024). They are all ground-dwelling birds that are mostly non-migratory, though they can seasonally use different habitats. Their young are precocial, which enable them to lay large clutches of eggs, and nests are typically built on the ground. Trees may be used for foraging or roosting, particularly in the winter. They are omnivorous, though they typically eat plants in the winter and insects in the summer. Quail tend to inhabit early successional, brushy areas.

Species listed as "species of special concern" by the USFWS and as "threatened" by the WDFW include greater sage-grouse (*Centrocercus urophasianus*) and sharp-tailed grouse

(*Tympanuchus phasianellus*). In Washington, both species can only be found on the eastern side of the state (BirdWeb 2024).

3.2.2.2.4 Birds of prey and vultures

Birds of prey include turkey vultures, raptors (e.g., falcons, kestrels, hawks, kites, harriers, goshawks, osprey, and eagles), and owls (e.g., barn owls, flammulated owls, western screech-owls, snowy owls, northern hawk owls, northern pygmy-owls, burrowing owls, northern spotted owls, barred owls, great gray owls, long-eared owls, short-eared owls, boreal owls, and northern saw-whet owls) (BirdWeb 2024). These species can represent the top avian predators in many ecosystems.

Turkey vultures (*Cathartes aura*) are the only vulture species to occur in Washington (BirdWeb 2024). They are scavengers that prefer fresh carrion, and typically feed on smaller species, though they can gather communally at night to feed on large carcasses. They utilize a wide variety of habitats, including open areas for foraging, and rocky outcroppings, cliffs, and forests for nesting. Their nests are typically located far from human disturbance in sheltered areas.

Raptors in Washington are split into two families: *Falconidae* (true falcons and kestrels) and *Accipitridae* (consisting of all other raptors noted in the above paragraph) (BirdWeb 2024). Falcons are some of the fastest flying birds in the state, aided by their long tails and pointed wings. Their prey ranges from other avian species that they catch in air, to small mammals, ground-dwelling birds, and insects, and they nearly always use their feet to catch their prey. Falcons are typically monogamous, and the females are larger than the males. Their young are not precocial, so extended parental care is common. Their habitats are diverse, ranging from open areas, cliffs, suburban towns, agricultural lands, riparian areas, boreal forests, and mountainous areas.

Other raptors found in Washington (hawks, kites, harriers, goshawks, osprey, and eagles) are all diurnal hunters that catch their prey with their feet (BirdWeb 2024). Like falcons, the females are larger than the males and they form long-term monogamous pairs that take care of their young for extended periods of time. Many species in this family are migratory, and they generally follow ridgelines to take advantage of updrafts when flying south. Their habitats are diverse, ranging from open areas, mature sloped coniferous forests, estuaries, marshes, lakes, rivers, grasslands, agricultural lands, deciduous forests, urban and suburban areas, prairies, sagebrush desert, shrubsteppe, tundra, boreal forest, and rocky cliffs. Raptor use of an area may be substantial if the area contains high prey density, usually in the form of ground squirrels, pocket gophers, and rabbits (WEST 2006).

Barn owls are the only member of *Tytonidae* to occur in Washington (BirdWeb 2024). They can typically be found in open habitats, particularly agricultural lands or basalt cliffs, as well as forests and wetlands. The other 14 species of owls found in Washington belong to *Strigidae*. Their habitats are diverse, ranging from coniferous or mixed forests, streamside woodlands, deserts, suburban areas, tundra, prairies, agricultural lands, open terrain, snags, mountainous areas, shrubsteppe, grasslands, marshes, shorelines, and boreal forest (BirdWeb 2024). Owl

diets typically consist of small mammals, small birds, amphibians, reptiles, and large invertebrates. Owl mates are typically monogamous.

The Washington State Trust Lands Habitat Conservation Plan also addresses conservation strategies that provide protection for northern spotted owls (DNR 1997).

3.2.2.2.5 Other non-passerine birds

Other non-passerine birds in Washington include pigeons, doves, cuckoos, swifts, hummingbirds, kingfishers, and woodpeckers (BirdWeb 2024).

Pigeons and doves both belong to the *Columbidae* family, and three species can be commonly found in Washington, including the mourning dove (*Zenaida macroura*), band-tailed pigeon (*Patagioenas fasciata*), and rock pigeon (*Columba livia*). The Eurasian collared-dove (*Steptopelia decaocto*) is noted as an invasive species that has been found in Washington, and the white-winged dove (*Zenaida asiatica*) is a rarer visitor that primarily lives in the Southwest of the United States (BirdWeb 2024). Pigeons and doves typically eat seeds, berries, nuts, acorns, fruit, and human food in urban areas. Their habitats range from suburban areas, urban cities, agricultural lands, cliffs, mixed forests, tidal flats, and mineral springs (BirdWeb 2024).

There are two cuckoo species that can possibly be found in Washington: the yellow-billed cuckoo (*Coccyzus americanus*) and the black-billed cuckoo (*Coccyzus erythropthalmus*). Yellow-billed cuckoos are considered extirpated in Washington, though there can be occasional sightings of individuals. Due to a lack of surveys, there remains the possibility that breeding pairs of yellow-billed cuckoos exist but have not been seen. There have only been 20 sightings in Washington since the 1950s (WDFW 2024l). Their habitat consists of large, continuous, deciduous riparian zones. Their diet mainly consists of large invertebrates, and they are a migratory species (WDFW 2024l). The black-billed cuckoo is a close relative of the yellow-billed cuckoo, and they have a similar habitat of deciduous woodlands. They have only been spotted in Washington four times, most recently in 1988, and are unlikely to be found in Washington.

The order Apodiformes has two family representatives in Washington: swifts (*Apodidae*) and hummingbirds (*Trochilidae*) (BirdWeb 2024). Both families have birds with similar wing structures evolved for rapid movement, and they only have 10 tail feathers, whereas most other birds have 12 tail feathers. There are three swift species found in Washington; black swift (*Cypseloides niger*), Vaux's swift (*Chaetura vauxi*), and the white-throated swift (*Aeronautes saxatalis*), and they are all common (BirdWeb 2024). They tend to both forage and nest in groups, and they are fast birds that forage for insects in the air. Swifts can fly long distances from their breeding grounds to forage. Foraging habitat can range from the open air over shrubsteppe, grasslands, wetlands, ponderosa pines near cliffs, lakes, rivers, forests, and mountainous areas. Nesting and breeding grounds can range from forested areas near rivers (particularly on damp cliffs or behind waterfalls), snags found in old-growth forests, and sea cliffs (BirdWeb 2024). They tend to nest in cavities and crevices that are not easily disturbed, and they build nests that stick to their preferred location with their saliva.

There are eight species of hummingbirds that have been seen in Washington, though four of those species have very infrequent sightings and are not commonly found. Species that can be found include the black-chinned hummingbird (*Archilochus alexandri*), Anna's hummingbird (*Calypte anna*), Calliope hummingbird (*Stellula calliope*), and rufous hummingbird (*Selasphorus rufus*). Hummingbirds have a unique flight style that allows them to hover in one spot, fly backwards, or fly forwards. The Anna's hummingbird can be found year-round, and the other three Washington hummingbird species migrate south for the winter (BirdWeb 2024). Hummingbirds feed on insects, arthropods, nectar, sap, and sugar water from human-provided hummingbird feeders. Their habitats can range from forest edges, residential areas, subalpine shrubby habitats, ponderosa pine zones, near wetlands, and in riparian zones (BirdWeb 2024).

The belted kingfisher (*Megaceryle alcyon*) is the only kingfisher species that can be found in Washington. Their foraging and nesting habitat consists of shorelines and wetlands in both salt and freshwater environments, and they predominantly eat fish, amphibians, and crayfish. They create their nests in burrows within sandy banks (BirdWeb 2024).

There are thirteen woodpecker species considered to be found in Washington, though one of those (the yellow-bellied sapsucker [*Sphyrapicus varius*]) is considered to be an accidental visitor to the state and is uncommonly found (BirdWeb 2024). Woodpeckers are adapted to climb trees and find food within the wood of trees. Woodpeckers typically eat insects but will also eat acorns, nuts, seeds, sap, nectar, berries, and fruits. Many woodpecker species are monogamous, and they create their nests by excavating nest cavities that are then lined with woodchips. Woodpecker habitat ranges from forested riversides, ponderosa pine forests, Garry oak stands, mixed forests, mountainous areas, old-growth forests, and residential areas (BirdWeb 2024).

3.2.2.3 Mammals

There are over 100 mammal species that live in Washington state and the study area. The more common mammals include bats, squirrels, raccoons, rabbits, skunks, moles, voles, mice, rats, nutria, opossums, muskrats, pocket gophers, beavers, river otters, bobcats, cougars, coyotes, black bears, deer, elk, moose, mountain goat, and pronghorn antelope.

The following discussion emphasizes species that have habitats that could be affected by solar energy development facilities and/or are representative of other species that share important habitats. Threatened, endangered, and other special-status mammal species are addressed in Section 3.2.2.6.

3.2.2.3.1 Bats

Fifteen species of bats reside in Washington and may occur within or adjacent to the study area. Bats are flying mammals that hibernate during the winter in a variety of locations, including caves, tunnels, attics, old wells, mine shafts, and cavities in large trees (WDFW 2024a). During hibernation, temperatures must be cool enough for bats to maintain a low body temperature but refrain from freezing, and humidity must be high and constant (WDFW 2024a). Bats typically enter their hibernation sites from late September to October, and they

may hibernate either alone or in groups (WDFW 2024a). Most bats in Washington also breed at their hibernation sites from late fall to winter, and fertilization occurs in the spring after the females waken from hibernation. Bats in Washington go into hibernation because there is a dearth of flying insects available for them to eat in the winter, so in order to survive, bats hibernate or migrate to regions with more insects, or a combination of both strategies (WDFW 2024a). If bats are disturbed during hibernation, they expend weeks' worth of energy to increase their body temperatures out of the hibernation state. Hibernating bats can starve to death before the spring or abandon their young if they are disturbed multiple times.

Of the fifteen species found in Washington, the species most commonly found around humans include the little brown bat (*Myotis lucifugus*), Yuma myotis (*Myotis yumanensis*), big brown bat (*Eptesicus fuscus*), pallid bat (*Antrozous pallidus*), and California myotis (*Myotis californicus*) (WDFW 2024a). Washington bats can range in size from 2.5 inches long (the canyon bat [*Parastrellus hesperus*]) to 6 inches long (the hoary bat [*Lasiurus cinereus*]). Bats can be found in a variety of habitats, including forests, shrubsteppe, deserts, canyons, arid grasslands, riparian zones, and urban areas, and can be found from sea level to more mountainous areas. Foraging for a variety of insects tends to occur from dusk to dawn in a variety of habitats.

3.2.2.3.2 Ungulates

Ungulates are mammals with hooves, and all ungulates found in Washington are even-toed, meaning that they walk on two of their five toes, and are all ruminants, meaning they have stomachs that are divided into compartments, allowing for easier and more productive digestion of plant matter (WDFW 2024m). Ungulate species found in Washington state that may occur within or adjacent to the study area include elk, moose, deer, bighorn sheep, mountain goats, pronghorn antelope, and woodland caribou.

WDFW formally recognizes 10 elk herds in Washington including both native subspecies of Rocky Mountain elk (*Cervus canadensis nelsoni*) and Roosevelt elk (*Cervus elaphus roosevelti*). Rocky Mountain elk can be primarily found in the mountain ranges and shrublands east of the Cascades, though small herds can also be found throughout parts of western Washington (WDFW 2024n). Bull Rocky Mountain elk can weigh up to 800 pounds and can run up to 35 miles an hour. The typical lifespan of an elk is 12 to 16 years. During the spring and summer months, elk tend to eat herbaceous plants such as grasses, sedges, and flowering plants. In the fall, elk spend more time browsing on the sprouts and branches of trees and shrubs, though they continue to eat grasses when available (WDFW 2024n). Roosevelt elk are typically found west of Interstate 5 and not in the study area.

Moose (*Alces alces*) in Washington are primarily found in the Northern Rockies and Columbia Plateau ecoregions, and their secondary range can be located in the Blue Mountains and North Cascades ecoregions. They can be as tall as 6 feet at the shoulder, and bulls can weigh up to 1,100 pounds. Moose are herbivorous, and they eat aquatic vegetation as well as the leaves, bark, and twigs from trees and shrubs (WDFW 2024o). Males are solitary, though females stay with their calves. Moose typically live 8 to 12 years.

According to WDFW, there are four subspecies of deer in Washington state: Rocky Mountain mule deer (*Odocoileus hemionus hemionus*), white-tailed deer (*O. virginianus*), Columbian white-tailed deer (*O. virginianus leucurus*), and Columbian black-tailed deer (*O. h. columbianus*) (WDFW 2024d). Columbian white-tailed deer primarily occur in the eastern third of Washington, mule deer primarily occur east of the Cascades, and black-tailed deer primarily occur west of the Cascades. Black-tailed deer are the most common species of deer in Washington. Mule deer are the largest species of deer in Washington. Columbian white-tailed deer were federally listed as an endangered species in Washington in 1967. Like elk, deer eat a variety of vegetation, ranging from grasses and other herbaceous species to browsing trees and shrubs. Male deer can weigh up to 250 pounds.

WDFW recognizes and manages 17 identified herds of bighorn sheep (*Ovis canadensis*) across central and eastern Washington. Male bighorn sheep can weigh over 250 pounds, and they can be identified by their large brown horns that curl back over their ears. Bighorn sheep have an average lifespan of 9 to 14 years, and they are the largest wild sheep in North America. They tend to be found in rugged terrain, and their hooves are adapted for that habitat.

Mountain goats (*Oreamnos americanus*) can weigh up to 180 pounds and can only be found in northwestern North America. They are native to the Cascade Range and have been introduced to the Blue Mountains and the Olympic Peninsula. As of 2008, anywhere between 2,400 and 3,200 mountain goats are estimated to live in Washington (WDFW 2024p). Breeding season occurs from mid-November to early December. Mountain goats eat alpine vegetation and supplement minerals through natural mineral licks and human-related minerals.

Pronghorn antelope (*Antilocapra americana*) can weigh up to 155 pounds and are smaller than most other ungulates found in Washington, measuring up to 3 feet at shoulder height (WDFW 2024f). Their habitat consists of open grasslands, where they graze on shrubs and grasses, and they can run over 55 miles an hour to escape predators. They have an average lifespan of 7 to 10 years.

Ecoregion 15y includes the largest contiguous old-growth cedar–hemlock forest in the interior U.S., extensive peatlands, and important lynx and grizzly bear habitat. It supported the only woodland caribou (*Rangifer tarandus*) herd in the conterminous U.S. Woodland caribou are listed as endangered both federally and by Washington State, and WDFW has noted their vulnerability to climate change to be high. Woodland caribou can measure 4.6 feet tall at the shoulder and weigh up to 500 pounds, and their hooves are adapted to allow them to cross wetlands and deep snow. The South Selkirk subpopulation of woodland caribou ranged from southeastern British Columbia, through northeastern Washington and northern Idaho, and was the only subpopulation to consistently range into the contiguous United States. The population declined rapidly from hundreds in the late 1800s to only 3 in 2018, and the last surviving member of the subpopulation was captured and moved to a pen enclosure near Revelstoke in 2019 (WDFW 2024q). They are now considered extirpated in Washington.

3.2.2.4 Reptiles

Reptiles found in Washington include lizards and snakes. Turtles and amphibians are discussed in Section 3.2.5.4. Washington habitats support snakes in the boa (*Boidae*), colubrid (*Colubridae*), and viper (*Viperidae*) families, totaling 12 species. Lizard families supported in Washington include the alligator lizard (*Anguidae*) family, iguanids (*Iguanidae*), and skinks (*Scincidae*) (WDFW 2024r).

The northern rubber boa is the only snake in the boa family to occur in Washington and can be found statewide. In the colubrid family, in Washington, the California mountain kingsnake (*Lampropeltis zonata*) has only been documented in southernmost areas of eastern Skamania County and western Klickitat County, which is isolated from the rest of the species' range by approximately 200 miles (WDFW 2024r). Other rarer snake species based on limited and patchy distributions include the common sharp-tailed snake (*Contia tenuis*), the desert striped whipsnake (*Coluber taeniatus taeniatus*), the northern desert nightsnake (*Hypsiglena chlorophaea deserticola*), and the ring-necked snake (*Diadophis punctatus*). Commonly found colubrid snake species include the common gartersnake (*Thamnophis sirtalis*), the gophersnake (*Pituophis catenifer*), the northwestern gartersnake (*Thamnophis ordinoides*), the terrestrial gartersnake (*Thamnophis elegans*), and the western racer (*Coluber constrictor*). The only viper snake found in Washington is the western rattlesnake (*Crotalus oreganus*), a widespread species in eastern Washington. Some snakes are exclusively found on either side of the Cascade crest, and others are more widespread throughout the state. Habitats can range from riparian zones, wetlands, lakes, shrubsteppe, desert, prairies, grasslands, and forests. They typically eat small mammals, amphibians, slugs, earthworms, and lizards.

There are seven species of lizards noted by WDFW as being found in Washington (WDFW 2024r). The northern alligator lizard (*Elgaria coerulea*), western fence lizard (*Sceloporus occidentalis*), and western skink (*Plestiodon skiltonianus*) are widespread throughout the state, and though the southern alligator lizard's (*Elgaria multicarinata*) range is more limited to south-central Washington, they are commonly found within their suitable habitat. The northern sagebrush lizard (*Sceloporus graciosus*), pygmy short-horned lizard (*Phrynosoma douglasii*), and side-blotched lizard (*Uta stansburiana*) are considered to have "of concern" statuses in Washington, either because they are rarer or their habitat is being threatened. Typical habitats can range from dry open forests, shrubsteppe, grasslands, shorelines, rocky canyons, sand dunes, or near creeks.

3.2.2.5 Invertebrates

Invertebrate groups include insects, mites, spiders, collembola (phylum *Arthropoda*), land snails and slugs (class *Gastropoda*), and worm (phylum *Annelid*) species. Invertebrates can be found in a variety of habitats, they provide a food source for other wildlife, and perform a variety of functional roles that are important for habitat health including carbon and nutrient cycling, pollination, microclimate control, decomposition, and plant biomass control (Niwa et al. 2001).

3.2.2.6 Special-status terrestrial species

The state of Washington provides a variety of habitats that support many plant and animal species that are listed as threatened, endangered, proposed for listing (i.e., candidate), or otherwise deemed as species of special concern at the federal, state, and local levels. Special-status species include the following:

- Plants and animals listed as endangered, threatened, or proposed for listing under the ESA
- Priority plant and animal species deemed sensitive by WDFW
- Plants and animals identified as rare species under the DNR Natural Heritage Program
- Plants and animals identified in county or municipal codes or associated ordinances as species of local importance or concern

3.2.2.6.1 Threatened and endangered species

ESA-listed species that may occur in Washington are summarized in Table 3. These species may also occur in the terrestrial study area for solar energy development. Attachment 1 includes the USFWS IPaC resource list for the state of Washington and details the 31 ESA-listed terrestrial species located in Washington. The USFWS Critical Habitat for Threatened and Endangered Species online mapper can also be used to view designated critical habitat for ESA-listed species in Washington (USFWS 2024a).

Table 3. USFWS federally listed terrestrial species

Species name	State status	Federal status	Critical habitat
Mammals			
Canada lynx (*Lynx canadensis*)	Endangered	Threatened	Designated/Occurs Within Study Area
Columbian white-tailed deer (*Odocoileus virginianus*)	Threatened	Threatened	Not Designated
Gray wolf (*Canis lupis*)	Endangered	Endangered	Not Designated
Grizzly bear (*Ursus arctos horribilis*)	Endangered	Threatened	Not Designated
North American wolverine (*Gulo gulo luscus*)	Candidate	Threatened	Not Designated
Olympia pocket gopher (*Thomomys mazama pugetensis*)	Threatened	Threatened	Designated/Does Not Occur Within Study Area
Pygmy rabbit (*Brachylogies idahoensis*)	Endangered	Endangered	Not Designated
Roy prairie pocket gopher (*Thomomys mazama glacialis*)	Threatened	Threatened	Not Designated
Southern Mountain Caribou DPS (*Rangifer tarandus* ssp. *caribou*)	Endangered	Endangered	Designated/Occurs Within Study Area
Tenino pocket gopher (*Thomomys mazama tumuli*)	Threatened	Threatened	Designated/Does Not Occur Within Study Area

Species name	State status	Federal status	Critical habitat
Yelm pocket gopher (*Thomomys mazama yelmensis*)	Threatened	Threatened	Designated/Does Not Occur Within Study Area
Birds			
Hawaiian petrel (*Pterodroma sandwichensis*)	None	Endangered	Not Designated
Marbled murrelet (*Brachyramphus marmoratus*)	Endangered	Threatened	Designated/Occurs Within Study Area
Northern spotted owl (*Strix occidentalis caurina*)	Endangered	Threatened	Designated/Occurs Within Study Area
Short-tailed albatross (*Phoebastria albatrus*)	Candidate	Endangered	Not Designated
Streaked horned lark (*Eremophila alpestris strigata*)	Endangered	Threatened	Designated/Does Not Occur Within Study Area
Western snowy plover (*Charadrius nivosus nivosus*)	Endangered	Threatened	Designated/Does Not Occur Within Study Area
Yellow-billed cuckoo (*Coccyzus americanus*)	Endangered	Threatened	Not Designated
Reptiles			
Northwestern pond turtle (*Actinemys marmorata*)	Endangered	Proposed Threatened	Not Designated
Insects			
Island marble butterfly (*Euchloe ausonides insulanus*)	Candidate	Endangered	Designated/Does Not Occur Within Study Area
Monarch butterfly (*Danaus plexippus*)	Candidate	Candidate	Not Designated
Taylor's checkerspot (*Euphydryas editha taylori*)	Endangered	Endangered	Designated/Does Not Occur Within Study Area
Flowering Plants			
Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*)	Endangered	Threatened	Designated/Does Not Occur Within Study Area
Marsh sandwort (*Arenaria paludicola*)	Possibly Extirpated	Endangered	Not Designated
Showy stickseed (*Hackelia venusta*)	Endangered	Endangered	Not Designated
Spalding's catchfly (*Silene spaldingii*)	Threatened	Threatened	Not Designated
Umtanum desert buckwheat (*Eriogonum codium*)	Endangered	Threatened	Designated/Occurs Within Study Area
Ute ladies'-tresses (*Spiranthes diluvialis*)	Endangered	Threatened	Not Designated
Wenatchee Mountains checkermallow (*Sidalcea oregana* var. *calva*)	Endangered	Endangered	Designated/Occurs Within Study Area
White Bluffs bladderpod (*Physaria douglasii* spp. *tuplashensis*)	Threatened	Threatened	Designated/Does Not Occur Within Study Area

Species name	State status	Federal status	Critical habitat
Conifers and Cycads			
Whitebark pine (*Pinus albicaulis*)	Sensitive	Threatened	Not Designated

3.2.2.6.2 State priority species

WDFW has a total of 111 terrestrial species on their statewide PHS list, including snails, slugs, beetles, dragonflies, bees, butterflies, snakes, lizards, birds, and mammals (WDFW 2023). Many of these PHS-listed species occur within the study area. The WDFW PHS on the Web online mapper can be used to view species on the PHS list within Washington (WDFW 2024h).

3.2.3 Aquatic habitats

The following sections describe the types of aquatic habitats that could be present in the study area, including habitats for freshwater and anadromous fish, amphibians, turtles, mollusks, urchins, crustaceans, and aquatic macroinvertebrates that could be affected by the facilities considered in this PEIS. The Washington Priority Habitat types that could be affected by the facilities include instream, freshwater wetland, and fresh deepwater habitats (WDFW 2023).

Freshwater aquatic habitat conditions are influenced by climatic conditions including precipitation level and temperature, and whether the source of the waterbody is glacial meltwater, snowmelt, or rain dominated. In addition, the connectedness of surface water with groundwater is determined by local geology and soil conditions.

Instream habitat is defined as the combination of physical, biological, and chemical processes and conditions that interact to provide functional life-history requirements for instream fish and wildlife resources. Freshwater wetlands are defined as transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface or covered by shallow water during the growing season each year. Ponds containing emergent vegetation may also be classified as freshwater wetlands. In western Washington, wetlands can be dominated by tidal influences and developed in the outwash plains left by glaciers (Hruby and Yahnke 2023). In the semi-arid regions of eastern Washington, aquatic habitats and associated riparian vegetation develop along elevation contours and gradients determined by geomorphic, erosional, and depositional formations (Hruby 2014). In comparison to wetter environments, water is present on the land for shorter durations and low levels of precipitation support lower vegetation biomass in riparian areas.

Instream habitat and freshwater wetlands can be further subdivided by the predominant hydrologic conditions in different areas and accessibility of the habitat to aquatic animals.

Surface waters that provide aquatic habitat can be categorized based on how long water is present and flowing on land throughout the year:

- Ephemeral streams are rain and snowmelt dependent. They have flowing water during brief periods of precipitation, typically during fall and early spring rain events.
- Intermittent streams are seasonal, with flowing water only during certain times of the year based on precipitation patterns or groundwater levels.
- Perennial streams have flowing water year-round.

Unique ecological functions are provided by low-order ephemeral and intermittent surface waters with intact riparian corridors:

- Provision of fish and wildlife habitat, oftentimes temporary, especially for reproduction or early rearing life stages in the spring
- Regulation of water temperature when shaded by reed-beds or riparian shrubs and trees
- Provision of organic inputs (e.g., leaves, pollen, and terrestrial insects) as a source of nutrients that support aquatic food webs close to, or distant downstream areas when seasonally connected

Fresh deepwater habitat is defined as permanently flooded areas lying below the deepwater boundary of wetlands (WDFW 2023). Surface water is permanent and often deep and includes all underwater structures and features such as rock piles, woody debris, and caverns. The principal medium in which the dominant organisms live is water, and the dominant plants are hydrophytes (WDFW 2023). Fresh deepwater habitat is found in all ecoregions of the state of Washington.

Human-created water storage features such as ditches, irrigation canals, or water retention ponds can provide opportunistic habitat for aquatic species although they are often lacking important habitat elements and may be lower quality habitat compared to natural ponds, wetlands, and streams. These features would not be protected by the regulatory framework in place to protect natural aquatic habitat.

Instream, fresh deepwater, and freshwater wetland habitats occur throughout all six ecoregions. Persistent snowpack in the Cascades, Eastern Cascades Slopes and Foothills, North Cascades, Northern Rockies, and Blue Mountains regions creates snowmelt-dominated waterbodies. In the uplands of the Cascades, Eastern Cascades Slopes and Foothills, North Cascades, and Northern Rockies regions, waterbodies are also glacially fed. Snowmelt originating from high-altitude watersheds with large snowpack and glacial meltwater can sustain abundant, cold aquatic habitat throughout the dry season (approximately July through September), even in more arid Eastern Cascades Slopes and Foothills that experience greater air temperature extremes. In contrast, large portions of the eastern, semi-arid ecoregions that lack high-altitude water sources, including the Columbia Plateau and parts of the Eastern Cascades Slopes and Foothills, are characterized by low precipitation and higher water temperatures in summer and fall. In comparison to wetter environments, snow and runoff is

present on the land for shorter durations and lower vegetation biomass is present in riparian areas.

3.2.4 Special-status habitat

Critical habitat includes geographic areas containing features essential to the recovery of listed species. Aquatic critical habitat is extensive throughout the state of Washington and the study area. Many waterbodies within the state are critical habitats for listed species such as salmon, bull trout, and steelhead. The extent of critical habitat for each ESA-listed aquatic species is determined and mapped by USFWS or NOAA Fisheries, where those analyses have been completed (87 *Federal Register* 37757, 2022) (USFWS 2024b).

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" and is designated for groundfish, Pacific salmon, and coastal pelagic composites (50 *Code of Federal Regulations* 600.10, 2024). For the purposes of this PEIS, the EFH considered in the study area includes wetlands, lakes, and rivers that are necessary for fish reproduction, growth, feeding, and shelter (NOAA 2024a).

3.2.5 Aquatic species

This analysis focuses on aquatic and amphibious plants and animals that are likely to occur in areas that could be affected by new solar facilities. The types of solar facilities being considered are likely to be sited to avoid aquatic habitat; however, potential impacts such as changes to drainage patterns or water quality could extend to adjacent freshwater streams and lakes or wetlands and ponds. Groups of aquatic animals that could be affected include fish, shellfish, aquatic macroinvertebrates, amphibians, and turtles.

3.2.5.1 Vegetation

Aquatic vegetation grows in a variety of growth forms and habitat types. Shoreline plants grow along the edges of lakes, rivers, streams, and ponds. Emergent vegetation is rooted in sediment with at least part of the stems, leaves, and flowers emerging from the water's surface. Floating rooted plants are rooted to the sediment with leaves that float on the water's surface. They may grow individually or form a mat on the water's surface. Free-floating plants float on the surface of the water, in the water column, or lie on the bottom of the waterbody. These plants do not root in the sediment. Submersed plants root to the sediment, usually with their leaves entirely underwater (Ecology 2024a).

Riparian vegetation communities occur along the banks of waterbodies such as rivers, lakes, and perennial and intermittent streams. These vegetation communities provide essential ecological functions such as providing shade, large woody debris, and pollutant removal to create complex channel morphologies and diverse aquatic habitat conditions (Quinn et al. 2020). Local environmental conditions such as hydrologic regimes, local climate, and soil type may result in broad variations in the make-up of aquatic plant communities (Ecology 1997).

There are also 21 aquatic noxious weeds listed by the WSNWCB that could be found in the study area. Alteration to aquatic habitat can promote the spread of noxious weeds, which can have negative impacts on native species distribution. Further information on identification and distribution of aquatic noxious weeds can be found on the WSNWCB website (WSNWCB 2024).

3.2.5.2 Fish

Numerous fish species occur throughout Washington. Species are dependent on the unique ecological functions of freshwater and wetland and riparian ecosystems to carry out the stages of their life cycle.

3.2.5.2.1 Migratory species

Several highly migratory species use Washington's major river basins and their tributaries, sometimes traveling hundreds of miles between spawning, rearing, and foraging habitats. These include native anadromous species of salmon, steelhead, lamprey, and white sturgeon, which migrate from freshwater spawning and rearing areas to the ocean to grow, then back to freshwater to complete their unique life cycles.

Salmon, steelhead, and bull trout

There are nine anadromous salmonid species found in Washington state. Some fish travel hundreds of miles upstream to reach their spawning grounds and rely heavily on the connectivity of waterbodies to complete their migration. The duration of freshwater rearing stages depends on the species, and migration rates depend on seasonal flows and fish age and size. Salmonids rely on riverine conditions with cold, well-oxygenated water with clean gravels; low levels of fine sediments to complete spawning and embryo incubation; and intact riparian zones with complex channel features that include woody material for rearing.

Table 4 summarizes the 12 populations of anadromous salmon and trout listed as threatened and endangered under the Federal ESA (WDFW 2024h) that could be found in the study area. Anadromous salmonids can be found in all six ecoregions within the study area depending on their species and distinct population.

Table 4. ESU and DPS salmonid populations in Washington

Species	Population (ESU/DPS)	Federal ESA status
Chinook salmon (*Oncorhynchus tshawytscha*)	Lower Columbia River ESU	Threatened
	Snake River Fall ESU	Threatened
	Snake River Spring/Summer ESU	Threatened
	Upper Columbia River Spring DPS	Endangered
Coho salmon (*Oncorhynchus kisutch*)	Lower Columbia River ESU	Threatened
Chum salmon (*Oncorhynchus keta*)	Columbia River ESU	Threatened
Sockeye salmon (*Oncorhynchus nerka*)	Snake River ESU	Endangered
Steelhead (*Oncorhynchus mykiss*)	Middle Columbia River DPS	Threatened

Species	Population (ESU/DPS)	Federal ESA status
	Snake River DPS	Threatened
	Upper Columbia River DPS	Threatened
Bull trout (*Salvelinus confluentus*)	Coastal Recovery Unit	Threatened
	Mid-Columbia Recovery Unit	Threatened

Notes:
An evolutionarily significant unit (ESU) is a population of Pacific salmonids that is substantially reproductively isolated from other populations of the same species (NOAA 2024b). A distinct population segment (DPS) is a population that is discrete from other populations of the same species and significant in relation to the species as a whole (NOAA 2024b).

Lamprey

The Pacific lamprey (*Entosphenus tridentatus*) and river lamprey (*Lampetra ayresii*) are anadromous species that can migrate upstream hundreds of miles to complete the freshwater phase of its life cycle. Lamprey heavily rely on the connectivity of waterbodies to complete their migration. Larvae burrow in the soft substrate of low gradient, cold-water streams to filter feed and rear for up to 8 years. Adults spend several years in the ocean and migrate back to freshwater to spawn. They are largely nocturnal and migrate through the lower part of the water column, stopping frequently to attach to substrate. Anadromous lamprey can be found in all six ecoregions within the study area.

Sturgeon

The white sturgeon (*Acipenser transmontanus*) is an anadromous species that spawns in large rivers and migrates to estuarine and marine environments to feed and develop from juveniles to adults. Sturgeon are able to spawn multiple times during their extended lifespan, which can be around 60 to 70 years (NOAA 2024c). During spawning, eggs are broadcast into the water column in relatively swift portions of the river and may be dispersed downstream before settling into river substrate. White sturgeon exhibit physiological sensitivity to water temperature, and increasing water temperatures may reduce spawning success while increasing the risk of disease (WDFW 2024h). White sturgeon can be found within or adjacent to the study area in the mainstem Columbia and Snake rivers, which extend through the Cascades, Eastern Cascades Slopes and Foothills, Columbia Plateau, Northern Rockies, Blue Mountains, and North Cascades regions.

3.2.5.2.2 Resident freshwater fish species

The resident freshwater fish population is composed of species that spend their entire life cycle in freshwater habitat, and move across relatively smaller areas within a single lake or river basin.

Rainbow trout, cutthroat, and whitefish

Similar to anadromous salmon and steelhead, resident rainbow and cutthroat trout prefer clean, cold-water habitat, which is especially key for spawning. Adults require enough water depth and flow to provide unimpeded access to spawning areas. Spawning adults require

specific flow conditions, cover, and access to spawning gravel to deposit eggs. Rainbow and cutthroat trout can be found throughout all six ecoregions within the study area.

In summer, whitefish species occur in groups in pools in locations of upstream tributaries that exhibit cooler temperatures. Whitefish species can be found in the North Cascades, Northern Rockies, Columbia Plateau, and Eastern Cascades Slopes and Foothills regions.

Freshwater sculpins, minnows, and suckers

Sculpins are benthic species that are widely distributed throughout Washington rivers. They are highly mobile, with a range of a few hundred meters or less, and may occupy the river environment year-round. Adult sculpins prefer rivers with gravel or cobble substrate and tolerate warm or cool water. Sculpin species can be found in the North Cascades and Columbia Plateau regions.

Minnow species are small-bodied fishes. Juveniles and most adult minnows prefer shallow nearshore and shoreline environments, with low velocities during the warmer months, while retreating to deeper water from October through April. Minnow species can be found in the Cascades, Columbia Plateau, North Cascades, and Northern Rockies regions.

Sucker species tolerate high water velocities and prefer deeper water habitats during the day, moving to shallower habitat at night. Juveniles prefer shallower water, pools, and backwaters. Suckers prefer gravel substrate and riffle habitat for spawning, which occurs in the spring. Sucker species can be found in the North Cascades, Columbia Plateau, Northern Rockies, and Eastern Cascades Slopes and Foothills regions.

3.2.5.3 Freshwater shellfish and aquatic macroinvertebrates

There are five species of freshwater mussels found in Washington. Freshwater mussels are found in shallow habitats in permanent bodies of water, concentrating in areas with consistent flows and stable substrate conditions. Freshwater mussels rely on the movements of host fish to reproduce and disperse. Their association with fish allows them to populate new areas. Highly migratory species such as Chinook salmon (*Oncorhynchus tshawytscha*), cutthroat trout, and steelhead have been documented as host fish for freshwater mussels (WDFW 2024h). They are considered an excellent indicator of water quality (WDFW 2024h). Two of these species, quagga mussels (*Dreissena bugensis*) and zebra mussels (*Dreissena polymorpha*), are highly invasive. Freshwater mussel species can be found throughout all nine ecoregions of Washington. There are 15 species of crayfish found in all freshwaters across Washington state, with signal crayfish (*Pacifastacus leniusculus*) being the only native species. Juveniles prefer shallow, weedy areas that provide protection from predators, while adults favor areas of deeper water (WDFW 2024s). Crayfish species can be found in waterbodies in all six ecoregions within the study area.

There are eight species of freshwater aquatic snails in Washington. They occur in cold, shallow, slow-flowing streams, springs, and permanent seeps with high dissolved oxygen content. Egg masses can be found under rocks or in loose, stable cobble substrate away from the flowing

current. *Juga* species exhibit seasonal upstream and downstream migrations (WDFW 2024h). Freshwater aquatic snail species can be found in all six ecoregions within the study area.

Benthic macroinvertebrates in freshwater are excellent indicators of the biological health and water quality of stream systems. Species include insects, crustaceans, mollusks, and worms that live in or near the streambed. Due to their limited mobility, they cannot escape exposure to pollutants and can integrate the effects of the stressors they are exposed to in freshwater drainages (USEPA 2023). These organisms also play a crucial role in freshwater ecosystems by providing food for adults and juveniles of larger aquatic species such as fish and amphibians. Resources are publicly available showing the health of specific streams and rivers within Washington state based on macroinvertebrate presence and abundance (e.g., Puget Sound Stream Benthos 2024).

3.2.5.4 Amphibians and turtles

Amphibians include frogs, toads, and salamanders. There are 25 native species of amphibians and five native species of turtles in the freshwaters of Washington (WDFW 2024r). Amphibians and turtles rely on still water such as ponds, wetlands, ephemeral pools, or slow-moving areas of rivers and creeks for breeding, egg laying, and juvenile rearing. Amphibians and freshwater turtles may migrate along waterbodies during wetter seasons. Within more arid regions, they may become residents in isolated waterbodies. Amphibian and freshwater turtle species are found throughout the six ecoregions within the study area.

3.2.5.5 Aquatic invasive species

Changes in water conditions and habitat connectivity can alter the distribution and competitive advantage of invasive species. Invasive species can negatively impact native species through direct interactions like predation and competition and indirect actions like disease spread (NOAA 2024d). Aquatic invasive species of greatest concern within the study area include zebra and quagga mussels and northern pike (*Esox lucius*) (WDFW 2024t).

The American bullfrog (*Rana [Lithobates] catesbeiana*) is an invasive species that is approximately two times larger than Washington's native frogs. They are found in lowland permanent waterbodies such as wetlands, ponds, creeks, rivers, and lakes. Bullfrogs have been reported in lowland areas of all ecoregions in Washington except the Blue Mountains region. The Columbia Plateau and Canadian Rockies regions have the most documented sightings (WDFW 2024h).

A major group of resident freshwater fish species that have been introduced to Washington freshwater habitats as game fish are centrarchids, or fish from the sunfish family including smallmouth bass (*Micropterus dolomieu*). Bass are opportunistic predators and large individuals can prey heavily on juvenile salmon where their distributions overlap (Wydoski and Whitney 2003). Other abundant invasive fish species include walleye (*Sander vitreus*), crappie (*Pomoxis* spp.), yellow perch (*Perca flavescens*), and members of the carp or bullhead family.

3.2.6 Special-status species

The state of Washington provides a variety of habitats that support many plant and animal species that are listed as threatened, endangered, proposed for listing (i.e., candidate), or otherwise deemed as species of special concern at the federal, state, and local levels. Special-status species include the following:

- Plants and animals listed as endangered, threatened, or proposed for listing under the ESA
- Priority plant and animal species deemed sensitive by WDFW
- Plants and animals identified as rare species under the DNR Natural Heritage Program
- Plants and animals identified in county or municipal codes or associated ordinances as species of local importance or concern

ESA-listed species that may occur in Washington state are summarized in Table 5.

Table 5. Aquatic special-status species

Common name	Scientific name	State status	Federal status	Preferred habitat	List
Fish					
Chinook salmon (Lower Columbia River ESU)	*Oncorhynchus tshawytscha* pop. 1		Threatened	Instream, fresh deepwater	PHS, SGCN,[1] ESA
Chinook salmon (Upper Columbia River Spring DPS)	*Oncorhynchus tshawytscha* pop. 12		Endangered	Instream, fresh deepwater	PHS, SGCN, ESA
Chinook salmon (Snake River Fall ESU)	*Oncorhynchus tshawytscha* pop. 2		Threatened	Instream, fresh deepwater	PHS, SGCN, ESA
Chinook salmon (Snake River Spring/Summer ESU)	*Oncorhynchus tshawytscha* pop. 8		Threatened	Instream, fresh deepwater	PHS, SGCN, ESA
Sockeye salmon (Snake River ESU)	*Oncorhynchus nerka* pop. 1		Endangered	Instream, fresh deepwater	PHS, ESA
Bull trout	*Salvelinus confluentus*	Candidate	Threatened	Instream, fresh deepwater	PHS, ESA
Bull trout (Coastal Recovery Unit)	*Salvelinus confluentus* pop. 2	Candidate	Threatened	Instream, fresh deepwater	PHS, SGCN, ESA
Bull trout (Mid-Columbia Recovery Unit)	*Salvelinus confluentus* pop. 3	Candidate	Threatened	Instream, fresh deepwater	PHS, SGCN, ESA
Chum salmon (Columbia River ESU)	*Oncorhynchus keta* pop. 3		Threatened	Instream, fresh deepwater	PHS, SGCN, ESA
Coho salmon (Lower Columbia River ESU)	*Oncorhynchus kisutch* pop. 1		Threatened	Instream, fresh deepwater	PHS, SGCN, ESA
Steelhead (Middle Columbia River DPS)	*Oncorhynchus mykiss* pop. 17	Candidate	Threatened	Instream, fresh deepwater	PHS, SGCN, ESA
Steelhead (Snake River DPS)	*Oncorhynchus mykiss* pop. 13	Candidate	Threatened	Instream, fresh deepwater	PHS, SGCN, ESA
Steelhead (Upper Columbia River DPS)	*Oncorhynchus mykiss* pop. 12	Candidate	Threatened	Instream, fresh deepwater	PHS, SGCN, ESA
Lake chub	*Couesius plumbeus*	Candidate		Instream, fresh deepwater	PHS, SGCN
Leopard dace	*Rhinichthys falcatus*	Candidate		Instream, fresh deepwater	PHS, SGCN

Common name	Scientific name	State status	Federal status	Preferred habitat	List
Mountain sucker	*Catostomus platyrhynchus*	Candidate		Instream, fresh deepwater	PHS, SGCN
Pacific lamprey	*Entosphenus tridentatus*			Instream, fresh deepwater	PHS, SGCN
River lamprey	*Lampetra ayresii*	Candidate		Instream, fresh deepwater	PHS, SGCN
Umatilla dace	*Rhinichthys umatilla*	Candidate		Instream, fresh deepwater	PHS, SGCN
Amphibians					
Oregon spotted frog	*Rana pretiosa*	Endangered	Threatened	Instream, wetland	PHS, SGCN, ESA
Cascade torrent salamander	*Phyacoriton cascadae*	Candidate		Instream, wetland	PHS, SGCN
Columbia spotted frog	*Rana luteiventris*	Candidate		Instream, wetland	PHS, SGCN
Northern leopard frog	*Lithobates [Rana] pipiens*	Endangered		Wetland	PHS, SGCN
Rocky Mountain tailed frog	*Ascaphus montanus*	Candidate		Instream, wetland	PHS, SGCN
Van Dyke's salamander	*Plethodon vandykei*	Candidate		Instream, wetland	PHS, SGCN
Western toad	*Anaxyrus boreas*	Candidate		Fresh deepwater, wetland	PHS, SGCN
Mollusks					
California floater mussel	*Anodonta californiensis*	Candidate		Instream, fresh deepwater	PHS, SGCN
Reptiles					
Northwestern pond turtle	*Actinemys marmorata*	Endangered		Fresh deepwater, wetland	PHS, SGCN

Note:

1. SGCN: Species of Greatest Conservation Need (Source: WDFW 2015)

3.2.7 Wetlands

Wetlands occur throughout the study area where utility-scale solar facilities are considered. However, unlike many streams, rivers, and lakes whose locations and boundaries are often evident and relatively well mapped, there are no comprehensive sources that identify and map the presence, extent, and condition of wetlands. As such, future developers of utility-scale solar energy facilities would be required to conduct additional quantitative analyses and site surveys (e.g., wetland determination or delineations, wetland rating and functions and values assessments, critical area assessments) to determine the amount, type, and category of wetlands, and the width and condition of their associated buffers, that exist on and adjacent to proposed development sites as part of the facility planning phase.

Information on the potential occurrence of wetlands in the landscape is available from the following sources:

- USFWS's NWI (USFWS 2024c)
- Ecology's 2016 Modeled Wetland Inventory (Ecology 2016)[2]
- USGS NHD (USGS 2024c)
- Available local wetland inventories
- Aerial photography and Light Detection and Ranging (LiDAR) imagery
- USGS topographic maps
- Natural Resources Conservation Service Web Soil Survey (USDA-NRCS 2024)

Although these sources can offer general information on the likelihood of a site to support wetlands, they do not provide a definitive indication of the presence or absence of wetlands. The definitive presence of wetlands and a demarcation of their boundaries can only be determined through a wetland delineation performed in accordance with the 1987 *Corps of Engineers Wetland Delineation Manual* (1987 Manual; Environmental Laboratory 1987) and the appropriate regional supplement produced by the U.S. Army Corps of Engineers (USACE).[3]

Wetlands provide a number of important ecosystem functions, including habitat for terrestrial, aquatic, and amphibious species; water quality improvement; flood flow reduction/protection; shoreline stabilization; groundwater recharge; and streamflow maintenance (Ecology 2023). Many of these functions such as flood flow reduction and shoreline stabilization are particularly valuable to humans. This resource report focuses on wetland functions and values associated with the provision of habitat for aquatic and terrestrial species. Hydrological wetland functions and values, including those related to water quality, flood protection, shoreline stabilization, and groundwater recharge are addressed in the *Water Resources Report*.

[2] The Ecology (2016) Modeled Wetland Inventory only covers the western portion of the state.

[3] Two regional supplements to the 1987 Manual are applicable to Washington: 1) *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (USACE 2010); and 2) *Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008).

Because of their ecological importance and value to humans, wetlands are regulated under various federal, state, and local laws including Sections 401 and 404 of the CWA, the Washington State Water Pollution Control Act, and county and municipal critical areas ordinances. Although the definitions of the jurisdictional limits of wetlands are similar under these various laws, there are differences in whether or not a wetland is subject to federal or state regulation. In particular, federal regulations typically only apply to those wetlands that are directly connected to certain surface waters that are considered to be waters of the U.S. Those wetlands determined to be non-jurisdictional by the federal government are often regulated under state and local laws.

As part of state and local regulation of wetlands in Washington, wetlands are rated and categorized using the Washington State Rating System, which was developed by Ecology. The rating system includes specific regional methods for the western (Hruby and Yahnke 2023) and eastern (Hruby 2014) portions of the state.[4] These methods are designed to consider regional differences in climate, landforms, hydrology, and wetland types that are characteristic of those areas. Ecology's wetland rating system is used to differentiate wetlands based on their sensitivity to disturbance, significance in the watershed, rarity, ability to be replaced, and the beneficial functions they provide to society. The rating system evaluates wetlands on their ability to provide water quality improvement, hydrologic, and wildlife habitat functions based on the wetland's physical characteristics (site potential), surrounding environment (landscape potential), and the importance of those functions to humans (value) in the vicinity. The categories derived using the rating system include the following:

- **Category I wetlands** represent a unique or rare wetland type, are more sensitive to disturbance, or are relatively undisturbed and contain ecological attributes that provide a high level of functions. These types and functions are very difficult to replace.
- **Category II wetlands** provide high levels of some functions. These types and functions are very difficult to replace.
- **Category III wetlands** have moderate levels of functions. They have been disturbed in some ways and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands.
- **Category IV wetlands** have the lowest levels of functions and are often heavily disturbed.

Wetland categories are used by local entities to assign protective buffers to wetlands under their critical areas regulations.

Because Category I and II wetlands typically represent relatively unique or rare wetland types that are difficult to replace and that provide high levels of function, any impacts on those wetland types would be difficult to mitigate for and would be determined on a case-by-case

[4] Western Washington is typically considered to mean "the geographic area in Washington west of the crest of the Cascade Mountains from the international border to the top of Mt. Adams, then west of the ridge line dividing the White Salmon River drainage from the Lewis River drainage and west of the ridge line dividing the Little White Salmon River drainage from the Wind River drainage to the Washington-Oregon state line" (Hruby and Yahnke 2023). Areas to the east of this boundary are considered eastern Washington.

basis. As shown in Table 6, Ecology has identified typical Category I and II wetlands for both the eastern and western portions of the state. Based on the geographic area of study for solar facilities, some western Washington wetland types (e.g., estuarine, interdunal, and coastal lagoons) are unlikely to occur where facilities considered in this PEIS may be sited.

Table 6. Typical Category I and II wetlands in the study area

Regional wetland category descriptions
Eastern Washington Category I wetlands
Alkali Wetlands: Wetlands characterized by the presence of shallow saline water with a high pH. Such wetlands provide primary habitat for several species of migrant shorebirds and are also heavily used by migrant waterfowl. They also support unique plants and animals not found anywhere else in eastern Washington, including important pollinators (e.g., alkali bees) that are vital to agriculture in the western United States.
Wetlands of High Conservation Value: Wetlands previously called Natural Heritage Wetlands that have been identified by the DNR Natural Heritage Program as important ecosystems for maintaining plant diversity in the state.
Bogs and Calcareous Fens *Bogs:* Wetlands with peat soils and a low pH (typically <5) that support plants and animals specifically adapted to such conditions. Bogs do not tolerate changes or disturbance well with even minor changes in water quality or nutrient inputs potential resulting in major adverse effects on the plant and animal communities. They are also extremely slow to develop. *Calcareous Fens:* Wetland with peat soils that exhibit neutral or alkaline conditions (pH >5.5) that are maintained by groundwater rich in calcium and magnesium bicarbonates (or sometimes calcium and magnesium sulfates) and that support rare plants and animals. Considered to be one of the rarest wetland types in the United States and one of the rarest peat wetland types in Washington. Found only in north-central to northeastern part of the state.
Mature and Old-growth Forested Wetlands with Slow Growing Trees: Wetlands containing mature of old-growth forested wetlands that are over 0.25 acre and dominated by slow growing tree species such a red cedar (*Thuja plicata*), Alaska yellow cedar (*Chamaecyparis nootkatensis*), pines (mostly western white pine, *Pinus monticola*), western hemlock (*Tsuga heterophylla*), Oregon white oak (*Quercus garryana*), and Engelmann spruce (*Picea engelmannii*).
Forests with Aspen Stands: Forested wetlands that include quaking aspen (*Populus tremuloides*) stands. Aspen stands are a PHS habitat.
Wetlands that Perform Many Functions Very Well: Wetlands scoring 22 points or more (out of 27) from the rating of functions.
Eastern Washington Category II wetlands
Forested Wetlands in the Floodplains of Rivers: Forested wetlands in the floodplain that are critical to the proper functioning and dynamic processes of rivers including influencing channel form and providing habitat for many aquatic species.
Mature and Old-growth Forested Wetlands with Fast Growing Trees: Mature and old-growth forested wetlands with over 0.25 acre of forest dominated by fast growing native trees such as red alder (*Alnus rubra*), cottonwood (*Populus* spp.), willow (*Salix* spp.), quaking aspen, and birch (*Betula* spp.)
Vernal pools: Vernal pool ecosystems are formed when small depressions in scabrock or in shallow soils fill with snowmelt or spring rains. They retain water until the late spring when they dry out as a result of reduced precipitation and increased evapotranspiration. Vernal pools hold water long enough throughout the year to allow some strictly aquatic organisms to flourish, but not long enough for the development of typical wetland characteristics.

Regional wetland category descriptions
Wetlands that Perform Functions Well: Wetlands scoring between 19 and 21 points (out of 27) on the questions related to functions. Includes wetlands judged to perform most functions relatively well or one group of functions very well and the other two moderately well.
Western Washington Category I wetlands
Wetlands of High Conservation Value: Wetlands previously called Natural Heritage Wetlands that have been identified by the DNR Natural Heritage Program as important ecosystems for maintaining plant diversity in the state.
Bogs: Wetlands with peat soils and a low pH (typically <5) that support plants and animals specifically adapted to such conditions. Bogs do not tolerate changes or disturbance well with even minor changes in water quality or nutrient inputs potential resulting in major adverse effects on the plant and animal communities. They are also extremely slow to develop.
Wetlands with Mature/Old-Growth Forests: Mature and old-growth forested wetlands over 1 acre in size.
Wetlands that Perform Functions at High Levels: Wetlands scoring 23 points or more (out of 27) on the questions related to functions are Category I wetlands.
Western Washington Category II Wetlands
Wetlands that Perform Functions Well: Wetlands scoring between 20 and 22 points (out of 27) on the questions related to functions. Includes wetlands judged to perform most functions relatively well or one group of functions very well and the other two moderately well.

Source: Hruby 2014; Hruby and Yahnke 2023

Category III and IV wetlands are the most common types of wetlands in the state. As a result, most wetlands that would be encountered on proposed development sites for utility-scale solar energy facilities are likely to be those types. Category III and IV wetlands typically provide moderate to low levels of functions and support relatively common plant and animal species. While such wetlands are still important (and regulated), they have likely experienced some level of disturbance and are easier to replace through compensatory mitigation. Permits that may be required for impacts on such areas are described in Section 3.3.

3.3 Potentially required permits

The following permits related to biological resources would be required for construction, operation, or decommissioning of typical facilities and activities:

3.3.1 Federal

- **CWA Section 404 Permit (USACE):** Required for activities that involve the discharge of dredged or fill materials in waters of the U.S., including streams and wetlands.
- **ESA Section 7 consultation (USFWS):** Issuance of a Department of the Army permit under CWA Section 404 is a federal action that requires interagency consultation with USFWS regarding terrestrial species under Section 7 of the ESA. Interagency consultation is performed to ensure that a proposed project would not jeopardize the existence of any listed species.

- **ESA Section 10 review (USFWS):** If take is determined likely to occur for ESA-listed species, Section 10 review would be required for the issuance of an incidental take permit.
- **Bald and Golden Eagle Protection Act compliance (USFWS):** If a project is likely to directly affect bald or golden eagle nesting sites, then an incidental take permit would be required as part of a project.

3.3.2 State

- **CWA Section 401 Water Quality Certification (Ecology/USEPA/Tribes):** Required for activities affecting a water of the U.S. and needing a federal permit or license (e.g., USACE Section 404 permit). Verifies whether projects can meet water quality standards.
- **Hydraulic Project Approval (WDFW):** If construction of a proposed project occurs in state-regulated rivers or streams, a hydraulic project approval would be required. This permit would include specific conditions of construction, such as timing of in-water work and monitoring requirements. Conditions of this permit may be used to mitigate potential effects to state priority species that may occur within the study area.
- **Forest Practices Act application/notification (DNR):** If a proposed project involves conversion of forestland to non-forestry use, an application under the Forest Practices Act would be required.
- **Chapter 90.48 Revised Code of Washington (RCW) authorization:** Impacts on non-federally regulated waters and wetlands may require authorization from Ecology pursuant to Chapter 90.48 RCW (Water Pollution Control).

3.3.3 Local

- **Critical Areas Permit:** Must be obtained for construction and development activities within designated critical areas regulated by local jurisdictions, including vegetated buffers adjacent to streams and wetlands, critical aquifer recharge areas, fish and wildlife conservation areas, steep slopes, and frequently flooded areas.
- **Shoreline Substantial Development Permit:** If a proposed project involves new development in a shoreline area that is regulated by the Washington State Shoreline Management Act and the local Shoreline Master Programs, the action would require a Shoreline Substantial Development Permit.
- **Land Use Permit:** This permit may be required for land development actions or changes in land use regulated by local jurisdictions. The permit would require compliance with the local agency's critical areas ordinance.
- **Fill and Grade Permit:** This permit is required for construction projects that require movement of earth regulated by local jurisdictions. The permit requires consideration of erosion and sedimentation to surface waters in the vicinity of a proposed project.
- **Floodplain Development Permit:** Local agencies may require this permit for development within the 100-year floodplain. The applicant must evaluate whether a proposed project would affect the flood elevation associated with the 100-year floodplain.

- **Earthmoving Permit:** This permit may be required for construction projects that include movement of earth or clearing regulated by local jurisdictions. The permit requires consideration of erosion and sedimentation to surface waters in the vicinity of the project.
- **Land Use Permit:** This permit may be required for land development actions or changes in land use regulated by local jurisdictions. The permit would require compliance with the local agency critical areas ordinance.
- **Flood Permit:** Local agencies may require this permit for development within the 100-year floodplain. The applicant must evaluate whether a proposed project would affect the flood elevation associated with the 100-year floodplain.
- **Noxious Weed List:** A county-level noxious weed list will need to be consulted, and a vegetation survey must be conducted pre-construction. All best management practices (BMPs) must be followed.

3.4 Small to medium utility-scale facilities of 20 MW to 600 MW (Alternative 1)

3.4.1 Impacts from construction

Construction of solar energy facilities would likely occur mainly in upland areas. Generation-tie transmission lines (gen-tie lines), roads, and fencing may cross wetlands, streams, or rivers, and sites may include wetlands. Development could affect a wide variety of aquatic and terrestrial species in the areas where it occurs.

During site characterization, project-level evaluations would require baseline surveys of vegetation, habitat, and potential wildlife presence; water typing; and wetland delineation surveys for a site. These would map and characterize species and habitats for a specific study area for impact analysis. Site characterization would involve minimal to no site disturbance except for potential ground disturbance to build access roads, construct meteorological towers, and drill soil cores.

3.4.1.1 Terrestrial habitats

Impacts on terrestrial habitats associated with the construction of small to medium facilities include the fragmentation, degradation, or loss of habitat associated with the limits of site characterization and preparation for solar energy infrastructure, access and service roads, and associated construction components (e.g., solar field, power collection system, operations and maintenance buildings, fencing). Land clearing and grading alter existing habitats or habitat connectivity and may introduce invasive species. Solar energy development could also result in erosion, fugitive dust, changes in hydrologic regimes, increased human access, spills, soil compaction or removal, or sedimentation.

The effects of habitat fragmentation, degradation, or loss are more readily observed in vegetation communities and wildlife but can also impact ecological processes. The construction of roads, staging areas, new structures, gen-tie lines, buildings, and other infrastructure

disrupts the connectivity between formally contiguous habitats resulting in a reduction in habitat interspersion and complexity. This can result in changes to energy flow and water and nutrient cycles. The reduction of total intact habitat area can also isolate communities, which could affect population sizes and dispersal rates (Wilcove et al. 1986; Wilcox and Murphy 1985). Ungulate habitat, including their migration corridors, would also be adversely affected by construction depending on study area siting.

Terrestrial habitat-related functions (e.g., biotic and abiotic functions) would also be adversely affected by construction. Biotic functions that would be affected include reduced plant growth and reproduction and reduced opportunities for wildlife species to use the habitat for shelter, foraging, and breeding. Abiotic functions that would be affected because of vegetation loss include moisture and temperature regulation, soil formation, and slope stability.

Adjoining habitats may also be affected by habitat fragmentation, degradation, or loss, as well as by disturbances from humans and construction-related noise, dust, and nighttime lighting. Construction of gen-tie lines would extend beyond the facility footprint, and the associated right-of-way (ROW) has been found to decrease the quality of habitat for forest interior bird species for distances up to 300 feet from the edge of the ROW (Anderson et al. 1977).

Generally, the significance of habitat fragmentation, degradation, or loss associated with construction of small to medium facilities depends on the amount of area disturbed, the types of habitats (e.g., grassland, scrub-shrub, forested) that would be affected, and the capacity or opportunity for the disturbed habitat to recover. Some habitat types may take a much longer time to recover than others, may never recover, or may change to a different, potentially less valuable habitat type. The number, configuration, and overall size of solar fields and associated infrastructure; location and extent of access roads and ROWs for gen-tie line corridors; and overall amount of lighting, noise, and dust generation also contribute to the magnitude of impacts. These factors determine whether the construction impacts to terrestrial habitat would be short or long term.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some construction activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to terrestrial habitats. Activities which cause the permanent degradation, loss, or conversion of suitable habitat that is critical to species viability would result in **potentially significant adverse impacts** on terrestrial habitats.

3.4.1.1.1 Special-status habitats

Impacts on special-status habitats associated with the site characterization and construction of small to medium facilities would be similar to, or the same as, those described on non-special-status habitats. However, because of the more sensitive nature of special-status habitats and the special-status species those habitats support, the impacts would be greater.

Specific impacts from solar energy development would depend on the locations of facilities relative to special-status habitats, and the construction details of facility development. In the

absence of siting considerations (e.g., avoidance of special-status habitats), minimization measures, and appropriate mitigation, impacts on special-status habitats could result from the following:

- Habitat fragmentation, degradation, or loss resulting from vegetation clearing, grading, removal or erosion of soils, construction of solar energy facilities and associated infrastructure, changes in hydrologic regimes, sedimentation, fugitive dust, oil or other contaminant spills, fragmentation or degradation of adjacent habitats, and the spread of invasive plant species
- Habitat fragmentation, degradation, or loss resulting from construction of access roads and electricity transmission infrastructure through intact habitats

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some construction activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to special-status terrestrial habitats. Activities that cause the permanent degradation, loss, or conversion of suitable habitat that is critical to special-species viability would result in **potentially significant adverse impacts** on special-status terrestrial habitats.

3.4.1.2 Terrestrial species

3.4.1.2.1 Vegetation

Development of solar energy facilities may require the total removal of most vegetation, which could result in varying effects to existing plant communities depending on the scale and design of the facility. It may also increase the risk of invasive species introduction and changes in species composition and distribution. Solar energy development could also result in erosion, fugitive dust, altered drainage patterns, increased human access, spills from construction-related chemical pollutants, soil compaction or removal, or sedimentation. Construction of gen-tie line corridors would also adversely affect vegetation through removal or disturbance.

Removal of vegetation can increase surface runoff, resulting in increased erosion and transport of sediment into adjacent vegetation communities. This could lead to long-term adverse effects such as altered soil characteristics, changes in hydrology, and the establishment of non-native or invasive plants. Affected plant communities could undergo short- or long-term changes in species abundance, composition, and distribution.

Depending on the scale and design of the facility, effects would primarily be associated with the mortality of vegetation and loss of habitat within the footprint of permanent structures, including solar fields and access roads. All vegetation would likely be cleared in the footprint of permanent structures and may also be cleared from the footprint of construction laydown areas and equipment assembly and staging areas. These areas may also require grading. It is assumed that outside the footprint of permanent structures, construction areas, and access roads, most existing vegetation within the solar energy facility would be retained; however, mowing or trimming may be needed to facilitate construction.

Generally, the significance of vegetation loss associated with construction of small to medium facilities depends on the amount of area directly disturbed, the types of plants (e.g., herbaceous, shrubs, trees) that would be affected and the capacity for the disturbed vegetation to recover, and whether listed or sensitive plants would be affected. Vegetation loss may be minimized during solar energy development by designing the facility around existing contours, limiting grading, and mowing or pruning vegetation instead of removing it to the extent possible. The re-establishment of vegetation around the solar fields and associated infrastructure would also depend on the climate, soils, and plant community types at a facility location. Some vegetation communities in more arid locations, such as shrubsteppe habitat, may be more challenged to recover over time. Where vegetation clearing is necessary, low-growing native vegetation could be re-established through plantings prior to installation of the solar panels. These factors determine whether the construction impacts to vegetation would be short or long term.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some construction activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to terrestrial vegetation. Activities that cause the permanent degradation, loss, or conversion of suitable habitat that is critical to species viability would result in **potentially significant adverse impacts** on terrestrial vegetation.

3.4.1.2.2 Wildlife

Site characterization and construction of small to medium facilities may adversely affect terrestrial wildlife species, depending on the types of wildlife and the various stressors associated with specific construction activities. Wildlife may be affected by site clearing and grading, solar field and associated infrastructure construction, access road and gen-tie line corridor construction, and the movement of construction vehicles and equipment. The magnitude of potential impacts on wildlife also depends on the length of time the construction effect would persist, the time of day or night, and the season of the wildlife activity (e.g., nesting, wintering, migration). The type of impacts associated with construction activities are generally related to habitat disturbance (see Section 3.4.1.1) and wildlife disturbance, injury, or mortality. Mortality could occur from digging or trenching in nests, burrows, or hibernacula or removing nesting vegetation.

In general, terrestrial wildlife species that are less capable of avoiding disturbance (e.g., non-winged invertebrates, reptiles, juvenile mammals, burrowing species, ground-nesting birds) would be more severely affected than more mobile wildlife species (e.g., winged invertebrates, most birds, adult mammals). Removal of vegetation during the breeding season could result in destruction of nests and injury or death to birds or eggs. Construction activities resulting in noise, nighttime lighting, erosion, fugitive dust, vibration, and altered terrestrial habitat may also cause temporary disruption in foraging, nesting, breeding, rearing, and migration activities for some terrestrial wildlife species. Spills during equipment refueling and release of stored fuel or hazardous materials may also adversely affect wildlife if present in the area.

The construction of small to medium facilities would also affect wildlife through habitat degradation, fragmentation, or loss. Changes in habitat may lead to the introduction of invasive or more opportunistic non-native wildlife species. The magnitude of impact to wildlife due to affected habitat would be determined by the extent of the solar energy facility (e.g., number and size of solar fields), the amount and configuration of associated infrastructure, and the existing degree of habitat disturbance in the study area.

Bird species that migrate, nest, or forage in or around solar facilities may be at risk of collision or altered behavior due to the "Lake Effect Hypothesis," which proposes that solar panels may appear to mimic waterbodies for birds in flights (USGS 2024d). This may attract migrating birds and cause them to collide with the panels or misguide them to use the panels as places to rest or feed.

Construction of solar energy facilities and associated gen-tie lines and access roads could result in new edge habitats. The presence of habitat edges could have both adverse and beneficial effects on wildlife. Adverse effects may include increasing predation of animals in the vicinity of edges, altering wildlife distribution and movement patterns, and reducing contiguous habitat size resulting in possible modification of foraging, nesting, breeding, rearing, and migration activities. Potential benefits include increasing local native wildlife diversity and abundance that are adapted to edge habitats.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some construction activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to terrestrial wildlife. Activities that affect species viability would result in **potentially significant adverse impacts** on terrestrial wildlife.

3.4.1.2.3 Special-status species

Impacts on special-status species associated with the site characterization and construction of small to medium facilities would be greater than those described for non-special-status species. Because special-status species vitality and populations are more sensitive to impacts, and these populations are often geographically restricted, the impacts would likely be greater.

Specific impacts from solar energy development would depend on the types of habitats affected, the amount of habitat disturbance, the duration and timing of construction, the amount and type of infrastructure present, and the occurrence and use of those areas by special-status species. In the absence of siting considerations (e.g., avoidance of areas where special-status species may occur), minimization measures, and appropriate mitigation, impacts on special-status species could result from the following:

- Habitat fragmentation, degradation, or loss resulting from vegetation clearing, grading, removal or erosion of soils, construction of solar energy facilities and associated infrastructure, changes in hydrologic regimes, sedimentation, fugitive dust, oil or other contaminant spills, fragmentation or degradation of adjacent habitats, and the spread of invasive plant species

- Habitat fragmentation, degradation, or loss resulting from construction of access roads and electricity transmission infrastructure through intact habitats
- Wildlife injury or mortality from collisions with construction vehicles or equipment
- Disturbance to wildlife activities, such as breeding or migration, from noise, dust, and human activities during clearing, grading, and construction

Impacts on special-status species would be greater than those described for non-special-status species because special-status species vitality and populations are more sensitive to impacts, and these populations are often geographically restricted.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some construction activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to special-status terrestrial wildlife. Activities that affect the mortality of any individual species or disturbance that disrupts successful breeding and rearing behaviors would result in **potentially significant adverse impacts** on terrestrial wildlife.

3.4.1.3 Aquatic habitats and species

Small to medium facility site characterization and construction activities that may affect aquatic habitats and species are similar to those described for wetlands in Section 3.4.1.4, including site clearing and grading, installing permanent meteorological towers, constructing access roads, excavating and installing solar field and associated infrastructure, and gen-tie line corridor construction.

Construction of access roads, resulting in vehicle and foot traffic, through aquatic habitat could injure or kill aquatic organisms and disturb aquatic habitats adjacent to a facility site. Access roads that cross streams would obstruct fish passage if culverts or low-water crossings are not properly installed. Vehicle traffic could result in the accumulation of cobbles in fish passages that prevents fish from moving freely throughout the stream. This would result in the disturbance of migration, foraging, and rearing behavior. Species most likely to be affected include migratory fish species such as salmon, steelhead, and lamprey.

An increase in sediment loads resulting from construction activities could affect fish and amphibian feeding, breeding, and incubating efficiency. BMPs to minimize erosion and sedimentation related impacts to surface water would be followed.

There is some potential for on-site water well installation and groundwater extraction to support construction of solar energy facilities. Groundwater extraction for construction uses could result in changes in drainage patterns and alterations of intermittent streams. The removal of riparian vegetation during site clearing could affect aquatic habitats by reducing the area of shading over the water, leading to higher water temperatures. As water temperature increases, dissolved oxygen levels tend to decrease, which could alter the preferred ecological conditions for many aquatic species. Surface water temperature can affect embryonic development, juvenile growth, migration of adults, susceptibility to disease, and interspecies

competition. Salmonids such as bull trout, Dolly Varden, and char have narrow windows of temperature tolerance, while species such as suckers and dace have less stringent temperature criteria (Ecology 2024b). Other benefits of the riparian vegetation for the aquatic habitat that could be lost include moderation of the water chemistry and addition of leaf litter, wood, and insects that fall into the water, which provide habitat structure and food for aquatic animals.

The release of hazardous or regulated chemicals used during construction could affect aquatic habitats and species if released into adjacent waterbodies. The level of impact would depend on the type and volume of chemical entering the waterway, waterbody characteristics, and the location of the release. Hazardous or regulated chemicals would generally not be expected to enter waterbodies if equipment and fueling locations are not used near aquatic habitat.

It is assumed that utility-scale solar facilities are unlikely to be sited in aquatic habitat or riparian areas and that most aquatic impacts can be avoided or minimized. Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, construction activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to aquatic habitats and species.

3.4.1.4 Wetlands

Impacts on wetlands and their ability to provide habitat for terrestrial and aquatic species could occur during the site characterization and construction of small to medium sized utility-scale solar energy facilities. Wetlands may need to be cleared and/or filled to establish initial site access for geotechnical surveys or to install meteorological towers. Wetlands may also need to be cleared and filled for the construction of staging/laydown areas, permanent site access routes, access roads, gen-tie line corridors, and other supporting facilities. Roads and other infrastructure constructed in the vicinity of wetlands could change surface drainage patterns and/or introduce sediments or pollutants into those areas via runoff.

State law requires a mitigation plan be developed and approved to ensure there is no net loss of wetland functions for wetlands and wetland buffers. A facility would require an approved wetland mitigation plan before permits are issued.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, construction activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to wetlands.

3.4.2 Impacts from operation

Operation of solar energy facilities would likely occur mainly in upland areas. Gen-tie lines, roads, and fencing may cross wetlands, streams, or rivers, and sites may include wetlands. Development could affect a wide variety of aquatic and terrestrial species in the areas where it occurs.

3.4.2.1 Terrestrial habitats

Impacts on terrestrial habitats associated with the operation of small to medium facilities include the long-term effects of habitat fragmentation, degradation, or loss of habitat associated with the limits of the solar facility and ongoing operation and maintenance activities. Adjacent habitats may also be affected by the long-term effects of habitat fragmentation, degradation, or loss, as well as by disturbances from humans and noise and movement from maintenance vehicles.

The loss of habitat or division of habitat into smaller and more isolated fragments can result in long-term changes in species composition or structure and reductions in terrestrial biodiversity that may lead to the degradation of ecosystems. The higher the quality of habitat affected, the greater the impact from operations and maintenance. The permanent removal of forested habitats would have a greater effect on ecosystem processing compared to grassland habitats. Tree or shrub removal results in increased light levels and reduced soil moisture, and favors shade-intolerant species, causing further changes to habitat dynamics. Additional impacts could result from alteration of natural fire patterns from fire suppression in and adjacent to facility sites.

The introduction and spread of invasive vegetation from vehicle and human disturbance could also result in long-term impacts on terrestrial habitats. Vehicle movements and trampling by humans may lead to soil erosion and affect the rate of rainfall interception and evapotranspiration, as well as alter water penetration, which affects soil moisture and surface and subsurface flows.

Solar energy development may potentially affect the long-term persistence of existing wildlife migration corridors. Ungulate migration corridors would be adversely affected, particularly if a solar facility is sited where physiographic constrictions (e.g., geologic formations, topography, development) force herds through relatively narrow corridors (Berger 2004).

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some operation activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to terrestrial habitats. Activities that cause the permanent degradation, loss, or conversion of suitable habitat that is critical to species viability or disrupt habitat continuity along migration routes would result in **potentially significant adverse impacts** on terrestrial habitats.

3.4.2.1.1 Special-status habitats

Impacts on special-status habitats associated with the operation and maintenance of small to medium facilities would be similar to those described for non-special-status habitats. However, because of the more sensitive nature of special-status habitats and the special-status species those habitats support, the impacts would be greater.

Specific impacts from solar energy operations and maintenance would depend on the solar fields and associated infrastructure and access roads within or adjacent to special-status

habitats. In the absence of operational BMPs, impacts on special-status habitats could result from long-term degradation or loss of special-status habitat within the facility footprint and in adjacent special-status habitats, altered hydrologic patterns, oil or other contaminant spills from maintenance activities, and the ongoing spread of invasive plant species.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some operation activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to special-status terrestrial habitats. Activities which cause the permanent degradation, loss, or conversion of suitable special-status habitat that is critical to species viability or disrupt habitat continuity along migration routes would result in **potentially significant adverse impacts** on special-status terrestrial habitats.

3.4.2.2 Terrestrial species

3.4.2.2.1 Vegetation

Operations could affect the viability of plant communities re-establishing within and adjacent to solar facilities as a result of mowing and vegetation maintenance, application of herbicides, trampling and soil compaction from humans and vehicles, and from fire suppression. Increased human activity also increases the risk for damage to adjacent vegetation communities.

The introduction and spread of invasive vegetation could also result in long-term impacts on plant communities. The increase in edge habitats, vehicle movements, and trampling by humans can create gaps in vegetation and allow exotic, non-native plant species to become established and displace native species over time. In addition, changes to wildlife diversity could affect pollinators of or seed dispersal agents for plants within vegetation communities. These factors could lead to extirpation of native plant species and vegetation communities.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some operation activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to terrestrial vegetation. Activities that reduce the ability for species to re-establish would result in **potentially significant adverse impacts** on terrestrial vegetation.

3.4.2.2.2 Wildlife

Operation of small to medium facilities would result in adverse effects to wildlife, particularly birds and bats, depending on number, sizes, and locations of the solar fields and associated infrastructure, and powerlines in relation to bird and bat activities. Birds and bats are at risk of collisions with gen-tie lines and vehicles, and all wildlife may be potentially affected by noise, vehicle traffic, hydrologic changes, and runoff.

The fragmentation, degradation, or loss of habitat could result in a long-term decrease in wildlife richness, abundance, and distribution, affecting overall native wildlife diversity. Some wildlife may become displaced into adjoining habitats that may not be able to sustain

population levels. Wildlife could incur increased physiological stress as a result of complications from greater competition for space and food, increased vulnerability to predators, and higher susceptibility to diseases and parasites. Wildlife such as ground-nesting birds or other species that require open grassland areas would be affected from long-term disturbance to habitats within the study area.

Even if adjacent habitats remain unaffected, wildlife may use these areas less due to the increased presence of people and disturbance from increased noise, light, and vehicular traffic that would occur during operation and maintenance of a solar facility.

As a result of habitat disturbance from solar facility development, the introduction of non-native, invasive animal species could impact native species through resource competition and changes in food web dynamics and biodiversity.

Wildlife injury or mortality due to vehicle collisions are expected to decrease during the operational phase because vehicle activity would likely be less frequent compared to the construction phase.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some operation activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to terrestrial wildlife. Activities that affect species viability would result in **potentially significant adverse impacts** on terrestrial wildlife.

3.4.2.2.3 Special-status species

Impacts on special-status species associated with the operation of small to medium facilities would be similar to, or the same as, those described for non-special-status species. However, because special-status species vitality and populations are more sensitive, the impacts would be greater.

Specific impacts from solar energy development would depend on the types of habitats affected, the amount of habitat disturbance over time, the amount and type of infrastructure present, and the occurrence and use of those areas by special-status species. In the absence of siting considerations (e.g., avoidance of areas where special-status species may occur), minimization measures, and appropriate mitigation, impacts on special-status species could result from the following:

- Long-term effects from reduced species use of habitat on and adjacent to a facility site due to changes in habitat, including mowing or other types of vegetation management (e.g., removal of woody vegetation)
- Collision with gen-tie lines and facility fences
- Noise from solar energy support machinery, motorized vehicles, and mowing equipment
- Periodic habitat disturbance within the gen-tie line ROWs and along the access roads from maintenance activities, including the risk of oil or other contaminant spills and the continued spread of invasive species

- Altered migration routes; disturbance to foraging, breeding, and nesting behaviors due to placement of facilities; or increased human activities
- Altered fire regimes that negatively impact fire adapted species

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some operation activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to special-status terrestrial wildlife. Activities that affect mortality of any individual species or disturbance that disrupts successful breeding and rearing behaviors would result in **potentially significant adverse impacts** on special-status terrestrial wildlife.

3.4.2.3 Aquatic habitats and species

Resulting levels of turbidity, sedimentation, and changes to temperature and oxygen regimes altered by small to medium facility construction activities could continue to affect aquatic habitat and species during the operational period.

If water drainage patterns, sediment delivery to waterbodies, riparian area function, or water quality are changed as a result of small to medium facility construction, those impacts could continue to affect aquatic habitat and species during the operational period. During operations, potential impacts from the use of motorized equipment and runoff of surface soils would be minimized through limiting the amount of maintenance activities occurring near riparian and aquatic habitat.

Release of hazardous or regulated chemicals used during operations could adversely affect aquatic habitats and species if released into adjacent waterbodies. The level of impact would depend on the type and volume of chemical entering the waterway, waterbody characteristics, and the location of the release. Hazardous or regulated chemicals would generally not be expected to enter waterbodies if equipment and fueling locations are not used near aquatic habitat.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, operation activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to aquatic habitats and species.

3.4.2.4 Wetlands

General operating procedures at utility-scale solar energy facilities are unlikely to affect wetlands as they typically involve relatively passive activities that do not readily alter the landscape once the infrastructure is installed. Potential water quality impacts on wetlands that could affect their ability to provide terrestrial and aquatic habitat include the periodic washing of solar panels, which could create runoff that carries sediment and other potential pollutants into nearby wetlands. Water quality impacts could also occur from spills of pesticides, fuel, vehicle fluids, or other hazardous materials used or stored at the facility. If not managed property, runoff from parking areas, buildings, and other facility infrastructure could also degrade water quality in adjacent wetland areas, as could discharges from undersized or poorly

maintained septic systems if such systems are used to manage sanitary wastewater at the facility.

If wetlands are located along access roads, in gen-tie line corridors, or on other portions of the facility where landscape maintenance is required, activities such as routine mowing, woody vegetation removal, and access road maintenance could also directly injure terrestrial and aquatic species using those wetlands and alter the existing habitat (e.g., convert forested or scrub-shrub wetlands to herbaceous wetlands). Such activities could also affect wetlands through the alteration of drainage patterns and modification of the wetland water regime. Facility lighting at substation and other facility infrastructure, and potential noise from facility operations, also have the potential to disturb terrestrial and aquatic species that use nearby wetlands.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, operation activities of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to wetlands.

3.4.3 Impacts from decommissioning

A solar energy facility would be decommissioned following the end of its useful life, which is expected to be approximately 30 years. An applicant may prepare a decommissioning plan as part of the proposal. Some cities and counties require financial security as part of a decommissioning plan.

Decommissioning actions include dismantling and removing aboveground solar array components and other aboveground components such as the collector substation, buildings, battery energy storage system, and overhead lines. Foundations are expected to be removed to a level of at least 3 feet below the ground surface. Cables, lines, or conduit that are buried 3 feet below grade or more are not expected to be removed. The removal of electrical substations would require inspection for contamination of the soil and decontamination as needed.

A facility site would be restored to its pre-facility conditions and uses unless the facility, permitting authority, and regulatory agencies agree on alternate actions. Restoring to pre-facility conditions could take several years and for some habitat types, such as sagebrush dominated shrubsteppe, restoration could take several decades. Service roads may be removed or may remain depending on agreements with the new or existing owner of the land.

3.4.3.1 Terrestrial habitats

Impacts on terrestrial habitats during decommissioning would be similar in nature to the impacts resulting from facility construction. It is assumed that habitat disturbance would primarily occur in the previously disturbed areas. The degree of impact would vary depending on how much the previously disturbed habitat had recovered during the operational phase.

Decommissioning activities would likely include the dismantling and removal of all aboveground structures as well as some underground structures. The types of impacts would be similar to those associated with facility construction. The extent of the effects would depend on how much of the facility infrastructure would be removed.

Decommissioning would result in soil disturbance, potentially including the regrading of some study areas. Ground disturbance would also occur in temporary work areas and storage areas.

The release of fuels, lubricants, solvents, or hazardous materials during decommissioning could impact habitats in the vicinity of a spill. Soil contamination is less likely during the decommissioning phase but could result from fuel and oil releases related to the use of trucks and mechanical equipment and toxic metal releases if solar energy cells are broken during facility dismantling.

Impacts to terrestrial habitats during decommissioning would be smaller than during construction, because the objective is to return the site to its native condition (e.g., by re-establishing native vegetative communities), and the use of existing access roads would reduce impacts such as compaction and erosion (e.g., fugitive dust generation).

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some decommissioning of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to terrestrial habitats. Activities that cause the permanent degradation, loss, or conversion of suitable habitat that is critical to species viability would result in **potentially significant adverse impacts** on terrestrial habitats.

3.4.3.1.1 Special-status habitats

Impacts on special-status habitats associated with decommissioning would be similar to, or the same as, those described for non-special-status habitats. However, because of the more sensitive nature of special-status habitats and the special-status species those habitats support, the impacts would be greater.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some decommissioning of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to special-status terrestrial habitats. Activities that cause the permanent degradation, loss, or conversion of suitable habitat that is critical to special-species viability would result in **potentially significant adverse impacts** on special-status terrestrial habitats.

3.4.3.2 Terrestrial species

3.4.3.2.1 Vegetation

Impacts on terrestrial vegetation during decommissioning would be similar in nature to the impacts resulting from facility construction, but they may be shorter in duration and more limited in scale. The disturbance of vegetation would be expected to primarily occur in previously disturbed areas. During decommissioning activities, vegetation would be removed or

damaged in areas of disturbed soils, and these areas would require the re-establishment of plant communities.

Disturbed areas would be returned to original grade, compacted soils would be restored, and native plant communities would be re-established. However, vegetation restoration at some decommissioned facilities may be more challenging due to factors such as region (e.g., arid environments with limited water sources), soil degradation, the extent of invasive species colonization, a change in seed dispersal patterns, or degradation of adjacent habitats. The length of time it takes for native vegetation to reestablish varies greatly depending on location, weather patterns, soil fertility, surrounding land use, and the type of vegetation planted or recruited (e.g., grasses, forbs, shrubs, trees).

Decommissioning activities would likely require the expansion of or establishment of new storage and work areas, including storage areas for fuel or waste. The release of fuels, lubricants, solvents, or hazardous materials during decommissioning could impact plant communities in the vicinity of a spill.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some decommissioning of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to terrestrial vegetation. Activities that cause the permanent degradation, loss, or conversion of suitable habitat that is critical to species viability would result in **potentially significant adverse impacts** on terrestrial vegetation.

3.4.3.2.2 Wildlife

Impacts on terrestrial wildlife from decommissioning activities would be similar to those from facility construction, but they may be shorter in duration and more limited in scale. Wildlife could be affected by changes to existing habitats depending on the extent of infrastructure that would need to be removed, generation of waste materials and spills, projected future land use, and the amount of required site restoration (e.g., regrading, revegetation).

During decommissioning activities, there would also be an increase in noise and visual disturbance associated with removal of infrastructure and site restoration. Traffic levels are expected to increase during decommissioning, which could result in wildlife injury or mortality from vehicle collisions.

It is anticipated that more mobile wildlife would avoid areas where decommissioning activities are occurring. Disturbance, injury, or mortality of less mobile wildlife (e.g., non-winged invertebrates, reptiles, juvenile mammals) could occur if those species are unable to avoid the decommissioning activities.

Removal of solar energy infrastructure may reduce potential nesting, perching, and resting habitats for several bird species (e.g., raptors); but this could benefit other wildlife, such as small mammals that are preyed on by those bird species.

The removal of gen-tie lines would reduce the number of bird and bat collisions, and the removal of other aboveground facilities would improve the free movement of wildlife in the study area. Habitats within and adjacent to the study area that had been avoided may become more utilized by wildlife once the disturbance from facility operations cease. Following decommissioning activities, the control of vegetation would end, and native shrubs and trees would be allowed to grow and increase in density. As disturbed areas re-establish with vegetation and habitat components improve, any impacts from fragmentation that existed during the facility lifetime would likely decrease. The potential improvement in wildlife diversity and habitat use would primarily depend upon the future land use of the study area and the degree of revegetation.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some decommissioning of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to terrestrial wildlife. Activities that affect species viability would result in **potentially significant adverse impacts** on terrestrial wildlife.

3.4.3.2.3 Special-status species

Impacts on special-status species associated with the decommissioning of solar energy facilities would be similar to, or the same as, those described for non-special-status species. However, because special-status species vitality and populations are more sensitive, the impacts may be greater.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, some decommissioning of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to special-status terrestrial wildlife species. Activities that affect the mortality of any individual species or disturbance that disrupts successful breeding and rearing behaviors would result in **potentially significant adverse impacts** on terrestrial wildlife species.

3.4.3.3 Aquatic habitats and species

Aquatic habitat and species could be affected by temporary increase in erosion potential during the removal of access roads and associated culverted road crossings, vehicle and foot traffic through aquatic habitat, release of hazardous or regulated chemicals, and disturbance to aquatic species in the vicinity. Impacts could be minimized by implementing standard construction equipment and chemical and hazardous material use/storage BMPs.

Removal of facility infrastructure and access roads could also alter drainage patterns on the site, potentially affecting aquatic habitat that occurs in the vicinity. Trenching and soil disturbance resulting from removal of buried cables could introduce sediments into adjacent waterbodies by runoff and erosion. Such impacts could be minimized by the implementation of erosion control measures and BMPs and via prompt revegetation of disturbed soils.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, decommissioning of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to aquatic habitats and species.

3.4.3.4 Wetlands

The removal of access roads and associated culverted road crossings from wetlands could temporarily increase erosion potential in those areas. Regrading those areas to pre-construction contours and restoring wetland hydrology and vegetation to those areas would limit the extent and duration of such impacts. Removal of solar arrays and supporting infrastructure would disturb soils and increase the potential for runoff to carry sediments into wetlands and associated waterways. Such impacts could be minimized by the implementation of erosion control measures and BMPs and via prompt revegetation of disturbed soils.

As with construction, operations, and maintenance activities, decommissioning work would increase the potential for spills and leaks of fuel and other vehicle fluids from construction equipment to enter wetlands. Again, such impacts could be minimized by implementing standard construction equipment and chemical and hazardous material use/storage BMPs. Removal of facility infrastructure and access roads could also alter drainage patterns on the site, potentially affected wetlands that occur in the vicinity. Restoration of pre-construction drainage patterns and previously filled wetlands on the site could reduce such impacts.

Through compliance with laws and permits and with implementation of actions that could avoid and reduce impacts, decommissioning of small to medium utility-scale solar energy facilities would result in **less than significant impacts** to wetlands.

3.4.4 Actions to avoid and reduce impacts

Because this is a programmatic environmental review of utility-scale solar facilities, site-specific mitigation actions would be developed during facility-specific reviews and permitting for each facility proposed in the future. The following sections describe relevant actions that could avoid or reduce impacts from construction, operation, or decommissioning of facilities and whether significant impacts are likely to be able to be mitigated to a less-than-significant level.

WDFW is developing mitigation guidelines for solar facilities and expects to finalize them by the end of 2024. WDFW's mitigation guidelines will be incorporated into this section in the Final PEIS.

3.4.4.1 Siting and design considerations

This section details siting and design considerations. Siting and design considerations are actions that should be taken by a developer in developing a facility design or considering a site. Early coordination with agencies is intended to result in the avoidance, minimization, and/or mitigation of potential resource impacts. The siting and design considerations described under Section 3.4.4.1.1 may also apply to aquatic habitats and species and wetlands.

3.4.4.1.1 Terrestrial habitats and species

- Contact appropriate agencies early to identify potentially sensitive ecological resources, including special-status species and habitats and designated critical habitat, that might be affected by a solar energy facility.
- Site and design the facility to avoid priority habitat, such as shrubsteppe habitat, to the maximum extent possible.
- Conduct surveys for special-status habitat and species. If special-status habitat or species are observed, site and design the facility to avoid individuals and populations to the extent possible.
- Site facilities on disturbed lands (i.e., developed, cultivated, or otherwise disturbed by roads or other corridors) to the maximum extent possible, except where such lands host significant aggregations of wildlife or are used by special-status species.
- Consider the Washington State University least-conflict solar siting study maps (conservation layer) to avoid areas identified as having highest conservation value.
- Design placement of solar panels and fencing to reduce impacts on wildlife corridors and overall habitat.
- If existing information suggests the probable occurrence of special-status species on a facility site at a level of concern, focused surveys are recommended during the appropriate season to determine the presence or likelihood of presence of the species.
- Site and design facility to minimize habitat loss, habitat fragmentation, and resulting edge habitat.
- Place linear facilities (such as collector cable routes, gen-tie line routes, or access roads) in or adjacent to existing disturbed corridors in order to minimize habitat fragmentation and habitat degradation.
- Screen potential facility sites through local, state, and federal mapping resources to identify sensitive habitat and wildlife areas and critical areas such as steep slopes, priority habitats, sensitive species occurrence locations, and other local critical area datasets. Design facilities to avoid and minimize impacts on surrounding landscape and landscape connectivity.
- Establish buffer zones around sensitive habitats and areas identified as critical to sensitive species (e.g., nests) and exclude or modify facilities and activities within those areas.
- Conduct all pre-construction surveys by qualified biologists following accepted protocols established by federal or state regulatory agencies, to identify and delineate the boundaries of important, sensitive, or unique habitats and wildlife within and adjacent to the facility including riparian habitat, remnant vegetation associations, rare or unique natural communities, and habitats supporting special-status species populations.
- Minimize use of overhead collector lines, unless underground collector lines are not appropriate or feasible due to environmental conditions (e.g., topography, soil conductivity, and other environmental impacts) or cultural or Tribal resource concerns.
- Avoid construction during bird nesting seasons to the maximum extent possible. If construction occurs during the bird nesting seasons, conduct nest clearance surveys prior to site disturbance.

- Design new roads to follow natural land contours and avoid or minimize hill cuts in and adjacent to a facility site. Limit new road construction or use existing roads.
- Minimize habitat loss, habitat fragmentation, and resulting edge habitat due to facility development to the extent practicable. Habitat fragmentation could be reduced by consolidating facilities (e.g., access roads and utilities could share common ROWs, where feasible), reducing the number of access roads to the minimum amount required, and locating facilities in areas where habitat disturbance has already occurred.
- Design and construct gen-tie lines to minimize avian electrocution, according to guidelines outlined in Avian Power Line Interaction Committee standards (APLIC 2012).
- Avoid siting access roads and facilities near open water or other areas known to attract a large number of birds.
- Locate staging and parking areas within the facility site to minimize habitat disturbance in areas adjacent to the site.
- Avoid surface water or groundwater withdrawals that affect sensitive habitats (e.g., riparian habitats) and any habitats occupied by special-status species.

3.4.4.1.2 Aquatic habitats and species

- Contact appropriate agencies early to identify potentially sensitive ecological resources, including but not limited to aquatic habitats, wetland habitats, and special-status species locations and habitats, as well as designated critical habitat, that might be present in the area proposed for a facility and associated access roads and ROWs.
- Conduct an aquatic habitat survey of the site to identify surface waters, riparian areas, drainage routes, and the potential habitat that they provide.
- Contact appropriate agencies early to identify potentially sensitive ecological resources, including but not limited to aquatic habitats, wetland habitats, and special-status species locations and habitats, as well as designated critical habitat, that might be present in the area proposed for a facility and associated access roads and ROWs.
- Conduct all pre-construction surveys by qualified biologists following accepted protocols established by federal or state regulatory agencies, to identify and delineate the boundaries of important, sensitive, or unique aquatic habitats and wildlife within and adjacent to the facility including waters of the U.S., wetlands, springs, seeps, ephemeral streams, intermittent streams, 100-year floodplains, ponds and other aquatic habitats, and habitats supporting special-status species populations.
- Avoid or minimize impacts on streams by designing the site and roads to avoid or minimize crossing streams. Design stream crossings to minimize permanent impacts as required in Washington Administrative Code (WAC) 220-660-190 and local regulations.
- Avoid surface water or groundwater withdrawals that affect sensitive habitats (e.g., aquatic habitats) and any habitats occupied by special-status species.

3.4.4.1.3 Wetlands

- Perform a wetland delineation on the site to identify and map any potential wetlands that may be present. Assess wetland functions and rate all on-site wetlands using the appropriate Washington Wetland Ratings System method to determine their category

and local buffer requirements. Examine adjacent properties for the presence of off-site wetlands that could be affected by facility construction and operation, map their locations, and identify any off-site connections to surface waters.
- Avoid siting structures and roads in wetlands or wetland buffers.

3.4.4.2 Permits, plans, and BMPs

This section details potential permits, plans, or BMPs. BMPs are activities, maintenance procedures, managerial practices, or structural features that prevent or reduce pollutants or other impacts. These may be required in permits or plans by a regulatory agency. The potential permits, plans, or BMPs described under Section 3.4.4.2.1 may also apply to aquatic habitats and species and wetlands.

3.4.4.2.1 Terrestrial habitats and species

- Develop and implement a Wildlife Habitat Management Plan to avoid, minimize, or reduce/eliminate impacts in compliance with WAC 463-62-040 to achieve "no net loss of habitat functions and values." The plan should include but is not limited to the following:
    - Demonstrate compliance of the facility with the regulatory requirements of the Bald and Golden Eagle Protection Act.
    - Implement measures to protect birds (including migratory species protected under the Migratory Bird Treaty Act) developed in coordination with the appropriate federal and state agencies.
    - Implement measures to protect raptors.
    - Implement measures to protect ground-nesting birds.
    - Implement measures to protect bats.
    - Implement measures to protect burrowing species.
    - Limit mowing during the bird nesting season, as feasible, to avoid impacts on ground-nesting birds.
    - Use down-shield lighting for permanent lighting at substations and buildings. Outdoor lighting should be sited, limited in intensity, shielded, and hooded in a manner that prevents the lighting from projecting onto adjacent properties, roadways, and waterways.
    - Turn off unnecessary lighting at night to limit attraction of migratory birds. This includes using lights with timed shutoff; using downward-directed lighting to minimize horizontal or skyward illumination; and avoiding steady-burning, high-intensity lights.
    - Avoid evening and nighttime construction activities to the extent practicable to limit the impacts of construction noise to wildlife.
    - Manage for low-maintenance vegetation (e.g., native shrubs, grasses, and forbs) and invasive species control, minimizing the use of herbicides near sensitive habitats (e.g., Designated Critical Habitat, Priority Habitats) and using only approved herbicides consistent with state and local regulations and safe application guidelines.

- Use wildlife-friendly cattle guards for new roads in areas where active grazing lands and livestock are present. To the extent practicable, improvements should be made to existing ways and trails that require cattle to pass through existing fences, fenceline gates, new gates, and standard wire gates alongside them.
- Time activities to avoid, minimize, or reduce/eliminate impacts on wildlife. For example, crucial winter ranges for elk, deer, and other species should be avoided especially during their periods of use. If activities are planned during bird breeding seasons, a nesting bird survey should be conducted first. If active nests are detected, the nest area should be flagged, and no activity should take place near the nest until nesting is completed (i.e., nestlings have fledged, or the nest has failed) or until appropriate agencies agree that activities can proceed with the incorporation of agreed-upon monitoring measures. The timing of activities should be coordinated with the authorizing federal and state agencies.
- Conduct seasonally appropriate walkthroughs prior to any ground-disturbing activity to ensure that important or sensitive species or habitats are not present in or near facility sites. Walkthroughs should be conducted by a qualified biologist or team of biologists and should include federal agency representatives, state natural resource agencies, and Tribal staff, as appropriate.
- Employ noise reduction devices to minimize the impacts on wildlife and special-status species populations.
- Limit vehicle speeds to 25 miles per hour on internal access roads to avoid wildlife collisions. Limit speeds in areas occupied by special-status animal species.
- Consider implementing road closures or other travel modifications (e.g., lower speed limits, no foot travel) during crucial periods when wildlife may be more susceptible to facility impacts (e.g., extreme winter conditions, calving/fawning seasons).
- Cap or otherwise modify vertical pipes and piles to prevent cavity-dwelling and nesting birds from entering and entrapment of other small species.
- Replant facility site with native vegetation at spaced intervals to the extent possible to break up areas of exposed soil and reduce soil loss by wind erosion.
- Design perimeter fencing to minimize collision risk for wildlife and allow for adequate wildlife movement through the area to reduce predation risk and corridor restrictions.

- Fencing:
  - Reduce the extent of fencing to key facility components (e.g., substation) to avoid and minimize potential safety hazards and access problems and to limit restrictions to wildlife movement.
  - Minimize impacts on small mammals and other small animals by raising fencing to a minimum of 4 to 6 inches above grade to allow animals to pass through the fence and use the area inside a facility's perimeter fence.
  - Ensure fencing complies with applicable codes, such as the National Electric Code.
  - Fencing should avoid single strand wire at the top (i.e., smooth wire, razor wire, or barbed wire) to minimize entanglement.

    - In shrubsteppe areas, use wildlife-friendly fence specifications promulgated by the WSRRI.
    - Design fencing arrays to allow for wildlife passage and avoid creating traps or barriers for wildlife.
    - Consider fencing arrays for corridors instead of a single, large, fenced area.
    - Consider installing wildlife escape measures, such as jump-outs for ungulates, if needed.
- Instruct personnel on wildlife resource protection measures, including the following: 1) applicable federal and state laws (e.g., those that prohibit animal collection or removal); and 2) the importance of these resources and the purpose and necessity of protecting the resources. Train personnel in awareness of sensitive habitats and bird species, potential bird nesting areas, potential bat roosting/breeding habitat, and general wildlife issues.
- Develop an Avian Protection Plan in consultation with USFWS and WDFW prior to construction that specifies mitigation or monitoring for facility impacts on birds, with particular attention to Birds of Conservation Concern.
- Develop and implement a Vegetation and Weed Management Plan with input from the county or city prior to construction.
- Develop and implement an Emergency Management Plan with input from with the local fire marshal.
- Develop and implement a Trash Abatement Plan that focuses on containing trash and food in closed and secured containers and removing them periodically to reduce their attractiveness to opportunistic species that could serve as predators on native wildlife and special-status animals.
- Develop and implement an Erosion and Sediment Control Plan and construction and operations Stormwater Pollution Prevention Plans as part of the National Pollutant Discharge Elimination System permit requirements. BMPs in these plans would help reduce erosion and impacts on vegetation.
- Develop a Revegetation Plan for decommissioning that describes methods, success criteria, monitoring, and reporting for revegetation of areas.
- Designate a qualified biologist to be responsible for overseeing compliance with all avoidance and minimization measures related to the protection of ecological resources throughout all facility phases, particularly in areas requiring avoidance or containing sensitive biological resources, such as special-status species and important habitats.

3.4.4.2.2 Aquatic habitats and species

- Obtain any necessary federal permit or licenses, including the following:
    - Section 401 Water Quality Certification may be required.
    - Coastal Zone Management Act Federal Consistency may be required if the facility is within one of the 15 coastal counties.
- Impacts to non-federally regulated waters and wetlands may require authorization from Ecology pursuant to Chapter 90.48 RCW.

- Develop and implement a Water Resources Monitoring and Mitigation Plan. Changes in surface water or groundwater quality (e.g., chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) or flow that result in the alteration of terrestrial plant communities or communities in wetlands, springs, seeps, intermittent streams, perennial streams, and riparian areas (including the alterations of cover and community structure, species composition, and diversity) of a facility site should be avoided to the extent practicable.
- In addition to the considerations listed in Section 3.4.4.3.1 above, as part of a Wildlife Habitat Mitigation Plan, consideration for aquatic habitats and species should include mitigation and monitoring to identify the presence of and prevent the permanent loss of priority habitats for special-status aquatic species or measures to prevent mortality of those species.
- Minimize the use of herbicides near sensitive habitats (e.g., aquatic habitats) and use only approved herbicides consistent with safe application guidelines.

3.4.4.2.3 Wetlands

- Impacts on federally regulated wetlands would likely require authorization under CWA Section 404 through USACE and a CWA Section 401 Water Quality Certification from Ecology.
- Impacts to non-federally regulated waters and wetlands may require authorization from Ecology pursuant to Chapter 90.48 RCW.
- Impacts on wetlands and their associated buffers may require authorization under local critical areas ordinances.
- Development and implementation of wetland restoration and compensatory mitigation plans (using the Wetland Mitigation in Washington State guidance) for wetland impacts.
- Minimize the use of herbicides near sensitive habitats (e.g., wetland habitats) and use only approved herbicides consistent with safe application guidelines.

3.4.4.3 Additional mitigation measures

This section describes any additional mitigation measures. The additional mitigation measures described under Section 3.4.4.3.1 may also apply to aquatic habitats and species and wetlands.

3.4.4.3.1 Terrestrial habitats and species

- Develop and implement a Wildlife Habitat Mitigation Plan to mitigate for impacts on important ecological resources. Request input from WDFW to determine appropriate mitigation. The plan should include measures that mitigate for the following unavoidable impacts:
    - Temporary impacts: revegetation, soil stabilization, and erosion reduction measures
    - Permanent impacts: mitigation and monitoring to address any significant impacts on the permanent loss of priority habitats that may be habitat for special-status plant and animal species

- Designate a qualified biologist to be responsible for overseeing compliance with and implementation of all mitigation measures in the Wildlife Habitat Mitigation Plan related to the protection of ecological resources throughout all facility phases, particularly in areas requiring avoidance or containing sensitive biological resources, such as special-status species and important habitats.
- For impacts to shrubsteppe habitat, incorporate higher compensatory mitigation ratios because such a large percentage of the shrubsteppe landscape in Washington has already been lost.
- Develop mitigation measures using WDFW's recommendations for solar power mitigation for temporary and permanent impacts to wildlife and habitat.

3.4.5 Unavoidable significant adverse impacts

Construction, operation, and decommissioning of small to medium solar facilities may result in **potentially significant and unavoidable adverse impacts** on terrestrial special-status habitats and species if activities cause the permanent degradation, loss, or conversion of suitable habitat that is critical to habitat or species viability; affect the mortality of any individual species or create a disturbance that disrupts successful breeding and rearing behaviors; or disrupt habitat continuity along migration routes. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site. Mitigation to reduce impacts below significance for terrestrial special-status habitats or species may not be feasible.

3.5 Large utility-scale facilities of 601 MW to 1,200 MW (Alternative 2)

3.5.1 Impacts from construction, operation, and decommissioning

The potential impacts on biological resources described in Section 3.4 for small to medium utility-scale facilities also apply to large utility-scale facilities for construction, operations, and decommissioning. The differences are in facility size and scale. Large facilities could potentially be up to 12,000 acres, with a higher number of electrical inverter/transformer stations (90) and larger collector substations (10 acres). Buildings for operations and maintenance are assumed to be of similar maximum size (5,000 square feet over a 5-acre area).

The larger size of the overall facility footprint would result in a proportionally greater area of habitat disturbance for construction and potentially a longer duration of construction activity. Risks to biological resources would depend on site-specific factors, but in general the larger sites and facilities are expected to present an increase in potential impacts on biological resources.

3.5.1.1 Terrestrial habitats and species

Impacts to terrestrial habitats and species from the construction, operation, or decommissioning of large solar energy facilities would be the same as described in Section 3.4.

3.5.1.2 Aquatic habitats and species

Impacts to aquatic habitats and species from the construction, operation, or decommissioning of large solar energy facilities would be the same as described in Section 3.4.

3.5.1.3 Wetlands

Similar to small to medium facilities, it is assumed that utility-scale solar facilities are unlikely to be sited in wetland areas and that most wetland impacts can be avoided or minimized. Impacts to wetlands from the construction, operation, or decommissioning of large solar energy facilities would be the same as described in Section 3.4

3.5.2 Actions to avoid and reduce impacts

Actions to avoid and reduce impacts would be the same as those identified in Section 3.4.4 for small to medium facilities. Although the scale of impacts would be proportionately increased for large facilities, there would be no change to the previously recommended mitigation measures.

3.5.3 Unavoidable significant adverse impacts

Construction, operation, and decommissioning of large solar facilities may result in **potentially significant and unavoidable adverse impacts** on terrestrial special-status habitats and species if activities cause the permanent degradation, loss, or conversion of suitable habitat that is critical to habitat or species viability; affect the mortality of any individual species or create a disturbance that disrupts successful breeding and rearing behaviors; or disrupt habitat continuity along migration routes. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site. Mitigation to reduce impacts below significance for terrestrial special-status habitats or species may not be feasible.

3.6 Solar facilities and co-located battery energy storage system (Alternative 3)

3.6.1 Impacts from construction, operation, and decommissioning

The potential impacts on biological resources described for facilities in Section 3.4 also apply to solar facilities with co-located battery energy storage systems (BESSs) for site characterization, construction, operations, and decommissioning.

Co-locating a BESS with solar energy facility development would require some additional construction-related ground disturbance and an increased building footprint relative to facilities with no BESS. Battery storage containers are typically 40 feet by 8 feet by 8.5 feet and installed on concrete foundations within a fenced area or within a warehouse-type enclosure and designed for secondary containment. The presence and use of a BESS at a solar energy facility would add another stormwater consideration to a facility and potentially another regulated element to be included in an Industrial SWPPP. BESSs would require heating, ventilation, and

air conditioning (HVAC) units, which could generate increased noise. A fire suppression and prevention system would also be installed.

The evaluation for impacts on terrestrial and aquatic habitats and species and wetlands described in Section 3.4 for small to medium facilities and Section 3.5 for large facilities also apply to facilities with BESSs for construction, operations, and decommissioning. The additional footprint of the BESS would impact more habitat and the increased noise from the HVAC system would have a greater impact to wildlife compared to facilities without a BESS, but the BESS is not expected to substantially add to the overall level of impact on terrestrial habitats and species through implementation of BMPs. During normal operations, the BESS electrolyte solutions are recovered and reused during the recharging process and are generally not reactive or toxic substances, so it is unlikely the BESS would additionally impact habitats and species.

3.6.1.1 Terrestrial habitats and species

Impacts to terrestrial habitats and species from the construction, operation, or decommissioning of solar energy facilities with a co-located BESS would be the same as described in Section 3.4.

3.6.1.2 Aquatic habitats and species

Similar to facilities without a BESS, it is assumed that the infrastructure of the facilities with a co-located BESS are unlikely to be sited in aquatic habitat or riparian areas and that aquatic impacts can be avoided or minimized. Impacts to aquatic habitats and species from the construction, operation, or decommissioning of solar energy facilities with a co-located BESS would be the same as described in Section 3.4.

3.6.1.3 Wetlands

Impacts to wetlands from the construction, operation, or decommissioning of solar energy facility with a co-located BESS would be the same as described in Section 3.4.

3.6.2 Actions to avoid and reduce impacts

The same actions as those identified in Section 3.4.4 are recommended to avoid and reduce impacts for facilities with BESSs.

3.6.3 Unavoidable significant adverse impacts

Construction, operation, and decommissioning of solar facilities with a co-located BESS may result in **potentially significant and unavoidable adverse impacts** on terrestrial special-status habitats and species if activities cause the permanent degradation, loss, or conversion of suitable habitat that is critical to habitat or species viability; affect the mortality of any individual species or create a disturbance that disrupts successful breeding and rearing behaviors; or disrupts habitat continuity along migration routes. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the

specific project and site. Mitigation to reduce impacts below significance for terrestrial special-status habitats or species may not be feasible.

3.7 Solar facilities that include agricultural uses (agrivoltaic) (Alternative 4)

3.7.1 Impacts from construction, operation, and decommissioning

The potential impacts on biological resources described for facilities in Section 3.4 also apply to solar facilities that include agricultural use (agrivoltaic) for construction, operations, and decommissioning. Facilities with co-located agriculture could be located on lands with existing agricultural uses, or the development of a facility could add a new agricultural use to the area.

Some of the ways the impacts for facilities that include agricultural use would differ from facilities without agricultural land use include the following:

- The solar panels may be spaced in a more dispersed way to allow for improved agricultural activities and grazing.
- Agricultural activities could include maintenance of existing or addition of new infrastructure, roads, fences, gates, and traffic.
- Human use at a site would increase compared to other facility types due to continued agricultural use. This would result in an increase in noise, herbicide and pesticide use, crop rotation, and livestock activities that would impact habitats and species.
- Because agricultural use would be combined with solar facilities, there would be a combined demand for water that is higher than for a solar energy facility with no agricultural use. For sites with existing agricultural use, the increase in water demand would be as described for facilities in Sections 3.4 and 3.5. For sites where the type of agricultural use is changed or where agriculture is added, there could be increased demand for water. The demand would be higher for a site with crop production and irrigation and lower for a site with livestock use with no crop production. This in turn could affect species and habitats that use the same water sources. Considerations for water availability and water rights are discussed further in the *Water Resources Report*.

The evaluation for impacts on terrestrial and aquatic habitats and species and wetlands described in Section 3.4 for small to medium facilities and Section 3.5 for large facilities apply to facilities with combined agricultural use for construction, operations, and decommissioning. Because the facility combined with agricultural use would allow for plant growth, impacts could be less; however, because these facilities would include crop production or grazing, the habitat and species impacts would be relatively the same as for other solar facilities.

3.7.1.1 Terrestrial habitats and species

Impacts to terrestrial habitats and species from the construction, operation, or decommissioning of solar energy facilities with co-located agricultural uses would be the same as described in Section 3.4.

3.7.1.2 Aquatic habitats and species

Similar to facilities without agricultural uses, it is assumed that the infrastructure of the facilities with co-located agriculture are unlikely to be sited in aquatic habitat or riparian areas and that aquatic impacts can be avoided or minimized. Impacts to aquatic habitats and species from the construction, operation, or decommissioning of solar energy facilities with co-located agricultural uses would be the same as described in Section 3.4.

3.7.1.3 Wetlands

Impacts to wetlands from the construction, operation, or decommissioning of solar energy facilities with co-located agricultural uses would be the same as described in Section 3.4.

3.7.2 Actions to avoid and reduce impacts

The actions to avoid, reduce, and mitigate impacts for facilities with co-located agricultural uses would be the same as those identified in Section 3.4.4.

3.7.3 Unavoidable significant adverse impacts

Construction, operation, and decommissioning of solar facilities with co-located agricultural uses may result in **potentially significant and unavoidable adverse impacts** on terrestrial special-status habitats and species if activities cause the permanent degradation, loss, or conversion of suitable habitat that is critical to habitat or species viability; affect the mortality of any individual species or create a disturbance that disrupts successful breeding and rearing behaviors; or disrupt habitat continuity along migration routes. Determining if mitigation options would reduce or eliminate impacts below significance would be dependent on the specific project and site. Mitigation to reduce impacts below significance for terrestrial special-status habitats or species may not be feasible.

3.8 No Action Alternative

3.8.1 Terrestrial

Facilities developed under the No Action Alternative would be subject to the same regulatory standards and biological resources permit conditions as those for other facilities considered in this analysis. Therefore, impacts to terrestrial habitat and species from the construction, operation, or decommissioning under the No Action Alternative would be the same as described in Section 3.4.

3.8.2 Aquatic

Facilities developed under the No Action Alternative would be subject to the same regulatory standards and biological resources permit conditions as those for other facilities considered in this analysis. Therefore, impacts to aquatic habitat and species from the construction, operation, or decommissioning under the No Action Alternative would be the same as described in Section 3.4.

3.8.3 Wetlands

Facilities developed under the No Action Alternative would be subject to the same regulatory standards and biological resources permit conditions as those for other facilities considered in this analysis. Therefore, impacts to wetlands from the construction, operation, or decommissioning under the No Action Alternative would be the same as described in Section 3.4.

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Attachment 1. USFWS Information for Planning and Consultation Resource List for Washington

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Washington

Local offices

Washington Fish And Wildlife Office

(360) 753-9440
(360) 753-9405

510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263

Oregon Fish And Wildlife Office

(503) 231-6179
(503) 231-6195

2600 Southeast 98th Avenue, Suite 100
Portland, OR 97266-1398

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Canada Lynx Lynx canadensis There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/3652	Threatened
Columbian White-tailed Deer Odocoileus virginianus leucurus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/154	Threatened
Gray Wolf Canis lupus There is **final** critical habitat for this species. https://ecos.fws.gov/ecp/species/4488	Endangered
Grizzly Bear Ursus arctos horribilis There is **proposed** critical habitat for this species. https://ecos.fws.gov/ecp/species/7642	Threatened
North American Wolverine Gulo gulo luscus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5123	Threatened
Olympia Pocket Gopher Thomomys mazama pugetensis Wherever found There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/6713	Threatened
Pygmy Rabbit Brachylagus idahoensis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1126	Endangered

Roy Prairie Pocket Gopher Thomomys mazama glacialis — Threatened
Wherever found
There is **final** critical habitat for this species. However, no *actual* acres or miles were designated due to exemptions or exclusions. See Federal Register publication for details.
https://ecos.fws.gov/ecp/species/7821

Southern Mountain Caribou Dps Rangifer tarandus ssp. caribou — Endangered
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/4618

Tenino Pocket Gopher Thomomys mazama tumuli — Threatened
Wherever found
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/6290

Yelm Pocket Gopher Thomomys mazama yelmensis — Threatened
Wherever found
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/7257

Birds

NAME	STATUS

Hawaiian Petrel Pterodroma sandwichensis — Endangered
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/6746

Marbled Murrelet Brachyramphus marmoratus — Threatened
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/4467

Northern Spotted Owl Strix occidentalis caurina — Threatened
Wherever found
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/1123

Short-tailed Albatross Phoebastria (=Diomedea) albatrus — **Endangered**
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/433

Streaked Horned Lark Eremophila alpestris strigata — **Threatened**
Wherever found
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/7268

Western Snowy Plover Charadrius nivosus nivosus — **Threatened**
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/8035

Yellow-billed Cuckoo Coccyzus americanus — **Threatened**
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/3911

Reptiles

NAME	STATUS

Northwestern Pond Turtle Actinemys marmorata — **Proposed Threatened**
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/1111

Amphibians

NAME	STATUS

Oregon Spotted Frog Rana pretiosa — **Threatened**
Wherever found
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/6633

Fishes

NAME	STATUS

Bull Trout Salvelinus confluentus — Threatened

There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/8212

Dolly Varden Salvelinus malma — PSAT

Wherever found

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/1008

Insects

NAME	STATUS

Island Marble Butterfly Euchloe ausonides insulanus — Endangered

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/3285

Monarch Butterfly Danaus plexippus — Candidate

Wherever found

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/9743

Taylor's (=whulge) Checkerspot Euphydryas editha taylori — Endangered

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/5907

Flowering Plants

NAME	STATUS

Kincaid's Lupine Lupinus sulphureus ssp. kincaidii — Threatened

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/3747

Marsh Sandwort Arenaria paludicola — Endangered
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/2229

Showy Stickseed Hackelia venusta — Endangered
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/5210

Spalding's Catchfly Silene spaldingii — Threatened
Wherever found
There is **proposed** critical habitat for this species.
https://ecos.fws.gov/ecp/species/3681

Umtanum Desert Buckwheat Eriogonum codium — Threatened
Wherever found
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/3627

Ute Ladies'-tresses Spiranthes diluvialis — Threatened
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/2159

Wenatchee Mountains Checkermallow Sidalcea oregana var. calva — Endangered
Wherever found
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/7222

White Bluffs Bladderpod Physaria douglasii ssp. tuplashensis — Threatened
Wherever found
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/5390

Conifers and Cycads

NAME STATUS

Whitebark Pine Pinus albicaulis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1748	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Bull Trout Salvelinus confluentus https://ecos.fws.gov/ecp/species/8212#crithab	Final
Canada Lynx Lynx canadensis https://ecos.fws.gov/ecp/species/3652#crithab	Final
Island Marble Butterfly Euchloe ausonides insulanus https://ecos.fws.gov/ecp/species/3285#crithab	Final
Kincaid's Lupine Lupinus sulphureus ssp. kincaidii https://ecos.fws.gov/ecp/species/3747#crithab	Final
Marbled Murrelet Brachyramphus marmoratus https://ecos.fws.gov/ecp/species/4467#crithab	Final
Northern Spotted Owl Strix occidentalis caurina https://ecos.fws.gov/ecp/species/1123#crithab	Final
Olympia Pocket Gopher Thomomys mazama pugetensis https://ecos.fws.gov/ecp/species/6713#crithab	Final
Oregon Spotted Frog Rana pretiosa https://ecos.fws.gov/ecp/species/6633#crithab	Final
Southern Mountain Caribou Dps Rangifer tarandus ssp. caribou https://ecos.fws.gov/ecp/species/4618#crithab	Final

Streaked Horned Lark Eremophila alpestris strigata https://ecos.fws.gov/ecp/species/7268#crithab	Final
Taylor's (=whulge) Checkerspot Euphydryas editha taylori https://ecos.fws.gov/ecp/species/5907#crithab	Final
Tenino Pocket Gopher Thomomys mazama tumuli https://ecos.fws.gov/ecp/species/6290#crithab	Final
Umtanum Desert Buckwheat Eriogonum codium https://ecos.fws.gov/ecp/species/3627#crithab	Final
Wenatchee Mountains Checkermallow Sidalcea oregana var. calva https://ecos.fws.gov/ecp/species/7222#crithab	Final
Western Snowy Plover Charadrius nivosus nivosus https://ecos.fws.gov/ecp/species/8035#crithab	Final
White Bluffs Bladderpod Physaria douglasii ssp. tuplashensis https://ecos.fws.gov/ecp/species/5390#crithab	Final
Yelm Pocket Gopher Thomomys mazama yelmensis https://ecos.fws.gov/ecp/species/7257#crithab	Final

Bald & Golden Eagles

There are no documented cases of eagles being present at this location. However, if you believe eagles may be using your site, please reach out to the local Fish and Wildlife Service office.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds

- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Bald and Golden Eagle information is not available at this time

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Migratory bird information is not available at this time

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid

cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to

you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
DUNGENESS NATIONAL WILDLIFE REFUGE	2,739.55 acres

FARM SERVICE AGENCY INTEREST OF WA	24,736.72 acres
FARM SERVICE AGENCY INTEREST OF WA	7,596.24 acres
FRANZ LAKE NATIONAL WILDLIFE REFUGE	582.17 acres
HANFORD REACH NATIONAL MONUMENT/SADDLE MOUNTAIN NATIONAL WILDLIFE REFUGE	242,116.97 acres
LITTLE PEND OREILLE NATIONAL WILDLIFE REFUGE	62,595.45 acres
PIERCE NATIONAL WILDLIFE REFUGE	391.46 acres
RIDGEFIELD NATIONAL WILDLIFE REFUGE	4,987.16 acres
SINLAHEKIN DEER WINTER RANGE AND WILDLIFE REFUGE	17,899.73 acres
STEIGERWALD LAKE NATIONAL WILDLIFE REFUGE	1,313.97 acres

Fish hatcheries

This location overlaps the following National Fish Hatcheries. Please contact them for further guidance.

HATCHERY	ACRES
MAKAH NATIONAL FISH HATCHERY	2,432.19 acres
WILLARD NATIONAL FISH HATCHERY	572.14 acres

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local

government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.