February 2020 Proposed Chehalis River Basin Flood Damage Reduction Project SEPA Draft Environmental Impact Statement

# Appendix P Wildlife Species and Habitats Discipline Report

Publication No.: 20-06-002



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## About this Document

This discipline report has been prepared as part of the Washington Department of Ecology's (Ecology's) State Environmental Policy Act (SEPA) Environmental Impact Statement (EIS) to evaluate a proposal from the Chehalis River Basin Flood Control Zone District (Applicant).

### **Proposed Action**

The Applicant seeks to construct a new flood retention facility and temporary reservoir near Pe Ell, Washington, and make changes to the Chehalis-Centralia Airport levee in Chehalis, Washington. The purpose of the Applicant's proposal is to reduce flooding originating in the Willapa Hills and improve levee integrity at the Chehalis-Centralia Airport to reduce flood damage in the Chehalis-Centralia area.

### **Time Frames for Evaluation**

If permitted, the Applicant expects Flood Retention Expandable (FRE) facility construction would begin in 2025 and operations in 2030, and the Airport Levee Changes construction would occur over a 1-year period between 2025 and 2030. The EIS analyzes probable impacts from the Proposed Action and alternatives for construction during the years 2025 to 2030 and for operations from 2030 to 2080. For purposes of analysis, the term "mid-century" applies to the operational period from approximately 2030 to 2060. The term "late-century" applies to the operational period from approximately 2060 to 2080.

### Scenarios Evaluated in the Discipline Report

This report analyzes probable significant environmental impacts from the Proposed Action, the Local Actions Alternative, and the No Action Alternative under the following three flooding scenarios (flow rate is measured at the Grand Mound gage):

- Major flood: Water flow rate of 38,800 cubic feet per second (cfs) or greater
- Catastrophic flood: Water flow rate of 75,100 cfs
- Recurring flood: A major flood or greater that occurs in each of 3 consecutive years

The general area of analysis includes the area in the vicinity of the FRE facility and temporary reservoir; the area in the vicinity of the Airport Levee Changes; and downstream areas of the Chehalis River to approximately river mile 9, just west of Montesano.

### **Local Actions Alternative**

The Local Actions Alternative represents a local and nonstructural approach to reduce flood damage in the Chehalis-Centralia area. It considers a variety of local-scale actions that approximate the Applicant's purpose through improving floodplain function, land use management actions, buying out at-risk properties or structures, improving flood emergency response actions, and increasing water storage from Pe Ell to Centralia. No flood retention facility or Airport Levee Changes would be constructed.

### **No Action**

Under the No Action Alternative, no flood retention facility or Airport Levee Changes would be constructed. Basin-wide large and small scale efforts would continue as part of the Chehalis Basin Strategy work, and local flood damage reduction efforts would continue based on local planning and regulatory actions.

# SUMMARY

This report describes existing conditions and probable impacts on wildlife, vegetation, and habitat, including those with protected status (federal, state, and local). The *Fish Species and Habitats Discipline Report* (Anchor QEA 2020a) addresses impacts on fish habitat and species; the *Wetlands Discipline Report* (Anchor QEA 2020b) addresses impacts on jurisdictional wetlands and other regulatory waterbodies, including both fish-bearing and non-fish-bearing streams. Impacts on geomorphology, recreation, tribal resources, and water have been identified in the *Earth Discipline Report* (Shannon & Wilson and Watershed GeoDynamics 2020), *Recreation Discipline Report* (ESA 2020a), *Tribal Resources Discipline Report* (Anchor QEA 2020c), and *Water Discipline Report* (ESA 2020b), respectively.

The study area for this analysis includes areas potentially affected by the Proposed Action. This includes the following four specific geographic areas:

- The area of the proposed Flood Retention Expandable (FRE) facility (including associated access, construction, and maintenance areas)
- The area of predicted maximum inundation for the temporary reservoir
- Floodplain downstream of the proposed FRE facility (mainstem Chehalis River and its floodplain), extending to the modeled limits of potential changes to late-century catastrophic flooding, around river mile (RM) 8.3 near Central Park
- The area of the proposed Airport Levee Changes

The analysis for the maximum inundation extent for the temporary reservoir includes an additional 660-foot extent area. The additional extent area is included to identify existing habitat and potential impacts, such as noise impacts, in the vicinity of the temporary reservoir maximum inundation extent. The 660-foot additional extent area was identified based on U.S. Fish and Wildlife Service (USFWS) bald eagle nest disturbance management guidelines (USFWS 2019a) and coordination with the Washington Department of Fish and Wildlife (WDFW; Hayes 2019). Likewise, the analysis downstream of the proposed FRE facility also includes an additional extent area was identified to consider wildlife species movements between the floodplain and adjacent uplands and coordination with WDFW (Hayes 2019).

Wildlife species and habitats are described here based on existing information and reports. Tables P-1 and P-2 include impact summaries for wildlife habitat and species. Impacts to wetlands from a regulatory perspective are described in more detail in the *Wetlands Discipline Report* (Anchor QEA 2020b), but are described in this discipline report in context of their function as wildlife habitat. Impacts to water quality and quantity are described in more detail in the *Water Discipline Report* (ESA 2020b), but are described in this discipline report in context of effects to wildlife habitat and species.

# Table P-1Summary of Wildlife Species and Habitats Impacts from the Proposed Action

		MITIGATION PROPOSED	SIGNIFICANT AND UNAVOIDABLE
ІМРАСТ	IMPACT FINDING	(SUMMARIZED, SEE SECTION 3.2.4)	ADVERSE IMPACT
PROPOSED ACTION (FRE FACILITY AND	AIRPORT LEVEE CHAN	IGES) – CONSTRUCTION	
Permanent removal of upland forest	Significant	WILDLIFE-1: Develop and	Yes, unless
and forested wetland vegetation for		implement a Vegetation	mitigation is
construction of the FRE facility,		Management Plan.	feasible
including Chehalis River riparian		WILDLIFE-2: Develop and	
habitat and effects on portions of		implement a Wildlife	
upland and wetland vegetation near		Species and Habitat	
access roads to the quarry sites.		Management Plan.	
Permanent removal of 90% of tree		WILDLIFE-3: Develop and	
cover in the 600-acre temporary		implement a Riparian	
reservoir area affecting upland,		Habitat Mitigation Plan.	
riparian, and wetland habitats.		EARTH-3: Develop and	
		implement a Large Woody	
		Material Management Plan.	
		FISH-1: Develop and	
		implement a Fish and	
		Aquatic Species and Habitat	
		Plan.	
		WATER-1: Develop and	
		implement a Surface Water	
		Quality Mitigation Plan.	
		WET-1: Develop and	
		implement a Wetland and	
		Wetland Buffer Mitigation	
		Plan.	
		WET-2: Develop and	
		implement a Stream and	
		Stream Buffer Mitigation	
		Plan.	

Wildlife Species and Habitats Discipline Report Summary

		MITIGATION PROPOSED	SIGNIFICANT AND UNAVOIDABLE
		(SUMMARIZED, SEE	ADVERSE
IMPACT	IMPACT FINDING	SECTION 3.2.4)	IMPACT
Mortality of wildlife individuals	Significant	Same as above	Yes, unless
during FRE facility construction from			feasible
Species with low mobility (organic			reasible
species with low mobility (aquatic			
hirds (shicks) would be upphic to			
bilds/clicks) would be unable to			
removal in the temperany recorder			
and normanont decrease in habitat			
functions from loss of trop cover			
would result in species mortality			
from loss of brooding, foraging			
rosting and overwintering babitat			
Pormanent removal/fill of wetlands	Modorato	Samo as abovo	No
(6.6 acres): and the associated	Wouerate	Same as above	INO
wotland buffer vegetation (44.2			
acres) would be disturbed and			
managed (mowed) for construction			
of the Airport Levee Changes			
Noise and disturbance of marbled	Significant	WII DI IEE-2. Develop and	Ves unless
murrelets from ERE facility	Jighineant	implement a Wildlife	mitigation is
construction		Species and Habitat	feasible
		Management Plan.	
Noise and disturbance of wildlife	Moderate	WII DI IFF-2: Develop and	No
(excluding marbled murrelets) from		implement a Wildlife	
FRE facility construction		Species and Habitat	
		Management Plan.	
Increased water temperature	Moderate	Same as above, plus:	No
downstream of the FRE facility		<b>TRANSP-1:</b> For roads not in	
during construction would reduce		managed forests, meet all	
habitat quality for aquatic wildlife		Forest Practices	
species such as amphibians.		requirements for road	
		building, maintenance, and	
		abandonment.	
Removal of habitat at airport levee.	Minor	WILDLIFE-2: Develop and	No
		implement a Wildlife	
		Species and Habitat	
		Management Plan.	
Fragmentation of migratory routes	Minor	WILDLIFE-2: Develop and	No
through the temporary reservoir		implement a Wildlife	
could cause increased competition		Species and Habitat	
and predation on wildlife species.		Management Plan.	

			SIGNIFICANT
			AND
			UNAVOIDABLE
IMPACT		(SUIVINIARIZED, SEE	
PROPOSED ACTION (FRE FACILITY AND	AIRPORT LEVEE CHAN	IGES) – OPERATIONS	IIVIPACI
Permanent and recurring inundation	Significant	WILDLIFE-1: Develop and	Yes. unless
impacts on 847 acres of upland,		implement a Vegetation	mitigation is
wetland (10 acres), and riparian		Management Plan.	feasible
vegetation communities; additional		WILDLIFE-2: Develop and	
tree removal on 180 acres after the		implement a Wildlife	
first catastrophic flood inundation		Species and Habitat	
event; ongoing periodic tree removal		Management Plan.	
on 847 acres; increased water		WILDLIFE-3: Develop and	
temperatures by 2°C to 3°C (3.6°F to		implement a Riparian	
5.4° F) in the Chehalis River and in		Habitat Mitigation Plan.	
Crim Creek by 2°C to 5°C (3.6°F to		EARTH-3: Develop and	
9°F); future invasive species		implement a Large Woody	
colonization; project precludes		Material Management Plan.	
future development of marbled		FISH-1: Develop and	
murrelet habitat.		implement a Fish and	
		Aquatic Species and Habitat	
		Plan.	
		WATER-1: Develop and	
		implement a Surface Water	
		Quality Mitigation Plan.	
		WET-1: Develop and	
		implement a Wetland and	
		Wetland Buffer Mitigation	
		Plan.	
		WET-2: Develop and	
		implement a Stream and	
		Stream Buffer Mitigation	
		Plan.	
Mortality of wildlife from recurring	Significant	Same as above	Yes, unless
inundation in the temporary			mitigation is
reservoir. Low-mobility species (e.g.,			feasible
amphibians) would be more			
vulnerable to drowning. Increases in			
water temperature would reduce			
habitat suitability and distribution of			
native species such as red-legged			
frog and increase habitat for non-			
native fish and wildlife species.			

		MITIGATION PROPOSED	SIGNIFICANT AND UNAVOIDABLE ADVERSE
ІМРАСТ	IMPACT FINDING	SECTION 3.2.4)	IMPACT
Long-term changes to quality and	Significant	Same as above	Yes, unless
quantity of downstream aquatic			mitigation is
habitats from reduced flooding			feasible
hydrology that creates side-channel,			
oxbow, and other aquatic habitats.			
Reduction in recruitment of	Moderate	Same as above	No
cottonwoods downstream of the FRE			
facility, and aging and eventual die-			
off of existing cottonwood habitat			
due to reduction in peak flows that			
are the primary cause of bare alluvial			
surfaces colonized by cottonwoods.			
Reduced habitat for native wildlife	Moderate	Same as above	No
species from increased temperature			
in downstream reaches and increased			
suitability of habitat for exotic fish			
and wildlife species.			
Long-term changes to downstream	Moderate	Same as above	No
floodplain habitats from reduced			
flooding of upland, wetland, and			
riparian vegetation that would not			
change status of wetland habitats but			
would favor transition to more woody			
species over time and would support			
different wildlife species over time.			
Noise and disturbance of wildlife	Minor	Same as above	No
from FRE facility operations.			
Disturbance of wildlife and habitat	Minor	None	No
by airport levee operations.			

### Table P-2

#### Summary of Wildlife Species and Habitats Impacts from Alternatives

ІМРАСТ	IMPACT FINDING
LOCAL ACTIONS ALTERNATIVE	
Potential species and habitat disturbance from construction of local action	Minor
elements.	
No impacts to species or habitat identified from operation of local actions.	None
Wildlife species and habitat would be affected by future floods.	Continuing substantial flood risks
NO ACTION ALTERNATIVE	
Wildlife species and habitat would be affected by future floods.	Continuing substantial flood risks

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### LIST OF ATTACHMENTS

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# **1** INTRODUCTION

This report describes wildlife species and habitats within the study area, including protected sensitive species. This report addresses probable impacts associated with the Chehalis River Basin Flood Control Zone District's (Applicant's) Proposed Action as well as for the No Action Alternative and Local Actions Alternative.

## 1.1 Resource Description

Wildlife species and habitats are described based on existing available information and wildlife management plans. Wildlife, plants, and habitats with protected status are described based on respective agency information (federal, state, and local). There are a wide variety of natural habitats within the study area, which include different combinations of plants, trees, and other vegetation cover types that provide various habitat features for wildlife species. Wildlife habitats are described based on vegetation cover types present within the study area. Wetland and aquatic habitats are generally described based on the wildlife species that they may support.

More detailed information is available in the *Fish Species and Habitats Discipline Report* (Anchor QEA 2020a) and the *Wetlands Discipline Report* (Anchor QEA 2020b). These discipline reports provide thorough descriptions of wetland and aquatic habitats within the study area including fish, Southern Resident killer whales, and aquatic insects (including macroinvertebrates). In addition, regulatory requirements for wetlands, wetland buffers, streams (regulatory waterbodies), and stream buffers are addressed in the *Wetlands Discipline Report* (Anchor QEA 2020b). Riparian areas and functions as they relate to wildlife species are described here. Impacts to geomorphology, recreation, tribal resources, and water have been identified in the *Earth Discipline Report* (Shannon & Wilson and Watershed GeoDynamics 2020), *Recreation Discipline Report* (ESA 2020b), respectively.

Wildlife habitats and vegetation communities that occur within the study area and wildlife species that occur or potentially occur within the study area are described based on existing natural resource information and studies. Wildlife species are discussed by animal groups, as follows:

- Amphibians (still-water breeding, stream breeding, and riparian breeding)
- Reptiles
- Birds (songbirds, raptors, shorebirds, waterfowl, and waterbirds)
- Terrestrial insects
- Mammals

The following plants, habitats, and wildlife species with protected status are also described:

- Endangered Species Act (ESA)-listed plant species and critical habitats
- State rare plants
- Washington Department of Fish and Wildlife (WDFW) priority habitats
- WDFW priority species
- Federal ESA-listed and state-protected wildlife species

### 1.2 Regulatory Context

Federal, tribal, state, and local regulations, statutes, and guidelines require the review of the possible environmental impacts of the alternatives. The jurisdictional authorities and regulations, statutes, and guidance relevant to impacts on wildlife species and habitats are summarized in Table P-3.

### Table P-3

#### Regulations, Statutes and Guidelines for Wildlife Species and Habitats

<b>REGULATION, STATUTE, GUIDELINE</b>	DESCRIPTION
FEDERAL	
Clean Water Act (33 U.S. Code [USC]	Enacted in 1972, the Clean Water Act was developed to protect water
1251 et seq.)	quality in surface water and groundwater. Section 404 regulates the
	discharge of dredged or fill material into waters of the United States,
	including adjacent wetlands.
Endangered Species Act (ESA;	Section 7 of the ESA requires consultation with the U.S. Fish and Wildlife
16 USC 1531 et seq.)	Service (USFWS) and/or National Oceanic and Atmospheric
	Administration (NOAA) Fisheries when undertaking a federal action to
	ensure the conservation of any ESA-listed animal species and critical
	habitat, so as not to jeopardize the continued existence of any listed
	species. NOAA Fisheries manages ESA-listed marine and anadromous
	species while USFWS manages listed terrestrial and freshwater species.
Bald and Golden Eagle Protection	Prohibits the take, possession, sale, purchase, barter, offer to sell,
Act of 1940, as amended	purchase or barter, transport, export or import, of bald or golden
(16 USC 668-668c)	eagles, including any part, nest, or egg, unless permitted under the
	authority of USFWS.
Migratory Bird Treaty Act of 1918, as	Prohibits the take of all migratory birds, their eggs, parts, or nests unless
amended (16 USC 703-713)	authorized by a permit under the regulatory authority of USFWS.
STATE	
Forest Practices Act Chapter 76.09	The Washington Department of Natural Resources administers rules
Revised Code of Washington (RCW)	that govern forest practices activities on non-federal and non-tribal
and Forest Practices Rules Title 222	forestland in Washington state.
Washington Administrative Code	
(WAC)	
WDFW State and Protected Species	WDFW oversees the listing and recovery of state-endangered,
(220-610 WAC)	threatened, or sensitive species to ensure their survival as populations
	in the state.

<b>REGULATION, STATUTE, GUIDELINE</b>	DESCRIPTION
WDFW Scientific Collection Permit	A scientific collection permit is required to salvage, move, or remove
(RCW 77.32.240, WAC 220-200-150,	fish and wildlife species (including avian nests and eggs) for research,
and WAC 220-450-030)	construction, and other purposes.
Washington Department of Natural	The Natural Heritage Program has no direct regulatory authority and is
Resources Natural Heritage Program	advisory only. Conservation status assigned to species and habitats is
	used to support federal, state, and local land management policies and
	listing decisions.
Washington State Hydraulic Code	The Washington State Hydraulic Code Rules serve to protect fish,
Rules (RCW 77.55, WAC 220-660)	shellfish, and their habitats by requiring all actions that use, divert,
	obstruct, or change the natural flow or bed of salt or fresh state waters
	to obtain a Hydraulic Project Approval from WDFW.
Washington State Shoreline	The Shoreline Management Act requires counties, cities, and towns to
Management Act (90.58 RCW)	develop and implement Shoreline Master Programs that regulate the
	use of shorelines, public access, and environmental protection.
Washington State Growth	The Growth Management Act requires all cities and counties in
Management Act (36.70A RCW)	Washington to adopt development regulations, according to best
	available science, that protect critical areas as defined in RCW 36.70A.030(5),
	including fish and wildlife habitat conservation areas.
LOCAL	
Lewis County Municipal Code	Lewis County Code Title 17 (Land Use and Development Regulations)
Chapter 17.38 (Critical Areas);	classifies and designates critical areas in Lewis County in Chapter 17.38.
Chapter 17.25 (Shoreline	
Management)	
Grays Harbor County Municipal Code	Grays Harbor County Code Title 18 (Environment) identifies and
Chapter 18.06 (Critical Areas	regulates environmentally critical areas under Chapter 18.06.
Protection Ordinance)	
Thurston County Municipal Code	Thurston County Code Title 24 establishes regulations and enforcement
Title 24 (Critical Areas); Title 19	processes for the protection of critical areas. Title 19 establishes
(Shoreline Master Program)	regulations for the protection of shorelines.
Pacific County Ordinance No. 180	Pacific County Code Title 23 (Critical Areas) implements the Growth
(Critical Areas and Resource Land);	Management Act and environmental goals of the Pacific County
Ordinance No. 183 (Shoreline	Comprehensive Plan through protecting the functions and values of
Master Program)	ecologically sensitive areas. Ordinance No. 183 establishes the Shoreline
	Master Program to manage and protect shorelines.
Chehalis Municipal Code Chapter	Chehalis Municipal Code Chapter 17 (Uniform Development
17.21 to 17.27 (Critical Areas);	Regulations) establishes regulations pertaining to the development of
Chapter 17.18 (Shoreline Substantial	critical areas to protect Chehalis's environmentally sensitive resources
Development Permit)	and regulate development within the shoreline zone.
Centralia Municipal Code Chapter	Centralia Municipal Code Chapter 16 (Environment) regulates the use of
16.16 to 16.21 (Critical Areas);	land in and around critical areas, wildlife habitat, and natural hazard
Chapter 16.08 (Shoreline Master	areas within the city and implements the Shoreline Master Program.
Program)	
Elma Municipal Code Chapter 14.26	Elma Municipal Code Chapter 14.26 establishes regulations that classify,
(Environmental Protection)	protect, and preserve Elma's critical areas and floodways in part for
	their beneficial biological functions.

REGULATION, STATUTE, GUIDELINE	DESCRIPTION		
Montesano Municipal Code Chapter 14.30 (Critical Areas)	Montesano Municipal Code Chapter 14.30 establishes regulations that classify, protect, and preserve Montesano's critical areas and floodways in part for their beneficial biological functions		
Oakville Municipal Code Chapter	Oakville Municipal Code Chapter 14.16 establishes regulations that classify, protect, and preserve Oakville's critical areas and floodways in		
	part for their beneficial biological functions.		

# 2 METHODOLOGY

## 2.1 Study Area

The study area for wildlife species and habitats (Figure P-1) includes four specific geographic areas that could be affected by the Proposed Action:

- The area of the proposed Flood Retention Expandable (FRE) facility (including associated access, construction, and maintenance areas)
- The area of predicted maximum inundation for the temporary reservoir
- The floodplain downstream of the proposed FRE facility (mainstem Chehalis River and its floodplain) extending to the modeled limits of potential late-century catastrophic flooding, about river mile (RM) 9 near Central Park, Washington
- The area of the proposed Airport Levee Changes

The study area for the FRE facility and the maximum inundation extent for the temporary reservoir includes an additional 660-foot extent area. The additional extent area is included to identify existing habitat and potential impacts, such as noise impacts, in the vicinity of the temporary reservoir maximum inundation extent. The 660-foot extent area was identified based on U.S. Fish and Wildlife Service (USFWS) bald eagle nest disturbance management guidelines (USFWS 2019a) and coordination with WDFW (Hayes 2019). Likewise, the analysis downstream of the proposed FRE facility includes an additional extent area beyond the modeled limits of late-century catastrophic flooding. A 300-foot additional extent area was identified based on the potential to affect wildlife species movements between the floodplain and adjacent uplands (Hayes 2019).

## 2.2 Studies and Reports Referenced/Used

The following studies and reports were used to evaluate wildlife impacts.

- Chehalis Basin Strategy Programmatic Environmental Impact Statement (Ecology 2017)
- Chehalis River Basin Flood Control Combined Dam and Fish Passage Supplemental Design Report: FRE Dam Alternative (Chehalis Basin Strategy 2018)
- Fish Species and Habitats Discipline Report (Anchor QEA 2020a)
- Wetlands Discipline Report (Anchor QEA 2020b)
- Chehalis Centralia Airport Levee Wetland Delineation Report (Anchor QEA 2019a)
- Downstream Floodplain Wetland Analysis Memorandum (Anchor QEA 2019b)
- Earth Discipline Report (Shannon & Wilson and Watershed GeoDynamics 2020)
- Water Discipline Report (ESA 2020b)
- Noise and Vibration Discipline Report (ESA 2020c)
- Cottonwood Habitat Study (Meadow Run Environmental and Anchor QEA 2019)

- WDFW's Priority Habitats and Species: Maps (WDFW 2019a)
- WDFW's Priority Habitats and Species List (WDFW 2019b)
- USFWS's endangered species information (USFWS 2019b)
- USFWS's ESA status reviews and listing information (USFWS 2019c)
- Washington Department of Natural Resources (DNR) Natural Heritage Program Rare Plants List (DNR 2019a)
- U.S. Geological Survey (USGS) National Land Cover Data Set (NLCD; USGS 2016)
- Washington Department of Ecology's (Ecology's) 2011 Modeled Wetlands Inventory
- WDFW's amphibian and wildlife studies (see Section 2.4.2)
- State Wildlife Action Plan (WDFW 2015)

### Figure P-1 Wildlife Species and Habitats Study Area



## 2.3 Technical Approach

The technical approach for the analysis of probable impacts on wildlife species and habitats in this report included reviewing the multiple recent technical studies by WDFW and others that document the distribution and abundance of specific wildlife species; reviewing publicly available geographic information system (GIS) mapping layers on land cover, wetlands, and species presence; and obtaining information from resource agencies, peer-reviewed literature, and aerial photographs (Section 2.2). The study area provides habitat for a wide variety of wildlife along the Chehalis River and its tributaries, floodplains, and throughout the forested areas of the Chehalis Basin. Some of these wildlife species are common and abundant, while others are threatened or endangered.

Within the study area, major vegetative community cover types were mapped based on USGS's NLCD (USGS 2016). The vegetative community cover types provide the basis for the analysis of wildlife habitats. For both accuracy and consistency with other discipline and technical reports, wetlands within the study area are described based on delineations performed for the project (Anchor QEA 2018, 2019a) and the 2011 Modeled Wetlands Inventory dataset (Ecology 2011), rather than USGS's NLCD wetland mapping layers. Ecology's and USGS's wetland data have some differences, and areas of open water are not included in this vegetation cover analysis. Therefore, the total vegetated area associated with the temporary reservoir and downstream of the FRE facility is different than the total footprint area reported for these study area components in other discipline reports.

Riparian habitat is a habitat type and not a vegetation community cover type, and therefore it is not identified with USGS's NLCD. For qualitative discussion of riparian habitat in this report and for mitigation, the Forest Ecosystem Management Assessment Team referenced in WDFW's *Riparian Ecosystems, Volume 1: Science Synthesis and Management Implications* (Quinn et al. 2019) used the site-potential height for a 200-year-old tree as the minimum width for full riparian ecosystem functions. Regulatory stream buffers per Lewis County critical areas code are quantified in the *Wetlands Discipline Report* (Anchor QEA 2020b).

Within the study area, probable impacts were assessed for construction and operation. Probable effects on wildlife habitats (vegetation community cover types and riparian habitat), each category of wildlife species (amphibians, reptiles, birds, terrestrial insects, large and small mammals), and special status species (federally and state protected) are evaluated.

## 2.4 Affected Environment

The following sections describe the types of wildlife and wildlife habitats found within the study area, including special status species. The discussion is divided into two sections: wildlife habitats and wildlife species. The wildlife habitats section (Section 2.4.1) describes vegetation community cover types and wildlife habitats known or likely to be present in the study area, including WDFW priority habitats and special status plant species. The wildlife species section (Section 2.4.2) describes wildlife species known

or likely to be present within the various vegetation community cover types present within the study area, including special status wildlife species (Section 2.4.3), based on the wildlife habitat in the study area and recent research.

### 2.4.1 Wildlife Habitats

Wildlife habitats are described based on the characteristics of vegetation community cover types including canopy cover (trees, shrubs, grass, and herbaceous species), and upland, wetland, or riparian habitat features. Vegetation zones are often used to differentiate habitats based on dominant tree species or plant associations. The study area lies primarily within the large-scale western hemlock (*Tsuga heterophylla*) vegetation zone of Western Washington and includes areas of the Douglas fir (*Pseudotsuga menziesii*)/Oregon white oak (*Quercus garryana*) zone, found in the wet and dry prairies of the Chehalis Basin (Van Pelt 2007).

### 2.4.1.1 U.S. Geological Survey NLCD Vegetation and Land Cover Types

The different types of upland tree, shrub, grass, and herbaceous plant species and land cover within the study area have been grouped into 13 categories for this analysis. The vegetation and land cover categories were developed based on information from USGS's NLCD mapping (USGS 2016). Figures P-2 through P-12 show the location of vegetation and land cover categories within the study area and depict their general geographic extent. Areas of open water are identified in the figures but are not included in this vegetation cover analysis.

As described in the following wetlands subsection, USGS's NLCD wetland cover type is shown on the figures but the wetland analysis is based on the resources used in the *Wetlands Discipline Report*. The developed land cover category is identified in the figures as one cover type. Developed land cover discussed in this report includes four subcategories based on land use intensity. Riparian habitat is not defined in USGS's NLCD mapping as a separate vegetation cover type. Instead all 13 land cover categories are within riparian habitat areas adjacent to rivers and streams within the study area, to varying degrees. The following subsections provide a description of the 13 USGS's NLCD vegetation and land cover categories used in the wildlife habitat analysis (USGS 2016). A list of plant species commonly found within the study area is provided in Attachment P-1, Table P1-1.















# Figure P-9 Vegetation and Land Cover Porter Creek •Olympia Porter Oakville Grand Mound Centralia Doty •Chehalis Adna Pe Ell Port Major Roads **Rivers and Streams** Tribal Lands Study Area Land Cover Type Wetland Open Water Scrub-Shrub Cultivated Crops Hay/Pasture Barren Mixed Forest Deciduous Forest Evergreen Forest Miles Developed 0.5 1

Herbaceous

Ñ







### **Evergreen Forest**

Evergreen forest areas are dominated by evergreen trees, in various stages of growth and density where 75% or more of the tree species maintain their leaves all year. Generally, in all forest categories, tree species are greater than 18 feet tall with the tree canopy accounting for 25% to 100% of the cover. Canopy is never without green foliage. Most of the evergreen forests within the study area have been managed for many decades to provide wood products and, therefore, the forests are typically even-aged stands of trees, typically ranging from less than 10 years old to more than 60 years old. The dominant, evergreen tree species include western hemlock, western red cedar (*Thuja plicata*), Douglas fir, and Sitka spruce (*Picea sitchensis*). Other plant species found in the understory of these forests include salal (*Gaultheria shallon*), low Oregon grape (*Mahonia nervosa*), vine maple (*Acer circinatum*), red huckleberry (*Vaccinium parvifolium*), salmonberry (*Rubus spectabilis*), trailing blackberry (*Rubus ursinus*), and sword fern (*Polystichum munitum*).

### **Deciduous Forest**

Deciduous forest areas are dominated by deciduous trees where 75% or more of the tree species shed foliage in response to seasonal change. These forested areas are dominated by deciduous trees such as black cottonwood (*Populus trichocarpa*), Oregon ash (*Fraxinus latifolia*), red alder (*Alnus rubra*), and big-leaf maple (*Acer macrophyllum*). The deciduous forests are commonly found alongside wetlands and riparian corridors (rivers and streams). Plant species found in the understory of these areas include salmonberry, vine maple, western azalea (*Rhododendron occidentale*), Indian plum (*Oemleria cerasiformis*), red elderberry (*Sambucus racemosa*), snowberry (*Symphoricarpos albus*), and beaked hazelnut (*Corylus cornuta*).

### **Mixed Forest**

Mixed forest areas are dominated by trees where neither deciduous nor evergreen species represent more than 75% of the cover present. Mixed forests are found in more fragmented patches than the coniferous and deciduous forested cover and are typically adjacent to roadways and developed areas. They contain similar understory species as coniferous and deciduous forests but may have a greater presence of non-native understory species.

#### Scrub-Shrub

Scrub-shrub areas include upland areas dominated by shrubs less than 18 feet tall with shrub canopy typically greater than 20% of the total vegetation. This class includes true shrubs, young trees in an early successional stage (less than 10 years) or trees stunted from environmental conditions. This category also includes areas dominated by non-native species, like Scot's broom (*Cytisus scoparius*) and Himalayan blackberry (*Rubus armeniacus*). These areas are often found along roadways or developed areas and within power line transmission corridors and recently harvested timber areas including restocked areas of managed forests where re-planted trees are less than 10 years old.

### Herbaceous

Herbaceous areas include upland areas dominated by grass or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be used for grazing.

### **Cultivated Crops**

Cultivated crop areas are characterized by herbaceous vegetation that has been planted or is intensively managed for the production of food, feed, or fiber; or is maintained in developed settings for specific purposes. Herbaceous vegetation accounts for 75% to 100% of the cover.

### Hay/Pasture

Hay/pasture areas include grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Hay/pasture vegetation accounts for more than 20% of total vegetation.

### Barren

This category includes areas characterized by bare rock, gravel, sand, or soil, with little or no "green" vegetation present regardless of its inherent ability to support life. Vegetation, if present, accounts for less than 15% of the total cover.

### **Developed Open Space**

This category includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.

### **Developed Low Intensity**

This category includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% of total cover. These areas most commonly include single-family housing units.

### **Developed Moderate Intensity**

This category includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.

### **Developed High Intensity**

This category includes areas highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.

### Wetlands

Wetlands are found associated with riverine systems such as the Chehalis River and many of the other rivers and perennial and intermittent streams in the study area; lacustrine systems associated with large waterbodies (e.g., lakes); and palustrine systems that support smaller areas of open water (e.g., ponds) as well as emergent, scrub-shrub, and forested vegetation.

While the USGS NLCD wetland cover type is shown in Figures P-2 through P-12, for both accuracy and consistency with other discipline and technical reports, wetlands within the study area are described based on delineations performed for the project (Anchor QEA 2018, 2019a) and the 2011 Modeled Wetlands Inventory dataset (Ecology 2011), rather than USGS's NLCD wetland mapping layers. These wetlands are classified using a variation of the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). Wetlands within the study area are described based on the analysis from the following documents: *Wetlands Discipline Report; Wetland, Water, and Ordinary High Water Mark Delineation Report* (Anchor QEA 2018); *Chehalis – Centralia Airport Levee Wetland Delineation Report* (Anchor QEA 2018); *Chehalis – Centralia Airport Levee Wetland Delineation Report* (Anchor QEA 2019b).

### **Riparian Habitat**

WDFW identifies riparian habitat as the area adjacent to flowing or standing freshwater aquatic systems. Riparian habitat encompasses the area beginning at the ordinary high water mark and extends to cover that portion of the terrestrial landscape that is influenced by, or that directly influences, the aquatic ecosystem. Riparian habitat includes the entire extent of the floodplain and riparian areas of wetlands that are directly connected to stream courses or other freshwater waterbodies (WDFW 2019a). In addition, WDFW's *Riparian Ecosystems, Volume 1: Science Synthesis and Management Implications* (Quinn et al. 2019) describes a riparian ecosystem as follows:

"[T]he area alongside a river or stream that significantly influences exchanges of energy and matter with the aquatic ecosystem. It includes the active channel, the active floodplain and terraces, and portions of the adjacent uplands that contribute organic matter and energy to the active channel or floodplain. It is a zone of influence; a transitional ecotone between terrestrial and aquatic ecosystems that is distinguished by gradients in biophysical conditions, ecological processes, and biota".

The Forest Ecosystem Management Assessment Team determined that the site-potential height for a 200-year-old tree is the minimum width for full riparian ecosystem functions.

A variety of large and small rivers and perennial and intermittent streams are present in the study area with associated riparian habitats that provide habitat for wildlife species. Riparian habitat is not defined or shown in USGS's NLCD mapping (USGS 2016). For the purposes of this discipline report, riparian habitats generally are those areas dominated by black cottonwood, red alder, and/or Oregon ash overstory and/or areas of willow shrubland. Some areas identified in the NLCD mapping as deciduous

forest or scrub-shrub vegetation fit this definition. In managed areas of evergreen forests in the study area, riparian habitat generally has dominant tree species comprised of Douglas fir, western hemlock, and western red cedar.

### 2.4.1.2 FRE Facility

The dominant vegetation cover type associated with the study area for the proposed FRE facility footprint (including associated access, construction, and maintenance areas) is privately owned evergreen forest habitat. This forest habitat is dominated by even-aged stands of Douglas fir in various stages of growth and density following ongoing timber practices (stands 5 to 10 years old and 10 to 20 years old; some may be older). Other vegetation cover types in the study area include mixed forest adjacent to the Chehalis River and scrub-shrub cover associated with recently clearcut areas. Vegetation cover types are presented in Table P-4 and shown in Figures P-13 through P-15.

### Table P-4

VEGETATION		FRE FACILITY		QUARRY SITES
COMMUNITY COVER	FRE FACILITY	660-FOOT EXTENT	QUARRY ACCESS	660-FOOT EXTENT
TTPES	(ACRES)	AREA (ACRES)	ROADS (ACKES)	AREA (ACRES)
Evergreen Forest	4.0	51.6	46.3	77.8
Deciduous Forest	0.0	1.6	0.4	0.0
Mixed Forest	1.4	4.7	1.1	2.9
Scrub-Shrub	0.2	11.1	12.5	10.9
Herbaceous	0.0	22.7	11.3	24.2
Wetland <sup>2</sup>	0.6 <sup>2</sup>	0.0	0.1 <sup>2</sup>	0.0
Developed Open Space	0.7	4.2	19.3	8.5
Developed Low Intensity	1.1	2.7	1.3	0.0
Total	8.0	98.6	92.3	124.3

Vegetation Community Cover Types Associated with the FRE Facility and Quarry Access Roads

Notes:

1. NLCD (USGS 2016) with the exception of wetland layer as described in Section 2.3.

2. Wetlands described in Anchor QEA 2018 and 2020b.

The proposed FRE facility and associated construction and operations areas include three proposed quarries: North Quarry, South Quarry, and Huckleberry Ridge Quarry (Figures P-1, P-2, P-13, P-14, and P-15). Accessing these quarry areas would include widening, improving, and upgrading existing roads to each of the quarries. The North Quarry would require widening 1.9 miles of the existing road, in addition to widening, surfacing, and making moderate improvements to the road subgrade. The South Quarry would require the same as the North Quarry with additional upgrades and widening of existing roads. The Huckleberry Ridge Quarry would include 3.01 miles of simple improvements, 2.93 miles of moderate improvements and excavation, and 0.81 mile of complex improvements, including heavy excavation, drilling, and blasting. A description of the quarry road improvements for the Proposed Action is presented in the *Transportation Discipline Report* (ESA 2020d).


## Figure P-14

Vegetation and Land Cover Near the FRE Facility and Temporary Reservoir





Vegetation community cover types within 25 feet of the North Quarry, South Quarry, and Huckleberry Ridge Quarry access roads are presented in Table P-4 and shown in Figures P-13 through P-15. Table P-4 identifies the total vegetation cover within 25 feet of the quarry access roads to identify existing vegetation that could be disturbed within potential areas of access road construction. The 25-foot width for potential disturbance along the entire length of the access roads is a conservative (high) estimate based on existing potential impact information. The existing vegetation community cover types within a 660-foot extent area around the quarry sites are also presented in Table P-4 and shown in Figures P-13 through P-15.

Riparian habitat vegetation associated with the Chehalis River also includes Douglas fir-dominant evergreen forest habitat. Eight wetlands are located within the proposed FRE facility footprint and associated construction areas, with over 30 acres of wetland buffer habitat. Additional common tree species include red alder and western red cedar. Common shrub and understory forest species include salal, low Oregon grape, vine maple, red huckleberry, salmonberry, lady fern (*Athyrium angustum*), and sword fern. Common herbaceous species include piggyback plant (*Tolmiea menziesii*), oxalis (*Oxalis oregana*), creeping buttercup (*Ranunculus repens*), stinging nettle (*Urtica dioica*), and reed canarygrass (*Phalaris arundinacea*). Development and disturbed areas associated with the FRE facility and quarry access roads include a network of gravel and dirt logging roads.

Within the identified footprint of the FRE facility and associated construction and operation areas, evergreen forest and mixed forest cover types account for 83% of the total vegetation cover. Scrubshrub and wetland communities account for 3% and 6% of the total cover, respectively. Developed areas account for the remaining 8% of the total cover.

Overall, existing development features include logging and access roads. The upland, riparian, and wetland vegetation communities and waterbody habitat features within the FRE facility and associated areas provide a variety of quality habitat features for wildlife species to breed, forage, rest, and overwinter.

# 2.4.1.3 Temporary Reservoir

The dominant vegetation cover type associated with the temporary reservoir inundation area is privately owned evergreen forest habitat. This forest habitat is dominated by even-aged stands of Douglas fir in various stages of growth and density following ongoing timber practices. In general, timber practices within the study area operate on 50-year cycles. Most of the evergreen forest cover includes even-aged evergreen (Douglas fir) forest stands 5 to 10 years old, 10 to 20 years old, and 20 up to 50 years old as well as areas of scrub-shrub cover associated with recently clearcut areas. The age of trees in riparian habitat may be older. The temporary reservoir maximum inundation area is 847 acres and includes a variety of vegetation community cover types providing habitat features for many wildlife species. Vegetation community cover types associated with the temporary reservoir study area are presented in Table P-5 and shown in Figures P-13 through P-15.

VEGETATION COMMUNITY	TEMPORARY	<b>RESERVOIR 660-FOOT</b>	
COVER TYPES <sup>1</sup>	RESERVOIR (ACRES)	EXTENT AREA (ACRES)	TOTAL (ACRES)
Evergreen Forest	485.7	997.2	1,482.9
Deciduous Forest	63.5 <sup>2</sup>	3.1	66.6
Mixed Forest	57.3	49.8	107.1
Scrub-Shrub	72.8	185.3	285.1
Herbaceous	64.6	131.9	196.5
Wetland <sup>2</sup>	10.2 <sup>3</sup>	3.7 <sup>2</sup>	13.9 <sup>2</sup>
Hay/Pasture	5.8	0.4	6.2
Developed Open Space	76.8	85.6	162.4
Developed Low Intensity	9.2	3.8	13.0
Developed Medium Intensity	0.4	0.0	0.4
Total Vegetated Cover	846.3	1,460.8	2,307.1
Open water	0.7		
Total area in reservoir study	847.0	1,460.8	2,307.1
area			

#### Table P-5

Vegetation Community Cover Types Associated with the Temporary Reservoir Study Area

Notes:

1. NLCD (USGS 2016) with the exception of wetland layer, as described in Section 2.3.

2. Deciduous forest cover type includes USGS NLCD woody wetland cover type that exceeded the 10.2 acres of delineated wetlands within the temporary reservoir area.

3. Wetlands described in Anchor QEA 2018 and 2020b.

In addition to the dominant even-aged stands of Douglas fir described earlier, deciduous forest and mixed forest also compose a portion of the vegetation cover within the proposed temporary reservoir. Deciduous forest cover adjacent to rivers and streams is riparian habitat; however, the predominant upland evergreen forest adjacent to rivers and streams composes the majority of vegetation cover within the riparian ecosystem due to topographic slopes. Common species in deciduous and upland evergreen forest cover types in the temporary reservoir include red alder, western red cedar, big-leaf maple, salmonberry, vine maple, stink currant (*Ribes bracteosum*), red elderberry, beaked hazelnut, devils club (*Oplopanax horridus*), piggyback plant, oxalis, creeping buttercup, stinging nettle, lady fern, and sword fern. Based on aerial photograph analysis, the scrub-shrub, herbaceous, and hay/pasture cover types include clearcut areas that are still dominated by young shrubs, ferns, grass, or herbaceous vegetation or planted evergreen saplings. Developed cover is associated with logging roads, pullouts, and storage/staging areas.

Eighty-nine wetlands equaling 10.2 acres are located within the temporary reservoir inundation area. Wetlands within the temporary reservoir area include various combinations of palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO) wetland types. The hydrogeomorphic (HGM) classes of wetlands found in the temporary reservoir area include depressional, slope, and riverine wetland types (Hruby 2014).

Typical tree vegetation present in the wetlands includes primarily red alder in the overstory, with western red cedar present to a lesser extent. Salmonberry, vine maple, devils club, and young red alder are dominant in the shrub layer. Herbaceous species that are present typically include piggyback plant, lady fern, Pacific waterleaf (*Hydrophyllum tenuipes*), Pacific golden-saxifrage (*Chrysosplenium glechomifolium*), skunk cabbage (*Lysichiton americanus*), and water parsley (*Oenanthe sarmentosa*).

Wetlands within the temporary reservoir area are described in the *Wetlands Discipline Report*. The wetland functional values and scores, rating, and classification of each of the wetlands delineated in the temporary reservoir are presented in the *Wetland, Water, and Ordinary High Water Mark Delineation Report* (Anchor QEA 2018).

There are nine stream channel drainage basins associated with major stream channels within the maximum temporary reservoir inundation area: the upper Chehalis River, Alder Creek, Big Creek, Browns Creek, Crim Creek, Hull Creek, Lester Creek, Roger Creek, and Smith Creek (Figures P-13 through P-15). Within the temporary reservoir, in addition to these large river and stream system regulatory waterbodies, there are also dozens of primary and secondary tributaries of these systems with perennial or annual seasonal flow. Isolated channels that flow subsurface before reaching a flowing channel are also present within the temporary reservoir. Vegetation communities near these waterbodies provide riparian habitat for wildlife species.

Development and disturbed areas associated with the temporary reservoir include a network of gravel and dirt logging roads. Areas that have been clearcut after 2016 are identified as scrub-shrub, herbaceous, or hay/pasture cover types. The hay/pasture cover areas appear to be recently clearcut areas with herbaceous cover.

Three forest cover types account for 69% of the total vegetation cover, with evergreen forest accounting for 61% and deciduous and mixed forest accounting for 1% and 7% respectively. Scrub-shrub and herbaceous communities account for 10% and 8% of the total cover, respectively. Wetlands and hay/pasture each account for 1% of the total cover. Developed areas account for the remaining 11% of the total cover. Vegetation cover types within the 660-foot extent area of the temporary reservoir generally follow similar proportional patterns of vegetation cover.

Overall, existing development features are lacking within the temporary reservoir with the exception of the network of logging and access roads. The upland, riparian, and wetland vegetation communities and waterbody habitat features within the temporary reservoir provide a variety of quality habitat features for wildlife species to breed, forage, rest, and overwinter and connect to upstream/downstream areas and nearby hill slopes.

# 2.4.1.4 Airport Levee

Vegetation community cover types within the airport levee study area include wetlands and disturbed or managed habitats dominated by development associated with airport transportation including roadways and airport operations and maintenance activities or adjacent farming land uses. The areas of existing vegetation community cover types within the airport levee study area are presented in Table P-6 and shown in Figure P-16.

### Table P-6

Vegetation Community Cover Types Associated with the Airport Levee Study Area

COVER TYPES <sup>1</sup>	TOTAL (ACRES)
Hay/Pasture	11.3
Wetlands <sup>2</sup>	6.6 <sup>2</sup>
Developed Open Space	21.1
Developed Low Intensity	20.5
Developed Medium Intensity	7.6
Developed High Intensity	2.7
Total	69.8

Notes:

1. NLCD (USGS 2016) with the exception of wetland layer, as described in Section 2.3.

2. Wetlands are described in Anchor QEA 2018, 2020b, and 2019a.

In addition to airport operations facilities, dominant features include agricultural fields, mowed vegetation, wetlands, drainage ditches, a maintained levee trail, and paved public roads. Most vegetation within the airport levee is mowed, including wetland buffer habitat. Common species include reed canarygrass, Canada thistle (*Cirsium arvense*), creeping bentgrass (*Agrostis stolonifera*), meadow foxtail (*Alopecurus pratensis*), prickly lettuce (*Lactuca serriola*), teasel (*Dipsacus fullonum*), red fescue (*Festuca rubra*), white clover (*Trifolium repens*), field horsetail (*Equisetum arvense*), and Himalayan blackberry (*Rubus armeniacus*).

Eight wetlands are within the proposed Airport Levee Changes footprint equaling 7.8 acres. Seven of the eight wetlands delineated within the airport levee area extend outside the study area boundary. Common wetland vegetation includes reed canarygrass, broad-leaf cattail (*Typha latifolia*), soft rush (*Juncus effusus*), Douglas spirea (*Spiraea douglasii*), red-osier dogwood (*Cornus sericea*), and Pacific willow (*Salix lasiandra*). Wetlands include various combinations of palustrine unconsolidated bottom (PUB), palustrine aquatic bed (PAB), PEM, PSS, and PFO wetland types; however, most of the wetlands are dominated by the PEM wetland class. Most of the wetlands include areas that are excavated for drainage, and all eight wetlands are classified as depressional under the HGM classification (Hruby 2014).

## Figure P-16

Vegetation and Land Cover Near the Airport Levee



Source: Anchor QEA 2016

Seven wetlands were visually identified within approximately 200 feet of the airport levee boundary to account for potential wetland buffers that may occur within the airport levee study area. These seven wetlands have similar features and wetland classes as the eight delineated wetlands within the airport levee. Wetlands within the airport levee are described in the *Wetlands Discipline Report*. The wetland functional values and scores, rating, and classification of wetlands delineated within the airport levee is presented in the *Chehalis – Centralia Airport Levee Wetland Delineation Report* (Anchor QEA 2019a).

No riparian habitat is present within the airport levee area because the wetlands are not directly connected to stream courses or other freshwater waterbodies. The Chehalis River flows west and north of the airport levee and is located within about 500 feet from the airport levee at the closest point. Developed areas account for 73% of the total cover. Within the developed areas, open space accounts for 30% of the total cover, low intensity is 29%, medium intensity is 10%, and high intensity is 4%. As described in Section 2.4.1.1, the open space developed areas cover type is defined as having less than 20% total impervious surfaces and vegetation (mostly lawns) associated with developed areas such as residential, parks, and golf courses. Hay/pasture accounts for 16% of the cover and wetlands account for the remaining 11% of the total cover.

Overall, existing vegetation associated with the airport levee is disturbed and regularly mowed with low plant species diversity and limited habitat features for wildlife species to breed, forage, rest, and overwinter.

# 2.4.1.5 Floodplain Downstream of the FRE Facility

For this report, the analysis of wildlife habitats and vegetation community cover types downstream of the FRE facility includes the modeled potential flood extent areas associated with late-century major and catastrophic floods on the mainstem Chehalis River. The analysis area consists of a 48,569-acre area for late-century major floods and a 58,485-acre area for late-century catastrophic floods. These areas include 101 miles of floodplain along the mainstem Chehalis River, including the lower ends of major tributaries (South Fork Chehalis River, Newaukum River, Skookumchuck River, Black River, Satsop River, Wynoochee River, Stearns Creek, Dillenbaugh Creek, Salzer Creek, Lincoln Creek, Independence Creek, Garrard Creek, Cedar Creek, and Porter Creek).

The downstream analysis area for the FRE facility is bounded on the upstream end at RM 108, the proposed FRE facility location, and on the downstream end at approximately RM 8 at Central Park (Figure P-1), which is the downstream extent of potential measurable changes to late-century catastrophic flooding from the proposed FRE facility. The analysis for downstream of the proposed FRE facility also extends an additional 300 feet beyond the modeled limits of late-century catastrophic flooding for consideration of wildlife species movements between the floodplain and adjacent uplands (Hayes 2019). Vegetation community cover types associated with the study area downstream of the FRE facility are presented in Table P-7 and shown in Figures P-3 through P-12. Table P-7 does not include the vegetation cover within the airport levee study area identified in Table P-6.

Table P-7

Vegetation Community Cover Types Associated with the Area Downstream of the FRE Facility

VEGETATION COMMUNITY COVER TYPES <sup>1</sup>	TOTAL (ACRES)
Evergreen Forest	1,191.1
Deciduous Forest	1,072.4
Mixed Forest	1,022.2
Scrub-Shrub	1,071.3
Herbaceous	511.8
Wetlands <sup>2</sup>	17,545.0 <sup>2</sup>
Cultivated Crops	2,829.5
Hay/Pasture	28,104.1
Barren Land	173.9
Developed Open Space	3,200.3
Developed Low Intensity	2,729.2
Developed Medium Intensity	1,555.3
Developed High Intensity	670.9
Total	61,677.0 <sup>3</sup>

Notes:

1. NLCD (USGS 2016) with the exception of wetland layer, as described in Section 2.3.

2. Wetlands described in Anchor QEA 2020b.

3. Total is slightly less than actual due to the exclusion of the USGS NLCD wetland and open water cover types and substitution of wetland data layers, and the inclusion of the 300-foot extent area, as described in Section 2.3.

Hay/pasture is the dominant vegetation cover type in the downstream floodplain study area, accounting for 46% of the total area, due to the dominant agricultural land use activity within the floodplain. Cultivated crops account for another 5%, and barren land accounts for less than 1% of the total vegetation cover. Collectively, the four developed cover type categories account for 13% of the total cover area. These seven land cover types account for 64% of the total cover and includes disturbed and developed areas with vegetation, when present, that is managed and typically includes homogenous plant species cover.

The three upland forest cover type categories account for 5% of the total cover, with evergreen forest accounting for 2% of the total cover and the deciduous and mixed forest covers each accounting for less than 2% of the cover. The scrub-shrub and the herbaceous cover types account for 2% and 1% of the total cover area, respectively. Wetlands account for 28% of the total cover area.

An analysis of wetlands within the 100-year floodplain downstream of the FRE facility was performed as described in the *Downstream Floodplain Wetland Analysis Memorandum* (Anchor QEA 2019b). The analysis area for this downstream floodplain report consists of an approximately 43,107-acre area that includes 75 miles of the floodplain along the mainstem Chehalis River and associated lower ends of major tributaries. Wetlands downstream of the FRE facility for this analysis were identified based on the

existing wetland mapping dataset of the 2011 Modeled Wetlands Inventory (Ecology 2011) and the analysis in the *Downstream Floodplain Wetland Analysis Memorandum* (Anchor QEA 2019b). Riparian habitat that includes the entire extent of the floodplain, and riparian areas of wetlands that are directly connected to stream courses or other freshwater waterbodies, are found downstream of the FRE facility.

Ecology's mapped wetlands downstream of the FRE facility include the following categories: PFO, PSS, PEM, palustrine unconsolidated shore (PUS), palustrine aquatic bed (PAB), estuarine aquatic bed (EAB), and a category of potentially disturbed wetlands. Potentially disturbed wetlands are defined by Ecology as areas that have a high potential to be wetland, but appear as pasture, hayfields, or cultivated land cover types (Ecology 2011).

Most of the mapped wetlands are within a few hundred feet of the Chehalis River shoreline; and as development increases moving away from the river shorelines, the wetland areas next to developed areas also increase. In general, the larger mapped wetland features are also near the river shorelines. Most of Ecology's (2011) mapped wetlands downstream of the FRE facility occur between the rivers to the central portion of the floodplain then decrease toward the outer portions of the floodplain. The buffers of wetlands downstream of the FRE facility often include a variation of the disturbed vegetation cover types.

Plant species associated with the vegetation cover types downstream of the FRE facility are similar to those identified in the prior sections and in Attachment P-1, Table P1-1. Overall, wildlife habitats downstream of the FRE facility range in quality from low in developed areas to moderate or high in the forested and wetland habitats. While large areas of forested and wetland communities exist, roads and other development features and agricultural land use fragment native vegetation communities and are frequently present near rivers and streams, reducing potential riparian and wetland functions for wildlife habitat. The upland, riparian, and wetland vegetation communities; waterbody habitat features; and developed areas downstream of the FRE facility provide a wide range of habitat features for wildlife species to breed, forage, rest, and overwinter.

All of Ecology's mapped wetlands fall within the Marshes and Wet Meadows subcategory of Wetland Ecological Systems based on the *Ecological Systems of Washington State* (Rocchio and Crawford 2015). Based on Government Land Office (GLO) map analyses, marsh was historically the most extensive aquatic habitat in the Chehalis floodplain and has sustained the greatest loss in area (Beechie et al. 2016). In the Chehalis floodplain, this reduced area of marsh and prairie wetlands is either Temperate Pacific Freshwater Emergent Marsh or Willamette Valley Wet Prairie (Rocchio and Crawford 2015). Both ecological categories experience seasonal or episodic inundation. Using the generalized but incorrect label of "wet prairie," Hamer et al. (2018) found these habitats disproportionately important to waterfowl. In particular, Hamer et al. (2018) found such habitat at only two of 36 of the floodplain aquatic habitats studied, but 80% of all dabbling ducks, the dominant waterfowl assemblage, were

observed at those two sites. These habitats are important to surface-feeding ducks, but most of their area has been converted to agricultural uses or overtaken by reed canarygrass or woody vegetation.

Neither Temperate Pacific Freshwater Emergent Marsh nor Willamette Valley Wet Prairie are specifically mapped for the study area, but Willamette Valley Wet Prairie, which is distinguished from other wetlands by its need to be fire-maintained (Rocchio and Crawford 2015), is more common in the upstream floodplain (and the study area) because this habitat was embedded within oak-prairie landscapes that were historically burned (Caplow and Miller 2004). Sixteen WDFW animal species of greatest conservation need (SGCN) are associated with Willamette Valley Wet Prairie habitat; eight of these have close associations (WDFW 2015) with this habitat. This close association partly reflects a tie to a suite of plant species, four of which are federally listed, two of which are federal species of special concern, and 12 additional plant species which are rare, most of which are state Threatened or Endangered (Caplow and Miller 2004). Additionally, those Willamette Valley Wet Prairie habitats with sufficiently long hydroperiods are important breeding habitat for native still-water-breeding amphibians because undesirable exotic predators that may enter those habitats during high flows are seasonally eliminated from those habitats when they dry out (Hayes et al. 2019a).

### **Cottonwood Riparian Habitat**

Cottonwoods are a key component of riparian habitats through the western United States; they are specifically adapted to naturally occurring floods and disperse seed that colonizes bare alluvial surfaces in spring following peak flows. Cottonwood riparian habitat provides unique habitat for a wide array of bird and mammal species and is a major contributor to aquatic foodwebs and source of large wood to rivers (Breck et al. 2003; Hough-Snee et al. 2014, 2016; Merritt and Bateman 2012; Schweitzer et al. 2008). Because cottonwoods depend on periodic flood inundation and/or sediment scour and deposition to create bare alluvial surfaces for ongoing recruitment, the regulation of flows via dams and other structures has been observed to reduce cottonwood recruitment over time.

Due to the importance of cottonwood riparian habitat, a detailed analysis of cottonwood habitats downstream of the proposed FRE facility was conducted and is contained in the *Cottonwood Habitat Study* (Meadow Run Environmental and Anchor QEA 2019). There are only sparse cottonwood trees present upstream of the FRE facility; thus, this area was not analyzed. The detailed mapping indicates that there are currently 15,948 acres of cottonwood-willow habitat in the Chehalis River 100-year floodplain from RM 108 to RM 0 at Grays Harbor (under existing conditions). Cottonwood habitat is most abundant downstream of Porter and in major tributary floodplains such as the Black, Satsop, and Wynoochee rivers. Cottonwood habitat has been constrained within the study area by land uses such as agriculture, residential areas, and commercial development.

# 2.4.1.6 WDFW Priority Habitats

WDFW's state-wide priority habitats and species list includes priority terrestrial and aquatic habitats as well as priority habitat features (WDFW 2019a). These priority habitats and features were identified

because of their unique characteristics and/or because they support a diverse mix of fish and wildlife species. Of the 20 priority habitats in Washington recognized by WDFW, 13 occur within the counties associated with the Chehalis Basin, excluding the marine habitats associated with Grays Harbor and Pacific counties. There are not enough data available to identify the exact priority habitat locations, or the extent of these habitats, throughout the study area; however, known habitats that occur within study area counties (Lewis, Thurston, Grays Harbor, and Pacific), excluding marine habitats, are presented in Table P-8. A description of WDFW priority habitats and features is presented in Attachment P-1, Table P1-2.

Overall, priority habitats that are known to occur within the study area based on existing information (Section 2.2) include biodiversity areas, snags and logs, riparian, freshwater wetlands, fresh deepwater, and instream habitats. The following priority terrestrial habitats were not identified within the FRE facility, temporary reservoir, or airport levee components of the study area: aspen stands, herbaceous balds, old-growth/mature forest, Oregon white oak woodlands, and westside prairie. Other priority habitat features (caves, cliffs, and talus slopes) also were not identified within these three components of the study area but can occupy relatively small, isolated areas. These priority habitats and priority habitat features could be present downstream of the FRE facility but are generally not typically associated with developed areas or the floodplain of the Chehalis River.

#### Table P-8

			GRAYS					
PRIORITY HABITATS	LEWIS	THURSTON	HARBOR	PACIFIC				
TERRESTRIAL HABITATS								
Aspen stands	•	•						
Biodiversity areas	•	•	•	•				
Herbaceous balds	•	•	•	•				
Old-growth/mature forest	•	•	•	•				
Oregon white oak woodlands	•	•	•	•				
Riparian	•	•	•	•				
Westside prairie	•	•	•					
AQUATIC HABITATS								
Freshwater wetlands and fresh deepwater	•	•	•	•				
Instream	•	•	•	•				
HABITAT FEATURES								
Caves	•	•	●	•				
Cliffs	•	•	•	•				
Snags and logs	•	•	•	•				
Talus	•	•	•	•				

WDFW Priority Habitats that Occur in Lewis, Thurston, Grays Harbor, and Pacific Counties

Source: WDFW 2019b

# 2.4.1.7 Special Status Plant Species

## 2.4.1.7.1 Federal and State Threatened and Endangered Plant Species

The study area includes known occurrences of ESA-listed threatened and endangered plant species, and state-protected threatened and endangered plant species. USFWS websites identify ESA-listed species in Washington that occur, or may occur, within the entire county where a project is proposed (USFWS 2019b) and ESA-listed species that occur or may occur within a specific location where a project is proposed (USFWS 2019c). DNR's Natural Heritage Program (DNR 2019a) also identifies specific counties in Washington where rare plant species have been documented. The status of federally listed plant species protected under the ESA (as identified by USFWS) and state plant species with threatened and endangered status (as identified by DNR) within study area counties are presented in Attachment P-1, Table P1-3.

The following four federally listed plant species have been identified by the USFWS as potentially occurring within the four counties associated with the study area: golden paintbrush (*Castilleja levisecta*), Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), Nelson's checker-mallow (*Sidalcea nelsoniana*), and water howellia (*Howellia aquatilis*; USFWS 2019b). The preferred habitats of these four federally listed plant species are presented in Attachment P-1, Table P1-4. Federally listed plant species identified by USFWS (2019c) as potentially occurring within the study area are presented in Table P-9. All four federally listed plant species identified as potentially occurring within the study area also have designated or proposed critical habitat protected under the ESA (USFWS 2019b). USFWS (2019c) does not identify any designated critical habitat for these plant species within the study area.

Table F	p-9
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	FEDERAL	STATE	FRE	TEMPORARY	AIRPORT	DOWNSTREAM
COMMON NAME	STATUS <sup>1</sup>	STATUS <sup>2</sup>	FACILITY	RESERVOIR	LEVEE	OF FRE FACILITY
Golden paintbrush	Threatened	Endangered			•	•
Kincaid's lupine	Threatened	None	•	•	•	•
Nelson's checker-mallow	Threatened	Endangered	•	•	•	•
Water howellia	Threatened	Threatened				•

#### Federally Listed Threatened and Endangered Plant Species that Potentially Occur in the Study Area

Source: USFWS 2019c Notes: 1. USFWS 2019b

2. DNR 2019a

## 2.4.1.7.2 State Rare Plant Species

More than 30 state rare plant species that could occur within the study area have been identified, based on information from DNR's Natural Heritage Program (DNR 2019a). In addition, the Natural Heritage Program identifies specific counties in Washington where rare plant species have been documented. Information from the Natural Heritage Program was used to identify rare plant species documented within the study area counties (Grays Harbor, Lewis, Pacific, and Thurston). A list of all rare plant species with state status within study area counties is presented in Attachment P-1, Table P1-5.

# 2.4.2 Wildlife Species

The diversity of vegetation, geology, topography variations, and climatic gradients within the study area provides habitat for a variety of wildlife species to breed, forage, rest, and overwinter. Wildlife habitats in the study area range in quality from low in developed and agricultural areas to moderate or high in the forested, riparian, and wetland habitats (see Section 2.4.1).

In general, wildlife diversity is related to the diversity of ecosystems, natural communities, and habitats (Brown 1985; Johnson and O'Neil 2001; WDFW 2019a, 2019b; Hayes et al. 2019a). Elements associated with wildlife diversity include, but are not limited to, the structure and composition of vegetation communities and variations in topography, substrate, aquatic systems, and weather conditions. Wetlands and forested habitats with well-developed tree and shrub layers are likely to support a greater number of species and populations of wildlife than areas with limited vegetation variation, non-native species presence, and close proximity to disturbed areas and human activities. Habitat for many upland and aquatic species is directly enhanced by the presence of adjacent riparian habitat (Quinn et al. 2019). Larger areas with undisturbed vegetation communities also have the opportunity to provide habitats to support a greater number of wildlife species than small, fragmented vegetation communities.

Aquatic habitats with a variety of widths, depths, sinuosity, and riparian communities provide habitat features that can support a wider variety of wildlife species than an aquatic system with more homogenous characteristics.

A summary of wildlife species that occur or potentially occur within the study area is provided in Attachment P-1, Table P1-6. The list of wildlife species is not intended to be a comprehensive list of all wildlife species that could be found within the study area, but is based on wildlife species identified within the study area or known and expected to occur in similar habitats in Lewis, Thurston, Grays Harbor, and Pacific counties, and Western Washington.

In addition to the studies and reports identified in Section 2.2, the following studies and research have been performed to characterize the presence and distributions of wildlife in the study area:

- 2015 Chehalis ASRP Off-Channel Habitat Summary Based on Off-Channel Extensive Surveys: 1st Progress Report for Post-Feasibility Effort (Hayes et al. 2015)
- 2016 Chehalis ASRP Egg Mass Surveys in Off-Channel Habitat: 3rd Progress Report for Post-Feasibility Efforts (Hayes et al. 2016a)
- 2018 Chehalis ASRP Stream-Associated Amphibian Surveys: Final Report for Post-Feasibility Baseline (Hayes et al. 2019b)

- 2017 Chehalis ASRP Stream-Associated Amphibian Survey Summary: Final Report for Post-Feasibility Baseline, December 2017 (Hayes et al. 2017)
- Chehalis ASRP Instream Amphibian Survey Report (Hayes et al. 2018)
- Intensive Study of Chehalis Floodplain Off-Channel Habitats (Hayes et al. 2019a)
- Waterfowl and Waterbird Abundance and Use of Aquatic Off-Channel Habitats in the Chehalis Floodplain: Preliminary Report (Hamer et al. 2018)
- Habitat Mapping and Wildlife Studies Technical Memorandum (HMWSTS 2014)

The following subsections provide a summary of the wildlife species found in the variety of wildlife habitats and vegetation communities described in Section 2.4.1 that occur within the study area.

# 2.4.2.1 Amphibians and Reptiles

The study area and greater Chehalis Basin has the highest species diversity of amphibians in Washington (Cassidy et al. 1997). This section provides a summary of the WDFW amphibian surveys (Section 2.4.2) performed within the study area. Table P1-7 in Attachment P-1 provides a list of amphibian species documented within the four counties within the study area, WDFW amphibian species habitat descriptions, and the federal and state protected status of amphibian species within the four counties within the study area. As described in this section, several of the amphibian species identified in Table P1-7 (Attachment P-1) occur within the study area.

Amphibian species in the study area can be grouped by their breeding strategy: still-water breeding, stream breeding, and upland breeding. Wetlands and off-channel aquatic habitats such as oxbows and ponds in the floodplain of the Chehalis River and its tributaries provide habitat for still-water breeding amphibians. Rivers and streams provide habitat for stream-breeding amphibian species, and the upland-breeding species can be highly associated with river and stream riparian habitats for breeding.

The still-water breeding amphibian assemblage within the study area, the most diverse of these three amphibian groups, includes long-toed salamander (*Ambystoma macrodactylum*), northern red-legged frog (*Rana aurora*), northwestern salamander (*Ambystoma gracile*), Pacific treefrog (*Pseudacris regilla*), roughskin newt (*Taricha granulosa*), the federally listed Oregon spotted frog (*Rana pretiosa*), and the state candidate western toad (*Anaxyrus boreas*).

Examples of the stream-breeding amphibian assemblage within the study area includes coastal giant salamander (*Dicamptodon tenebrosus*), Cope's giant salamander (*Dicamptodon copei*), coastal tailed frog (*Ascaphus truei*), and Columbia torrent salamander (*Rhyacotriton kezeri*).

The upland-breeding amphibian assemblage within the study area includes the Ensatina salamander (*Ensatina eschscholtzi*), the western red-backed salamander (*Plethodon vehiculum*), and the riparian associated state candidate species Dunn's salamander (*Plethodon dunni*) and Van Dyke's salamander (*Plethodon vandykei*).

WDFW has recently performed a variety of multi-year wildlife surveys in the study area (Section 2.4.2). Egg mass and extensive surveys focused on off-channel habitats for still-water breeding amphibians (Hayes et al. 2016a, 2018, 2019a) and stream-breeding and upland-breeding amphibians (Hayes et al. 2016b, 2018, 2019b).

The egg mass and extensive surveys document occupancy of still-water breeding amphibians in off-channel habitats in the floodplain of the mainstem Chehalis River. For these surveys, the floodplain is defined as the Federal Emergency Management Agency 100-year flood line plus an additional 328 feet perpendicular to the line that extends from the proposed FRE facility to the U.S. Route 101 bridge in Aberdeen.

Six native amphibian species were observed during the egg mass and extensive surveys, including northern red-legged frog, northwestern salamander, long-toed salamander, Pacific treefrog, roughskin newt, and state candidate western toad. One non-native species, American bullfrog (*Rana catesbeiana*), was also documented (Hayes et al. 2016a). Except for western toad, which was found at only three sites, all native amphibian species and bullfrogs were at least moderately widespread (Hayes et al. 2016a, 2018).

The upland- and stream-breeding amphibian surveys document occupancy of stream-associated amphibians in the headwaters of the mainstem Chehalis River. The survey data include the headwaters of the Chehalis River, including the vicinity of the proposed FRE facility and temporary reservoir.

Twelve amphibian species were observed during the riparian and stream-breeding amphibian surveys: four riparian breeding amphibians and eight stream and still-water breeding amphibians (Hayes et al. 2017, 2016b, 2018). Riparian breeding species included western red-backed salamander, Ensatina salamander, and state candidate species Dunn's salamander and Van Dyke's salamander. The other eight amphibians observed included five still-water breeding species (Pacific treefrog, northern red-legged frog, northwestern salamander, roughskin newt, and state candidate western toad) and three streambreeding species (coastal giant salamander, coastal tailed frog, and Columbia torrent salamander).

Instream surveys document the occupancy of amphibians in the mainstem Chehalis River and adjacent areas, including the vicinity of the proposed FRE facility and temporary reservoir. Six amphibian species were observed during instream amphibian surveys: Columbia torrent salamander, northern red-legged frog, Pacific treefrog, roughskin newt, state candidate western toad, and non-native American bullfrog (Hayes et al. 2016b, 2018).

Western toad breeding within the study area was observed within the upper portions of the Chehalis Basin watershed and was more abundant in the footprint of the proposed FRE facility and the temporary reservoir than either upstream or downstream of these areas on the mainstem Chehalis River (Hayes et al. 2016b, 2018). Western toad breeding also was observed extensively in the Wynoochee River (although primarily upstream of the study area) and one occurrence in the lower Satsop River within the study area (Hayes et al. 2018) WDFW PHS maps (2019a) also document two occurrences of western toad in the downstream reach of the study area, southwest of the town of Satsop near the Satsop River.

Amphibian and reptile species with federal and state protected status, including Oregon spotted frog (*Rana pretiosa*) and western pond turtle (*Actinemys marmorata*), are discussed in Section 2.4.3.1.

Reptiles such as the common garter snake (*Thamnophis sirtalis*) and western terrestrial garter snake (*T. elegans*) are likely to occur in the wetlands-adjacent to upland habitats of the study area. Wetlands, riparian areas, and aquatic habitats of the study area may support painted turtle (*Chrysemys picta*) and the non-native pond slider turtle (*Trachemys scripta*), and could provide habitat for western pond turtle. Upland habitats with rocks and woody material support species such as northern alligator lizard (*Gerrhonotus coeruleus*), northwestern garter snake (*T. ordinoides*), and rubber boa (*Charina bottae*).

## 2.4.2.2 Birds

The study area provides a range of habitat features that can provide breeding, foraging, resting, and overwintering habitat to support a wide range of bird species (Johnson and O'Neil 2001; Hamer et al. 2018). Bird surveys performed in the temporary reservoir area identify an extensive list of bird species that likely occur in other similar habitats of the study area (HMWSTS 2014). Surveys of aquatic, off-channel habitats in the Chehalis River floodplain of the study area have identified waterfowl (e.g., ducks, geese) and waterbird (e.g., heron, grebes, cormorants) species presence (Hamer et al. 2018). This section provides a brief summary of bird species and associated habitats documented within the study area or known to occur in the western Puget Sound region.

Forested habitats provide foraging and nesting habitat for a wide variety of songbird species such as song sparrow (*Melospiza melodia*), bushtit (*Psaltriparus minimus*), Bewick's wren (*Thryomanes bewickii*), Steller's jay (*Cyanocitta stelleri*), spotted towhee (*Pipilo erythrophthalmus*), Swainson's thrush (*Catharus ustulatus*), winter wren (*Troglodytes hiemalis*), varied thrush (*Ixoreus naevius*), black-capped chickadee (*Parus atricapillus*), dark-eyed junco (*Junco hyemalis*), chestnut-backed chickadee (*Parus rufescens*), golden-crowned kinglet (*Regulus satrapa*), and red-breasted nuthatch (*Sitta canadensis*). Disturbance-sensitive migratory bird species such as black-throated gray warbler (*Dendroica nigrescens*), solitary vireo (*Vireo solitarius*), yellow-rumped warbler (*Dendroica coronata*), and yellow warbler (*Dendroica petechia*) likely use forested habitats for foraging during spring and fall migrations. In addition, medium- to large-diameter trees provide nesting habitat for marbled murrelet (*Brachyramphus marmoratus*).

Upland herbaceous, grassland, and agricultural habitats are used by species like barn (*Hirundo rustica*), and tree (*Tachycineta bicolor*) swallows and white-crowned sparrows (*Zonotrichia leucophrys*). Predatory birds, like red-tailed hawks (*Buteo jamaicensis*), commonly hunt in these habitat types. Other raptors such as northern harrier (*Circus cyaneus*) and bald eagle (*Haliaeetus leucocephalus*) occur in forested areas near waterbodies. Snags and downed trees in logged habitat, and along the forest edges, also provide perch sites for these species. Snags in forested habitats also provide potential nest sites for cavity-nesting birds such as great horned owl (*Bubo virginianus*), and species of woodpeckers including downy woodpecker (*Picoides pubescens*), northern flicker (*Colaptes auratus*), and pileated woodpecker (*Dryocopus pileatus*).

Off-channel aquatic habitats, wetland habitats, and agricultural fields provide a variety of habitat for terrestrial birds, waterbirds, and waterfowl. Open water sections of wetlands and ponds can be expected to provide habitat for belted kingfisher (*Megaceryle alcyon*) and wintering and migratory waterfowl, including gadwall (*Anas strepera*), American widgeon (*Mareca americana*), mallard (*Cistothorus palustris*), ring-necked duck (*Aythya collaris*), greater scaup (*Aythya marila*), American coot (*Fulica americana*), green-winged teal (*Anas crecca*), and cinnamon teal (*Spatula cyanoptera*). Wetland areas with grass and herbaceous vegetation provide habitat for red-winged blackbird (*Agelaius phoeniceus*), song sparrow, and marsh wren (*Cistothorus palustris*), among other species including waterfowl such as mallard, green-winged teal, and American widgeon. Forested and scrub-shrub wetlands are commonly used by similar species as well as wood duck (*Aix sponsa*) and ring-necked duck. Waterbird species such as great blue heron (*Ardea herodias*), pied-billed grebe (*Podilymbus podiceps*), and double crested cormorant (*Phalacrocorax auritus*) also use many of these habitats.

Agricultural fields that are ponded or flooded from precipitation or during high-water events are often used by a variety of waterfowl including Canada goose (*Branta canadensis*), trumpeter swan (*Cygnus buccinator*), cackling goose (*Branta hutchinsii*), mallard, green-winged teal, ring-necked ducks, and American widgeon. Waterfowl and waterbird survey data suggest wetlands and off-channel aquatic sites that are close enough to the mainstem Chehalis River to have water flowing through them during high-water events tend to have lower species diversity and use than other types of off-channel aquatic habitats (Hamer et al. 2018).

Wintering and migratory shorebird species that occupy coastal estuary habitats such as plovers (*Charadrius* spp.), sandpipers (*Calidris* spp.), avocets (*Recurvirostra* spp.), oystercatchers (*Haematopus* spp.), stilts (*Himantopus* spp.), snipes (*Gallinago* spp.), and phalaropes (*Phalaropus* spp.) occur in the downstream study area along the lower Chehalis River tidal zone near the Grays Harbor estuary system (Larsen et al. 2004, WDFW 2019a).

Developed habitats in the study area provide habitat for disturbance-tolerant bird species like American crow (*Corvus brachyrhynchos*) and American robin (*Turdus migratorius*), and non-native species such as European starling (*Sturnus vulgaris*), rock dove (*Columba livia*), and house sparrow (*Passer domesticus*).

## 2.4.2.3 Mammals

Small mammal species associated with forested habitats include shrew mole (*Neurotrichus gibbsii*), Townsend's vole (*Microtus townsendii*), masked shrew (*Sorex cinereus*), and striped skunk (*Mephitis mephitis*). Larger mammals such as elk (*Cervus elaphus*), black-tailed deer (*Odocoileus hemionus*) *columbianus*), black bear (*Ursus americanus*), cougar (*Felis concolor*), bobcat (*Lynx rufus*), and coyote (*Canis latrans*) also occur in the larger forest landscape.

Wetlands and riparian areas associated with rivers and streams in the Chehalis Basin provide habitat for North American beaver (*Castor canadensis*), mink (*Mustela vison*), North American river otter (*Lontra canadensis*), water shrew (*Sorex palustris*), and raccoon (*Procyon lotor*). The non-native species Virginia opossum (*Didelphis virginiana*) also occurs in these habitat types. These, and similar species, depend on water for foraging, breeding, and, sometimes, overwintering habitats. Streams also provide a source of drinking water for larger mammals, such as black-tailed deer and coyote.

Beaver dams create habitat for many other animals and plants of Washington. Flowing water through the stick matrix of beaver dams provides important overwintering habitat for a number of amphibians, which shelters them from freezing and predators, and provides suitable oxygenation. In winter, deer and elk frequent beaver ponds to forage on plants. Weasels, raccoons, otters, and herons hunt frogs and other prey along the marshy edges of beaver ponds. Migratory waterfowl and waterbirds use beaver ponds as nesting areas and resting stops during migration. Ducks and geese often nest on top of beaver lodges because they offer warmth and protection, especially when lodges are formed in the middle of a pond. The trees that die as a result of rising water levels attract insects, which in turn feed woodpeckers, whose holes later provide homes for other wildlife (Link 2004).

Large mammals such as elk, black-tailed deer, black bear, and cougar are likely present in small numbers in the area of the proposed FRE facility and temporary reservoir inundation area. Foraging habitats for elk and black-tailed deer are most strongly associated with riparian corridors and early seral habitats, while forested areas provide security cover. Black bears are omnivores, foraging on a wide variety of vegetation, fruits, small mammals, fish, and invertebrates; varying forest stand ages may promote more habitat for bears and support a number of individuals (Maser 1998). Cougars primarily feed on elk, deer, and small mammals and forage widely across the landscape. Roosevelt elk (*Cervus elaphus roosevelti*), a subspecies of elk, is documented by WDFW (2019a) in the downstream study area south of the town of Elma within the Chehalis River floodplain. Roosevelt elk in Washington are generally found in the Coast Range, the Olympic Mountains, and other areas west of Interstate 5 (WDFW 2005).

Developed habitats in the study area reduce available wildlife habitat for mammals and limit its value to larger mammals that require greater areas of unbroken habitat to forage and reproduce. These areas are likely populated by common, urban-adapted species, including raccoon and a variety of small mammals, including deer mice and voles. Developed habitats are also typically associated with non-native species like Virginia opossum, eastern gray squirrel (*Sciurus carolinensis*), and old world rodents (such as the Norway rat [*Rattus norvegicus*]).

# 2.4.2.4 Terrestrial Insects and Mollusks

Several terrestrial insects and mollusks with state status or importance to the ecosystem potentially occur within the study area. Table P1-9 in Attachment P-1 lists the insects with state status identified to potentially be present within the four counties of the study area. Species that are more likely to occur in the study area include Taylor's checkerspot (*Euphydryas editha taylori*), Puget blue (*Plebejus icarioides blackmorei*), valley silverspot (*Speyeria zerene bremnerii*), Mardon skipper (*Polites mardon*), and the mollusk blue-gray taildropper (*Prophysaon coeruleum*). Species unlikely to occur in the study area include Beller's ground beetle (*Agonum belleri*), Pacific clubtail (*Gomphus kurilis*), Johnson's hairstreak (*Mitoura johnsoni*), and Oregon silverspot (*Speyeria zerene hyppolyta*). Descriptions of the primary habitats used by the species are provided below.

Beller's ground beetle is only known to occur in Puget Trough Sphagnum bogs (WDFW 2015). No Sphagnum bogs have been identified within the study area; thus, this beetle is unlikely to be present within the study area.

Taylor's checkerspot is a federally listed endangered species (butterfly) but has only been identified as occurring on Joint Base Lewis-McChord within Thurston County in native prairie (WDFW 2015). It uses short grasslands with nectar flowers. It is possible that suitable prairie habitat still occurs within the downstream study area, although Taylor's checkerspot has not been documented in the study area.

Johnson's hairstreak is a butterfly with extremely specific host plant requirements, using western dwarf mistletoe that parasitizes old-growth western hemlock trees (WDFW 2015). It has been identified in Lewis County, but there are no old-growth forests within the study area. It is unlikely to be present in the study area.

Puget blue is a butterfly with extremely specific host plant requirements, using sickle-keeled lupine (*Lupinus albicaulis*) that occurs in native South Puget Sound prairies and alpine meadows in the Olympic Mountains (WDFW 2015). It has been identified in both Thurston and Grays Harbor counties and could potentially occur in the study area if suitable prairie habitat is present.

Oregon silverspot is a federally listed threatened species (butterfly) that has been extirpated in Washington (WDFW 2015). The state is planning reintroductions in coastal Pacific County. It is unlikely to occur in the study area.

Valley silverspot is a butterfly with extremely specific host plant requirements, using the western blue violet (*Viola adunca*; WDFW 2015). The valley silverspot is known from scattered locations in Lewis and Thurston counties, generally in native short-grass prairies. It could potentially occur in the downstream study area if suitable prairie habitat is present.

Mardon skipper is a butterfly that uses native short-grass prairie, typically dominated by Roemer's fescue (*Festuca roemeri*) with blue violet and vetch as nectar sources (WDFW 2015). It could potentially occur in the downstream study area if suitable prairie habitat is present.

Leschi's millipede has only been collected in one area in Thurston County (Lower Nisqually River basin; WDFW 2015). However, it occurred in leaf litter in mature second-growth forest dominated by big-leaf maple, red alder, western red cedar, and sword fern. It has not been recorded in the Chehalis Basin but could potentially occur in mature second-growth forest.

Pacific clubtail is associated with large lakes and has only been recorded at Black Lake in Thurston County (WDFW 2015). It is unlikely to occur in the study area.

The blue-gray taildropper is a rare endemic slug that occurs in moist coniferous or big-leaf maple dominated forest in areas with extensive leaf litter and coarse woody material on the forest floor (WDFW 2015). It has been identified in Lewis County and could potentially occur in the study area in areas of more mature tree growth.

Native pollinator bees, particularly bumblebees, have experienced significant declines in recent years. The western bumblebee (*Bombus occidentalis*), Morrison's bumble bee (*B. morrisoni*), and Suckley cuckoo bumble bee (*B. suckleyi*) are considered vulnerable or critically endangered (WDFW 2015). They have not been identified in the study area. Other native bees are likely to be present in all parts of the study area.

# 2.4.2.5 FRE Facility

Wildlife habitat associated with the FRE facility includes upland, riparian, and wetland vegetation communities (Section 2.4.1.2) and the aquatic habitat of the Chehalis River that support a wide variety of native amphibian, reptile, bird, and small and large mammal species (Section 2.4.2) to breed, forage, rest, and overwinter. Disturbed and developed habitat features associated with the FRE facility and associated areas are limited to logging and access roads. Stream-breeding and riparian-breeding amphibian species occur within the area of the FRE facility. State candidate western toad was observed in the footprint of the FRE facility (Hayes et al. 2018, 2019b). Reptile species likely to occur include garter snakes. Songbird, waterfowl, waterbirds, and raptor species occur in FRE facility habitats. Federally listed bird species likely to occur include the marbled murrelet (see Section 2.4.3.1). Small mammal species occur in the FRE facility footprint and large mammals occur and travel through the area.

# 2.4.2.6 Temporary Reservoir

Privately owned, even-aged stands of evergreen forest dominate the temporary reservoir inundation area, although some areas are protected by the Forest Practices Rules, such as riparian areas and unstable slopes, and may contain medium- to large-diameter trees that provide nesting platforms for marbled murrelets. This forest habitat is dominated by even-aged stands of Douglas fir in various stages

of growth and density following ongoing timber practices. Wildlife habitat associated with the temporary reservoir inundation area includes more than 847 acres of upland, riparian, and wetland vegetation communities (Section 2.4.1.3) and the aquatic habitats of rivers and perennial and ephemeral streams that support a wide variety of native amphibian, reptile, bird, and small and large mammal species (Section 2.4.2) to breed, forage, rest, and overwinter. Disturbed and developed habitat features associated with the temporary reservoir are generally limited to logging and access roads.

The proposed temporary reservoir area includes the highest quality habitat in the study area to support the widest diversity of wildlife species, including several amphibians (Hayes et al. 2017). Stream, riparian, and still-water breeding amphibian species occur within the temporary reservoir area. The state candidate species western toad, Dunn's salamander, and Van Dyke's salamander, northern redlegged frog, and Pacific treefrog have been observed here. Most of these species also occur both upstream and downstream of the temporary reservoir, within or near the Chehalis River and several tributaries (Hayes et al. 2016b, 2017, 2018). Reptile species include garter snake species and northern alligator lizard. The temporary reservoir provides habitat that supports songbird species, waterfowl, waterbirds, owls, woodpeckers, hawks, and eagles. Small and large mammal species also occur here.

# 2.4.2.7 Airport Levee

Wildlife habitat associated with the Airport Levee Changes includes upland and wetland vegetation communities (Section 2.4.1.4) that potentially support a moderate variety of native amphibian, reptile, bird, and small mammal species identified in Section 2.4.2 to breed, forage, rest, and overwinter. Disturbed and developed habitat features associated with the airport levee operation facilities, roads, and agricultural land use is a dominant component of potential wildlife habitat. These habitats support disturbance-tolerant native wildlife species such as deer, raccoon, coyotes, and non-native species like European starlings, rock doves, and rats.

Still-water breeding amphibian species could occur in the wetland habitat, but amphibian species presence is limited by the degraded mowed and field wetland buffer habitat. Garter snakes and small mammals occur in the grass habitats. Swallows and hawk species feed in the grass habitats. Waterfowl species occur in wetland and grass habitats.

# 2.4.2.8 Downstream of the FRE Facility

Wildlife habitat in the study area downstream of the FRE facility includes thousands of acres of upland, riparian, and wetland vegetation communities (Section 2.4.1.5) as well as the aquatic habitats of large and small rivers and perennial and ephemeral streams that support a wide variety of native amphibian, reptile, bird, and small and large mammal species (Section 2.4.2) to breed, forage, rest, and overwinter.

More than two-thirds of the wildlife habitat land cover downstream of the FRE facility includes disturbed and developed areas, roads, and agricultural land use activities. These land cover types are typically near native vegetation communities and fragment wildlife habitat. These wildlife habitat features downstream support disturbance-tolerant native and non-native wildlife species, though several species of amphibians, including state candidate species western toad and Dunn's salamander, and roughskin newt, northern red-legged frog, and Pacific treefrog occur in and along the mainstem Chehalis River and some tributaries (Hayes et al. 2016b, 2017, 2018).

# 2.4.3 Special Status Wildlife Species

Several species that occur in the study area, and their habitats, are protected by federal and state law due to declines compared to historical numbers because their populations are unique and limited, or the study area has been identified as important habitat for maintaining these species.

# 2.4.3.1 Federally and State-Listed Threatened and Endangered Wildlife Species

ESA-listed wildlife species that may occur within the study area were identified based on information from the endangered species websites of USFWS (2019b, 2019c). USFWS websites identify ESA-listed species in Washington that occur, or may occur, within the entire county (USFWS 2019b) and within the specific location (USFWS 2019c) where a project is proposed. The study area includes portions of Lewis, Thurston, Grays Harbor, and Pacific counties. The WDFW priority habitats and species database identifies specific counties in Washington where state-protected threatened and endangered species have been documented and information on state-protected species known to occur within the study area (WDFW 2019b). Fish species, aquatic macroinvertebrates, and shellfish are addressed in the *Fish Species and Habitats Discipline Report*.

The status and preferred habitats of federally listed or proposed species protected under the ESA (as identified by USFWS) and state species with threatened and endangered status (as identified by WDFW) within study area counties are described in the following subsections by wildlife group. USFWS federally listed species identified as potentially occurring within the four geographic areas of the study area are also described in the following. USFWS-designated critical habitats protected under the ESA identified as potentially occurring within the four geographic areas of the study area are also identified as potentially occurring within the four geographic areas of the study area are also identified.

## 2.4.3.1.1 Amphibians and Reptiles

Oregon spotted frog is the one federally and state-listed threatened or endangered status amphibian species documented within the study area counties. Western pond turtle is the single state-listed reptile species with threatened or endangered status that is identified as potentially occurring within the study area counties based on the presence of available suitable habitat. There are no federally listed reptile species documented within the study area counties. Oregon spotted frog and western pond turtle are described in this section. Information on the potential presence (and federally and state-listed status) of species and habitats in the study area counties is presented in Attachment P-1, Table P1-7.

## **Oregon Spotted Frog**

Oregon spotted frog is identified by the USFWS (2019c) as potentially occurring downstream of the FRE facility. Designated critical habitat protected under the ESA for Oregon spotted frog is identified by USFWS as occurring within one of the four counties in the study area, Thurston County, downstream of the FRE facility (USFWS 2019c).

Oregon spotted frogs are highly aquatic, inhabiting wetland edges of ponds, streams, and lakes. They are most often associated with non-woody wetland plant communities, such as sedges, rushes, and grasses (Nussbaum et al. 1983). These aquatic environments must include a shallow emergent wetland component large enough to be capable of supporting an Oregon spotted frog population (Pearl and Hayes 2004). Oregon spotted frogs are preyed upon during all life stages by a wide variety of predators, ranging from invertebrates that prey on eggs to garter snakes and herons that feed on adults. Among the most significant of predators are the various introduced species of fish and bullfrog (McAllister and Leonard 1997).

The historical range of the spotted frog includes portions of Western Washington; although, over the past 50 years, this species has been dramatically reduced. Before 1940, Oregon spotted frog was found in portions of the Puget Sound Lowlands and the Willamette Valley. They now appear to be virtually eliminated from these areas (Leonard et al. 1993). The most significant factor contributing to the decline of Oregon spotted frogs is the loss and alteration of wetland habitat. Oregon spotted frogs have life history traits, habitat requirements, and population characteristics that make them vulnerable to habitat loss and limit their distribution (WDFW 2019c).

According to WDFW, the species persists in only six drainages in Washington, two each in Klickitat County and Whatcom County and one in Skagit County. The sixth drainage is in Thurston County, in the Black River drainage, with the current known distribution being located less than 1 mile northwest of the study area. Six sub-populations have been identified in the Black River floodplain and its tributaries (Hallock 2013). WDFW surveys in the Chehalis River floodplain in areas with off-channel habitat features that support Oregon spotted frog did not record any observations of this species (Hayes et al. 2016a, 2019a). However, not all potential habitat has been surveyed (for example, only about 60% of the extensive off-channel habitats in the Chehalis River floodplain have been surveyed), so the possibility of occurrence cannot be excluded.

### Western Pond Turtle

Western pond turtles inhabit marshes, sloughs, moderately deep ponds, and slow-moving sections of creeks and rivers (Holland 1994). They require waters with abundant aquatic vegetation and protected shallow areas where juveniles may rest and feed under cover. In Washington, the species overwinters in upland habitats adjacent to waterbodies or in mud bottoms of lakes or ponds. Basking sites such as partially submerged logs, vegetation mats, rocks, or mud banks are a critical habitat requirement for this species. This species was once widely distributed throughout Western Washington, but is now severely

restricted in range. According to WDFW, the species occurs in six locations in Washington: three sites in Skamania County and one each in Klickitat, Mason, and Pierce counties (Hallock et al. 2017).

Western pond turtle is believed extirpated from the study area and greater Chehalis Basin. WDFW surveys in the Chehalis River floodplain in areas with off-channel habitat features that support western pond turtle did not record any turtle observations (Hayes et al. 2016a, 2019a). However, not all potential habitat has been surveyed (for example, only about 60% of the extensive off-channel habitats in the Chehalis floodplain have been surveyed), so the possibility of occurrence cannot be excluded. WDFW has been involved in several cooperative western pond turtle captive rearing and re-introduction projects in a variety of locations in Washington since 1992, four in the Columbia Gorge and two in Puget Sound in Pierce and Mason counties (WDFW 2013; Hallock et al. 2017).

## 2.4.3.1.2 Birds

Several bird species with federal and state threatened or endangered status are documented within the study area counties including marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), streaked horned lark (*Eremophila alprestris strigata*), and yellow-billed cuckoo (*Coccyzus americanus*). Bird species that are associated exclusively with marine and/or beach habitat in Grays Harbor and Pacific counties (e.g., brown pelican [*Pelecanus occidentalis*], short-tailed albatross [*Phoebastria albatrus*], tufted puffin [*Fratercula cirrhata*], and western snowy plover [*Charadrius alexandrinus nivosus*]) are not likely to occur in the study area. Preferred habitats of bird species with threatened and endangered status within study area counties are presented in Attachment P-1, Table P1-8.

Federally listed bird species identified by USFWS (2019c) as potentially occurring within the four geographic areas of the study area are presented in Table P-10. The four federally listed bird species also have state endangered status. Northern spotted owl is documented within the study area counties (USFWS 2019b) but is not identified by USFWS as potentially occurring within the study area (USFWS 2019c), and the study area is not identified as within the current range of the species (USFWS 2019d). While northern spotted owl, streaked horned lark, and yellow-billed cuckoo are identified by USFWS as having the potential to occur in the study area, habitat associated with these species (large areas of undisturbed old-growth forest or prairies) is not likely to occur within the study area. However, too few data exist to identify the exact habitat locations, or the extent of these habitats, throughout the study area. Marbled murrelet also has the potential to occur in the study area due to the presence of suitable nesting habitat and the proximity of occupied habitat. An occupied marbled murrelet site has been identified approximately one-half mile from the temporary reservoir inundation area (WDFW Wildlife Survey Data Management [WSDM] database 2016).

#### Table P-10

Federally Listed Threatened and Endangered Bird Species that Potentially Occur in the Study Area

COMMON NAME	FEDERAL STATUS <sup>1</sup>	STATE STATUS <sup>2</sup>	FRE FACILITY	TEMPORARY RESERVOIR	AIRPORT LEVEE	DOWNSTREAM OF FRE FACILITY
Marbled murrelet	Threatened	Endangered	•	•	•	•
Northern spotted owl	Threatened	Endangered				
Streaked horned lark	Threatened	Endangered	•	•	•	•
Yellow-billed cuckoo	Threatened	Endangered	•	•	•	•

Source: USFWS 2019c

Notes:

1. USFWS 2019b

2. WDFW 2019a

All four federally listed bird species identified as potentially occurring within the study area or the study area counties also have designated or proposed critical habitat protected under the ESA (USFWS 2019b). Federally listed bird species critical habitat protected under the ESA within Lewis, Thurston, Grays Harbor, and Pacific counties, as identified by USFWS, are presented in Table P-11.

#### Table P-11

#### Federally Listed and Proposed Bird Species Designated Critical Habitats that Occur in Study Area Counties

		CRITICAL	LEWIS	THURSTON	<b>GRAYS HARBOR</b>	PACIFIC
COMMON NAME	AGENCY	HABITAT STATUS <sup>1</sup>	COUNTY <sup>1</sup>	COUNTY <sup>1</sup>	<b>COUNTY<sup>1</sup></b>	COUNTY <sup>1</sup>
Marbled murrelet	USFWS	Designated	•	•	•	•
Northern spotted owl	USFWS	Designated	•	•	•	
Streaked horned lark	USFWS	Designated			•	•
Yellow-billed cuckoo	USFWS	Proposed				

Note:

1. USFWS 2019b

### 2.4.3.1.3 Marbled Murrelet

Critical habitat for marbled murrelet is identified by USFWS (2019c) as occurring within the four geographic areas of the study area. Marbled murrelet critical habitat is designated within forested habitat downstream of the FRE facility.

Marbled murrelets primarily use inland old-growth forests or mature stands with old-growth characteristics including large trees, multiple canopy layers, snags, and moderate to high canopy closure. In Washington, nests have been found in low-elevation conifer stands with medium- to large-diameter trees with an average size of 19 inches diameter at breast height (dbh), although nest trees were greater than 30 inches dbh and averaged 63 inches dbh. Nest trees have large branches or

deformities including those created by mistletoe infestations used as nest platforms. Suitable platforms are more important than tree size (USFWS 1997).

Marbled murrelets are sensitive to edge condition and disturbance of habitat. In addition, murrelets have a naturally low reproductive potential, low dispersal ability, and high energetic costs (USFWS 1997). The high rate of energy cost is associated with traveling from distant food sources to the nest platform, providing for chicks, and molting (Ralph et al. 1995). Murrelets use flapping (muscle-powered flight) the entire distance and do not use gliding techniques (Hull et al. 2001). They have high site fidelity with a propensity to return to previously used nesting sites. Nesting occurs over an extended period from late March to late September, and a single egg is laid in a suitable depression (platform) on a limb. Because marbled murrelets feed primarily on fish and invertebrates in nearshore marine waters, they require nearshore marine habitats with sufficient prey resources (USFWS 1997).

The marbled murrelet population in Washington is declining by 4% per year, representing a 44% reduction from 2001 to 2015, the main stressor being ongoing loss of potential nesting habitat. Since federal listing in 1992, there has been a 30% loss of nesting habitat on non-federal lands in Washington due to timber harvest (Pearson et al. 2018). The federal recovery plan (USFWS 1997) concludes that areas on non-federal lands that already have structural components should be retained as long as possible.

Change of a site location caused by harvest creates increased energetic costs for marbled murrelets to relocate and may delay reproduction. No information is available demonstrating that marbled murrelets respond to habitat loss by dispersing to new habitat in the same season, or move into remaining habitat after a harvest or catastrophic event (USFWS 2019b). For a species with high site fidelity to breeding areas, removal of those habitat patches will have a prolonged impact (USFWS 1997).

Given that too few data exist to identify the exact habitat locations for marbled murrelets, or the extent of these habitats throughout the study area, areas protected by the Forest Practices Rules such as riparian areas and unstable slopes may provide the structural components for marbled murrelet habitat. Because of the lack of available data, evergreen, deciduous, mixed stand, and wetland habitat types in the FRE facility and temporary reservoir areas have been identified as suitable marbled murrelet habitat. Field verification within these habitat types would improve the quantification of available habitat.

## 2.4.3.1.4 Insects

Three insect species with federal or state threatened or endangered status are documented within the counties associated with the Chehalis Basin including Mardon skipper (*Polites mardon*), Oregon silverspot (*Speyeria zerene hippolyta*), and Taylor's checkerspot (*Euphydryas editha taylori*). Mardon skipper is a state endangered species and federal species of concern. Oregon silverspot is a state endangered species. Taylor's checkerspot is a state and federal endangered species. Preferred habitats of insect species with threatened or endangered status within Lewis,

Thurston, Grays Harbor, and Pacific counties are presented in Section 2.4.2.4. One federally listed insect species, Taylor's checkerspot, is identified by USFWS (2019c) as potentially occurring within part of the study area, downstream of the FRE facility. The USFWS does not identify any designated or proposed critical habitat for insect species as occurring within the four geographic areas of the Chehalis Basin (USFWS 2019c).

## 2.4.3.1.5 Mammals

Several mammal species with federal and state threatened, endangered, or proposed status are identified as potentially occurring within the counties associated with the study area including Canada lynx (*Lynx canadensis*), fisher (*Martes pennanti*), gray wolf (*Canis lupus*), North American wolverine (*Gulo luscus*), and five pocket gopher species (Olympic [*Thomomys mazama pugetensis*], Roy Prairie [*T. m. glacialis*], Tenino [*T. m. tumuli*], western [*T. m. couchi louiei*], and Yelm [*T. m. yelmensis*]; USFWS 2019b, 2019c).

Marine mammal species are associated exclusively with marine habitat in Grays Harbor and Pacific counties and are not included as potential species within the study area. Impacts to salmon that could affect Southern Resident orca are evaluated in the *Fish Species and Habitats Discipline Report*. Western gray squirrel (*Sciurus griseus*) is a state threatened species with no federal status (WDFW 2019a).

All five of the gopher subspecies have state threatened status; four of the five have federal threatened status and the fifth is a federal species of concern (USFWS 2019b, 2019c). Preferred habitats of mammal species with threatened, endangered, or proposed status within study area counties are presented in Attachment P-1, Table P1-10.

Federally listed mammal species identified by USFWS (2019c) as potentially occurring within the study area are presented in Table P-12. The state status of the federally listed species are also identified in Table P-12.

Of the federally listed mammal species identified as potentially occurring within the study area, only the four listed gopher species, Olympic, Roy Prairie, Tenino, and Yelm, also have designated critical habitat protected under the ESA (USFWS 2019b) within the counties associated with the study area. Thurston County contains designated critical habitat for the four listed gopher species. USFWS does not identify any designated or proposed critical habitat as occurring within the four geographic areas of the study area (USFWS 2019c).

COMMON NAME	FEDERAL STATUS <sup>1</sup>	STATE STATUS <sup>2</sup>	FRE FACILITY	TEMPORARY RESERVOIR	AIRPORT LEVEE	DOWNSTREAM OF FRE FACILITY
Fisher	Proposed	Endangered				
	Threatened					•
Gray wolf <sup>3</sup>	Proposed	Endangered				
	Endangered		•	•		
North American	Proposed	Candidate				
wolverine <sup>3</sup>	Threatened		•	•		
Olympia pocket gopher	Threatened	Threatened				•
Tenino pocket gopher	Threatened	Threatened				•
Yelm pocket gopher	Threatened	Threatened				•

#### Table P-12

Federally Listed Threatened, Endangered, or Proposed Mammal Species that Potentially Occur in the Study Area

Source: USFWS 2019c Notes:

- 1. USFWS 2019b
- 2. WDFW 2019a
- 3. Unlikely to be present in study area

## 2.4.3.2 WDFW Priority Wildlife Species

Information from WDFW's priority habitats and species database (WDFW 2019a) was referenced to identify state priority species that could occur within the study area. In addition, the priority habitat and species list (WDFW 2019b) identifies specific counties in Washington where priority species have been documented. Information from this list was used to identify priority species potentially occurring within study area counties. The state status and habitat descriptions of WDFW priority species within study area counties are presented by wildlife group in Attachment P-1. Amphibians and reptiles are described in Table P1-7, birds are described in Table P1-8, insects are described in Table P1-9, and mammals are described in Table P1-10.

# 2.4.4 Climate Change Effects on Wildlife

Worldwide there is increasing evidence that climate change is impacting biodiversity and that species and populations are responding in a variety of ways (Carter et al. 2018). Crozier et al. (2019) report that major ecological realignments are already occurring in response to climate change. Climate change has already impacted wildlife species and habitat and impacts are expected to increase in the future.

The Chehalis Basin is a rain-dominated watershed and is expected to experience more intense precipitation events and possible shifts in the timing of the most intense rainfall (Mauger et al. 2016). The Pacific Northwest warmed about +1.3°F during the past century (1895 to 2011) and this is projected to increase in the future (DNR 2018). In the Chehalis Basin, the WDFW Chehalis Thermalscape (CT) model estimates average water temperature during August under current conditions across the basin (Winkowski 2019). Modification of the WDFW CT model data using the U.S. Forest Service NorWeST

model predicts increased future (2040 and 2080) water temperatures in the Chehalis Basin (McConnaha 2018).

Rising stream temperatures and lower summer streamflows will reduce the quality and quantity of habitat for aquatic wildlife species (DNR 2018). Higher temperatures in the summer could cause thermal stress, reduce the amount of habitat available, increase non-native predator populations, and increase susceptibility to disease, parasites, and predators. Erosion and lateral channel migration are projected to increase due to higher peak water flows. Flooding and landslide frequency could increase due to more intense and frequent heavy rainfall events, especially if the soil moisture conditions are already high (DNR 2018).

Recent research has been conducted on the invasion and expansion of non-native species under future climate change scenarios for the Pacific Northwest (Lawrence et al. 2012, 2014; Rubenson and Olden 2019). This research is highly relevant to the Chehalis Basin given that it is a low-elevation, rain-dominated system that currently supports a diverse assemblage of non-native species. Warmer stream temperatures in the future may positively impact non-native species currently present in the Chehalis Basin; this would cause additional stresses for native species due to increased predation by non-native species (Winkowski and Zimmerman 2019).

Forests will be affected by increasing air temperatures, changes in precipitation, reduced snowpack, and decreased soil moisture (DNR 2018; WDFW 2019d). There may also be changes to the growing season, more frequent and severe fires, shifts in species composition, and the spread of invasive species (WDFW 2019d). Increased disturbance will likely affect critical habitats for forest-dependent species and may challenge the existing strategies that support species recovery (DNR 2018). Seed diversity and supply may be insufficient to support reforestation needs (DNR 2018). The annual area burned by forest fires is likely to increase because projected decreases in summer precipitation and increases in summer temperatures would reduce moisture of existing fuels, facilitating fire (WDFW 2019d).

Climate change is expected to transform Washington's forests over the long term by affecting the establishment, growth, and distribution of forest plant species, and by increasing disturbances such as fire, insect outbreaks, and disease (CIG 2013). The large projected increases in fire suggest that indirect impacts of climate change through disturbance are likely to be greater and more immediate agents of change for Washington forests than direct effects to productivity (CIG 2013). Large fires are projected to become more frequent, and the fire season is likely to start earlier and last longer, requiring increased resources over a longer period (DNR 2018).

The climate is projected to become unfavorable for Douglas fir over 32% of its current range in Washington by the 2060s, relative to 1961 to 1990, under a medium greenhouse gas scenario (CIG 2013). Areas of climatic suitability for Douglas fir are projected to decline most noticeably at lower elevations (CIG 2013). Given projections of warmer, possibly drier summers in Washington, tree growth

may increase where trees are currently energy-limited (e.g., higher elevations) and decrease where trees are currently water-limited (e.g., drier areas). Washington forests are likely to become increasingly water-limited, with episodes of drought increasing in area and intensity. This is likely to lower forest productivity in some areas, while also increasing vulnerability to disturbances such as fire, insects, and pathogens (CIG 2013).

Climate change is expected to cause significant changes in plant and animal distributions and communities (DNR 2018; CIG 2013). The timing of biological events, such as spring budburst and migration, will shift for many species, leading to significant impacts on species and habitats (CIG 2013). Climate change will affect biodiversity through major ecosystem disturbances, including fire, drought, and flooding. Climate change may promote the spread of invasive species, including both native invasive species moving beyond their historical ranges, and non-native species increasing due to improved conditions (CIG 2013). Stream crossing design on non-fish-bearing streams may be affected by projected increases in peak flows and sediment transport, and the frequency of road damage could increase due to additional landslides (DNR 2018).

Warmer temperatures may cause shifts in species distributions, altered hydrologic regimes, and reduced summer soil moisture and summer streamflow (DNR 2018). Increased wildfire frequency and extent could result in the loss of priority species and ecosystems in protected areas (DNR 2018). Non-native, invasive species could benefit from changes in climate and associated increases in disturbance, allowing them to outcompete and/or prey upon native species (both rare and common native species), alter ecosystem processes, and negatively impact intact, functioning ecosystems (DNR 2018).

Overall, it is likely that climate change has already negatively affected wildlife species and habitats within the study area and will continue to do so in the future.

# 2.5 Impact Assessment

The analysis for impacts to wildlife habitat and wildlife species, and wildlife, plants, and habitats with protected status (federal, state, local) considered the following:

- Permanent loss of wildlife habitats (vegetation communities)
- Temporary loss of wildlife habitats (vegetation communities)
- Construction and operation impacts on wildlife species
- Calculated estimated loss or conversion of vegetation communities by cover type and acres
- Loss of or modifications to species habitats (e.g., inundation, deposition)
- Fragmentation of habitats
- Impediments to migration (e.g., reservoir, roads)
- Vegetation removal and management in temporary reservoir inundation area

# **3 TECHNICAL ANALYSIS AND RESULTS**

# 3.1 Overview

This section describes the probable wildlife species and habitat impacts from the Proposed Action (Section 3.2), Local Actions Alternative (Section 3.3), and No Action Alternative (Section 3.4). This section also evaluates required permit conditions and planning document requirements that could address the impacts identified (Section 3.2.3). When probable significant adverse environmental impacts remain after considering these, Section 3.2.4 identifies mitigation measures that could avoid, minimize, or reduce the identified impact below the level of significance.

# 3.2 Proposed Action

# 3.2.1 Impacts from Construction

Potential construction impacts on wildlife habitat and species could occur from land clearing, excavation, grading, and fill placement activities that permanently remove, fill, or otherwise change existing habitats. These impacts are summarized in Table P-13. Construction for the FRE facility is estimated to last 5 years, from 2025 to 2030. The construction of the Airport Levee Changes would occur over 1 year during this period.

Potential construction impacts on wildlife habitat and species include temporary and permanent removal or disturbance of vegetation or habitats during construction activities. Temporarily disturbed vegetation communities would be restored to pre-construction status and/or function following construction, in some areas. The design for the Proposed Action provides a level of detail to quantify potential construction activities that could temporarily disturb vegetation communities, with the exception of the FRE facility quarry access roads. Under the Proposed Action, some construction impacts are anticipated, with subsequent restoration to pre-construction status and/or function, while other impacts are anticipated to have permanent effects.

Potential construction impacts on wildlife habitat (including wetlands) and species within the study area are described in the following subsections. Potential impacts on wetlands and waterbodies in the study area are described in the *Fish Species and Habitats Discipline Report* (Anchor QEA 2020a) and the *Wetlands Discipline Report* (Anchor QEA 2020b).

#### Table P-13

Summary of Probable Vegetation Community Impacts from Construction Activities

VEGETATION COMMUNITY COVER	FRF FACILITY ARFA <sup>2,3</sup>	FRE CONSTRUCTION ACTIVITIES WITHIN TEMPORARY	TEMPORARY RESERVOIR (ACRES)	AIRPORT I FVFF	DOWNSTREAM OF
TYPES <sup>1</sup>	(ACRES)	RESERVOIR <sup>3</sup>	TREE REMOVAL <sup>4</sup>	(ACRES)	(ACRES)
Evergreen Forest	6.4	8.2	334.7 <sup>5</sup>	0.0	0.0
Deciduous Forest	0.0	0.7	<b>50.5</b> ⁵	0.0	0.0
Mixed Forest	1.6	0.9	34.7 <sup>5</sup>	0.0	0.0
Scrub-Shrub	6.7	4.2	43.8 <sup>5</sup>	0.0	0.0
Herbaceous	17.6	1.8	44.0 <sup>5</sup>	0.0	0.0
Wetlands	0.6	0.5	6.5⁵	6.6	0.0
Cultivated Crops	0.0	0.00	0.00	0.0	0.0
Hay/Pasture	0.0	0.0	5.6 <sup>5</sup>	11.3	0.0
Barren Land	0.0	0.0	0.0	0.00	0.0
Developed Open Space	0.7	2.7	50.9 <sup>5</sup>	21.1	0.0
Developed Low Intensity	1.6	0.2	9.0 <sup>5</sup>	20.5	0.0
Developed Medium Intensity	0.0	0.0	0.4 <sup>5</sup>	7.6	0.0
Developed High Intensity	0.0	0.0	0.0	2.7	0.0
Total Vegetated Cover	34.9	19.2 <sup>3</sup>	580.1 <sup>4</sup>	69.8	0.0
Open Water	0.0	0.0	0.7	0.0	0.0
Total Cover	34.9	19.2	580.8	69.8	0.0
Total Temporary Reservoir Cover			600.0		
Total Construction Impact Area	34.9	19.2	<b>426.4</b> <sup>5</sup>	69.8	0.0

Notes:

1. NLCD (USGS 2016) with the exception of wetland layer, as described in Section 2.3

2. Impact areas for quarry access roads are not defined and therefore not included in the table.

3. FRE facility construction activities includes areas within the temporary reservoir.

4. Construction activities include the removal of trees in the 10-year and 20-year inundation zones (Zones 1 and 2) within the temporary reservoir.

5. Only forested and wetland (primarily forested) categories included in total to account for trees removed during construction.

N/A: not applicable

# 3.2.1.1 Direct

3.2.1.1.1 Wildlife Habitat

## FRE Structure Site and Associated Areas

Wildlife habitat within the proposed construction footprint of the FRE structure and associated access, construction, and maintenance areas includes upland, riparian, and wetland vegetation communities. These vegetation communities would be eliminated with FRE facility structures and permanent access and parking or maintenance areas. Vegetation includes forested riparian habitat next to the Chehalis River. Vegetation community categories and impact areas within the FRE facility footprint are shown in Table P-13. As shown in Table P-13, construction impacts associated with the FRE facility and associated areas include areas that are located within the temporary reservoir.

The FRE structure site and associated areas include three proposed quarry areas (North Quarry, South Quarry, and Huckleberry Ridge Quarry). Accessing these quarry areas would include widening, improving, and upgrading the existing roads. Impact areas for quarry access roads have not been specified by the Applicant, so an estimate of potential disturbance along a 25-foot-wide road widening area along the entire length of the access roads has been assumed.

These probable adverse impacts are considered **significant** for wildlife habitat, particularly habitat for the federally threatened and state endangered marbled murrelet. The FRE structure and associated areas would eliminate 35.0 acres of various types of upland habitats, 30.14 acres of which includes wetland buffer habitat, and 1.08 acres of wetland vegetation communities, including the permanent loss of larger trees that provide suitable habitat for marbled murrelets in areas currently protected by Forest Practices Rules in those vegetation communities. The 1.08 acre of disturbed wetland habitat includes 0.43 acre located within the temporary reservoir area. An acreage of 40.9 acres within the 25-foot width along the Huckleberry Ridge Quarry access roads could be disturbed and/or eliminated as well, and the majority of the 40.9 acres could provide present and/or future marbled murrelet habitat. The roadway improvements to provide access to the North and South quarries would overlap areas proposed for tree removal in the temporary reservoir inundation area. Forested riparian habitat within the FRE facility footprint is composed of upland vegetation. The affected wetlands are within the upper Chehalis River subbasin. The elimination of these wetlands would require compensatory mitigation per U.S. Army Corps of Engineers (Corps), Ecology, and Lewis County regulations to ensure no net loss of wetlands. Wetland impacts and mitigation are described in more detail in the *Wetlands Discipline Report*.

Mitigation is proposed for the Applicant to develop plans for Wildlife Species and Habitat Management, Vegetation Management, Riparian Habitat, Wetlands and Wetland Buffers, Streams and Stream Buffers, Large Woody Material Management, and Surface Water Quality to mitigate impacts to wildlife habitat at the FRE structure site and associated areas; however, there is uncertainty if the implementation of a plan is technically feasible or economically practicable. Therefore, the Proposed Action would have **significant and unavoidable** adverse environmental impacts on wildlife habitat, unless the Applicant develops the plans described above that meet regulatory requirements and for which implementation is feasible.

#### **Temporary Reservoir**

No construction of structures or paved surfaces is proposed in the temporary reservoir inundation area under the Proposed Action. As described earlier in the FRE facility and associated areas impact discussion, upland and wetland habitats within the temporary reservoir would be disturbed during FRE facility construction activities. Impacts to these 19.2 acres of habitat are accounted for in the FRE facility and associated areas impact analysis. Construction activities would include the removal of all non-floodtolerant trees (primarily Douglas fir) and all trees greater than 6 inches dbh within Zones 1 and 2 of the temporary reservoir (approximately 426 acres of upland and riparian habitat within the 600-acre area of Zones 1 and 2) during the 5-year construction period. An additional 9.7 acres of forest habitat within the temporary reservoir would be removed during FRE facility construction activities. Figure P-17 and Table P-14 identify the areas of expected vegetation community types by inundation zone in the temporary reservoir.

While the Applicant's *Pre-Construction Vegetation Management Plan* (Anchor 2016) states non-flood-tolerant trees within Zone 1 would be selectively harvested, the trees in Zone 2 would also be under water for an average of 4 days when flooded. Douglas fir, the dominant tree species in this zone, is not likely to survive multiple days of inundation. Therefore, the analysis assumes construction activities would include the removal of all non-flood-tolerant trees within both Zones 1 and 2 of the temporary reservoir (approximately 420 acres) and all other trees greater than 6 inches dbh during the 5-year construction period as a conservative approach (Table P-14).
# Figure P-17

Expected Vegetation Community Types in the Temporary Reservoir



#### Table P-14

#### Expected Vegetation Community Types by Inundation Zone in the Temporary Reservoir

INUNDATION ZONE	CHANCE OF BEING FLOODED IN A YEAR	AVERAGE NUMBER OF DAYS UNDER WATER IF FLOODED	ELEVATION RANGE (FEET) <sup>1</sup>	AREA (ACRES) <sup>1</sup>	PRE-CONSTRUCTION TYPICAL VEGETATION COMMUNITY TYPE AND TYPICAL VEGETATION	EXPECTED POST- CONSTRUCTION VEGETATION COMMUNITY TYPE AND TYPICAL VEGETATION
1	10% chance of being flooded in a year	25 days	424 to 567	514	Evergreen Forest, Deciduous Forest, Developed; Douglas fir, red alder, various	Scrub-Shrub: young willows, dogwood, elderberry, salmonberry
2	5% chance of being flooded in a year	4 days	567 to 584	86	grasses Evergreen Forest, Mixed Forest, Scrub- Shrub; Douglas fir, red alder, ocean spray, snowberry	Deciduous Forest (early successional): young alder, willows, dogwood, elderberry, salmonberry
3	1% chance of being flooded in a year	1 day	584 to 612	154	Evergreen Forest, Scrub-Shrub; Douglas fir, ocean spray, snowberry	Mixed Deciduous and Evergreen Forest: young Douglas fir, western red cedar, red alder, big leaf maple
4	Less than 1% chance of being flooded in a year	Less than 1 day	612 to 627	93	Evergreen Forest, Scrub-Shrub; Douglas fir, sword fern, salal, ocean spray	Evergreen Forest: young Douglas fir, western red cedar

#### Notes:

1. See map of expected post-construction vegetation zones, Figure P-17.

Based on USGS vegetative land cover types, about 370 acres (approximately 62% of the total of 600 acres in Zones 1 and 2) is Douglas fir forest or Douglas fir mixed forest. All Douglas fir, big-leaf maple, and red alder trees would be expected to be removed. The analysis assumes that trees outside riparian zones would be removed first, and trees within riparian zones would be removed last. A mitigation measure to remove trees in the riparian zones last is described in Section 3.2.4. The Applicant's project description states vegetation would be planted to provide stability; therefore, the analysis assumes that planting of native flood-tolerant shrubs would occur after tree harvesting to minimize bare ground. It is assumed some clearing and grading for construction of temporary access roads within the temporary reservoir inundation area would be required to facilitate tree removal, but this has not been quantified. Vegetation community categories and impact areas within the temporary reservoir maximum inundation extent are shown in Table P-14 and Figures P-13 through P-15.

Based on the removal of trees and plantings that would occur during construction, the resulting plant communities would be evergreen forest (Douglas fir dominated) in Zones 3 and 4 (approximately 142 acres) and scrub-shrub (dominated by young willows, dogwood, elderberry, salmonberry) in Zones 1 and 2 (approximately 600 acres total).

Removal of trees within riparian areas along the Chehalis River channel and tributary streams in the temporary reservoir inundation area would alter or eliminate many of the important riparian functions (Knutson and Naef 1997) provided by these areas, including habitat corridors for wildlife, water and sediment filtration, shading and thermoregulation of instream water temperatures, and reduction in ecosystem complexity. Activities required for selective tree removal could also affect wetlands and streams that are reported to support amphibians (Hayes et al. 2016b, 2017). These impacts could subsequently affect wildlife species and change the types of habitat available in this area over both the short and long term.

Upland, riparian, and wetland forested habitats would lose wildlife habitat functions associated with tree canopy cover such as shade, habitat features (snags and woody material), and habitat diversity. The removal of the tree canopy could promote the spread of non-native vegetation within the previously forested habitats, such as Himalayan blackberry and Scot's broom.

Given that too few data exist to identify the exact priority habitat locations, or the extent of these habitats, throughout the study area, areas protected by the Forest Practices Rules such as riparian areas and unstable slopes may provide the structural components for marbled murrelet habitat. Evergreen, deciduous, mixed stand, and wetland habitat types in the FRE facility and temporary reservoir inundation area have been identified as suitable marbled murrelet habitat. Approximately 426 acres of forested and wetland habitat that could be suitable marbled murrelet habitat in Zones 1 and 2 would be eliminated.

These probable adverse impacts are considered **significant** for wildlife habitat because approximately 90% of the trees within Zones 1 and 2 (approximately 426 forested acres of the total 600 acres of upland and riparian habitat) would be removed over the 5-year construction period, and replanting would only provide shrub cover. Medium- and large-diameter trees in areas currently protected by Forest Practices Rules that are suitable for the federally threatened and state endangered marbled murrelet will be eliminated. In addition, the future maturation of trees within riparian areas, unstable slopes, and other buffered areas protected under the Forest Practices Rules, but not yet at the medium and large tree age class, will be eliminated. While managed forest in the area is regularly logged under current conditions, the size of the cleared areas allowed under Forest Practices Rules is smaller and the managed forest is replanted with trees that are allowed to grow well beyond 6 inches dbh. For the Proposed Action, the near complete loss of tree canopy and cover would **significantly** reduce wildlife habitat functions in upland, riparian, and wetland areas.

Mitigation is proposed for the Applicant to develop plans for Wildlife Species and Habitat Management, Vegetation Management, Riparian Habitat, Wetlands and Wetland Buffers, Streams and Stream Buffers, Large Woody Material Management, and Surface Water Quality to mitigate impacts to wildlife habitat in the temporary reservoir area; however, there is uncertainty if the implementation of a plan is technically feasible or economically practicable. Therefore, the Proposed Action would have **significant and unavoidable** adverse environmental impacts on wildlife habitat, unless the Applicant develops the plans described above that meet regulatory requirements and for which implementation is feasible.

#### **Airport Levee**

Wildlife habitat within the proposed construction footprint of the airport levee includes upland and wetland vegetation communities and airport facility and road infrastructure. Vegetation communities would be permanently eliminated with Airport Levee Changes; however, developed areas account for 73% of the total cover and hay/pasture accounts for 16%. Wetlands account for the remaining 11% cover. Airport levee wetland buffers are mowed and offer low-quality habitat for wildlife species. Vegetation community categories and impact areas within the airport levee footprint are shown in Table P-13 and Figure P-16.

These probable impacts are considered **moderate** for wildlife habitat because while the upland vegetation cover types are managed and disturbed, 6.6 acres of wetland and 44.2 acres of wetland buffer vegetation communities would be permanently filled or disturbed. The affected wetlands do not include Category I wetlands and are already highly disturbed and of low function. The majority of the wetland buffers are herbaceous (associated with the airport and adjacent farm fields). Impacts to 6.6 acres of disturbed and low function wetland and 44.2 acres of upland wetland buffer habitats would not result in significant impacts to wildlife habitat in the study area. The elimination of these wetlands would require compensatory mitigation per Corps, Ecology, and Lewis County regulations to ensure no net loss of wetland functions. Wetland impacts and mitigation are described in more detail in the *Wetlands Discipline Report*.

### Downstream of the FRE Facility

No construction activities are proposed downstream of the FRE facility under the Proposed Action. Construction of the FRE facility will be required to meet water quality standards as described in the *Water Discipline Report* (ESA 2020b); however, temporary increases in turbidity and increased water temperatures are likely. This is discussed as an indirect effect from construction in Section 3.2.1.2.1.

### 3.2.1.1.2 Wildlife Species

Probable construction impacts on wildlife would result from construction activities that include clearing of upland, riparian, and wetland vegetation communities or construction- and equipment-generated noise and disturbance. Probable adverse impacts on wildlife species associated with construction are described here. Construction activities that would affect wildlife species within the four specific geographic areas of the study area are described in the following subsections.

Construction activities that require disturbance of vegetation communities would also disturb the habitats of native wildlife species that use these areas to breed, forage, rest, and overwinter. Vegetation removal activities in construction areas would degrade or eliminate habitat and could directly injure or kill wildlife that are unable to relocate to avoid the disturbance (e.g., amphibians, reptiles, small mammals, and nesting bird species such as marbled murrelets). Activities such as grading, excavation, and fill placement would adversely affect wildlife with limited capacity to flee the disturbance area, particularly burrowing mammals such as moles, voles, and shrews.

If land clearing takes place during the spring and early summer, when most birds nest, eggs and nestlings of tree- and ground-nesting birds could be lost or nests could be abandoned. Native amphibians breed and rear from late winter to late summer (January through August) when they are most vulnerable to the impacts of construction activities. More mobile species (e.g., young and adult birds, medium and large mammals) would be displaced to nearby habitat during land-clearing activities. Marbled murrelets have high site fidelity, naturally low reproductive potential, and low dispersal ability, and the high energetic costs to relocate may compromise individuals and/or annual reproductive success. Wildlife displaced from construction sites would move to nearby habitats where they could be competing with resident wildlife, especially if nesting and food resources are already limited. The resulting changes in the local species composition would affect a variety of species in the food web that occupy these habitats, including species that prey on amphibians, reptiles, and small mammals.

For more transient construction disturbances such as increased noise levels and vehicle usage, some wildlife species would adapt to these disruptions (e.g., birds and mammals that are habituated to human disturbance), and some species would successfully relocate to other suitable habitat (e.g., larger mammals, birds). Some less mobile wildlife species (e.g., small mammals, amphibians, reptiles) would be unsuccessful in adapting or relocating, and their ability to find adequate shelter and foraging and breeding habitat would be constrained. Elevated noise levels can cause a variety of stressors to wildlife including acoustic masking of vocalizations, reduced transmission distance of vocalizations, reduced

ability to find prey or increased predation, increased stress response, or generally reduced fitness (Brittingham 2014).

Guidelines for analyzing potential harassment of nesting marbled murrelets (USFWS 2006) indicate that sounds that are significantly higher than ambient (20 to 25 decibels [dB] higher than ambient) or sounds above 90 dB are most likely to cause a severe response such as flushing from a nest. To protect federally threatened and state endangered marbled murrelet, DNR Forest Practices Rules require a 0.25-mile disturbance avoidance zone around occupied sites. Temporary restrictions on disruptive activities, including tree felling and bucking, within this zone are required within the critical nesting season from April through August. Disturbance during the nesting season could cause mortality of eggs or young chicks if adults abandoned the nests or were absent for long periods of time (due to predation, starvation, or lack of incubation). This applies to the FRE facility, associated haul routes, and the temporary reservoir.

Blasting of rock would occur at the bypass tunnels and at the rock quarries and may be necessary for upgrading the quarry roads. A detailed description of potential noise levels is provided in the *Noise and Vibration Discipline Report* (ESA 2020c). Blasting and pile driving would have the highest noise levels, ranging from 90 to 104 dB, as well as causing vibration. Other construction noise from equipment, truck traffic, tree removal, and similar activities ranges from 70 to 85 dB. Because the forest in the FRE facility and temporary reservoir inundation area is currently managed for timber production, wildlife likely experience similar periodic noise levels from equipment and truck traffic under current conditions. However, due to the sporadic nature of construction equipment use, the potential for startling wildlife is high. Vibrations from blasting and pile driving could travel through the ground and affect wildlife species that burrow in the ground (e.g., mice, rabbits, amphibians, muskrat).

#### **FRE Structure Site and Associated Areas**

Construction of the FRE structure site and associated areas would disturb upland, riparian, and wetland vegetation communities (see Section 3.2.1.1.1), which are currently providing habitat for native wildlife species that use these areas to breed, forage, rest, and overwinter.

Diversion of the Chehalis River through the temporary river bypass tunnel and dewatering of in-channel work areas would likely kill any aquatic species using the dewatered areas for breeding, foraging, or overwintering during diversion and dewatering. Such impacts would primarily affect some individual amphibians that use instream areas for these purposes (e.g., coastal giant salamander, coastal tailed frog, Columbia torrent salamander), as well as those amphibians that use the stream margin and associated still-water areas (e.g., Pacific treefrog, northern red-legged frog, roughskin newt, and state candidate species Van Dyke's salamander, Dunn's salamander, and western toad; Hayes et al. 2016a, 2016b, 2017, 2018). WDFW surveys have documented breeding of western toad within the FRE facility footprint (Hayes et al. 2018). Western toads breed during April through July, and tadpoles and toadlets

rear during July through August. A mitigation measure is proposed in Section 3.2.4 to limit construction activities of the FRE facility to avoid breeding and rearing periods for amphibian species.

Impacts on upland, riparian, and wetland habitats would affect wildlife using these areas and change the types and functions of available habitat over the long term. Potential impacts on wildlife vary depending on the type of activity and the different classes of wildlife species that occupy these habitats. The clearing of vegetation to construct the FRE facility structures and their supporting infrastructure (e.g., access roads, disposal of spoils) would cause a direct loss of wildlife habitat and cause varying degrees of habitat fragmentation based on the width and orientation of the clearing as well as the wildlife species affected and the species' dispersal strategies.

Generally, wildlife such as songbirds, raptors, and large mammals are more adaptable to changes in habitat features, although marbled murrelets have high site fidelity and will expend much energy to find a new nest site, which may cause mortality. These wildlife groups are also able to disperse more easily to nearby areas with suitable habitat conditions. Amphibian, reptile, and small mammal species would be more vulnerable to changes in habitat that require dispersing to other suitable habitat conditions and the distances needed to reach suitable habitats. Given the proposed FRE facility would be located in a basin dominated by managed forestland, similar forest habitats are abundant and accessible in the area for songbirds, raptors, and large mammals. However, relocation of these species into adjacent habitats would likely cause increased stress and potentially mortality of a few individuals due to increased competition for food resources. Certain wildlife (e.g., various types of birds, raptors, coyote, raccoon) could adapt to and continue to use areas disturbed by construction activities.

Semi-aquatic wildlife species like amphibians and North American beaver, however, rely on specific aquatic habitat features to breed, forage, and overwinter, and would be much more vulnerable to the localized impacts on the river, wetlands and the conversion of riparian vegetation communities. Such species would not be able to adapt to significant changes in aquatic habitat and are unlikely to disperse successfully to other suitable habitats. Amphibians, birds, and small mammals could also face increased predation within modified habitats as a result of changes in the availability or quality of cover (e.g., vegetation, leaf litter, woody material), as well as a potential increase in the number of predators (e.g., fish, reptiles, small and medium-sized mammals, shorebirds, raptors, other amphibians) due to displacement from adjacent modified habitats. Cover is also a habitat feature that provides areas where amphibians can shelter from direct sun and hydrate, an important element during summer climate conditions. Since human disturbance from logging currently occurs in portions of the FRE facility, some level of habituation by wildlife to noise and human activity has likely already occurred.

USFWS bald eagle nest disturbance management guidelines (USFWS 2019a) suggest 660-foot-wide zones around bald eagle nests where eagles have a line-of-sight view of construction, logging, and blasting (among other uses). Temporary restrictions on disruptive activities within this zone are recommended within the nesting season from August through January. Should blasting be used during

construction, bald eagles and other sensitive species outside the immediate vicinity of the FRE facility study area may be disturbed. Timing and distance restrictions to minimize the noisiest activities in proximity to nests during the nesting season would minimize this impact. Disturbance during the nesting season could cause mortality of eggs or young chicks if adults abandoned the nests or were absent for long periods of time (due to predation, starvation, or lack of incubation). Disturbances caused by construction activities outside of the nesting season would result in the temporary loss of perching habitat used by eagles for foraging in the area of the FRE facility. Bald eagles and other sensitive bird species would be able to relocate to similar habitats in the surrounding area, depending on the timing, but would likely not re-nest if disturbed during the nesting season and would thus lose one or more broods during the construction period.

No terrestrial insects with sensitive status are likely to occur in the FRE facility area. Other more common native bees and wasps are likely to be present in the FRE facility area and would likely be killed or displaced by excavation and tree and other vegetation removal activities.

Overall, these probable adverse impacts are considered **significant** for wildlife species, specifically the federally threatened and state endangered marbled murrelet, because the loss of upland, riparian, and wetland habitats that support wildlife species would result in wildlife mortality for low-mobility species and species with high energetic costs. Amphibian, reptiles, and small mammal species would be unlikely to avoid construction activities. Species with more mobility, such as birds and small and large mammals, could avoid some construction activities.

Mitigation is proposed for the Applicant to develop plans for Wildlife Species and Habitat Management, Vegetation Management, Riparian Habitat, Wetlands and Wetland Buffers, Streams and Stream Buffers, Large Woody Material Management, and Surface Water Quality to mitigate impacts to wildlife species at the FRE structure site and associated areas; however, there is uncertainty if the implementation of a plan is technically feasible or economically practicable. Therefore, the Proposed Action would have **significant and unavoidable** adverse environmental impacts on wildlife species, unless the Applicant develops the plans described above that meet regulatory requirements and for which implementation is feasible.

#### **Temporary Reservoir**

No construction of structures or paved surfaces is proposed in the temporary reservoir inundation area. Potential adverse impacts on habitat conditions and functions in the temporary reservoir include the loss, conversion, and fragmentation of upland, riparian, and wetland vegetation communities that function as wildlife habitat (see Section 3.2.1.1.1). The loss, conversion, and fragmentation of such communities would occur during construction of the temporary reservoir through selective clearing of tree cover. While the proposed tree clearing would be similar to typical commercial forest practices, the scale of change from forested to herbaceous and shrub-sapling (564 acres of the total 600 acres within

Zones 1 and 2) would be much larger than normal commercial forest practices that include guidelines for the size and timing of timber harvest.

The loss of tree and shrub vegetation from the riparian zone in the temporary reservoir inundation area through tree removal during construction would directly remove nesting, denning, and feeding habitat used by wildlife including birds, mammals, amphibians, and other animals. Tree removal from these areas would also adversely affect many of the riparian functions being performed by these areas, including water filtration and purification, stream channel stability, nutrient dynamics, stream shading (i.e., thermoregulation), and wood recruitment. Increased sediments entering the stream system from runoff and streambank erosion could lead to filling of interstitial spaces in stream substrates that are used by amphibians for breeding and foraging (Leonard et al. 1993). Reduction in the amount of leaf litter, organic material, and other nutrient inputs that support species at the base of the food chain would reduce foraging for aquatic and semi-aquatic wildlife species. Reduction in the amount and variety of woody material entering the system would also affect nutrient cycles and limit instream habitat-forming processes that support stream-associated amphibians, including macroinvertebrate prey for amphibians. Macroinvertebrates are addressed in the *Fish Species and Habitats Discipline Report*.

Riparian woody material is a habitat feature used by terrestrial amphibians, including Dunn's and Van Dyke's salamanders, both state candidate species, for nesting, shelter, and foraging. Instream woody material is used by stream-breeding amphibians such as the Columbia torrent salamander for breeding and refuge. In addition to these impacts, the reduction of cover within riparian areas would reduce, eliminate, or fragment habitat and travel corridors for wildlife including amphibians, reptiles, birds, and various mammals. The construction work within the temporary reservoir would also affect the gene flow of species, specifically low mobility amphibians (e.g., Van Dyke's salamander, Dunn's salamander, and Columbia torrent salamander) and small mammals. The change to the area would isolate low mobility populations and would likely affect gene flow due to limited dispersal capabilities and loss of cover and overhead canopy. If a species cannot reestablish in this area, then connection with others of the same species upstream and downstream would also be affected.

Conversion of forested upland, riparian, and wetland habitats to those dominated by herbaceous and shrubby vegetation would result in the loss of habitats used by some wildlife species in the temporary reservoir inundation area. For example, loss of riparian cover would impair habitat conditions for many amphibians, especially by reducing adequate surface moisture and appropriate temperature conditions for terrestrial stages of stream-associated amphibians, like Van Dyke's salamander (NatureServe 2019). Conversely, the shrub vegetation that would replace several of the forested riparian zones in the temporary reservoir inundation area could provide additional foraging habitat for deer, elk, and birds of prey (Link 2004). Disturbances to native species habitats provide opportunities for the invasion of non-native wildlife species (e.g., European starling, American bullfrog) that could prey on or out-compete native wildlife species for resources (Knutson and Naef 1997).

As described previously for the FRE facility, wildlife like songbirds, raptors, and various classes of mammals are more adaptable to changes in habitat features. These wildlife groups are also able to disperse more easily to adjacent areas with suitable habitat conditions. The proposed temporary reservoir area would be in a basin dominated by managed forestland, and similar forest habitats are abundant and accessible in the region.

Some habitat such as riparian areas and unstable slopes are protected through the Forest Practices Rules where patches of larger trees provide habitat for specialist species. These trees are not harvested and younger stands can grow to larger sized trees supporting marbled murrelets. An occupied marbled murrelet site is located approximately 0.5 mile from the temporary reservoir inundation area and could be disturbed by construction activities. Murrelets have high site fidelity, and disturbance and/or nest abandonment will cause them to endure high energetic costs to find a new nest site, which may cause mortality.

Semi-aquatic wildlife species like amphibians and North American beaver, however, rely on specific aquatic habitat features to breed, forage, and overwinter, and would be much more vulnerable to the localized impacts on wetlands and the conversion of riparian vegetation communities. Such species would not be able to adapt to significant changes in aquatic habitat and are unlikely to disperse successfully to other suitable habitats. Some amphibians could also face increased predation within modified habitats as a result of changes in the availability or quality of cover (e.g., vegetation, leaf litter, woody material) as well as a potential increase in the number of predators (e.g., fish, reptiles, small and medium-sized mammals, birds, other amphibians) in the area due to displacement from nearby modified habitats. Cover is also a habitat feature that provides areas where amphibians can shelter from direct sun and hydrate, an important element during summer climate conditions.

Within the temporary reservoir area, cutting and bucking of trees would generate noise and disturbance, and the two quarries are located within the temporary reservoir inundation area. Temporary restrictions on disruptive activities within this zone are recommended within the nesting season from August through January. Blasting would occur at the quarries during construction, and bald eagles and other sensitive species may be disturbed. Timing and distance restrictions to minimize the noisiest activities in proximity to nests during the nesting season would minimize this impact. Disturbance during the nesting season could cause mortality of eggs or young chicks if adults abandoned the nests or were absent for long periods of time (due to predation, starvation, or lack of incubation). Disturbances caused by construction activities outside of the nesting season would result in the temporary loss of perching habitat used by eagles for foraging in the temporary reservoir. Bald eagles and other sensitive bird species would be able to relocate to similar habitats in the surrounding area, depending on the timing, but would likely not re-nest if disturbed during the nesting season and would thus lose one or more broods during the construction period.

These probable adverse impacts are considered **significant** for wildlife species, specifically the federally threatened and state endangered marbled murrelet,<sup>1</sup> because all non-flood-tolerant trees and all trees larger than 6 inches dbh within Zones 1 and 2 of the temporary reservoir, 564 acres of the total 600 acres, would be removed during the 5-year construction period. Tree removal activities during construction could result in wildlife mortality for species with limited mobility, like amphibians, and species with high site fidelity and high energetic costs, like marbled murrelet. The speed of this change would be expected to cause direct mortality for several riparian and stream-associated amphibians that will not be able to move out of the habitat (state candidate species Van Dyke's salamander and Dunn's salamander, along with Columbia torrent salamanders and some frog life stages). The loss of most of the tree cover would significantly reduce upland, riparian, and wetland habitat functions for wildlife, and the loss of breeding, foraging, resting, and overwintering habitat features could result in wildlife mortality.

Mitigation is proposed for the Applicant to develop plans for Wildlife Species and Habitat Management, Vegetation Management, Riparian Habitat, Wetlands and Wetland Buffers, Streams and Stream Buffers, Large Woody Material Management, and Surface Water Quality to mitigate impacts to wildlife species in the temporary reservoir area; however, there is uncertainty if the implementation of a plan is technically feasible or economically practicable. Therefore, the Proposed Action would have **significant and unavoidable** adverse environmental impacts on wildlife species, unless the Applicant develops the plans described above that meet regulatory requirements and for which implementation is feasible.

#### **Airport Levee**

The probable responses of wildlife to construction impacts are similar to those described previously. However, impacts would be limited because fewer wildlife species and individuals are present in this area. The airport levee is heavily disturbed and developed with road and airport infrastructure. Upland herbaceous grassland habitat is regularly mowed during airport maintenance or agricultural activities and does not provide habitat for species associated with grassland habitat such as the federal and statelisted streaked horned lark. Impervious surfaces and disturbed grassland are also the dominant wetland buffer habitats, and they are unsuitable for breeding, foraging, resting, and overwintering for amphibians, birds, reptiles, and small mammals that may occur in the adjacent wetland habitat. In addition to the lack of existing habitat features to support songbird, shorebird, waterfowl, and raptor species, bird species are discouraged from using airport properties because of airplane safety concerns, further limiting the potential for birds to use the airport levee study area.

No terrestrial insects with sensitive status are likely to occur in the airport levee study area. Other native bees and wasps may occur and could be killed or displaced by excavation and placement of fill if nests are present.

<sup>&</sup>lt;sup>1</sup> Unless audio-visual surveys are conducted to verify the presence, or absence, of marbled murrelet habitat, the Forest Practices Rules consider the removal of potential habitat to have a significant adverse impact (WAC 222-10-042).

The probable adverse impacts on wildlife species are considered **minor** because of the limited quality of the upland and wetland vegetation communities that would be disturbed. The probable adverse impacts on the composition of wildlife species occurring in these habitats are considered **minor** due to the relatively small area of wildlife habitat associated with the airport levee and the disturbed conditions and human activities and disturbances within and in the vicinity of the airport levee.

### Downstream of the FRE Facility

No construction activities are proposed downstream of the FRE facility under the Proposed Action. However, construction activities at the FRE facility could reduce water quality (increased turbidity and temperatures) downstream during construction. This is discussed as an indirect effect in Section 3.2.1.2.1.

## 3.2.1.2 Indirect

## 3.2.1.2.1 Wildlife Habitat

Construction activities would have moderate effects on water quantity and quality (see the *Water Discipline Report* for detail) by temporarily increasing turbidity and water temperatures and reducing dissolved oxygen. Construction could indirectly reduce the quantity and quality of instream and floodplain habitats via reduced water quality for wildlife species such as amphibians in the reach downstream to Pe Ell. The construction activities would be required to meet state water quality standards; therefore, this would be a **moderate** impact to wildlife habitat.

## 3.2.1.2.2 Wildlife Species

The fragmentation of migratory routes through the FRE facility and temporary reservoir area may tend to concentrate wildlife species in some locations or cause them to move to other areas, causing increases in competition for food and cover and potentially increasing predation in other areas. This overall impact is considered **minor**.

# 3.2.2 Impacts from Operation

Potential operation impacts on wildlife species and habitats from the Proposed Action include inundation from operation of the FRE facility, which requires filling of the temporary reservoir, and the elimination of channel-forming flows and subsequent changes in hydrology and inundation in the floodplain downstream of the FRE facility associated with reducing flood levels during major and catastrophic floods and recurring floods.

# 3.2.2.1 Direct

Direct impacts from the operation of the FRE facility are described separately for major and catastrophic floods. The recurring flood scenario would generally have the same impacts as the catastrophic flood scenario and is not described separately.

### 3.2.2.1.1 Wildlife Habitat

#### **FRE Structure Site and Associated Areas**

**No potential impacts** on wildlife habitat at the FRE structure site and areas associated with operation of the Proposed Action are identified, because the construction of the facility and associated areas would have eliminated or highly modified all upland, riparian, and wetland vegetation communities and made permanent changes to wildlife habitat within this part of the study area.

#### **Temporary Reservoir**

All wildlife habitat within the 847-acre temporary reservoir maximum inundation area would be submerged during a catastrophic flood or larger. Of the 847 acres that would be submerged, approximately 63% would be scrub-shrub as a result of the tree removal that would occur during construction and existing shrub areas; approximately 1% are wetlands, and the remainder would be forested (31%) and herbaceous areas and roads (5%). Under the Proposed Action, inundation within Zone 1 would typically last for 25 days. Vegetation cover types and impact areas within the temporary reservoir are shown in Table P-15 and Figure P-17.

Under the catastrophic flood scenario, inundation in the maximum temporary reservoir inundation area would likely occur, submerging all wildlife habitats within it (847 acres) and killing all trees in Zones 3 and 4. Dead trees would then be cut and removed, and these zones would be replanted with tree species such as western red cedar, Douglas fir, red alder, and big leaf maple, resulting in the permanent conversion of existing forested habitat to a sapling-dominated area of approximately 180 additional acres beyond the approximately 426 acres of forested habitat in Zones 1 and 2 where tree removal would occur during construction. This one-time large-scale removal of trees would cause significant disturbance to 180 acres of forested wildlife habitat.

As flows reach 8,500 cubic feet per second (cfs) at the outlet gates of the FRE facility, some backwatering upstream would begin to occur, resulting in more frequent drowning and disturbance of wildlife habitats for approximately 300 feet upstream of the FRE facility. Under a major flood scenario, inundation levels within the temporary reservoir would likely be lower than the full reservoir capacity, submerging a proportion of the wildlife habitats (approximately 400 acres). Under the recurring flood scenarios, the inundation levels would vary but the submersion of wildlife habitats would occur in 3 consecutive years and is assumed to have similar effects as the catastrophic or major flood scenario.

The *Water Discipline Report* indicates that the operation of the FRE facility and associated changes in vegetation cover in the temporary reservoir inundation area would increase water temperatures in the Chehalis River in the temporary reservoir area and upstream of the FRE facility by 2°C to 3°C when not inundated, and in Crim Creek by 2°C to 5°C. This would reduce the suitability of aquatic habitats for most native wildlife species. The probable adverse impacts from the permanent conversion of the entire temporary reservoir inundation area to herbaceous or shrub and sapling-dominated zones and the

subsequent increased temperature are considered **significant** for wildlife habitat within the temporary reservoir.

Mitigation is proposed for the Applicant to develop plans for Wildlife Species and Habitat Management, Vegetation Management, Riparian Habitat, Wetlands and Wetland Buffers, Streams and Stream Buffers, Large Woody Material Management, and Surface Water Quality to mitigate impacts to wildlife habitat in the temporary reservoir area; however, there is uncertainty if the implementation of a plan is technically feasible or economically practicable. Therefore, the Proposed Action would have **significant and unavoidable** adverse environmental impacts on wildlife habitat, unless the Applicant develops the plans described above that meet regulatory requirements and for which implementation is feasible.

#### Table P-15

#### Summary of Probable Vegetation Community Impacts from Operation Activities

		TEMPORARY	TEMPORARY		
VEGETATION COMMUNITY	FRE FACILITY	RESERVOIR (ACRES)	RESERVOIR (ACRES)	AIRPORT LEVEE	DOWNSTREAM OF FRE
COVER TYPES <sup>1</sup>	(ACRES)	ZONES 1 AND 2 <sup>2</sup>	ZONES 3 AND 4	(ACRES)	FACILITY (ACRES)
Evergreen Forest	N/A	0.0 <sup>2</sup>	142.8	N/A	N/A
Deciduous Forest	N/A	86.0 <sup>2</sup>	12.3	N/A	N/A
Mixed Forest	N/A	0.0 <sup>2</sup>	21.7	N/A	N/A
Scrub-Shrub	N/A	506.8 <sup>3</sup>	24.7	N/A	N/A
Herbaceous	N/A	0.0	18.8	N/A	N/A
Wetlands	N/A	6.5 <sup>2,4</sup>	3.3	N/A	N/A
Cultivated Crops	N/A	0.0	0.0	N/A	N/A
Hay/Pasture	N/A	0.0	0.2	N/A	N/A
Barren Land	N/A	0.0	0.0	N/A	N/A
Developed Open Space	N/A	0.0	23.2	N/A	N/A
Developed Low Intensity	N/A	0.0	0.0	N/A	N/A
Developed Medium	N/A	0.0	0.0	N/A	N/A
Intensity					
Open Water	N/A	0.7	0.0	N/A	N/A
Operations Total	0.00	600.0	247.0	0.00	0.00
Total Cover Per Area	0.00		847.00	0.00	0.00

Notes:

1. NLCD (USGS 2016) with the exception of wetland layer, as described in Section 2.3.

2. Tree cover removed during construction as identified in Table P-13, but planted to scrub-shrub and early successional deciduous forest as identified in Table P-14.

3. Based on proposed plantings identified in Table P-14 following tree removal during construction.

4. Four small wetlands (0.43 acre) would be permanently filled as part of the FRE facility within the temporary reservoir inundation area, so they are not included in the total.

N/A: not applicable

During operations, the temporary reservoir would be periodically inundated and many areas would experience a foot or more of sediment deposition after inundation (see the *Earth Discipline Report* [Shannon & Wilson and Watershed GeoDynamics 2020] for more detailed information on sediment deposition). This would cause a permanent shift in vegetation toward herbaceous and early successional shrub and tree species that can quickly colonize the disturbed and/or bare surfaces.

The Applicant has proposed to replant the temporary reservoir after inundation events, which would minimize the potential colonization of non-native invasive species. The temporary reservoir is predicted to have plant communities (Table P-16) that would be in a permanent young stage (generally less than 10 years old), because most plants would die each time inundation occurs. In addition, while trees would not be removed in the upper zone of the temporary reservoir during construction, they would be removed as they die to reduce the potential for large debris jams floating and damaging the FRE facility. Over time, there would not be any trees larger than 6 inches in diameter anywhere within the maximum temporary reservoir inundation area. These actions would prevent some habitat such as riparian areas and unstable slopes that are currently protected through the Forest Practices Rules from developing into suitable habitat for marbled murrelets in the future. The scale of permanent change from forested to herbaceous and shrub-sapling (847 acres) would be much larger than normal commercial forest practices, which include guidelines for the size and timing of timber harvest and reforestation.

#### Table P-16

INUNDATION	PRE-CONSTRUCTION	
ZONE	MANAGEMENT	LONG-TERM PLANT COMMUNITY
10% and 5%	Harvest most trees; replant	Scrub-Shrub and Deciduous Forest (early successional):
chance of being	with flood-tolerant native	Shrub and herbaceous riparian including willows, dogwood,
flooded in a year	trees and shrubs	salmonberry, young cottonwood and ash, sedges and
		grasses
1% chance of	No additional harvest	Mixed Deciduous and Evergreen Forest: Shrub/sapling
being flooded in		uplands including young red alder, western red cedar,
a year		snowberry, red elderberry, oso berry, twinberry, ferns,
		grasses
Less than 1%	No additional harvest	Evergreen Forest: Early successional forest including young
chance of being		western hemlock, western red cedar, big-leaf maple, red
flooded in a year		alder, snowberry, oso berry, ferns, grasses

#### Expected Vegetation Community in the Temporary Reservoir Area

The probable adverse impacts are considered **significant** for wildlife habitat within the temporary reservoir because the vast majority of the upland, wetland, and riparian vegetation would not survive such prolonged and deep inundation every time the reservoir is filled, thus permanently changing the predominantly coniferous forest vegetation to grass, herbaceous, emergent and early successional shrub/sapling vegetation that regrows after every event. The prolonged and deep inundation every time the reservoir is filled would also prevent some areas currently protected by Forest Practices Rules from

developing into suitable marbled murrelet habitat in the future. In addition, there would likely be erosion and/or sedimentation associated with the inundation that could cause periodic changes to the upland and wetland morphology and could also promote the colonization of non-native invasive plant species.

Mitigation is proposed for the Applicant to develop plans for Wildlife Species and Habitat Management, Vegetation Management, Riparian Habitat, Wetlands and Wetland Buffers, Streams and Stream Buffers, Large Woody Material Management, and Surface Water Quality to mitigate impacts to wildlife habitat in the temporary reservoir area; however, there is uncertainty if the implementation of a plan is technically feasible or economically practicable. Therefore, the Proposed Action would have **significant and unavoidable** adverse environmental impacts on wildlife habitat, unless the Applicant develops the plans described above that meet regulatory requirements and for which implementation is feasible.

In the recurring flood scenario, where a major flood or larger occurs in 3 consecutive years, all existing vegetation in the temporary reservoir inundation area would die and only early colonizing annuals would likely colonize. Following the 3-year period, the entire temporary reservoir would likely be highly susceptible to colonization by non-native species even with proposed plantings of native species because the entire reservoir would be without vegetation for a period of 1 month or more after the third inundation event. The change in vegetation would also fragment habitats for amphibian, bird, reptile, and mammal species.

Potential adverse operation impacts associated with the 660-foot extent area outside the inundation area are considered **minor** for wildlife habitat. While this area would not be inundated during floods, the colonization of non-native invasive species within the temporary reservoir could spread into the 660-foot extent area and could increase edge habitat in the extent after catastrophic floods and could change species using the area around the temporary reservoir.

#### **Airport Levee**

The *Water Discipline Report* found that if the Airport Levee Changes are completed before the FRE facility is operational and a catastrophic flood occurs, there is the potential for increased flood elevations immediately upstream and downstream of the levee (0.9 foot and 0.2 foot, respectively). The areas that could experience increased flood elevations are primarily herbaceous (agriculture, golf course) or developed. Upland vegetation communities outside wetland areas inside the airport levee would continue to be mowed, as currently occurs under airport maintenance operations. Upland and wetland vegetation outside the airport levee near to the expanded levee would continue to be mowed, as currently be moved be minor adverse impacts on wildlife habitat associated with operation of the airport levee.

### Floodplain Downstream of the FRE Facility

The analysis of wildlife habitat downstream of the FRE facility includes the potential flood extent of vegetation communities associated with late-century major and catastrophic floods. Potential impacts on wetlands and the variety of waterbodies present in the study area are described in the *Wetlands Discipline Report* and the *Fish Species and Habitats Discipline Report*. An analysis of existing wetlands and potential impacts on wetlands downstream of the FRE facility associated with the 100-year floodplain under existing conditions, a smaller analysis area, is described in the *Downstream Floodplain Wetland Analysis Memorandum* (Anchor QEA 2019b).

The FRE facility would typically allow water from all flow events up to about 8,500 cfs to pass through the facility with the outlet gates fully open and without surcharge. The FRE facility would begin to retain water at a major flood level flow (when flows are predicted to reach 38,800 cfs at the Grand Mound gage). Therefore, its operation would have no effect on the inundation area of overbank flooding from flows below major flood levels.

Table P-17 shows the approximate acreage of vegetation cover types in the predicted major flood inundation area based on NLCD mapping (USGS 2016) under the No Action Alternative and Proposed Action, and the areas that would no longer be inundated under the predicted major flood. Table P-18 shows the approximate acreage of vegetation cover types in the predicted catastrophic flood inundation area under the No Action Alternative and Proposed Action, and the areas that would no longer be inundated under the predicted catastrophic flood inundation area under the No Action Alternative and Proposed Action, and the areas that would no longer be inundated under the predicted catastrophic flood inundation.

VEGETATION COMMUNITY COVER TYPES <sup>1</sup>	NO ACTION (ACRES)	PROPOSED ACTION (ACRES)	AREA NO LONGER INUNDATED (ACRES)	
Evergreen Forest	617.0	542.7	74.3	
Deciduous Forest	878.5	834.4	44.1	
Mixed Forest	747.9	704.3	43.6	
Scrub-Shrub	847.8	776.3	71.4	
Herbaceous	402.3	391.9	10.5	
Wetlands <sup>2</sup>	16,286.0 <sup>2</sup>	15,764.0 <sup>2</sup>	522.0 <sup>2</sup>	
Cultivated Crops	2,648.9	2,517.5	131.4	
Hay/Pasture	22,754.5	20,657.1	2,097.4	
Barren Land	161.5	159.9	1.6	
Developed Open Space	1,741.8	1,463.2	278.7	
Developed Low Intensity	1,081.1	846.4	234.6	
Developed Medium Intensity	300.9	244.7	56.3	
Developed High Intensity	118.5	94.7	23.8	
Total	48,586.5 <sup>3</sup>	44,997.12 <sup>3</sup>	3,589.7 <sup>3</sup>	

#### Table P-17

Vegetation Downstream of the FRE Facility in Predicted Late-Century Major Flood Inundation Areas

Notes:

1. NLCD (USGS 2016) with the exception of wetland layer, as described in Section 2.3.

2. Wetlands described in Anchor 2020b and 2019b.

3. Total area does not equal the 48,569-acre area for late-century major flood extent due to the exclusion of the USGS NLCD open water cover type, as described in Section 2.3.

#### Table P-18

Vegetation Downstream of the FRE Facility Within Predicted Late-Century Catastrophic Flood Inundation Areas

VEGETATION COMMUNITY		PROPOSED ACTION	AREA NO LONGER
COVER TYPES <sup>1</sup>	NO ACTION (ACRES)	(ACRES)	INUNDATED (ACRES)
Evergreen Forest	918.5	708.1	210.4
Deciduous Forest	1,077.9	930.1	147.9
Mixed Forest	962.7	852.0	110.8
Scrub-Shrub	1,036.1	914.9	121.2
Herbaceous	461.0	432.1	28.9
Wetlands <sup>2</sup>	17,469.0 <sup>2</sup>	16,963.0 <sup>2</sup>	506.0 <sup>2</sup>
Cultivated Crops	2,795.5	2,736.3	59.2
Hay/Pasture	27,068.9	25,275.1	1,793.8
Barren Land	165.66	163.2	2.4
Developed Open Space	2,830.9	2,478.9	351.9
Developed Low Intensity	2,309.2	2,010.7	298.5
Developed Medium Intensity	1,147.9	954.5	193.47
Developed High Intensity	482.8	397.4	85.45
Total	58,726.1 <sup>3</sup>	54,816.3 <sup>3</sup>	3,909.9 <sup>3</sup>

Notes:

- 1. NLCD (USGS 2016) with the exception of wetland layer, as described in Section 2.3.
- 2. Wetlands described in Anchor 2020b and 2019b.
- 3. Total area does not equal the 58,485-acre area for late-century catastrophic flood extents due to the exclusion of the USGS NLCD open water cover type, as described in Section 2.3.

Areas that fall within the catastrophic flood inundation area include those mapped in the major flood inundation areas. For example, the total area of evergreen forest inundated by the catastrophic flood inundation area includes the areas of that cover type that would also be inundated by the major flood inundation area. In general, under either the late-century major or catastrophic flood scenario, approximately 7% of the floodplain would no longer be inundated. These areas include most upland plant communities. Wetland and riparian areas would tend to transition to more upland species over time and could become more forested because they would no longer be inundated.

In general, the proportion of vegetation cover types within the late-century major and catastrophic flood extents that would be flooded under the No Action Alternative and Proposed Action flood events are similar in scale. Hay/pasture, due to the dominant agricultural land use activity, is the most prevalent vegetation cover type, accounting for more than 46% of the total area under both major and catastrophic flood extents. Of the three upland forest cover type categories, evergreen forest accounts for 1% of the total cover area under the late-century major flood extent and 2% under the catastrophic flood extents. The proportion of evergreen forest cover type within both the late-century major and catastrophic flood extents that would be flooded under the Proposed Action flood events is 1%. Deciduous forest and mixed forest cover types each account for about 2% of the total cover within the late-century major and catastrophic flood extents. The scrub-shrub and herbaceous cover types each account for 2% and 1% of the total cover area under both the late-century major and catastrophic flood events. The scrub-shrub and herbaceous cover types each account for 2% and 1% of the total cover area under both the late-century major and catastrophic flood events.

The four developed cover type categories increase toward the outer portions of the floodplain. Developed areas account for 7% of the total area under the late-century major flood extent and 12% of the total area under the catastrophic flood extent.

Conversely, wetlands downstream of the FRE facility are most prevalent in the central portion of the floodplain, becoming less prevalent toward the outer portions of the floodplain. Wetlands account for 34% of the total cover area under the late-century major flood extent and 30% of the total area under the catastrophic flood extent.

As described previously, under operation of the Proposed Action, upland and wetland vegetation communities would continue to be inundated by floodwaters generated by flows below major flood levels because the FRE would not be retaining water during flow events of the magnitudes below major flood flows.

Under the late-century major flood flow, the FRE facility would be operating and the downstream flood inundation extent would decrease compared to if the facility were not operating. As a result of operation of the FRE facility, more than 3,589 acres of vegetation in the major flood inundation extents would no longer receive overbank flooding from a major flood (Table P-17). More than 2,823 acres or 79% of the total area downstream, includes barren land, cultivated crops, hay/pasture, and the four

developed cover type habitats. The three forest, scrub-shrub, and herbaceous vegetation cover types account for about 244 acres or 7% of the area that would no longer receive overbank flooding, and wetland habitats account for 522 acres or 14% of the total area.

For the catastrophic flood flow, approximately 3,909 acres of vegetation cover types in the late-century catastrophic flood inundation extents would no longer be inundated by floods from catastrophic flood flow events (Table P-18). Similar to the major flood extents, more than 2,784 acres or 71%, includes barren land, cultivated crops, hay/pasture, and the four developed cover type habitats. The three forest, scrub-shrub, and herbaceous vegetation cover types account for about 619 acres or 16% of the area that would no longer receive overbank flooding, and wetland habitats account for 506 acres or 13% of the total area.

The *Water Discipline Report* indicates that the operation of the FRE facility and associated permanent changes in riparian vegetation cover within the temporary reservoir inundation area would increase water temperatures by 2°C to 3°C in the Chehalis River in the reach downstream of the proposed FRE facility, reducing to negligible differences at the confluence with the South Fork Chehalis River. This would tend to reduce the suitability of instream and floodplain aquatic habitats for native wildlife species such as northern red legged frog, but may incidentally improve instream breeding temperatures for western toad. The increase in temperature may also increase suitability for non-native predators such as bullfrogs and centrarchid fish species that prey on native amphibians, thus reducing native amphibian populations in the reach between the FRE facility and the South Fork Chehalis River confluence.

In addition, the *Earth Discipline Report* indicates that the reach of the Chehalis River between the FRE facility and the South Fork Chehalis River confluence would tend to narrow over time due to reduced channel forming flows and encroachment of woody vegetation. This would tend to reduce the suitability of channel margin habitats for the western toad that need warm and sunny shallow water habitats. The reduction of channel forming flows would also tend to reduce the formation of off-channel habitats that provide important habitats for still-water breeding amphibians, including northern red legged frog. In addition, changes in the frequency, magnitude, and duration of flow downstream of the FRE facility resulting from the drawdown of the temporary reservoir would change the aquatic habitat conditions in this reach for aquatic and semi-aquatic amphibians that depend on stable flow during some life stages.

Major, catastrophic and recurring flood operations have similar effects on downstream wildlife habitats as the on downstream floodplain wetlands based on the available information and modeling tools used for this analysis, however the scope of these analyses is short-term in nature. Over the long-term, the reduction in peak flows would decrease the occurrence of natural hydrologic processes, such as channel migration and formation of side channels, bars, and wetlands, downstream of the FRE facility. The formation of aquatic habitat is a dynamic process, changing through time with various flows and conditions. While natural hydrologic processes create most aquatic habitat at high peak flows, habitat can be changed at lower flows via sedimentation and other processes. By truncating the peak flows, the net effect will shift the dynamic equilibrium between creation and loss toward a slow progressive loss of aquatic habitat quantity and diversity over the long term. This probable adverse impact is considered **significant** because flooding above a certain magnitude has been entirely removed. The slow progressive loss of aquatic habitat over the long term under the operation of the FRE facility will be an additional stressor to the aquatic habitat already impacted by human elimination of off-channel habitats within the recent historical past (Pierce et al. 2017).

Mitigation is proposed for the Applicant to develop plans for Wildlife Species and Habitat Management, Vegetation Management, Riparian Habitat, Wetlands and Wetland Buffers, Streams and Stream Buffers, Large Woody Material Management, and Surface Water Quality to mitigate impacts to wildlife habitat downstream of the FRE to the confluence with the South Fork Chehalis River; however, there is uncertainty if the implementation of a plan is technically feasible or economically practicable. Therefore, the Proposed Action would have **significant and unavoidable** adverse environmental impacts on wildlife habitat, unless the Applicant develops the plans described above that meet regulatory requirements and for which implementation is feasible.

The amount of upland vegetated habitat downstream of the FRE facility used by wildlife would transition to drier and more woody conditions; thus, these probable adverse impacts are considered **moderate** for upland wildlife habitat.

The probable adverse impacts of temperature are considered **moderate** for wildlife habitat in the reach between the FRE facility and the South Fork Chehalis River due to likely reduced quality of habitat for native species and increased habitat suitability for non-native predator species that would likely reduce native amphibian populations in this reach.

### Cottonwood Riparian Habitat

The reduction in peak flows downstream of the FRE facility would reduce the episodic disturbance of downstream riparian areas by major or larger floods. This could result in a reduction in the occurrence of channel avulsions and channel migrations, reducing sediment deposition and erosion processes and reducing the formation of bare alluvial surfaces that provide colonization space for cottonwoods. The *Cottonwood Habitat Study* (Meadow Run Environmental and Anchor QEA 2019) evaluated the potential for the FRE facility to reduce the long-term recruitment of cottonwood and the quantity of this habitat in the downstream floodplain.

Because of the development of much of the downstream floodplain for agricultural and other land uses, existing cottonwood riparian habitat and the current formation of bare alluvial surfaces is relatively limited compared to what would naturally occur in a river basin of this size. However, the formation of bare alluvial surfaces does primarily occur during infrequent peak flows; thus, a reduction in peak flows would reduce the formation of these surfaces. The analysis in *Cottonwood Habitat Study* (Meadow Run

Environmental and Anchor QEA 2019) focused on the Chehalis River 100-year floodplain between RM 108 and 33, near Porter. The analysis estimates the FRE facility would reduce inundation of existing cottonwood riparian habitat (6,587 acres) between RM 108 and RM 33 by approximately 200 acres (3.5%) and 450 acres (7%) for major and catastrophic floods, respectively, and reduce inundation of island, bar, and active terrace landforms by 3 acres (2.6%) and 2 acres (2%), respectively.

The analysis in the *Cottonwood Habitat Study* (Meadow Run Environmental and Anchor QEA 2019) did not include the floodplain downstream of Porter (RM 0 to 33) where a much larger area of cottonwood habitat currently exists (9,361 acres); predominantly located in the tidal zone between RM 0 and RM 13 (Wynoochee River confluence) and in the floodplain south of Elma, between RM 21 and 25. The *Water Discipline Report* indicates that downstream of Porter, portions of the floodplain would have less depth of inundation during a catastrophic late-century flood with FRE operations (between 1 and 2 feet less depth) down to RM 8 near Central Park. Approximately 5,600 acres of existing cottonwood-willow habitat occurs between RM 8 and 33 and currently experiences from 5 to 15 feet of inundation during a catastrophic flood. This depth of inundation would now be lessened to approximately 3 to 14 feet of inundation, which would still result in inundation and deposition of sediment that could create bare alluvial surfaces.

This small reduction in depth of inundation is unlikely to change cottonwood recruitment and survival substantially downstream of Porter. Small areas of cottonwood-willow habitat within the floodplain downstream of RM 33 that are currently inundated in either major or catastrophic floods would no longer be inundated with FRE operations. Approximately 236 acres (5%) and 47 acres (1%) would not be inundated during a major flood at mid-century and late-century, respectively. Approximately 112 acres (2%) and 14 acres (0.2%) would not be inundated during a catastrophic flood at mid-century and late-century, respectively. This similarly represents a small proportional area of effect, but is an effect on a very important habitat type.

While the potential changes in inundation area and depths are relatively minor changes for the entire downstream floodplain, they would disproportionately affect a very important habitat type for many wildlife species. Over time, the reduction of cottonwood recruitment would tend to transition the patches of riparian habitats upstream of Porter to more upland plant dominated habitats that might include species such as Douglas fir, big-leaf maple, snowberry, elderberry, and non-native species. While the long-term reduction of cottonwood riparian habitats along the upper and middle Chehalis River mainstem would tend to reduce the seed source, cottonwood riparian habitat is more prevalent in the tributaries to the Chehalis River, so overall reduction of seed source basin-wide is likely to be minor.

Overall this adverse impact is anticipated to be **moderate** because it would not affect a large percentage of the downstream floodplain, but it would affect a unique flood-adapted plant community that has high value for many wildlife species.

#### 3.2.2.1.2 Wildlife Species

#### **FRE Facility Site and Associated Areas**

Adverse impacts associated with operation of the FRE facility are anticipated to be **minor** because the construction of the facility and associated areas would have eliminated or disturbed all upland, riparian, and wetland vegetation communities and made permanent changes to wildlife habitat within this part of the study area. Noise associated with operation of the FRE facility, such as vehicle traffic, could cause bird and mammal species to avoid or move away from the area but the area currently experiences regular truck traffic associated with logging, so the additional traffic would be unlikely to substantially change conditions.

#### **Temporary Reservoir**

All wildlife habitat within the 847-acre temporary reservoir maximum inundation area would be inundated and submerged periodically during operations for any of the flood scenarios (see Section 3.2.2.1.1). Increased deposition of sediment upstream of the FRE facility would negatively affect water quality as well as breeding and foraging habitat for stream-associated amphibians and fish and stream invertebrates, as described in the *Fish Species and Habitats Discipline Report*. Temporary inundation and sedimentation of river and stream channels would alter their structures from pools and riffles to an eroded channel through sediment, and would replace stable aquatic habitat with a more shifting sediment-rich habitat, removing instream habitat preferred by aquatic amphibians.

Inundation of the reservoir would temporarily flood upland, riparian, wetland, and stream habitats. This would affect many stream-dwelling wildlife species, especially native amphibians, which are not well adapted to deep inundation. This would result in a loss of functional habitat for these species and a significant adverse impact on aquatic and upland wildlife. Most wildlife species would not adapt to the temporary changes from upland, riparian, wetland, and stream habitats to open water habitat, forcing these species to attempt to relocate to other suitable habitat (Knutson and Naef 1997). Some species would successfully relocate to other suitable habitat and some species would be unsuccessful in relocating to other habitats and would perish (Knutson and Naef 1997).

Species that would be adversely affected by temporary reservoir inundation include limited mobility species such as small mammals and amphibian species, including the state candidate amphibian species western toad, Van Dyke's salamander, and Dunn's salamander, and the state endangered reptile species western pond turtle. Limited mobility species and even highly mobile small mammals are unlikely to be successful in avoiding the reservoir inundation; they would be unable to adapt or relocate to other suitable breeding, foraging, resting, and overwintering habitat and would likely suffer mortality. Small mammals that have made their burrows or other refuges within the temporary reservoir inundation area would also be unlikely to avoid the reservoir inundation. More mobile species such as birds and large mammals would be able to move away from the reservoir during inundation.

Breeding habitat for western toads in the upper Chehalis Basin is concentrated in the mainstem Chehalis River and larger tributaries, within the proposed temporary reservoir inundation area, within shallow and warm habitat on the margins of the river and primary streams (Hayes et al. 2016b, 2018). Temporary reservoir inundation of these areas during flood retention would cover this habitat and may drown overwintering western toads sheltering in the riparian zone, because these toads would typically be underground or under debris during inundation events that occur in winter, and they may not be able to move because of low temperatures affecting their physiology. While the stream breeding habitat may reform following inundation, such inundation events may locally extirpate toads. Western toads also occur both upstream and downstream of the temporary reservoir and might recolonize but would be subject to renewed local extirpation during each winter inundation event. Renewed local extirpation would also reduce gene flow in the population. Most western toad breeding sites found, to date, in the upper Chehalis River mainstem are in its upper portion (Pe Ell and upstream; Hayes et al. 2016b, 2018), so potential mortality that would occur in the temporary reservoir on a recurring basis could affect a significant proportion of the western toad population in the Chehalis Basin.

State candidate species Dunn's salamander and Van Dyke's salamander would likely be more severely affected than western toad due to their more limited mobility. Western pond turtle, a state-endangered species that is potentially present in the study area (though undocumented), would also be affected by the temporary loss of potential breeding habitat from the temporary conversion of stream habitat to reservoir habitat (ASEPTC 2014). Such temporary losses could contribute to the local extirpation of that species.

The loss of tree and shrub vegetation from the riparian zone in the temporary reservoir inundation area would directly remove nesting, denning, and feeding habitat used by wildlife including birds, mammals, amphibians, and other animals. The permanent maintenance of all trees smaller than 6 inches dbh from the riparian zone would also adversely affect many of the riparian functions being performed by these areas including water filtration and purification, stream channel stability, nutrient dynamics, stream shading (i.e., thermoregulation), and wood recruitment. This would also reduce habitat available for snags and cavity nesting animals. Increased sediments entering the stream system from runoff and streambank erosion could lead to filling of interstitial spaces in stream substrates that are used by amphibians for breeding and foraging (Leonard et al. 1993). Reduction in the amount of leaf litter, organic material, and other nutrient inputs that support species at the base of the food chain would reduce foraging for aquatic and semi-aquatic wildlife species. Reduction in the amount and variety of woody material entering the system would also affect nutrient cycles and limit instream habitat-forming processes that support stream-associated amphibians.

Mammal species associated with stream and riparian habitats such as North American beaver and mink rely on forested riparian habitats and would be unlikely to adapt to the loss of tree vegetation. Eagle, hawk, and owl raptor species that use trees for perching, foraging, and nesting also would not adapt to the loss of forested vegetation. Large mammals such as bear and cougar would likely be displaced from the temporary reservoir area periodically during and after inundation but may utilize the herbaceous and shrub vegetation for foraging. As large trees and wood would be permanently removed from the temporary reservoir area, it would be less likely that any bears would attempt to den in this area, thus minimizing the potential for adverse effects during flood events.

Riparian large wood material is a habitat feature used by terrestrial amphibians, like the state-candidate species Van Dyke's salamander, for breeding and foraging. Instream woody material, which facilitates the accumulation of coarse sediment, is particularly important to the assemblage of stream-breeding amphibians such as the Columbia torrent salamander that use coarse sediment accumulations for breeding and refuge. In addition to these impacts, conversion or removal of riparian areas would reduce, eliminate, or fragment habitat and travel corridors for wildlife including amphibians, reptiles, birds, and various mammals.

Conversion of forested upland, riparian, and wetland habitats to those dominated by herbaceous and shrubby vegetation would result in the loss of habitats used by some wildlife species in the temporary reservoir inundation area and could represent a gain of habitat for other wildlife species. For example, loss of riparian cover would impair habitat conditions for stream-associated wildlife, including amphibians such as the state candidate species Van Dyke's salamander, especially by reducing adequate surface moisture and suitably cool temperature conditions (NatureServe 2019).

The operation of the temporary reservoir would affect gene flow of species, specifically low mobility amphibians (state candidate species Van Dyke's salamander and Dunn's salamander, and Columbia torrent salamander) and small mammals. If a species cannot reestablish in this area, then connection with others of the same species upstream and downstream would also be affected.

Conversely, the shrub vegetation that would likely replace several of the forested riparian zones in the temporary reservoir inundation area could provide additional foraging habitat for deer, elk, and birds of prey (Link 2004). Disturbances to habitats of native species provide opportunities for the invasion of non-native wildlife species (e.g., European starling, American bullfrog) that could prey on or out-compete native wildlife species for resources (Knutson and Naef 1997). Because the reservoir inundation would be temporary, up to 35 days, permanent open water habitat that can provide breeding habitat for American bullfrog would not be established during operation of the temporary reservoir. However, during inundation, the temporary reservoir could serve as a stepping stone for dispersing bullfrogs. A stepping-stone habitat may allow a species to exist temporarily at that location but not reproduce there. They might use it as a jump-off point to reach suitable reproductive habitats farther away. Bullfrogs that are present in the temporary reservoir area and that survive the inundation could move into uninhabited wetland areas on the upper margins of the temporary reservoir or farther upstream into the small beaver-created wetlands scattered in the Chehalis River headwaters.

Temporary inundation of riparian and stream habitats would disturb salmon spawning habitat within the reach of the Chehalis River upstream of the FRE facility. Salmon provide nutrients to a wide range of wildlife species that directly prey on live spawners, scavenge the carcasses of dead fish, or prey upon salmon eggs after spawning and rearing juveniles. The range of mammal species that feed on salmon includes bears, weasels, shrews, and potentially deer, squirrels, and mice. Avian predators and scavengers include eagles, hawks, gulls, crows, and some songbirds (Willson and Halupka 1995). The nutrients from spawners also benefit wildlife by fertilizing riparian and aquatic plant species which, in turn, provide food or cover for aquatic and terrestrial animal species (Schindler et al. 2003). Decreases in salmon abundance resulting from the temporary inundation of freshwater habitat will, therefore, have an adverse impact on wildlife species that either feed on or otherwise benefit from salmon-derived nutrients. The significance of the adverse impact on wildlife is proportional to the decrease in abundance and is also expected to be most intense in areas where salmon spawning in the temporary reservoir inundation area is substantially reduced during floods.

The periodic inundation of the temporary reservoir would also likely kill or displace terrestrial insects and mollusks with sensitive status, including Leschi's millipede, the blue-gray taildropper, and native bumblebees, if present in the study area. These species are of limited mobility and would likely be dormant during the flood season. The transition of the habitat to herbaceous and early successional conditions would likely eliminate the use of the habitat by Leschi's millipede and blue-gray taildropper that utilize mature second-growth forest. Herbaceous species might promote a more diverse native bee assemblage, but the bees would be periodically killed or displaced by flooding if they burrow in the temporary reservoir footprint.

The probable adverse impacts are considered **significant** for wildlife species because many wildlife species could not relocate within the 847-acre temporary reservoir every time the reservoir is filled. Low mobility species, like some amphibians including state candidate species Van Dyke's salamander and western toad, would be particularly vulnerable to mortality during inundation. Birds and large and small mammals are more mobile and would have more success avoiding and moving out of the area during inundation. The complete loss of wildlife habitat for breeding, foraging, resting, and overwintering habitat features during the temporary inundation would also result in wildlife mortality.

Mitigation is proposed for the Applicant to develop plans for Wildlife Species and Habitat Management, Vegetation Management, Riparian Habitat, Wetlands and Wetland Buffers, Streams and Stream Buffers, Large Woody Material Management, and Surface Water Quality to mitigate impacts to wildlife species in the temporary reservoir area; however, there is uncertainty if the implementation of a plan is technically feasible or economically practicable. Therefore, the Proposed Action would have **significant and unavoidable** adverse environmental impacts on wildlife species, unless the Applicant develops the plans described above that meet regulatory requirements and for which implementation is feasible.

#### **Airport Levee**

No operation impacts on wildlife species associated with the airport levee are identified.

### Floodplain Downstream of the FRE Facility

Changes to the way floodwaters move through the system downstream of the FRE facility would disrupt many of the existing physical, chemical, and biotic processes of riparian areas, reducing or eliminating many of the important functions provided by the riparian zone (Knutson and Naef 1997). Downstream of the FRE facility, flood control would cause a reduction in the magnitude of peak floods, which would reduce natural geomorphic processes such as channel migration and formation of side channels, bars, and wetlands, especially those that are driven by major floods. While flooding of the magnitude that would trigger flood retention would be infrequent, it is the largest floods that have the greatest ability to reshape the river channel and form habitats for aquatic and semi-aquatic species and wildlife species that use the riparian areas and the floodplain (Meadow Run Environmental and Anchor QEA 2019). Reduced sediment and large woody material transport through the FRE facility may also reduce the formation of in-channel habitats. More details on the potential geomorphic effects of the FRE facility are provided in the *Earth Discipline Report*.

Western toad habitat in the lower Satsop River would experience less depth of inundation (1 to 2 feet shallower), although would still experience inundation during major and catastrophic flood events. The formation of shallow water sand and gravel bar and backwater habitats along the lower Satsop River is more likely influenced by flows on the Satsop River so FRE operations is not likely to substantially change these habitats. Similarly, shorebird and waterfowl habitats in the lower Chehalis River floodplain would experience less depth of inundation (1 to 2 feet shallower), although would still experience inundation during major and catastrophic flood events. This is not likely to substantially change these habitats.

Terrestrial insects with sensitive status that may occur in prairie habitat downstream of the FRE facility include the Puget blue, valley silverspot, and Mardon skipper. The reduction in the magnitude of peak floods could allow for more woody vegetation to invade floodplain prairie habitats, thus reducing habitat for terrestrial insects, although none of these species have been identified in the study area.

In addition to changes to floodplains, changes in the magnitude and duration of flow downstream of the FRE facility resulting from the drawdown of the temporary reservoir would change the aquatic habitat conditions in the reach downstream. If elevated flows associated with drawdown occur in late spring or early summer coincident with western toad breeding in the mainstem channel of the upper Chehalis River, toad breeding could be affected by some combination of altered flow and/or temperature conditions. Toads will only lay their eggs in very slow-moving water, and extending the duration of higher flows could delay or deter egg laying. Even if egg laying is successful, the unattached eggs could be easily swept into unsuitably cooler and deeper habitat. Moreover, the water released during drawdown may be cooler than typical, which could protract development if egg deposition has occurred.

The probable adverse impacts are considered **moderate** for wildlife species due to the size of the study area relative to the change in the extent of flooding and potential changes in habitat features and because it would also likely affect the connectivity of off-channel habitats that could have more substantial long-term effects. It is not likely that changes in the extent of flooding downstream would result in any direct wildlife species mortality.

The probable adverse impacts are considered **moderate** for wildlife species due to changes in the magnitude and duration of flow downstream of the FRE facility.

# 3.2.2.2 Indirect Impacts

## 3.2.2.2.1 Wildlife Habitats

The *Water Discipline Report* indicates that the operation of the FRE facility and associated changes in vegetation cover in the temporary reservoir inundation area would increase water temperatures by 2°C to 3°C in the downstream reach of the Chehalis River (to the South Fork Chehalis River confluence). This would likely reduce habitat quality for native amphibians in the river and floodplain habitats and increase the habitat suitability for non-native predator species such as bullfrogs and centrarchid fish species. This would be a **moderate** indirect impact on wildlife habitats in the reach from the FRE facility to the South Fork Chehalis River.

## 3.2.2.2.2 Wildlife Species

Due to the water temperature increase identified above, northern red-legged frog, and other native amphibians would likely have reduced populations and survival in the reach below the FRE facility. This would be a **moderate** indirect impact on wildlife species in the reach from the FRE facility to the South Fork Chehalis River.

# 3.2.3 Required Permits

Potential permits related to wildlife habitats and wildlife species associated with the construction and operation of the Proposed Action include the following:

- County and Local Shoreline Management Act and Critical Areas Review (Lewis County, Thurston County, Pacific County, Grays Harbor County, City of Centralia, City of Chehalis): Construction and operation of the Proposed Action would require local shoreline and clearing and grading permits.
- **ESA Consultation (USFWS):** The Proposed Action could affect listed wildlife species or designated critical habitats. USFWS would evaluate the effects on listed and proposed species and critical habitats.
- Forest Practices Application (DNR): Upgrading and expanding forest roads and quarries within managed forests would require Forest Practices Applications. This process may also require additional evaluation under the State Environmental Policy Act (SEPA).

- Hydraulic Project Approval (WDFW): The Proposed Action would use, divert, obstruct, and change the natural flow and bed of freshwaters of the state and therefore would require a Hydraulic Project Approval from WDFW under the state's hydraulic code rules. The Hydraulic Project Approval would include conditions intended to minimize impacts on instream and riparian habitat and functions.
- Scientific Collection Permit (WDFW): Relocation or collection of wildlife species may require a scientific collection permit.
- Section 401 Clean Water Act Water Quality Certification (Ecology): Because a federal (Corps Section 404) permit would be needed to construct the Proposed Action, a Section 401 Water Quality Certification from Ecology would be needed to document the state's review of the project and its concurrence that the Applicant has demonstrated that the Proposed Action will meet state water quality standards. This certification is intended to provide reasonable assurance that the Applicant's project will comply with state water quality standards and other requirements for protecting aquatic resources, and covers both construction and operation of the facility.
- Section 404 Clean Water Act Permit (Corps): Section 404 requires a permit to authorize discharges of dredged/fill material to waters of the United States. Because construction of the FRE facility would involve excavation and fill placement in the Chehalis River, and construction of the Airport Levee Changes may involve fill placement in wetlands, the Proposed Action would require a Section 404 permit from the Corps. As part of this approval, Endangered Species Act consultation would also be required.

# 3.2.4 Proposed Mitigation Measures

This section describes the mitigation measures proposed for the Applicant to implement that would reduce and compensate for impacts related to wildlife habitats and species from construction and operation of the Proposed Action. These mitigation measures would be implemented in addition to compliance with environmental permits, plans, and authorizations described in Section 3.2.3 that would be required for the Proposed Action.

The Applicant will implement the following measures to mitigate impacts on wildlife habitats and species:

WILDLIFE-1 (Vegetation Management Plan): To mitigate construction and operation impacts to habitat associated with the FRE facility (34.9 acres) and the temporary reservoir (847 acres), mitigation is proposed for the Applicant to develop and implement a Vegetation Management Plan. The Applicant will consult with DNR, WDFW, Lewis County, other applicable local, state, and federal agencies and tribes during plan development. The plan must be approved by WDFW and Lewis County and be ready to implement prior to the start of construction. The measures described in the plan may include a range of mitigation options. The mitigation will be required to be completed within and near the FRE facility and temporary reservoir area or along the Chehalis River mainstem. The mitigation will include, but is not limited to, the following:

- Harvest of trees in the temporary reservoir during construction will be phased to remove trees in sections of a size to support revegetation of cleared areas before the next section is cleared. For associated forest practices activities, the Applicant will participate in preapplication consultation as provided in the Forest Practices Rules. The harvest of trees in areas being converted to non-forestry uses for the FRE facility and temporary reservoir will follow the Forest Practices Act and local ordinances as appropriate.
- An evaluation to determine if trees larger than 6 inches dbh can remain within the temporary reservoir to minimize the number of trees removed and ensure safety. Leave trees that can safely be retained.
- A multi-phased and detailed planting plan including targeted native species assemblages, structure and diversity targets, and succession goals over the life of the project.
- Plant native species within 90 days of completing drawdown following each inundation event to minimize the potential for invasive species to colonize.
- Routinely monitor and remove invasive and non-native species in the temporary reservoir footprint to prevent undesirable vegetation from spreading into upland areas or migrating downstream.
- Establish an adaptive management process to evaluate the Vegetation Management Plan every 3 years and after a catastrophic flood. Best available science will be used to adjust tree removal and vegetation planting in the temporary reservoir area. Sites will be visually inspected annually to identify plant health and survival, and records will be maintained for the lifetime of the Proposed Action.
- This plan will be developed in conjunction with mitigation plans for large woody material, wetlands, riparian habitat, fish and aquatic species and habitat, and wildlife species and habitat.
- WILDLIFE-2 (Wildlife Species and Habitat Management Plan): To mitigate the impacts to
  wildlife species and habitat from construction and operation of the Proposed Action, the
  Applicant will prepare a Wildlife Species and Habitat Management Plan. The plan must be
  developed in coordination with and approved by WDFW and other applicable local, state, and
  federal agencies and tribes. It must be ready to implement prior to the start of construction.
  The measures described in the plan may include a range of mitigation options. Mitigation will
  be required to be implemented within the upper Chehalis River Basin from the headwaters of
  the Chehalis River to the confluence of the Chehalis and Newaukum rivers. The mitigation will
  include, but is not limited to, the following:
  - Permanent protection measures for upland conifer habitat via land acquisition or through a conservation easement in perpetuity to replace habitat functions in the temporary reservoir area.
  - Inclusion of habitat structures (e.g., sediment wedges created from engineered large woody material, large woody material placement) in mitigation areas such as the mainstem

Chehalis River downstream of the Proposed Action and appropriately sized tributaries of the Chehalis River mainstem.

- To reduce impacts to nesting bird species from construction of the FRE facility, the Applicant will conduct spring season (pre-nesting) pre-construction surveys in the FRE facility area and airport levee area to identify any preliminary raptor presence and nesting activity, particularly bald eagles, within 660 feet of the construction footprint. If any nests are observed to be starting, the nests could be removed (prior to any eggs being laid) to encourage the birds to move elsewhere. If nests are removed, the Applicant will build a replacement nesting platform in another location outside of the inundation zone. If any active bald eagle nests are observed, then construction activities should be timed to minimize noise effects to the bald eagle nest until the nesting season is over (approximately August 1).
- The Applicant will follow the U.S. Fish and Wildlife Service 2012 Guidance for Identifying Suitable Marbled Murrelet Nesting Habitat in Washington State to define and identify potential habitat and nesting platforms. If habitat is found, the 2003 Pacific Seabird Group Methods for Surveying Marbled Murrelets in Forests: A Revised Protocol for Land Management and Research survey protocol will be used to identify marbled murrelet presence. A ground assessment for marbled murrelet potential nesting habitat will be conducted to verify presence/absence of nesting platforms. If habitat is verified, 2-year protocol surveys will be completed to determine occupancy. When a nest is occupied, DNR Forest Practices Rules require a minimum avoidance zone around the nest to minimize disturbance to marbled murrelets. Temporary restrictions on disruptive activities, including felling and bucking, within this zone are required within the critical nesting season from April through August. Mitigation will be identified in the plan for any loss of marbled murrelet habitat.
- To reduce impacts to amphibians from construction of the FRE facility, the Applicant will consult WDFW to determine the preferred construction periods to avoid amphibian breeding or rearing time frames.
- To minimize the effects of recurring inundation on state candidate western toad, and other native amphibians that occur in the temporary reservoir inundation area, the Applicant will create areas both upstream and downstream of the temporary reservoir and maintain them frequently to create more sunny openings in shallow-water stream margins for western toad breeding.
- To minimize the effects of recurring inundation on state candidate species western toad,
   Van Dyke's salamander, and Dunn's salamander, and other native amphibians that occur in
   the temporary reservoir inundation area, the Applicant will conduct native species plantings
   and placement of downed wood in riparian areas upstream of the temporary reservoir to

provide better winter adult cover to increase the upstream populations and maintain a source for recolonization to the temporary reservoir and other downstream areas.

- This plan will be developed in conjunction with mitigation plans for large woody material, vegetation, wetlands, riparian habitat, and fish and aquatic species and habitat.
- WILDLIFE-3 (Riparian Habitat Mitigation Plan): To mitigate the impacts to riparian habitat from construction and operation of the Proposed Action, mitigation is proposed for the Applicant to develop and implement a Riparian Habitat Mitigation Plan. The plan must be developed in coordination with and approved by WDFW, Lewis County, other applicable local, state, and federal agencies and tribes and be ready to implement prior to the start of construction. The plan must include restoration options that provide no net loss for the riparian and stream habitats impacted by construction and operational activities. Mitigation will be considered from the headwaters of the Chehalis River to the confluence of the Chehalis and Newaukum rivers. The mitigation will include, but is not limited to, the following:
  - The Applicant intends to remove non-flood-tolerant trees and trees over 6 inches dbh in the riparian zone within the temporary reservoir inundation area. To minimize impacts on riparian habitat and retain shade as long as possible, these trees will be removed in the last phase of the 5-year construction period.
  - Permanent protection measures via land acquisition or through a conservation easement in perpetuity that fully encumbers the restored riparian habitat.
  - Mitigation in the form of replacement for the area of riparian habitat impacted by the Proposed Action. Restored or created riparian habitat must meet tree heights detailed in Draft WDFW Riparian Ecosystems, Volume 2: Management Recommendations.
  - A maintenance component that addresses, but is not limited to, invasive and non-native species removal and control, plant replacement, irrigation, and adaptive management measures.
  - A monitoring component that addresses, but is not limited to, species use surveys (e.g., avian, amphibians, wildlife), vegetation surveys (e.g., survival, mortality, cover), and analysis of functionality over time.
  - This plan will be developed in conjunction with management and mitigation plans for vegetation, wetlands and wetland buffers, streams and stream buffers, fish and aquatic species and habitat, wildlife species and habitat, surface water quality, and large woody material.

### **Other Related Mitigation Plans:**

• EARTH-3 (Large Woody Material Management Plan): To mitigate the impacts of construction and operation of the Proposed Action on large woody material and habitat, mitigation is proposed for the Applicant to develop and implement a Large Woody Material Management Plan (for details, see *Earth Discipline Report*).

- FISH-1 (Fish and Aquatic Species and Habitat Plan): To mitigate the impacts to fish and aquatic species and habitats associated with construction and operation of the Proposed Action, mitigation is proposed for the Applicant to develop and implement a Fish and Aquatic Species and Habitat Plan (for details, see *Fish Species and Habitat Discipline Report*).
- **TRANSP-1**: To reduce impacts on the environment from construction, upgrades, use, or abandonment of roads not covered under Forest Practices Rules, mitigation is proposed for the Applicant to meet all Forest Practices Act requirements for road building, maintenance, and abandonment for roads at the FRE facility site or in the temporary reservoir area. The Applicant will ensure road construction, equipment on the roadway, and maintenance are in accordance with state requirements for the protection of streams, wetlands, unstable slopes, or other sensitive sites.
- WATER-1 (Surface Water Quality Mitigation Plan): To reduce probable impacts to surface water quality and designated aquatic life uses of the Chehalis River and Crim Creek from construction and operation of the Proposed Action, mitigation is proposed for the Applicant to develop and implement a Surface Water Quality Mitigation Plan (for details, see *Water Discipline Report*).
- WET-1 (Wetland and Wetland Buffer Mitigation Plan): To reduce probable impacts to wetlands from construction and operation of the Proposed Project, mitigation is proposed for the Applicant to develop and implement a Wetland and Wetland Buffer Mitigation Plan (for details, see *Wetlands Discipline Report*).
- WET-2 (Stream and Stream Buffer Mitigation Plan): To mitigate the impacts streams and stream buffer from construction and operation of the Proposed Action, mitigation is proposed for the Applicant to develop and implement a Stream and Stream Buffer Mitigation Plan (for details, see *Wetlands Discipline Report*).

# 3.2.5 Significant and Unavoidable Adverse Environmental Impacts

There is uncertainty if mitigation is technically feasible or economically practicable, therefore, construction and operation of the Proposed Action would have **significant and unavoidable** adverse environmental impacts on wildlife species and habitats, as follows:

- Wildlife habitat at the FRE structure site and for associated construction because most vegetation cover associated with wetland, upland, and riparian habitats would be removed and/or permanently converted to herbaceous species. The loss of tree canopy would eliminate current and future habitat for marbled murrelets and significantly reduce habitat functions of vegetation communities and wetlands on up to 92 acres.
- Wildlife habitat in the temporary reservoir because most tree cover associated with wetland, upland, and riparian habitats within the temporary reservoir inundation area would be removed. The loss of tree canopy would significantly change the habitat functions of vegetation communities and wetlands within Zones 1 and 2 of the reservoir (426 acres) and would

fragment habitats for many wildlife species during construction. During operation, all wildlife habitat within the proposed temporary reservoir inundation area (847 acres) would be inundated and would not survive. The permanent loss of forested habitats that would otherwise be protected as riparian and wetland buffers or on steep slopes would preclude the development of future marbled murrelet habitat.

- Wildlife habitat in the upper Chehalis River within the temporary reservoir area resulting from an increase of 2°C to 3°C, and in Crim Creek by 2°C to 5°C. This would reduce the suitability of aquatic habitats for most native wildlife species.
- The long-term reduction in both the quantity and quality of aquatic habitats downstream of the FRE facility resulting from the loss of peak flows that create and sustain these habitats.
- Likely mortality of individuals of some less mobile wildlife species (e.g., amphibians, small mammals, reptiles, eggs/chicks of nesting birds) during construction at the FRE structure site and in the temporary reservoir area. These species would be unsuccessful in avoiding tree cover removal and filling of wetlands and unable to adapt to the changes in habitat or relocate to other suitable breeding, foraging, resting, and overwintering habitat. The noise, including blasting, that would also occur would likely cause some nesting birds (including bald eagles and marbled murrelets) to abandon nests.
- Recurring mortality of individuals of less mobile wildlife species (e.g., amphibians, small mammals, reptiles, eggs/chicks of nesting birds) that would be unsuccessful in avoiding the reservoir inundation and unable to adapt or relocate to other suitable breeding, foraging, resting, and overwintering habitat.

The Applicant may provide mitigation plans as described above. If agencies determine the plans meet the regulatory requirements and the implementation is feasible, then the impacts would be addressed as part of the permitting processes.

# 3.3 Local Actions Alternative

Local Action Alternative elements include land use management, floodproofing, buy-out of at-risk properties or structures, floodplain storage improvements (riparian restoration, afforestation, floodplain reconnection, water flow abatement), channel migration protection, and early flood warning systems. Under the Local Actions Alternative, flooding would not be significantly reduced. Wildlife species and habitat would continue to experience **substantial flood risks** under the Local Actions Alternative.

# 3.3.1 Impacts from Construction

# 3.3.1.1 Direct

# 3.3.1.1.1 Wildlife Habitat

Of the six elements identified under this alternative, three could result in the need for construction activities. Floodproofing existing structures could involve localized construction projects for buildings in floodplains. This activity would likely occur sporadically, as funding mechanisms become available, and would reasonably be expected to result in brief, localized construction activity over an extended period.

Floodplain storage improvements and channel migration protection would also be expected to result in sporadic, localized construction activity over an extended period and, therefore, potentially result in construction impacts on vegetation communities.

Adverse direct impacts from these undefined construction activities could include permanent loss of upland, riparian, wetland, and/or floodplain vegetation and fragmentation of vegetation communities. Overall, due to the limited scope of these actions and the likely location around developed areas, such impacts on vegetation would have probable **minor** adverse impacts within the study area. The installation of bank protection or other features would need to comply with federal, state, and local requirements to avoid, minimize, and mitigate for impacts on critical areas, and vegetation communities would be restored to pre-construction status and/or function following completion of floodproofing.

# 3.3.1.1.2 Wildlife Species

The potential responses of wildlife species to impacts on habitat would be limited in magnitude because the actions are limited in number and extent and because the areas in which these actions would occur are currently developed and likely currently provide limited habitat for wildlife. These temporary impacts could disturb habitat used by native wildlife species to breed, forage, rest, and overwinter. Construction, including noise impacts, could temporarily disturb habitat used by native wildlife species to breed, forage, rest, and overwinter. Overall, due to the limited scope of the actions and the likely location around developed areas, impacts from construction of the local actions are considered **minor** adverse impacts within the study area.
# 3.3.1.2 Indirect

## 3.3.1.2.1 Wildlife Habitat

**No probable adverse indirect impacts** on wildlife habitat from construction of the Local Actions Alternative are anticipated.

## 3.3.1.2.2 Wildlife

**No probable adverse indirect impacts** on wildlife species from construction of the Local Actions Alternative are anticipated.

# 3.3.2 Impacts from Operation

## 3.3.2.1 Direct

The Local Actions Alternative does not include any identified operational activities that would affect wildlife. However, increased frequency and severity of droughts and storm events could cause more frequent floods and lower flows. While flooding is a natural phenomenon that forms and sustains aquatic, riparian, and floodplain habitats, an increased frequency and intensity of flooding would cause more frequent disturbances to wildlife habitat that could promote the proliferation of non-native invasive species (both plants and animals) and cause more frequent mortality of wildlife individuals during flood events. Similarly, more frequent and severe droughts could cause mortality of native plants and animals and expand the suitability of habitat for non-native species.

## 3.3.2.1.1 Wildlife Habitat

The Local Actions Alternative is anticipated to result in **substantial continuing flood risks** to wildlife habitats.

## 3.3.2.1.2 Wildlife Species

The Local Actions Alternative is anticipated to result in **substantial continuing flood risks** to wildlife species.

## 3.3.2.2 Indirect

## 3.3.2.2.1 Wildlife Habitat

No probable adverse indirect impacts from operation of the Local Actions Alternative are anticipated.

## 3.3.2.2.2 Wildlife Species

No probable adverse indirect impacts from operation of the Local Actions Alternative are anticipated.

# 3.4 No Action Alternative

The No Action Alternative activities that could affect wildlife habitats and species are floodproofing efforts led by the Chehalis Basin Flood Authority (Flood Authority), potential Washington State Department of Transportation (WSDOT) programs including floodwalls and barriers to protect major roadways, and ongoing land uses including development, agriculture, and timber harvest. Stream and floodplain restoration efforts that will occur include the Chehalis Basin Strategy-led Aquatic Species Restoration Plan and ongoing habitat restoration funded by the Salmon Recovery Funding Board and other state grant programs, all of which may result in broad restoration efforts spread across the entire Chehalis Basin that could benefit aquatic and semi-aquatic wildlife species. In addition, recovery efforts are underway for listed species.

# 3.4.1 Impacts from Construction

Under the No Action Alternative, flooding would not be significantly reduced. Wildlife species and habitat would continue to experience **substantial flood risk** under the No Action Alternative.

Elements of the No Action Alternative that would require construction include Flood Authority projects (a mix of in-water and out-of-water construction), WSDOT programs that require construction of floodwalls or levees or road raising, ongoing land use and development, continuing or new agricultural uses, timber harvest, and stream, wetland, or riparian restoration.

Of the various construction needs identified under the No Action Alternative, elements that could result in vegetation removal, wetland filling or modification, or work within the river channel could result in impacts on wildlife habitat and species. Construction activities would be expected to result in sporadic, localized impacts on wildlife habitats and species over a short time.

Wildlife present within the river reach of a construction activity may be directly affected during any inwater work. Construction activities that involve water diversions, cut and fill, or vegetation disturbance have the potential to increase turbidity and sedimentation in the stream channels and to remove or disrupt nests or dens. Accidental releases of pollutants from construction equipment may cause temporary reductions in water quality. Elevated sound and vibration associated with construction activities may disturb wildlife and cause birds to abandon nests (the effects of sound on wildlife species are described in greater detail for the Proposed Action in Section 3.2.1.1).

Work within critical areas or below the ordinary high water mark would need to comply with federal, state, and local requirements to avoid, minimize, and mitigate for impacts on water quality, endangered species, and fish and wildlife habitats.

Overall, construction activities in the study area under the No Action Alternative are limited in duration, and many activities would occur in already developed areas. Stream, wetland, and riparian restoration activities would benefit wildlife in the long term.

Construction associated with elements of the No Action Alternative adjacent to or within the river channel may have indirect impacts on areas downstream of project sites if water quality is impaired by pollutants or elevated turbidity. However, permits would be required for these activities which would require meeting water quality standards.

# 3.4.2 Impacts from Operation

The No Action Alternative would include ongoing regulatory programs intended to reduce flood impacts and protect critical areas, construction projects to floodproof structures and roads in the 100-year floodplain, projects intended to improve ecological functions of streams and floodplains, and ongoing land uses, development, and timber harvest. Under the No Action Alternative, flooding would not be significantly reduced. Wildlife species and habitat would continue to experience **substantial flood risk** under the No Action Alternative.

Projects undertaken to restore habitat under the No Action Alternative are not predicted to have direct adverse impacts on habitat in the study area. Climate change is predicted to have numerous impacts on habitat, which are discussed in Section 2.4.4.

Operation of floodproofing projects, including Flood Authority projects for various commercial and residential properties and WSDOT's road protection projects, could have adverse impacts on wildlife habitats and species by causing fragmentation of habitats and potentially leading to increased development in the floodplain.

Protection measures for structures in the floodplain, as part of the floodproofing elements undertaken by the Flood Authority or WSDOT, would allow for continuation of activities in the floodplain that have already degraded wildlife habitats. Pollution, habitat degradation, and habitat disconnection would continue associated with agriculture, residential and commercial development, and intensive transportation along the Interstate 5 corridor.

Ongoing land use, development, and timber harvest will adversely affect wildlife habitat by continuing to alter vegetation communities. Tree growth in riparian buffer areas will continue to be protected under the Forest Practices Act of 1974 and its implementing provisions under the Forest Practices Rules (WAC 222), resulting in improved shading and improved water temperatures, primarily in headwater areas of the Chehalis River and its tributaries. Large wood recruitment to the river from mature riparian buffer areas may increase over time and would improve aquatic habitats by creating new pools, cool water refugia, off-channel low-velocity habitat, and substrate for macroinvertebrates by mid- or late-century.

Aquatic Species Restoration Plan activities will improve habitat complexity by adding large wood and gravels, and reconnecting floodplain and side-channel habitats, as well as reducing water temperature by restoring and protecting riparian vegetation and creating cool-water refugia. Currently, the effects

are considered indirect because proposed projects will be undertaken primarily in tributaries across the Chehalis Basin and outside the study area, but most benefits could potentially improve wildlife species populations more broadly across the basin.

Projected climate change effects are included in the No Action Alternative and would continue to degrade wildlife habitats through increased air and water temperatures, as well as increased frequency and severity of droughts and storm events that could cause more frequent floods and lower flows. While flooding is a natural phenomenon that forms and sustains aquatic, riparian, and floodplain habitats, an increased frequency and intensity of flooding would cause more frequent disturbances to wildlife habitat that could promote the proliferation of non-native invasive species (both plants and animals) and cause more frequent mortality of wildlife individuals during flood events. Similarly, more frequent and severe droughts could cause mortality of native plants and animals and expand the suitability of habitat for non-native species.

## 3.4.2.1.1 Wildlife Habitat

The No Action Alternative is anticipated to result in **substantial ongoing flood risks** to wildlife habitats.

## 3.4.2.1.2 Wildlife Species

The No Action Alternative is anticipated to result in **substantial ongoing flood risks** to wildlife species.

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Attachment P-1 Species Tables

COMMON NAME	SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME	
GRASS, FERNS, AND HERBA	ACEOUS		• •	
Canadian thistle	Cirsium arvense	Pacific silverweed	Potentilla pacifica	
Colonial bentgrass	Agrostis capillaris	Pickleweed	Salicornia virginica	
Common duckweed	Lemna minor	Quackgrass	Agropyron repens	
Common velvet grass	Holcus lanatus	Red fescue	Festuca rubra	
Deer fern	Blechnum spicant	Redtop	Agrostis gigantea	
Dewey sedge	Carex deweyana	Salt grass	Distichlis spicata	
Field horsetail	Equisetum arvense	Salt-marsh sandspurry	Spergularia marina	
Field mustard	Brassica campestris	Seaside arrowgrass	Triglochin maritima	
Fireweed	Epilobium angustifolium	Slough sedge	Carex obnupta	
Fowl mannagrass	Glyceria striata	Small bedstraw	Gallium trifidum	
Foxglove	Digitalis purpurea	Soft rush	Juncus effusus	
Giant horsetail	Equisetum telmateia	Spike rush	Eleocharis palustris	
Grooved rush	Juncus patens	Stinky bob	Geranium robertianum	
Jaumea	Jaumea carnosa	Tall fescue	Festuca arundinacea	
Lady fern	Athyrium filix-femina	Tufted hairgrass	Deschampsia cespitosa	
Lyngby's sedge	Carex lyngbyei	Watson's willow-herb	Epilobium watsonii	
Orchard morning glory	Convolvulvus arvensis	Yarrow	Achillea millefolium	
Pacific bleeding heart	Dicentra formosa	1		
SHRUBS				
American speedwell	Veronica americana	Oceanspray	Holodiscus discolor	
Arrowleaf groundsel	Senecio triangularis	Pacific dogwood	Cornus nuttallii	
Beaked hazelnut	Corylus cornuta	Pacific rhododendron	Rhododendron	
Bracken fern	Pteridium aquilinum		macrophyllum	
Cattail	Typha latifolia	Piggyback plant	Tolmiea menziesii	
Claspleaf twisted-stalk	Streptopus amplexifolius	Prickly currant	Ribes lacustre	
Common dandelion	Taraxacum officinale	Red clover	Trifolium pratense	
Common mullein	Verbascum thapsus	Red elderberry	Sambucus racemosa	
Common plantain	Plantago major	Red huckleberry	Vaccinium parvifolium	
Common tansy	Tanacetum vulgare	Red-osier dogwood	Cornus sericea	
Cooley's hedge-nettle	Stachys cooleyae	Reed canarygrass	Phalaris arundinacea	
Creeping buttercup	Ranunculus repens	Salal	Gaultheria shallon	
Curly dock	Rumex crispus	Salmonberry	Rubus spectabilis	
Devil's club	Oplopanax horridus	Scotch broom	Cytisus scoparius	
English ivy	Hedera helix	Sitka willow	Salix sitchensis	
English laurel	Prunus laurocerasus	Skunk cabbage	Lysichiton americanus	
English plantain	Plantago lanceolata	Snowberry	Symphoricarpos albus	
Evergreen blackberry	Rubus laciniatus	Stinging nettle	Urtica dioica	
Evergreen huckleberry	Vaccinium ovatum	Stink currant	Ribes bracteosum	
False-lily-of-the-valley	Maianthemum dilatatum	Sword fern	Polystichum munitum	
Field mint	Mentha arvensis	Tall Oregon grape	Mahonia aquifolium	

COMMON NAME	SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME
Himalayan blackberry	Rubus armeniacus	Trailing blackberry	Rubus ursinus
Holly	llex aquifolium	Twinberry	Lonicera involucrate
Indian plum	Oemleria cerasiformis	Twinflower	Linnaea borealis
Japanese knotweed	Polygonum cuspidatum	Vine maple	Acer circinatum
Kentucky bluegrass	Poa pratensis	Water-parsley	Oenanthe sarmentosa
Laurel	Kalmia spp.	Western azalea	Rhododendron occidentale
Licorice fern	Polypodium glycyrrhiza	Western thimbleberry	Rubus parviflorus
Low Oregon grape	Mahonia nervosa	Western trillium	Trillium ovatum
Marsh yellowcress	Rorippa palustris	White clover	Trifolium repens
Nootka rose	Rosa nutkana	Wood rose	Rosa gymnocarpa
TREES			
Austrian black pine	Pinus nigra	Oregon ash	Fraxinus latifolia
Big-leaf maple	Acer macrophyllum	Oregon white oak	Quercus garryana
Bitter cherry	Prunus emarginata	Pacific madrona	Arbutus menziesii
Black cottonwood	Populus trichocarpa	Pacific ninebark	Physocarpus capitatus
Black hawthorn	Crataegus douglasii	Pacific willow	Salix lasiandra
Cascara	Rhamnus purshiana	Paper birch	Betula papyrifera
Cherry	Prunus sp.	Quaking aspen	Populus tremuloides
Crabapple	Malus sp.	Red alder	Alnus rubra
Domestic apple	Malus domestica	Scouler willow	Salix scouleriana
Douglas fir	Pseudotsuga menziesii	Sitka spruce	Picea sitchensis
Grand fir	Abies grandis	Western hemlock	Tsuga heterophylla
Hooker's willow	Salix hookeriana	Western red cedar	Thuja plicata
Oak	Quercus sp.	Western white pine	Pinus monticola
AQUATICS			
Broadleaf arrowhead	Sagittaria latifolia	Olney's three square	Schoenoplectus
		bulrush	americanus
Broadleaf cattail	Typha latifolia	Small-fruited bulrush	Scirpus microcarpus
Common spikerush	Eleocharis palustris	Softstem bulrush	Schoenoplectus
			tabernaemontani
Creeping spikerush	Eleocharis palustris	Water buttercup	Ranunculus longirostris
Giant bur-reed	Sparganium eurycarpum	Watercress	Nasturtium officinale
Hardstem bulrush	Schoenoplectus acutus	Yellow water lily	Nuphar lutea
Narrowleaf bur-reed	Sparganium angustifolium		

## State WDFW Priority Habitats in Lewis, Thurston, Grays Harbor, and Pacific Counties

PRIORITY HABITAT TYPF	HABITAT DESCRIPTION	L
TERRESTRIAL		
Aspen stands	Pure or mixed stands of aspen greater than 0.4 ha (1 ac).	
Biodiversity	Biodiversity areas:	
areas	<ul> <li>a. The area has been identified as biologically diverse through a scientifically based assessment conducted over a landscape scale (e.g., ecoregion, county- or city-wide, watershed, etc.). Examples include but are not limited to WDFW Local Habitat Assessments, Pierce County Biodiversity Network, and Spokane County's Wildlife Corridors and Landscape Linkages.</li> <li>OR</li> </ul>	
	b. The area is within a city or an urban growth area (UGA) and contains habitat that is valuable to fish or wildlife and is mostly composed of native vegetation. Relative to other vegetated areas in the same city or UGA, the mapped area is vertically diverse (e.g., multiple canopy layers, snags, or downed wood), horizontally diverse (e.g., contains a mosaic of native habitats), or supports a diverse community of species as identified by a qualified professional who has a degree in biology or closely related field and professional experience related to the habitats or species occurring in the biodiversity area. These areas may have more limited wildlife functions than other priority habitat areas due to the general nature and constraints of these sites in that they are often isolated or surrounded by highly urbanized lands.	
	Corridors:	
	Corridors are areas of relatively undisturbed and unbroken tracts of vegetation that connect fish and wildlife habitat conservation areas, priority habitats, areas identified as	
	biologically diverse (see attribute a), or valuable habitats within a city or UGA (see attribute b).	
Herbaceous balds	Occur as variable-sized patches of grass and forb vegetation located on shallow soils over bedrock, commonly fringed by forest or woodland. Typically consists of low-growing vegetation adapted for survival on shallow soils amid seasonally dry conditions; often on steep slopes. Dominant flora includes herbaceous vegetation, dwarf shrubs, mosses,	
	and lichens. Rock outcrops, boulders, and scattered trees are often present, especially Douglas-fir, Pacific madrone, and Oregon white oak. Balds occur within mid-montane to	
	lowland forest zones. On slopes near saltwater shorelines in the northern Puget Trough, herbaceous balds and herbaceous bluffs can sometimes be difficult to differentiate.	
	Balds typically are smaller than 5 ha (12 ac), although some can be up to about 100 ha (250 ac).	
Old- growth/mature forest	Old-growth west of Cascade crest: Stands >3 ha (7.5 ac) having at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/ac) that are >81 cm (32 in) diameter at breast height (dbh) or >200 years of age; and >10 snags/ha (4 snags/ac) over 51 cm (20 in) diameter and 4.6 m (15 ft) tall; with numerous downed logs, including 10 logs/ha (4 logs/ac) that are >61 cm (24 in) diameter and >15 m (50 ft) long. High-elevation stands (>762 m [2,500 ft]) may have lesser dbh (>76 cm [30 in]), fewer snags (>0.6/ha [1.5/ac]), and fewer large downed logs (0.8 logs/ha [2 logs/ac]) that are >61 cm (24 in) diameter and >15 m (50 ft) cm (24 in) diameter and >15 m (50 ft) long.	
Oregon white	Stands of oak or oak/conifer associations where canopy coverage of the oak component of the stand is 25%, or where total canopy coverage of the stand is <25%, but oak	
oak woodlands	accounts for at least 50% of the canopy coverage. The latter is often referred to as oak savanna. In non-urbanized areas west of the Cascades, priority oak habitat consists of	
	stands >0.4 ha (1.0 ac) in size. East of the Cascades, priority oak habitat consists of stands >2 ha (5 ac) in size. In urban or urbanizing areas, single oaks or stands <0.4 ha (1 ac) may also be considered a priority when found to be particularly valuable to fish and wildlife. Oak woodlands in western Washington may contain understory plants indicative of prairie (see westside prairie)	
Riparian	The area adjacent to flowing or standing freshwater aquatic systems. Riparian habitat encompasses the area beginning at the ordinary high water mark and extends to that	
	portion of the terrestrial landscape that is influenced by, or that directly influences, the aquatic ecosystem. In riparian systems, the vegetation, water tables, soils,	
	microclimate, and wildlife inhabitants of terrestrial ecosystems are often influenced by perennial or intermittent water. Simultaneously, adjacent vegetation, nutrient and	
	sediment loading, terrestrial wildlife, as well as organic and inorganic debris influence the biological and physical properties of the aquatic ecosystem. Riparian habitat	
	includes the entire extent of the floodplain and riparian areas of wetlands that are directly connected to stream courses or other freshwater.	
Westside prairie	Herbaceous, non-forested (<60% forest canopy cover) plant communities that can either take the form of a dry prairie where soils are well-drained or a wet prairie.	

EWIS DUNTY	THURSTON COUNTY	GRAYS HARBOR COUNTY	PACIFIC COUNTY
•			
•	•	•	•
•	•	•	•
•	•	•	•
•	•	•	•
•	•	•	•
•	•	•	

PRIORITY HABITAT TYPE	HABITAT DESCRIPTION	LEWIS COUNTY	THURSTON COUNTY	GRAYS HARBOR COUNTY	PACIFIC COUNTY
AQUATIC					
Freshwater	Freshwater wetlands: Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow				
wetlands and	water. Wetlands must have one or more of the following attributes: the land supports, at least periodically, predominantly hydrophytic plants; substrate is predominantly				
fresh deepwater	undrained hydric soils; and/or the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.				
	Fresh deepwater: Deepwater habitats are permanently flooded lands lying below the deepwater boundary of wetlands. Deepwater habitats include environments where	•	•	•	•
	surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live. The dominant plants are				
	hydrophytes; however, the substrates are considered non-soil because the water is too deep to support emergent vegetation. These habitats include all underwater				
	structures and features (e.g., woody debris, rock piles, caverns).				
Instream	The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife	•			•
	resources.	•	•	•	•
HABITAT FEATURE	S		-		
Caves	A cave is a naturally occurring cavity, recess, void, or system of interconnected passages (including associated dendritic tubes, cracks, and fissures) located under the earth in				
	soils, rock, ice, or other geological formations, and is large enough to contain a human. Mine shafts (a human-made excavation in the earth usually used to extract minerals)	•	•	•	•
	may mimic caves, and abandoned mine shafts with actual or suspected occurrences of priority species should be treated in a manner similar to caves.				
Cliffs	Greater than 7.6 m (25 ft) high and occurring below 1,524 m (5,000 ft).	•	•	•	•
Snags and logs	Snags and logs occur within a variety of habitat types that support trees. Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to				
	enable cavity excavation/use by wildlife. Priority snags have a dbh of >51 cm (20 in) in western Washington and >30 cm (12 in) in eastern Washington, and are >2 m (6.5 ft) in				
	height. Priority logs are >30 cm (12 in) in diameter at the largest end, and >6 m (20 ft) long. Abundant snags and logs can be found in old-growth and mature forests or				
	unmanaged forests of any age; in damaged, burned, or diseased forests; and in riparian areas. Priority snag and log habitat includes individual snags and/or logs, or groups of	•	•	•	•
	snags and/or logs of exceptional value to wildlife due to their scarcity or location in a particular landscape. Areas with abundant, well-distributed snags and logs are also				
	considered priority snag and log habitat. Examples include large, sturdy snags adjacent to open water, remnant snags in developed or urbanized settings, and areas with a				
	relatively high density of snags.				
Talus	Homogenous areas of rock rubble ranging in average size 0.15 to 2.0 m (0.5 to 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine	_			•
	tailings. May be associated with cliffs.	•	•		•

Source: WDFW 2019a

Federal and State Threatened and Endangered Plants that Occur in Lewis, Thurston, Grays Harbor, and Pacific Counties

	FEDERAL	STATE	LEWIS	THURSTON	GRAYS HARBOR	PACIFIC
COMMON NAME (SCIENTIFIC NAME)	STATUS	STATUS	COUNTY <sup>1,2</sup>	COUNTY <sup>1,2</sup>	COUNTY <sup>1,2</sup>	COUNTY <sup>1,2</sup>
FEDERAL THREATENED AND ENDANGERED PLANTS	1					1
Golden paintbrush (Castilleja levisecta)	Threatened	Endangered	•	•	•	
Kincaid's lupine (Lupinus sulphureus ssp. kincaidii)	Threatened	Not applicable	•			
Nelson's checker-mallow (Sidalcea nelsoniana)	Threatened	Endangered	•			
Water howellia (Howellia aquatilis)	Threatened	Threatened	•	•	•	•
STATE THREATENED AND ENDANGERED PLANTS						
Bear's-foot sanicle (Sanicula arctopoides)	Species of	Endangered			•	
	Concern				•	•
Brewer's cinquefoil (Potentilla breweri)		Threatened	•			
California swordfern (Polystichum californicum)		Threatened		•		
Chapparal broom (Baccharis pilularis ssp. consanguinea)		Threatened				•
Dense sedge (Carex densa)		Sensitive	•	•		
Tillamook shooting-star (Dodecatheon austrofrigidum)	Sensitive	Endangered			•	•
Salmon Jacob's-ladder (Polemonium carneum)		Threatened	•	•	•	•
Hairy-stemmed checker-mallow (Sidalcea hirtipes)		Threatened	•			
Hall's aster (Symphyotrichum hallii)		Threatened		•		
Kincaid's sulfur lupine (Lupinus oreganus)	Threatened	Endangered	•			
Large-awned sedge (Carex macrochaeta)		Threatened				•
Menzies' burnet (Sanguisorba menziesii)		Threatened			•	
Ocean-bluff bluegrass (Poa unilateralis ssp. Pachypholis)		Threatened				•
Oregon coyote-thistle (Eryngium petiolatum)		Threatened	•			
Oregon goldenweed (Heterotheca oregona)		Sensitive	•	•		
Pacific lanceleaved springbeauty (Claytonia multiscapa		Endangered	•		•	
ssp. Pacifica)			•		•	
Pacific peavine (Lathyrus vestitus var. ochropetalus		Endangered	•	•		
Pale larkspur (Delphinium leucophaeum)	Strategic	Endangered	•			
Pine-foot (Pityopus californicus)		Threatened		•		
Pink sand-verbena (Abronia umbellata var. acutalata)	Strategic	Endangered				•

COMMON NAME (SCIENTIFIC NAME)	FEDERAL STATUS <sup>1</sup>	STATE STATUS <sup>2</sup>	LEWIS COUNTY <sup>1,2</sup>	THURSTON COUNTY <sup>1,2</sup>	GRAYS HARBOR COUNTY <sup>1,2</sup>	PACIFIC COUNTY <sup>1,2</sup>
Queen of the forest (Filipendula occidentalis)	Strategic	Sensitive				٠
Olympic fawn-lily (Erythronium quinaultense)		Threatened			•	
Rose checker-mallow (Sidalcea virgata)		Threatened		•		
Thin-leaved peavine (Lathyrus holochlorus)		Endangered	•			

Sources:

1. USFWS 2019b

2. DNR 2019

Federal Plant Species' Critical Habitats and Preferred Habitats That Potentially Occur in the Study Area

COMMON NAME		
(SCIENTIFIC NAME)	STATUS <sup>1</sup>	PREFERRED HABITAT <sup>2</sup>
Golden paintbrush	Threatened	Gravelly, glacial outwash prairie; upland prairie, flat grasslands,
(Castilleja levisecta)		some characterized by mounded topography and thickets of low
		deciduous shrubs
Kincaid's lupine (Lupinus	Threatened	Native, dry, upland prairie with the dominant species being red
sulphureus ssp. kincaidii)		fescue (Festuca rubra) and/or Idaho fescue (Festuca idahoensis)
Nelson's checker-mallow	Threatened	Oregon ash (Fraxinus latifolia) swales and meadows with wet
(Sidalcea nelsoniana)		depressions, or along streams; wetlands with remnant prairie
		grasslands; primarily occurs in open areas with little or no shade
		and will not tolerate encroachment of woody species
Water howellia ( <i>Howellia</i>	Threatened	Shallow water (1 to 2 m) and on edges of deep ponds that are
aquatilis)		partially surrounded by deciduous trees such as black
		cottonwood and aspen (Populus spp.)

Sources:

1. USFWS 2019b

2. NatureServe 2019

### State Rare Plants that Occur in Lewis, Thurston, Grays Harbor, and Pacific Counties

			THURSTON	GRAYS HARBOR	
COMMON NAME (SCIENTIFIC NAME)	STATE STATUS	LEWIS COUNTY	COUNTY	COUNTY	PACIFIC COUNTY
Alaska plantain (Plantago macrocarpa)	Sensitive			•	
Eastwood's daisy (Erigeron aliceae)	Sensitive	•		•	•
Blunt-leaf pondweed (Potamogeton obtusifolius)	Sensitive		•		
Bog clubmoss (Lycopodiella inundata)	Sensitive		•		•
Branching montia (Montia diffusa)	Sensitive	•			
Bulb-bearing water-hemlock (Cicuta bulbifera)	Sensitive		•		
California compassplant (Wyethia angustifolia)	Sensitive	•	•		
Canadian St. John's-wort (Hypericum majus)	Sensitive		•		
Coiled sedge (Carex circinata)	Threatened			•	
Common bluecup (Githopsis specularioides)	Sensitive	•	•		
Cooley's buttercup (Ranunculus cooleyae)	Threatened			•	
Fringed kittentails (Synthyris schizantha)	Review -				
	Potential	•		•	
	Concern				
Giant chain fern (Woodwardia fimbriata)	Sensitive		•		
Loose-flowered bluegrass (Poa laxiflora)	Sensitive	•			•
Mt. Rainier lousewort (Pedicularis rainierensis)	Sensitive	•			
Marsh grass-of-parnassus (Parnassia palustris	Sensitive				
var. neogaea)				•	•
Nuttall's quillwort (Isoetes nuttallii)	Sensitive	•	•		
Pink fawn-lily (Erythronium revolutum)	Sensitive	•	•	•	•
Puget balsamroot (Balsamorhiza deltoidea)	Review -				
	Potential	•	•		
	Concern				
Scouler's catchfly (Silene scouleri ssp. Scouleri)	Sensitive		•		
Scurvygrass (Cochlearia groenlandica)	Threatened			•	
Small-flowered trillium (Trillium parviflorum)	Sensitive	•	•		
Swamp sandwort (Arenaria paludicola)	Possibly Extinct				
	or Extirpated			•	

Wildlife Species and Habitats Discipline Report Attachment P-1

			THURSTON	GRAYS HARBOR	
COMMON NAME (SCIENTIFIC NAME)	STATE STATUS	LEWIS COUNTY	COUNTY	COUNTY	PACIFIC COUNTY
Tall agoseris (Agoseris elata)	Sensitive		•		
Tall bugbane (Cimicifuga elata)	Sensitive	•	•	•	
Texas toadflax (Nuttallanthus texanus)	Threatened		•		
Thompson's fleabane (Erigeron peregrinus var.	Threatened				
thompsonii)				•	
Three-rib arrowgrass (Triglochin striata)	Review -				
	Potential			•	•
	Concern				
Western wahoo (Euonymus occidentalis var.	Sensitive	•	•		
occidentalis)		-	•		•
White-top aster (Sericocarpus rigidus)	Sensitive		•	•	
Yellow-flowered sedge (Carex anthoxanthea)	Threatened			•	
Yerba de Selva (Whipplea modesta)	Threatened		•		

Source: DNR 2019

Wildlife Species that Occur or Potentially Occur in the Study Area (Special Status Species Are Listed in Tables P1-7 and P1-8)

COMMON NAME	SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME
AMPHIBIANS			
American bullfrog*	Rana catesbeiana	Northern red-legged frog	Rana aurora
Coastal giant salamander	Dicamptodon tenebrosus	Northwestern salamander	Ambystoma gracile
Coastal tailed frog	Ascaphus truei	Pacific treefrog	Hyliola regilla
Columbia torrent	Rhyacotriton kezeri	Roughskin newt	Taricha granulosa
salamander			
Cope's giant salamander	Dicamptodon copei	Van Dyke's salamander	Plethodon vandykei
Dunn's salamander	Plethodon dunni	Western red-backed	Plethodon vehiculum
		salamander	
Ensatina	Ensatina eschscholtzii	Western toad	Anaxyrus boreas
Long-toed salamander	Ambystoma		
	macrodactylum		
BIRDS	1		
American coot	Fulica americana	House wren	Troglodytes aedon
American crow	Corvus brachyrhynchos	Killdeer	Charadrius vociferus
American goldfinch	Carduelis tristis	Mallard	Anas platyrhynchos
American robin	Turdus migratorius	Marsh wren	Cistothorus palustris
American widgeon	Mareca americana	Mountain quail	Oreortyx pictus
Bald eagle	Haliaeetus leucocephalus	Northern flicker	Colaptes auratus
Barn swallow	Hirundo rustica	Northern goshawk	Accipiter gentilis
Belted kingfisher	Ceryle alcyon	Northern harrier	Circus cyaneus
Bewick's wren	Thryomanes bewickii	Olive-sided flycatcher	Contopus borealis
Black-capped chickadee	Parus atricapillus	Orange-crowned warbler	Vermivora celata
Black-headed grosbeak	Pheucticus	Osprey	Pandion haliaetus
	melanocephalus		
Black-throated gray warbler	Dendroica nigrescens	Pied-billed grebe	Podilymbus podiceps
Brown creeper	Certhia americana	Pileated woodpecker	Dryocopus pileatus
Brown-headed cowbird	Molothrus ater	Purple finch	Carpodacus purpureus
Bufflehead	Bucephala albeola	Red breasted sapsucker	Sphyrapicus ruber
Bushtit	Psaltriparus minimus	Red-breasted nuthatch	Sitta canadensis
California quail	Callipepla californica	Red-tailed hawk	Buteo jamaicensis
Cackling goose	Branta hutchinsii	Red-winged blackbird	Agelaius phoeniceus
Canada goose	Branta canadensis	Ring-necked duck	Aythya collaris
Chestnut-backed chickadee	Parus rufescens	Rock dove*	Columba livia
Cinnamon teal	Spatula cyanoptera	Ruby-crowned kinglet	Regulus calendula
Common goldeneye	Bucephala clangula	Rufous hummingbird	Selasphorus rufus
Common yellowthroat	Geothlypis trichas	Savannah sparrow	Passerculus sandwichensis
Cooper's hawk	Accipiter cooperii	Solitary vireo	Vireo solitaius
Dark-eyed junco	Junco hyemalis	Song sparrow	Melospiza melodia
Double crested cormorant	Phalacrocorax auritus	Spotted towhee	Pipilo erythrophthalmus
Downy woodpecker	Picoides pubescens	Steller's jay	Cyanocitta stelleri

COMMON NAME	SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME
European starling*	Sturnus vulgaris	Swainson's thrush	Catharus ustulatus
Gadwall	Anas strepera	Tree swallow	Tachycineta bicolor
Golden-crowned kinglet	Regulus satrapa	Trumpeter swan	Cygnus buccinator
Golden eagle	Aquila chrysaetos	Varied thrush	lxoreus naevius
Gray catbird	Dumetella carolinensis	Violet-green swallow	Tachycineta thalassina
Great blue heron	Ardea herodias	White-breasted	Sitta caralinensis
		nuthatch	
Great horned owl	Bubo virginianus	White-crowned sparrow	Zonotrichia leucophrys
Greater scaup	Aythya marila	Winter wren	Troglodytes hiemalis
Green-winged teal	Anas crecca	Wood duck	Aix sponsa
Hairy woodpecker	Picoides villosus	Yellow warbler	Dendroica petechia
Hooded merganser	Lophodytes cucullatus	Yellow-rumped warbler	Dendroica coronata
House finch	Carpodacus mexicanus		
House sparrow*	Passer domesticus		
MAMMALS	_		-
Bat	<i>Myotis</i> sp.	Mink	Mustela vison
Black-tailed deer	Odocoileus hemionus	Mountain beaver	Aplodontia rufa
	columbianus		
Black bear	Ursus americanus	North American beaver	Castor canadensis
Bobcat	Lynx rufus	Red fox	Vulpes
Cougar	Felis concolor	Norway rat*	Rattus norvegicus
Coyote	Canis latrans	Opossum*	Didelphis virginiana
Deer mouse	Peromyscus maniculatus	Raccoon	Procyon lotor
Douglas' squirrel	Tamiasciurus douglasii	Red fox	Vulpes
Eastern gray squirrel*	Sciurus carolinensis	River otter	Lontra canadensis
Elk	Cervus elaphus	Shrew	Sorex sp.
Elk, Roosevelt	Cervus elaphus roosevelti		
Ermine	Mustela erminia	Shrew mole	Neurotrichus gibbsii
Least chipmunk	Tamias minimus	Southern red-backed vole	Clethrionomys gapperi
Long-tailed weasel	Mustela frenata	Striped skunk	Mephitis mephitis
Marten	Martes americana	Townsend's mole	Scapanus townsendii
Masked shrew	Sorex cinereus	Vole	Microtus sp.
Mink	Mustela vison	Water shrew	Sorex palustris

COMMON NAME	SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME
REPTILES			
Common garter snake	Thamnophis sirtalis	Rubber boa	Charina bottae
Northern alligator lizard	Gerrhonotus coeruleus	Western pond turtle	Actinemys marmorata
Northwestern garter snake	Thamnophis ordinoides	Western terrestrial	Thamnophis elegans
		garter snake	
Painted turtle	Chrysemys picta		
Pond slider turtle*	Trachemys scripta		

#### Notes:

Table includes wildlife species that occur or potentially occur within the study area. The list of wildlife species is not intended to be a comprehensive list of all wildlife species that could be found within the study area but is based on wildlife species identified within the study area or known and expected to occur in similar habitats in Lewis, Thurston, Grays Harbor, and Pacific counties, and Western Washington.

\* non-native species

Amphibian and Reptile Species with Federal and/or State Status and Preferred Habitats in Lewis, Thurston, Grays Harbor, and Pacific Counties

	FEDERAL STATUS	STATE	24		LEWIS	THURSTON	GRAYS HARBOR	PACIFIC
COMMON NAME (SCIENTIFIC NAME)	(USFWS) <sup>1,2</sup>	STATUS <sup>3,4</sup>	PRIORITY AREA <sup>3,4</sup>	HABITAT DESCRIPTION <sup>3,5</sup>	COUNTY <sup>1,3,4</sup>	COUNTY <sup>1,3,4</sup>	COUNTY <sup>1,3</sup>	COUNTY <sup>1,3</sup>
AMPHIBIANS WITH FEDERAL OR STATE	E SPECIAL STATUS		7					
Dunn's salamander	None	Candidate	Any occurrence:' In the	Forested areas from sea level to 1,006 m (3,300 ft); both juveniles and				
(Plethodon dunni)			Chehalis Basin, known only	adults inhabit wet, rocky substrates that are heavily shaded, including				
			from the Willapa Hills <sup>6</sup>	wet talus slopes, seeps, and stream borders; use downed logs and	•		•	•
				woody debris for cover and feeding; use riparian areas more often than				
				upslope areas and are generally considered to be riparian associates.				
Oregon spotted frog	Threatened	Endangered	Any occurrence: <sup>7</sup> In the	Highly aquatic, inhabiting marshes and marshy edges of ponds,				
(Rana pretiosa)			Chehalis Basin, currently	streams, and lakes.	•	•	•	•
			known only from the Black		•	•	•	•
			River system <sup>6</sup>					
Van Dyke's salamander	None	Candidate	Any occurrence: <sup>7</sup> In the	Inhabits rocky seeps and stream banks or moist, north-facing, rocky				
(Plethodon vandykei)			Chehalis Basin, known only	habitats in forested areas from sea level to 1,097 m (3,600 ft); both				
			from the Cascades,	juveniles and adults inhabit the splash zones of streams where they can				
			Olympic, and Willapa Hills	be found under cobbles and woody debris and in cracks in rock faces;				
			highlands <sup>6</sup>	Van Dyke's salamanders have been found far from water on	•	•	•	•
				moss-covered talus slopes and fractured rock outcrops with northerly				
				exposures; associated to some degree with riparian habitats in mature				
				and old-growth coniferous forests where they are thought to use				
				downed logs for cover and feeding.				
Western toad	None	Candidate	Any occurrence: <sup>7</sup> In the	Occurs in a wide variety of habitats ranging from desert springs to				
(Anaxyrus boreas)			Chehalis Basin, known only	mountain wetlands, and various upland habitats around ponds, lakes,				
			from medium river habitat <sup>6</sup>	reservoirs, and slow-moving rivers and streams; for shelter, they dig		_		-
				burrows in loose soil or seclude themselves under logs or rocks; egg	•	•	•	•
				laying sites include shallow areas of ponds, lakes, or reservoirs, or				
				pools of slow-moving streams.				
<b>REPTILES WITH FEDERAL OR STATE SPE</b>	CIAL STATUS	•						
Western pond turtle	None	Endangered	Any occurrence: <sup>7</sup> Thought	Marshes, ponds, sloughs, and small lakes in Washington from sea level				
(Actinemys marmorata)			to be extirpated in Chehalis	to approximately 763 m (2,500 ft); permanent and intermittent bodies				
			Basin; targeted for	of water on a variety of substrates, including rock, gravel, sand, mud,				
			reintroduction <sup>6</sup>	and decaying vegetation; submerged vegetation, rocks and logs,		_		
				undercut banks, and mud are also important refugia; adults require	•	•	•	
				emergent logs or boulders, or floating vegetation for basking during				
				sunny hours; dense, woody vegetation that shades potential basking				
				sites may render an area unsuitable.				

Notes:

Table includes amphibian and reptile species and habitats identified for Grays Harbor, Lewis, Thurston, and Pacific counties. The list of species and habitats was developed using WDFW Priority Habitats and Species (PHS) distribution maps (2019a) and lists (2019b). Species distribution maps depict counties where each priority species is known to occur as well as other counties where habitat primarily associated with the species exists. The following two assumptions were made when developing distribution maps for each species: 1) there is a high likelihood a species is present within a county, even if it has not been directly observed, if the habitat with which it is primarily associated exists; and 2) over time, species can naturally change their distribution and move to new counties where usable habitat exists.

1. USFWS 2019b2. USFWS 2019c3. WDFW 2019a4. WDFW 2019b5. NatureServe 20196. Hayes 2019b7. Species are considered a priority only when they occur within known limiting habitats or priority areas. If limiting habitats are unknown, or species are rare, the priority area is described as "any occurrence."

## Table P1-8 Bird Species with Federal and/or State Status and Preferred Habitats in Lewis, Thurston, Grays Harbor, and Pacific Counties

COMMON NAME (SCIENTIFIC NAME)	FEDERAL STATUS (USFWS) <sup>1,2</sup>	STATE STATUS/PHS DESIGNATION <sup>3,4</sup>	PRIORITY AREA <sup>3,4</sup>	HABITAT DESCRIPTION <sup>3,5</sup>	LEWIS COUNTY <sup>1,3,4</sup>	THURSTON COUNTY <sup>1,3,4</sup>	GRAYS HARBOR COUNTY <sup>1,3</sup>	PACIFIC COUNTY <sup>1,3</sup>
Band-tailed pigeon ( <i>Columba fasciata</i> )	None	Status: None PHS Designation: Recreational, commercial, and/or tribal importance	Regular concentrations, occupied mineral sites	Mixed conifer and hardwood forests interspersed with younger wooded areas or small fields; Douglas-fir, hemlock, redcedar, maple, spruce, willow, pine, cottonwood, and Garry oak.	•	•	•	•
Black-backed woodpecker ( <i>Picoides arcticus</i> )	None	Candidate	Breeding areas, regular occurrences	Associated with boreal and montane coniferous forests, especially in areas with standing dead trees such as burns, bogs, and windfalls.	•			
Cavity-nesting ducks	None	Status: None PHS Designation: Recreational, commercial, and/or tribal importance	Breeding areas	Nest primarily in late-successional forests and riparian areas adjacent to low-gradient rivers, sloughs, lakes, and beaver ponds; nest almost exclusively in tree cavities, which offer protection from weather and predators; snags and cavity trees near shallow wetlands are ideal for brooding.	•	•	•	•
Cavity-nesting ducks: Barrow's goldeneye ( <i>Bucephala islandica</i> )	None	Status: None PHS Designation: Vulnerable aggregations, nonbreeding concentrations; recreational, commercial, and/or tribal importance	Breeding areas: In the Chehalis Basin, in Grays Harbor, wintering occurs, but is unrecorded <sup>6</sup>	Marine tidal areas. <sup>6</sup>	•	•	•	•
Cavity-nesting ducks: Bufflehead ( <i>Bucephala albeola</i> )	None	Status: None PHS Designation: Vulnerable aggregations, nonbreeding concentrations; recreational, commercial, and/or tribal importance	Breeding areas: Tied to flickers for nest cavities, in the Chehalis Basin, breeding locations uncertain <sup>6</sup>	Riparian forest and adjacent aquatic habitat. <sup>6</sup>	•	•	•	•
Cavity-nesting ducks: Common goldeneye ( <i>Bucephala clangula</i> )	None	Status: None PHS Designation: Vulnerable aggregations, nonbreeding concentrations; Recreational, commercial, and/or tribal importance	Breeding areas: Vulnerable aggregations, in the Chehalis Basin, in Grays Harbor and tidal surge floodplain area <sup>6</sup>	Marine tidal areas. <sup>6</sup>	•	•	•	•
Cavity-nesting ducks: Hooded merganser ( <i>Lophodytes</i> cucullatus)	None	Status: None PHS Designation: Recreational, commercial, and/or tribal importance	Breeding areas: Vulnerable aggregations, in the Chehalis Basin, in Grays Harbor and tidal surge floodplain area <sup>7</sup>	Marine tidal areas. <sup>6</sup>	•	•	•	•
Cavity-nesting ducks: Wood duck ( <i>Aix sponsa</i> )	None	Status: None PHS Designation: Recreational, commercial, and/or tribal importance	Breeding areas: Vulnerable aggregations, in the Chehalis Basin, in Grays Harbor and tidal surge floodplain area <sup>6</sup>	Marine tidal areas, lakes, reservoirs, and wetlands. <sup>6</sup>	•	•	•	•

COMMON NAME	FEDERAL STATUS	STATE STATUS/PHS			LEWIS	THURSTON	GRAYS HARBOR	PACIFIC
(SCIENTIFIC NAME)	(USFWS) <sup>1,2</sup>	DESIGNATION <sup>3,4</sup>	PRIORITY AREA <sup>3,4</sup>	HABITAT DESCRIPTION <sup>3,5</sup>	COUNTY <sup>1,3,4</sup>	COUNTY <sup>1,3,4</sup>	COUNTY <sup>1,3</sup>	COUNTY <sup>1,3</sup>
Common loon (Gavia immer)	None	Status: Sensitive	Breeding sites, migratory	Breeding habitat usually includes clear lakes containing				
		PHS Designation: Vulnerable	stopovers, regular	both shallow and deepwater areas; nest sites are found				
		aggregations, nonbreeding	concentrations: In the Chehalis	on small islands, quiet backwaters, mainland shores,				
		concentrations	Basin, appears in Grays Harbor	marshy portions of lakes; in winter and during		•	•	•
			and lower Chehalis River	migration, use inland lakes and rivers and marine and				
			seasonally <sup>6</sup>	estuarine coastal waters.				
Golden eagle (Aquila chrysaetos)	None	Candidate	Breeding areas, foraging areas	Open, arid plateaus deeply cut by streams and canyons,				
				western shrub-steppe and grassland communities and				
				transition zones between shrub, grassland, and				
				forested habitat; sometimes found in mature and	•	•	•	•
				old-growth forests near the edges of clearcuts in				
				western Washington; nests generally are located on				
				cliffs and are occasionally located in trees.				
Great blue heron (Ardea	None	Status: None	Breeding areas: in the Chehalis	Nesting habitat typically consists of mature forest;				
herodias)		PHS Designation: Vulnerable	Basin, in Grays Harbor and tidal	breeding herons feed in wetland complexes, large				
		aggregations	surge floodplain area <sup>6</sup>	rivers and creeks, and small lakes: fall/winter often	•	•	•	•
				prev on small mammals in fallow, freshly plowed, or				
				mowed fields and in grassland habitat.				
Harlequin duck (Histrionicus	None	Status: None	Breeding areas, regular	Require fast-flowing water with loafing sites nearby:				
histrionicus)		PHS Designation: Vulnerable	concentrations in saltwater:	streams usually have substrate that ranges from cobble				
		aggregations: recreational	vulnerable aggregations in the	to boulder with adjacent vegetated banks: they have				
		commercial and/or tribal	Chehalis Basin in Gravs Harbor	been found more often at distances >50 m (164 ft)				
		importance	and tidal surge floodplain area <sup>6</sup>	from roads or trails and in stream reaches with mature	•	•	•	
				and old-growth forest cover: stream alterations that				
				would cause greater surface runoff changing water				
				levels or lower macroinvertebrate levels should be				
				avoided				
Marbled murrelet	Threatened	Endangered	Any occurrence in suitable	Mature old-growth forests (nesting roosting)				
(Brachyramphus marmoratus)	medicileu	PHS Designation: Vulnerable	habitat		•	•	•	•
		aggregations	habitat		•	•	•	
Mountain quail (Oreortyx pictus)	None	Status: None	Any occurrence <sup>7</sup>	Mixed evergreen-deciduous forests, regenerating				
	None	PHS Designation: Recreational	Any occurrence	clearcuts forest and meadow edges chanarral slones				
		commercial and/or tribal		shrub-steppe, and mixed forest/shrub areas: seek	•	•		•
		importance		brush bardwood and conifer communities for pesting	•	•	•	· ·
		Importance		broading in cool moist bottoms of draws and canyons				
Northern goshawk (Acciniter	None	Candidate	Breeding areas Including	All forested regions with >50% closed canony with				
aentilis)	None	Candidate	alternate nest sites nost-	multiple layers			•	
gentinsy			flodging foraging areas		•		•	•
Northorn spotted owl (Striv	Throatonod	Endangered		Mature old growth forests (posting reacting				
occidentalis cauring)	Infeateneu	Endangered	Any occurrence	for a singly second growth used for dispersel	•	•	•	•
	Nono	Candidata		Various open babitate with grass including provide				
(Papagatas graminous affinia)	None	Candidate	Any occurrence'	various open nabitats with grass, including prairie,	•	•	•	•
				sagebrush steppe, meadows, pastures, and roadsides.				
Plieated woodpecker	None	Candidate	Breeding areas	Uid-growth and mature forest.	•	•	•	•
(Dryocopus pileatus)								

COMMON NAME (SCIENTIFIC NAME)	FEDERAL STATUS (USFWS) <sup>1,2</sup>	STATE STATUS/PHS DESIGNATION <sup>3,4</sup>	PRIORITY AREA <sup>3,4</sup>	HABITAT DESCRIPTION <sup>3,5</sup>	LEWIS COUNTY <sup>1,3,4</sup>	THURSTON COUNTY <sup>1,3,4</sup>	GRAYS HARBOR COUNTY <sup>1,3</sup>	PACIFIC COUNTY <sup>1,3</sup>
Shorebirds: plovers ( <i>Charadrius</i> ssp.), sandpipers ( <i>Calidris</i> ssp.), avocets ( <i>Recurvirostra</i> ssp.), oystercatchers ( <i>Haematopus</i> ssp.), stilts ( <i>Himantopus</i> ssp.), snipes ( <i>Gallinago</i> ssp.), and phalaropes ( <i>Phalaropus</i> ssp.)	None	Status: None PHS Designation: Vulnerable aggregations	Breeding areas, regular concentrations	Coastal estuaries.			•	•
Slender-billed white-breasted nuthatch ( <i>Sitta carolinensis</i> aculeata)	None	Candidate	Any occurrence <sup>7</sup>	Large patches of Oregon white oak, as well as black cottonwood and Oregon ash.	•	•		
Sooty grouse (Dendragapus fuliginosus)	None	Status: None PHS Designation: Recreational, commercial, and/or tribal importance	Breeding areas, regular concentrations	During breeding season, can be found in forested habitats from sea level to thousands of feet in elevation; lowland forest is the preferred habitat for this species; in winter, found almost entirely in coniferous forests.	•	•	•	•
Streaked horned lark (Eremophila alprestris strigata)	Threatened	Endangered	Any occurrence <sup>7</sup>	Large expanses of bare or thinly vegetated land, including fields, prairies, dunes, upper beaches, airports, and similar areas with low/sparse grassy vegetation.		•	•	•
Trumpeter swan ( <i>Cygnus buccinator</i> )	None	Status: None PHS Designation: Vulnerable aggregations; recreational, commercial, and/or tribal importance	Breeding areas, regular concentrations in saltwater: Vulnerable aggregations, in the Chehalis Basin, in Grays Harbor and tidal surge floodplain area <sup>5</sup>	Ponds, lakes, and marshes; breeding in areas of reeds, sedges or similar emergent vegetation, primarily in freshwater; wintering in open ponds, lakes, and sheltered bays and estuaries.			•	•
Tundra Swan ( <i>Cygnus</i> columbianus)	None	Status: None PHS Designation: Vulnerable aggregations; recreational, commercial, and/or tribal importance	Regular concentrations: Vulnerable aggregations, in the Chehalis Basin, in Grays Harbor and tidal surge floodplain area <sup>6</sup>	Marine tidal areas. <sup>6</sup>				•
Vaux's swift ( <i>Chaetura vauxi</i> )	None	Candidate	Breeding areas, communal roosts	Strongly associated with old-growth and mature forests; they require hollow chambers in large snags or live trees with broken tops for nesting and night roosting.	•	•	•	•
Waterfowl concentrations ( <i>Anatidae</i> excluding Canada geese in urban areas)	None	Status: None PHS Designation: Vulnerable aggregations; recreational, commercial, and/or tribal importance	Significant breeding areas, regular concentrations in winter	None provided.	•	•	•	•
Western grebe (Aechmophorus occidentalis)	None	Status: Candidate PHS Designation: Vulnerable aggregations	Breeding areas: Vulnerable aggregations, in the Chehalis Basin location of breeding aggregation currently unknown <sup>6</sup>	Marshes, lakes, and bays; in migration and winter also sheltered seacoasts or rivers; nests anchored to living vegetation on large inland bodies of water very close to deep water to allow bird to swim submerged.		•	•	•

COMMON NAME (SCIENTIFIC NAME)	FEDERAL STATUS (USFWS) <sup>1,2</sup>	STATE STATUS/PHS DESIGNATION <sup>3,4</sup>	PRIORITY AREA <sup>3,4</sup>	HABITAT DESCRIPTION <sup>3,5</sup>	LEWIS COUNTY <sup>1,3,4</sup>	THURSTON COUNTY <sup>1,3,4</sup>	GRAYS HARBOR COUNTY <sup>1,3</sup>	PACIFIC COUNTY <sup>1,3</sup>
Western Washington breeding concentrations of: Cormorants ( <i>Phalacrocoracidae</i> ), Storm- petrels ( <i>Hydrobatidae</i> ), Terns ( <i>Laridae</i> ), Alcids ( <i>Alcidae</i> )	None	Status: None PHS Designation: Vulnerable aggregations	Breeding areas	None provided.		•	•	•
Western Washington non- breeding concentrations of: Barrow's goldeneye ( <i>Bucephala</i> <i>islandica</i> ), Bufflehead ( <i>Bucephala albeola</i> ), Common goldeneye ( <i>Bucephala clangula</i> )	None	Status: None PHS Designation: Vulnerable aggregations; recreational, commercial, and/or tribal importance	Regular concentration	Nest primarily in late-successional forests and riparian areas adjacent to low-gradient rivers, sloughs, lakes, and beaver ponds; nest almost exclusively in tree cavities, which offer protection from weather and predators; snags and cavity trees near shallow wetlands are ideal for brooding.	•	•	•	•
Western Washington non- breeding concentrations of: <i>Charadriidae, Scolopacidae,</i> <i>Phalaropodidae</i>	None	Status: None PHS Designation: Vulnerable aggregations	Regular concentrations	Most significant areas during migration include Grays Harbor; during the nonbreeding period, most shorebird species in Washington aggregate in large single- or multi-species flocks at estuaries, beaches, wetlands, or other foraging and/or roosting locations; flocks of black-bellied plovers occasionally occur at non- estuarine sites in Western Washington (e.g., flooded fields in the Wynoochee and Chehalis River valleys).	•	•	•	•
Western Washington nonbreeding concentrations of: Loons ( <i>Gaviidae</i> ), Grebes ( <i>Podicipedidae</i> ), Cormorants ( <i>Phalacrocoracidae</i> ), Fulmar and Shearwaters ( <i>Procellariidae</i> ), Storm-petrels ( <i>Hydrobatidae</i> ), Alcids ( <i>Alcidae</i> )	None	Status: None PHS Designation: Vulnerable aggregations	Regular concentrations	None provided.		•	•	•
Wild turkey ( <i>Melegris gallopavo</i> )	None	Status: None PHS Designation: Recreational, commercial, and/or tribal importance (non-native)	Regular concentrations and roosts in WDFW's primary management zones for wild turkey	Depend on trees and grasses; trees provide food, escape cover, and roost sites, while grasses provide food for adults and an environment that allows poults.	•	•	•	•

COMMON NAME (SCIENTIFIC NAME)	FEDERAL STATUS (USFWS) <sup>1,2</sup>	STATE STATUS/PHS DESIGNATION <sup>3,4</sup>	PRIORITY AREA <sup>3,4</sup>	HABITAT DESCRIPTION <sup>3,5</sup>	LEWIS COUNTY <sup>1,3,4</sup>	THURSTON COUNTY <sup>1,3,4</sup>	GRAYS HARBOR COUNTY <sup>1,3</sup>	PACIFIC COUNTY <sup>1,3</sup>
Yellow-billed cuckoo (Coccyzus	Threatened	Endangered	Any occurrence <sup>7</sup>	Breed in open woodlands, parks, deciduous, riparian				
americanus)	(Western U.S.			woodlands; nest in tall cottonwood and willow riparian		-		
	<b>Distinct Population</b>			woodlands, moist thickets, orchards, or overgrown		•	•	
	Segment)			pasture.				

Notes:

Table includes bird species and habitats identified for Grays Harbor, Lewis, Thurston, and Pacific counties. The list of species and habitats was developed using WDFW PHS distribution maps (2019a) and lists (2019b). Species distribution maps depict counties where each priority species is known to occur as well as other counties where habitat primarily associated with the species exists. The following two assumptions were made when developing distribution maps for each species: 1) there is a high likelihood a species is present within a county, even if it has not been directly observed, if the habitat with which it is primarily associated exists; and 2) over time, species can naturally change their distribution and move to new counties where usable habitat exists. 1. USFWS 2019b

2. USFWS 2019b

3. WDFW 2019a

4. WDFW 2019a

5. NatureServe 2019

6. Hayes 2019b

7. Species are considered a priority only when they occur within known limiting habitats or priority areas. If limiting habitats are unknown, or species are rare, the priority area is described as "any occurrence." PHS: Priority Habitats and Species

### Table P1-9 Insect Species with Federal and/or State Status and Preferred Habitats in Lewis, Thurston, Grays Harbor, and Pacific Counties

COMMON NAME (SCIENTIEIC NAME)	FEDERAL STATUS	ςτατε ςτατιις <sup>3,4</sup>	<b>ΔΡΙΟΡΙΤΥ ΑΡΕΛ<sup>3,4</sup></b>				GRAYS HARBOR	
Beller's ground beetle (Agonum belleri)	None	Candidate		Lowland sphagnum hogs associated with lakes below elevations of	COONT	COONT	COONT	COUNTY
bener 3 ground beetle (Agonam benerij	None	Canalate	Any occurrence	1 000 ft		•		
Blue-gray taildropper (Pronbysgon	None	Candidate	Any occurrence <sup>6</sup>	Moist coniferous or mixed-wood forests of varving age classes				
coeruleum)	None	Canalate	Any occurrence	worst, connerous or mixed wood forests of varying age classes.	•			
Johnson's hairstreak ( <i>Mitoura johnsoni</i> )	None	Candidate	Any occurrence <sup>6</sup>	Old-growth coniferous forests; associated with conifer mistletoe	-		-	
				(genus Arceuthobium).	•		•	
Leschi's millipede (Leschius mcallisteri)	None	Candidate	Any occurrence <sup>6</sup>	None provided.		•		
Makah copper (Lycaena mariposa charlottensis)	None	Candidate	Any occurrence <sup>6</sup>	None provided.			•	•
Mardon skipper ( <i>Polites mardon</i> )	Species of Concern	Endangered	Any occurrence <sup>6</sup>	Primarily inhabits open grasslands on glacial outwash prairies, as				
				well as openings and ridgetops within ponderosa pine (Pinus				
				ponderosa) woodlands; Idaho fescue (Festuca idahoensis) is the		•	•	
				suspected host plant.				
Oregon silverspot (Speyeria zerene	Threatened	Endangered	Any occurrence <sup>6</sup>	Occurs in coastal salt spray meadows, stabilized dunes, and				
hyppolyta)				montane meadows; the butterfly's primary larval host plant is the				
				hookedspur violet (Viola adunca); important adult nectar plants				
				include common yarrow (Achillea millefolium), western pearly				•
				everlasting (Anaphalis margaritacea), Canada goldenrod (Solidago				
				canadensis), and Douglas aster (Symphyotrichum subspicatus var.				
				subspicatus).				
Pacific clubtail (Gomphus kurilis)	None	Candidate	Any occurrence <sup>6</sup>	None provided.		•		
Puget blue (Plebejus icarioides	None	Candidate	Any occurrence <sup>6</sup>	Forest clearings with a presence of lupine (Lupinus spp.), Puget				
blackmorei)				lowland prairies and their forest edges, powerline cuts, and		•	•	
				unsprayed railroad rights-of-way.				
Taylor's checkerspot (Euphydryas editha	Endangered	Endangered	Any occurrence <sup>6</sup>	Prairies with a dominance of original vegetation; host plants include				
taylori)				the native seaside plantain (Plantago maritima macrocarpa) and	•	•		
				the non-native English plantain (P. major lanceolata).				
Valley silverspot (Speyeria zerene	None	Candidate	Any occurrence <sup>6</sup>	Open prairies, arctic-alpine tundra, subalpine glades, and mid-				
bremnerii)				elevation roadsides and clearings; the only known host plant is the	•	•		
				western blue violet, Viola adunca.				

Notes:

Table includes insect species and habitats identified for Grays Harbor, Lewis, Thurston, and Pacific counties. The list of species and habitats was developed using WDFW PHS distribution maps (2019a) and lists (2019b). Species distribution maps depict counties where each priority species is known to occur as well as other counties where habitat primarily associated with the species exists. The following two assumptions were made when developing distribution maps for each species: 1) there is a high likelihood a species is present within a county, even if it has not been directly observed, if the habitat with which it is primarily associated exists; and 2) over time, species can naturally change their distribution and move to new counties where usable habitat exists.

1. USFWS 2019b

2. USFWS 2019c

3. WDFW 2019a

4. WDFW 2019b

5. NatureServe 2019

6. Species are considered a priority only when they occur within known limiting habitats or priority areas. If limiting habitats are unknown, or species are rare, the priority area is described as "any occurrence." PHS: Priority Habitats and Species

## Mammal Species with Federal and/or State Status and Preferred Habitats in Lewis, Thurston, Grays Harbor, and Pacific Counties

	FEDERAL STATUS	24	24		LEWIS	THURSTON	GRAYS HARBOR	PACIFIC
COMMON NAME (SCIENTIFIC NAME)	(USFWS) <sup>1,2</sup>	STATE STATUS <sup>3,4</sup>	PRIORITY AREA <sup>3,4</sup>	HABITAT DESCRIPTION <sup>3,3</sup>	COUNTY <sup>1,3</sup>	COUNTY <sup>1,3</sup>	COUNTY <sup>1,3</sup>	COUNTY <sup>1,3</sup>
MAMMALS WITH FEDERAL OR STATE SPECIAL STATU	IS Threatened	Endermond	A	Mature forests with dense underseven and denoted			T	
Canada iynx (Lynx canadensis)	Inreatened	Endangered	Any occurrence	wood for denning	•			
Cascade red fox (Vulnes vulnes cascadensis)	None	Candidate	Any occurrence <sup>6</sup>	None provided	•			
Columbian black-tailed deer (Odocoileus hemionus	None	Status: None	Regular concentrations.	Forage areas are <60% cover with understory of shrubs				
columbianus)		<ul> <li>PHS Designation: Recreational, commercial, and/or tribal</li> </ul>	migration corridors	and vegetation; thermal cover has >70% canopy cover of old-growth or late-stage stand rotation.	•	•	•	•
		importance						
Elk (Cervus elaphus)	None	<ul> <li>Status: None</li> <li>PHS Designation: Recreational, commercial, and/or tribal importance</li> </ul>	Calving areas, migration corridors, regular concentrations in winter and in foraging areas along coastal waters	Forested areas in winter; in summer can use moderate- sized patches of forage openings and cover areas.	•	•	•	•
Fisher ( <i>Martes pennanti</i> )	Proposed Threatened	Endangered	Any occurrence <sup>6</sup>	Mature, uneven stands of coniferous and mixed coniferous/deciduous with extensive continuous canopy where 50% to 90% of overstory is evergreen that is optimal winter habitat.	•	•	•	
Gopher: Olympia pocket gopher (Thomomys mazama pugetensis)	Threatened	Threatened	Any occurrence <sup>6</sup>	Prairie and mountain meadows.	•	•	•	
Gopher: Roy Prairie pocket gopher ( <i>Thomomys mazama</i> glacialis)	Threatened	Threatened	Any occurrence <sup>6</sup>	Prairie and mountain meadows.		•		
Gopher: Tenino pocket gopher ( <i>Thomomys mazama tumuli</i> )	Threatened	Threatened	Any occurrence <sup>6</sup>	Prairie and mountain meadows.	•	•	•	
Gopher: Western pocket gopher (Thomomys mazama couchi louiei)	Species of Concern	Threatened	Any occurrence <sup>6</sup>	Prairie and mountain meadows.	•	•	•	
Gopher: Yelm pocket gopher ( <i>Thomomys mazama yelmensis</i> )	Threatened	Threatened	Any occurrence <sup>6</sup>	Prairie and mountain meadows.	•	•	•	
Gray wolf (Canis lupus)	Proposed Endangered	Endangered	Regular occurrences	Security habitat >300 m from road, ungulate prey base.	•	•		
Marten ( <i>Martes americana</i> )	None	<ul> <li>Status: None</li> <li>PHS Designation: Recreational, commercial, and/or tribal importance</li> </ul>	Regular occurrence <sup>6</sup>	Mixed-age forests of a variety of species composition.	•	•	•	•
Mountain goat ( <i>Oreamnos americanus</i> )	None	<ul> <li>Status: None</li> <li>PHS Designation: Recreational, commercial, and/or tribal importance</li> </ul>	Breeding areas, regular concentration	Alpine and subalpine habitat; steep grassy talus slopes, grassy ledges of cliffs, or alpine meadows, usually at timberline or above; may seek shelter and food in stands of spruce or hemlock in winter.	•		•	

COMMON NAME (SCIENTIFIC NAME)	FEDERAL STATUS (USFWS) <sup>1,2</sup>	STATE STATUS <sup>3,4</sup>	PRIORITY AREA <sup>3,4</sup>	HABITAT DESCRIPTION <sup>3,5</sup>	LEWIS COUNTY <sup>1,3</sup>	THURSTON COUNTY <sup>1,3</sup>	GRAYS HARBOR COUNTY <sup>1,3</sup>	PACIFIC COUNTY <sup>1,3</sup>
North American wolverine (Gulo gulo luscus)	Proposed Threatened	Candidate	Any occurrence <sup>6</sup>	Rugged, remote country, spending most of the time in high elevations near or above timberline.	•	•		
Olympic marmot ( <i>Marmota olympus</i> )	None	Candidate	Any occurrence <sup>6</sup>	Subalpine and alpine meadows and talus slopes near timberline; many colonies are located on south-facing slopes, where food availability is probably greater because of earlier snowmelt.			•	
Western gray squirrel ( <i>Sciurus griseus</i> )	None	Threatened	Any occurrence <sup>6</sup>	Pine and oak typical; transitional, conifer-dominated areas that merge with open patches of oak and other deciduous trees; mature and large seeded mast- producing trees provide abundant food and sites for nest construction.	•	•	•	
BATS WITH FEDERAL OR STATE SPECIAL STATUS								
Roosting concentrations of: Big-brown bat ( <i>Eptesicus fuscus</i> ), Myotis bats ( <i>Myotis</i> spp.), Pallid bat ( <i>Antrozous pallidus</i> )	None	<ul> <li>Status: None</li> <li>PHS Designation: Vulnerable aggregations</li> </ul>	Regular concentrations in naturally occurring breeding areas and other communal roosts	None provided.	•	•	•	•
Keen's myotis ( <i>Myotis evotis keenii</i> )	None	<ul> <li>State Status: Candidate</li> <li>PHS Designation: Vulnerable aggregations</li> </ul>	Any occurrence <sup>6</sup>	Associated with coastal forest habitat; roost in southwest-facing rock crevices, among geothermally heated rocks, in tree cavities, bark crevices, and buildings.			•	
Townsend's big-eared bat (Corynorhinus townsendii)	None	<ul> <li>State Status: Candidate</li> <li>PHS Designation: Vulnerable aggregations</li> </ul>	Any occurrence <sup>6</sup>	Uses caves, mines, hollow trees, and built structures for roosting; westside lowland conifer-hardwood forest, ponderosa pine forest and woodlands, mixed highland conifer forest, eastside mixed conifer forest, shrub- steppe, and both eastside and westside riparian wetlands.	•	•	•	•

Notes:

Table includes mammal species and habitats identified for Grays Harbor, Lewis, Thurston, and Pacific counties. The list of species and habitats was developed using WDFW PHS distribution maps (2019a) and lists (2019b). Species distribution maps depict counties where each priority species is known to occur as well as other counties where habitat primarily associated with the species exists. The following two assumptions were made when developing distribution maps for each species: 1) there is a high likelihood a species is present within a county, even if it has not been directly observed, if the habitat with which it is primarily associated exists; and 2) over time, species can naturally change their distribution and move to new counties where usable habitat exists. 1. USFWS 2019b

2. USFWS 2019c

3. WDFW 2019a

4. WDFW 2019b

5. NatureServe 2019

6. Species are considered a priority only when they occur within known limiting habitats or priority areas. If limiting habitats are unknown, or species are rare, the priority area is described as "any occurrence." PHS: Priority Habitats and Species

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