VEGETATION MAPPING STUDY DRAFT REPORT

ATTACHMENT E

CORRELATION WITH WDFW PHS

Table E-1. Vegetation cover types for mapped WDFW's priority habitats and species (PHS) (X = PHS mapped in cover type).

Species	Habitat Requirements[1]	Cover Type																
		G210	G219	G237	G240	G241	G305	G318	G322	G488	G517	G521	G524	G527	G648	G849	G851	G853
Biodiversity areas and corridor	Biodiversity areas have been identified as biologically diverse through a scientifically based assessment at a landscape scale or are areas within a city or urban growth area (UGA) that contains habitat valuable to fish and wildlife. 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, or valuable habitats within a city or UGA (WDFW 2008).	-	-	X	X	-	-	-	X	-	-	-	X	-	X	-	X	X
Wood duck (*Aix sponsa*) breeding areas	The wood duck, and other cavity-nesting ducks, nest primarily in late successional forests and riparian areas adjacent to low gradient rivers, sloughs, lakes, and beaver ponds. They are secondary cavity nesters, using cavities created by large woodpeckers or by decay or damage to the tree (WDFW 2004).	-	-	X	X	-	-	-	X	-	-	-	-	-	X	-	X	X
Northern goshawk (*Accipiter gentilis*)	Nesting sites are more likely to be occupied in landscapes dominated by larger uniform patches of forest in mature and late seral stages (WDFW 2004).	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Western toad (or boreal toad) (*Anaxyrus boreas boreas*)	Permanent waters including wetlands, ponds, lakes, river edges, off-channel habitat (WDFW 2015).	-	-	-	X	-	-	-	X	-	-	-	-	-	-	-	X	-
Marbled murrelet (*Brachyramphus marmoratus*)	Mature and old-growth conifer forests, and sometimes younger forests with residual old-growth trees with suitable nesting platforms within close proximity to marine water foraging areas (WDFW 2015).	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	X	-
Gray wolf (*Canis lupis*)	Wolves are generalists in habitat use and have been recorded in every habitat with large ungulates, including forests, prairies, swamps, tundra, and coasts (WDFW 2011).	-	-	X	X			X	X	-	-	-	-	-	-	-	-	-
Elk (*Cervus elaphus*)	Grasslands, meadows, or clearcut areas where not covered by deep snow and often interspersed with closed-canopy forests to provide cover. Winter ranges can be largely on private lands (WDFW 2005).	-	-	X	X	-	-	-	X	-	-	-	X	-	X	-	X	X
Pileated woodpecker (*Dryocopus pileatus*)	Inhabit mature and old-growth forests, and second-growth forests with large snags and fallen trees. Large snags and large decaying live trees in older forests are used by pileated woodpeckers for nesting and roosting throughout their range (WDFW 2004).	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Wolverine (*Gulo gulo*)	Alpine and subalpine-forest habitats. Denning sites are commonly located in north and northeastern facing cirque habitats. Dens are typically associated with a passage through deep snow to a space within talus or under a fallen tree(s) or other large woody debris (WDFW 2015).	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Harlequin duck (*Histrionicus histrionicus*) breeding areas	During the nesting season, adult harlequin ducks require fast-flowing water with loafing sites nearby. Harlequins often nest on the ground; however, cavities in trees and cliff faces also serve as nest sites (WDFW 2004).	-	-	X	X	-	-	-	X	-	X	-	X	-	X	-	X	X

Species	Habitat Requirements[1]	Cover Type																
		G210	G219	G237	G240	G241	G305	G318	G322	G488	G517	G521	G524	G527	G648	G849	G851	G853
Canada lynx (*Lynx canadensis*)	Subalpine and boreal coniferous forests that have substantial accumulations of snow; lynx typically hunt for snowshoe hares in early successional forest. Use mature forest stands for denning with den sites, often in piles of fallen trees (WDFW 2015).	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
California myotis (*Myotis californicus*)	Roost sites include crevices beneath tree bark and rocks; in tree cavities, caves, mines, buildings, and bridges; on shrubs; and on the ground. Maternity colonies occur in many of these same types of sites. May also use human-made shelter (WDFW 2013).	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Western long-eared bat (*Myotis evotis*)	Foraging occurs in a variety of forest types, along forest edges, and over open meadows, but riparian areas and other habitats near water appear to be especially preferred. Most commonly associated with conifer forests. Non-forested habitats are also used, including shrub-steppe, chaparral, and agricultural lands, if suitable roosting sites, water sources, and riparian habitats are available (WDFW 2013).	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Little brown bat (*Myotis lucifugus*)	Day roosting occurs in a variety of sites, including buildings and other structures, tree cavities and beneath bark, rock crevices, caves, and mines. Reproductive females usually live separately from males and non-reproductive females, forming maternity roosts at sites with warm (30-55°C) (86-131°F), stable temperatures that facilitate rapid development of the young (WDFW 2013).	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-legged myotis (*Myotis volans*)	Roost sites include snags and live trees with loose bark, long vertical cracks, or hollows; cracks and crevices in rocks, stream banks, and the ground; buildings; bridges; caves; and mines. Roost snags and trees are typically taller and larger in diameter than other snags and trees in the surrounding canopy, are farther from neighboring tall trees, occur in areas of lower canopy closure, and are in the early to intermediate stages of decay (WDFW 2013).	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Yuma myotis (*Myotis yumanensis*)	Buildings, bridges, cliff crevices, caves, mines, and trees are used as summer day roosts, especially when located near water. Maternity colonies occupy buildings, caves, mines, and the undersides of train trestles and piers. Adapted for foraging within forests and along forest edges (WDFW 2013).	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Columbian black-tailed deer (*Odocoileus hemionus columbianus*)	Prefer brushy, logged lands and coniferous forests and thrive at the interface or opening and cover patches. Normally reside in a ½ to 3 square mile area WDFW (2021).	-	-	X	X	-	-	-	X	-	-	-	-	-	X	-	X	-
Spotted owl (*Strix occidentalis*) buffer	Mid- and late seral coniferous forests. Typical habitat with generally high canopy closure; complex canopy structure involving trees of multiple age or size classes; large decaying trees and/or snags; and, in most forest areas, a high volume of downed wood (WDFW 2015).	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Species	Habitat Requirements[1]	Cover Type																
		G210	G219	G237	G240	G241	G305	G318	G322	G488	G517	G521	G524	G527	G648	G849	G851	G853
Western gray squirrel (*Sciurus griseus*)	Typically, in transitional, conifer-dominated areas that merge with open patches of oak and other deciduous trees. Forested stands used as habitat offer a long-term supply of seed and fungi, escape cover, and plentiful nest sites (WDFW 2010).	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-
Grizzly bear (*Ursus arctos*)	Grizzly bears have a broad range of habitat tolerance. Contiguous, relatively undisturbed mountainous habitat having a high level of topographic and vegetative diversity characterizes most areas where the species remains (USFWS 1993).	-	-	-	X	-	-	X	X	-	-	-	-	-	-	-	-	-
Waterfowl concentrations	Includes areas of significant breeding areas and regular winter concentration of waterfowl (*Anatidae* family) excluding Canada geese in urban areas. These areas are generally surrounded by or close to water and may include the shores of cattail and bulrush marshes where they can feed on submerged aquatic vegetation. Nest sites vary widely and may include marshes, trees, and unoccupied nests of other birds such as eagle, herons, and ospreys (WDFW 2004).	-	-	X	X	-	-	-	X	-	-	-	X	-	X	-	X	-

1   Sources:

USFWS. 1993. Grizzly Bear Recovery Plan. Missoula, Montana. 181pp.

WDFW. 2004. Management Recommendations for Washington's Priority Species – Volume IV: Birds.

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VEGETATION MAPPING STUDY DRAFT REPORT

ATTACHMENT F

CORRELATION WITH WDFW SWAP SGCN

Table F-1. Vegetation cover types for Species of Greatest Conservation Need habitat ranges (D = documented habitat; P = potential habitat[1]).

Species	Habitat Requirements[2]	Cover Type[3]																			
		G210	G219	G223	G237	G240	G241	G271	G305	G318	G322	G488	G517	G520	G521	G524	G527	G648	G849	G851	G853
Western pond turtle[4] (*Actinemys marmorata*)	Ponds and lakes; nest in grassland and open woodlands around ponds.	-	-	-	P	P	-	-	-	-	P	-	-	-	-	P	-	P	-	P	P
Western toad (or boreal toad) (*Anaxyrus boreas boreas*)	Permanent waters including wetlands, ponds, lake, river edges, off-channel habitat.	D/P	D/P	-	D/P	D/P	D/P	-	D/P	D/P	D/P	D/P	D/P	D	P	D/P	D/P	D/P	D/P	D/P	D/P
Golden eagle[5] (*Aquila chrysaetos*)	Steep terrain. Nests are situated on cliff ledges, rocky outcrops, large trees, or human-made structures, such as power poles and transmission towers.	D	-	-	D	D	D	-	-	D	D	D	D	-	D	D	D	D	D	D	D
Marble murrelet (*Brachyramphus marmoratus*)	Mature and old-growth conifer forests, and sometimes younger forests with residual old-growth trees with suitable nesting platforms within close proximity to marine water foraging areas.	D/P	P	-	D/P	D/P	D/P	-	P	D/P	D/P	D/P	D/P	P	P	D/P	P	D/P	P	D/P	D/P
Gray wolf (*Canis lupis*)	Can thrive in almost any habitat (i.e., forests, prairies, swamps, mountains, deserts, and tundra) with sufficient prey and limited human-caused mortality.	D/P	D/P	-	D/P	D/P	D/P	-	D/P	D/P	D/P	D/P	D/P	P	D/P	-	D/P	-	D/P	D/P	-
Townsend's western big-eared bat (*Corynorhinus townsendii*)	Lowland conifer and deciduous forest, montane conifer forest, riparian forest, shrub-steppe, and open fields. Maternity and hibernation colonies are typically in caves, mine tunnels, and old buildings. Caves, tunnels, buildings, and tree cavities are used as night roosts.	P	P	-	D/P	D/P	P	-	P	P	D/P	P	P	P	P	D/P	P	D/P	P	D/P	D/P
Peregrine falcon (*Falco peregrinus*)	Breed on cliffs and occasionally tall buildings, bridges, and other locations that offer security and a vantage point above surrounding terrain.	D/P	D/P	-	D/P	D/P	D/P	-	D	D/P	D/P	D/P	D/P	D	D/P	D/P	D/P	D/P	D/P	D/P	D/P
Common loon (*Gavia immer*)	Inland lakes and rivers. Breeding habitat includes clear lakes containing both shallow and deep water areas. Nest sites are on small islands, quiet backwaters, or mainland shores.	D/P	D/P	-	D/P	D/P	D/P	-	D/P	D/P	D/P	D/P	D/P	P	D	D/P	D/P	-	D/P	D/P	-
Wolverine (*Gulo gulo*)	Alpine and subalpine-forest habitats. Denning sites are commonly located in north and northeastern facing cirque habitats. Dens are typically associated with a passage through deep snow to a space within talus or under a fallen tree(s) or other large woody debris.	D/P	D	-	D/P	D/P	D/P	-	D	D/P	D/P	D/P	D/P	D	D	D/P	D/P	D/P	D/P	D/P	D/P
Bald eagle (*Haliaeetus leucocephalus*)	Breeding habitat most commonly includes areas close to coastal areas, bays, rivers, lakes, reservoirs, or other bodies of water that reflect the availability of primary food sources including fish, waterfowl, or seabirds. Nests are usually constructed in large trees, both coniferous and deciduous.	-	-	-	D/P	D/P	-	-	-	-	D/P	-	-	-	-	D/P	-	D/P	-	D/P	D/P

Species	Habitat Requirements[2]	Cover Type[3]																			
		G210	G219	G223	G237	G240	G241	G271	G305	G318	G322	G488	G517	G520	G521	G524	G527	G648	G849	G851	G853
Hoary bat (*Lasiurus cinereus*)	Primarily deciduous and coniferous forests and woodlands, including areas altered by humans. Roost sites are usually in tree foliage 10 to 16 feet above the ground, with dense foliage above and open flying room below, often at the edge of clearings.	P	P	-	D/P	P	-	P	P	P	D/P	P	P	P	P	D/P	P	D/P	P	D/P	D/P
Silver haired bat (*Lasionycteris noctivagans*)	Forested and riparian areas with large dead and dying trees that offer structural complexity. Large snags provide suitable roost trees, and a multi-layered canopy structure is favorable to flying and foraging.	P	P	-	D/P	D/P	-	P	P	P	D/P	P	PP	P	P	D/P	P	D/P	P	D/P	D/P
Canada lynx[4] (*Lynx canadensis*)	Subalpine and boreal coniferous forests that have substantial accumulations of snow; lynx typically hunt for snowshoe hares in early successional forest. Use mature forest stands for denning with den sites, often in piles of fallen trees.	P	P	-	P	P	-	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Fisher (*Martes pennanti*)	Coniferous and mixed forests away from significant human activity and developed areas. Consistently associated with forests that provide moderate to high canopy closure and the presence of large woody structures such as cavity trees, snags, and logs.	D/P	P	-	D/P	D/P	-	D/P	P	D/P	D/P	D/P	D/P	P	D/P	P	D/P	P	D/P	D/P	P
American pika (*Ochotona princeps*)	Rocky talus slopes, primarily the talus meadow interface. Often above the tree line up to the limit of vegetation. Also found at lower elevations in rocky areas within forests or near lakes.	P	P	-	D/P	D/P	-	D/P	P	P	D/P	P	P	P	P	D/P	P	D/P	P	D/P	D/P
Western screech owl (*Otus kennicotii macfarlanei*)	Found in many forest types, from urban to rural and including riparian zones and forests dominated by Douglas-fir, western hemlock, Sitka spruce, and grand fir.	D/P	P	-	D/P	D/P	-	D/P	P	D/P	D/P	D/P	D/P	P	P	D/P	D/P	D/P	D/P	D/P	D/P
Purple martin (*Progne subis*)	Previously established cavities in trees, primarily in the marine environment but can occur near lakes and marshes. Rarely nest in snags or uplands.	-	-	-	D/P	D/P	-	-	-	-	D/P	-	-	-	-	D/P	-	D/P	-	D/P	D/P
Columbia spotted frog (*Rana luteiventris*)	Occupy a variety of stillwater habitats as well as in streams and creeks. Commonly found basking on the shore or on floating debris. Breeding habitat is the seasonally flooded margins of wetlands, ponds, and lakes.	D/P	D/P	-	D/P	D/P	-	D/P	D/P	D/P	D/P	D/P	D/P	D	P	-	D/P	-	D/P	D/P	-
Oregon spotted frog[3] (*Rana pretiosa*)	Large shallow wetland systems associated with a stream or stream network. Breeding habitat is in seasonally flooded margins of wetlands and areas of extensive shallows (approximately 6 to 8 inches deep).	-	-	-	P	P	-	-	-	-	P	-	-	-	-	P	-	P	-	P	P

Species	Habitat Requirements[2]	Cover Type[3]																			
		G210	G219	G223	G237	G240	G241	G271	G305	G318	G322	G488	G517	G520	G521	G524	G527	G648	G849	G851	G853
Western bluebird (*Sialia mexicana*)	Woodland/prairie mosaics, agricultural areas, and recently logged or burned forest where snags or cavity trees are present. Nests are in natural tree cavities, abandoned woodpecker holes, or bird nest boxes, and standing snags/cavity trees are important habitat features.	-	-	-	D/P	-	-	-	-	-	D/P	-	-	-	-	P	-	D/P	-	D/P	D/P
Great gray owl (*Strix nebulosa*)	Mature conifer forests adjacent to foraging areas in openings and wet meadows. Nests are found in broken-topped snags, clusters of mistletoe-infected branches, and nests built by other species (e.g., northern goshawk).	D/P	-	-	D/P	D/P	-	D/P	-	D/P	D/P	D/P	D/P	-	-	-	D	-	D	D/P	-
Northern spotted owl (*Strix occidentalis caurina*)	Mid- and late seral coniferous forests. Typical habitat with generally high canopy closure; complex canopy structure involving trees of multiple age or size classes; large decaying trees and/or snags; and, in most forest areas, a high volume of downed wood.	D/P	D/P	-	D/P	D/P	-	D/P	D/P	D/P	D/P	D/P	D/P	D	D/P	D/P	D/P	D/P	D/P	D/P	D/P
Grizzly bear (*Ursus arctos*)	Mostly in subalpine mountain forests. Require huge areas of habitat remote from most human activity. Common only where food is abundant and concentrated (e.g., salmon runs, caribou calving grounds). Hibernation dens are usually on steep north-facing slopes where snow accumulates.	D/P	D	-	D/P	D/P	-	D/P	D	D/P	D/P	D/P	D/P	D	D	P	D/P	D/P	D/P	D/P	D/P

1   Documented habitat ranges are compiled using knowledge from field biologists; potential habitat ranges have been modeled and are derived from the Ecological Systems data developed by NatureServe (WDFW 2015).
2   Source: WDFW. 2015. Washington's State Wildlife Action Plan: 2015 Update. Olympia, Washington. Species of Greatest Conservation Need (SGCN). [Online] URL: https://wdfw.wa.gov/sites/default/files/publications/01742/wdfw01742.pdf.
3   Cover type definitions can be found in Table A-1 of Attachment A.
4   No documented habitat ranges were provided by WDFW for this species.
5   No potential habitat ranges were provided by WDFW for this species.

VEGETATION MAPPING STUDY DRAFT REPORT

ATTACHMENT G

CONTENTS OF THE GEODATABASE

Table G-1.   **GIS data sources for the vegetation assessment.**

Dataset	Layer Name	Description	Data Type	Data Originator	Date
Data Primary					
SCL FERC Vegetation Study Area	Vegetation Study Area	0.5 mile buffer around FERC Project Boundary, SCL owned parcels and mitigation lands	Polygon	HDR/ESA	2020
USDA NAIP 4band-1m	NAIP	1m 4-band aerial imagery (2017)	Raster	USDA	2017
LiDAR Bare Earth DEM	DEM	Mosaic Digital Elevation Model from HDR processed LiDAR sources	Raster	Various	Various
LiDAR CHM	CH	Mosaic Canopy Height Model from HDR processed LiDAR source	Raster	Various	Various
LiDAR Slope	Slope	LiDAR Derived Slope derivative dataset from HDR processed LiDAR source	Raster	Various	Various
Sentinel-2	Enhanced Vegetation Index	13-band satellite imagery	Raster	ESA	Various
Pictometry	N/A	High resolution 4"/6"	Raster	EagleView	2018
Topographic Wetness Index	TWI	LiDAR derivative for vegetative patterns and forest site quality	Raster	Various	Various
Topographic indices	N/A	LiDAR derivatives including plan curvature, grad curvature and profile curvature	Raster	Various	Various
WDFW HRLC Mapping	HRLC	WDFW High Resolution Land Cover mapping	Polygon	WDFW	2017
WDFW	Visible Surface Water	WDFW Visible Surface Water (open and flowing water, gravel bars)	Polygon	WDFW	2017
Soil Survey	GeogSsurgo_soilmu_a_wa651	SSURGO Soil Survey data – Kinds and the distribution of soils on the landscape	Polygon	U.S. Department of Agriculture, Natural Resources Conservation Service	2014
Geologic unit	GeogDnr_geologic_unit_100k	Geology of Washington State at a scale of 1:100,000	Polygon	Washington Division of Geology and Earth Resources	2010
NPS (NOCA) Final Vegetation Assessment	NOCA	Final USNVC vegetation map at Association level	Raster	NPS (PSU)	2021

Dataset	Layer Name	Description	Data Type	Data Originator	Date
USDA Crop Distribution	USDA Crop Distribution	USDA Agricultural Crops Mapping	Polygon	USDA	2018
Data Supporting					
NPS PLOTS field data collection points	noca_training_draft	Draft NPS PLOTS field data collection database	Point	NPS	2019
LEMMA GNNMaps	mr200_2012	Landscape Ecology, Modeling, Mapping & Analysis (LEMMA) Structure Maps	Raster	OSU	2012
Weed Survey Location	BotaScl_Weed_Survey_NISIMS	This dataset is intended to be used to track and manage invasive species within the City Light Project areas and on City Light owned property	Polygon	National Park Service, Seattle City Light	2019
Nooksack Vegetation Supplement	BotaScl_Nooksack_Veg_Supplement	Vegetation of Nooksack area	Polygon	Seattle City Light	2018
Barnaby Detailed Vegetation	BotaSrsc_Barnaby_Detail_Veg	Vegetation of Barnaby Slough area	Polygon	Skagit River System Cooperative	2013
TetraTech Veg Map	BotaTt_Veg_map	Vegetation mapped by TetraTech for the 2006 SCL Wildlife Mitigation Lands Management Plan	Polygon	TetraTech	2006
SWC Riparian Assessment	ESA_SWC_Riparian_Cover_Combined	Riparian cover classification for major river floodplains in the Skagit Watershed	Polygon	ESA	2018
ESA Wetlands	ESA Wetlands	TR-02 Wetlands Assessment data product	Polygon	ESA	2021
NWI wetlands	HydrFws_Wetlands_NWI	Extent, approximate location and type of wetlands and deepwater habitats – NWI Wetlands	Polygon	U.S. Fish and Wildlife Service	2014
NHD stream	HydrNhd_NHDFlowline	Stream segments or reaches that make up the nation's surface water drainage system (NHD)	Polyline	U.S. Geological Survey	2014
Waterbodies	HydrHdr_NHD_Water_Area	Single unified dataset of NHD waterbodies for basemap	Polygon	HDR	2019
Streams	HydrHdr_NHD_Water_Lines	Single unified dataset of NHD flowlines for basemap	Polyline	HDR	2019
NWI wetlands	HydrFws_Wetlands_NWI	Extent, approximate location and type of wetlands and deepwater habitats – NWI Wetlands	Polygon	U.S. Fish and Wildlife Service	2019
Park boundaries	NPS_NOCA_Admn_Bndy	Park boundary/administrative unit boundaries within the North Cascades National Park Service Complex	Polygon	North Cascades National Park	2005

Dataset	Layer Name	Description	Data Type	Data Originator	Date
FERC Project Boundary	AdmnFerc_SkgFERCbndyEK2021	Single FERC Project Boundary dataset for use on relicensing maps/figures. Includes main Project "non-islanded" Boundary (lakes, developments, and transmission line) as well as "islands" (mitigation lands) included in the 2011 Exhibit K	Polygon	Seattle City Light	2021
Seattle City Light Land	PropScl_FeeOwnedCurrent - 2020	Current fee-owned lands of Seattle City Light. Use for displaying ownership	Polygon	Seattle City Light	2020
Mitigation Lands	PropScl_Mitigation_Lands_EK2021	This feature class represents the mitigation lands portion of Seattle City Light's FERC Project Boundary as approved by FERC on February 2, 2021	Polygon	Seattle City	2021
Transmission Lines	AdmnScl_TransLines	Transmission lines along the Project from Ross development to south of Bothell substation	Polyline	Seattle City Light	2020
Washington State parcels	AssrDoe_Parcels_Statewide	Statewide parcel dataset with normalized attribute data (field names are same across all counties)	Polygon	Washington State Dept. of Ecology	2019
Skagit parcels	AssrSkco_Parcels	All Skagit County Tax Parcels	Polygon	Skagit County Assessor	2018
Snohomish Parcels	AssrSnco_Parcels	All Snohomish County Tax Parcels	Polygon	Snohomish County Assessors	2018
WDFW Priority Habitats & Species	Various	WDFW Priority Habitats & Species	Various	WDFW	2021
WDFW State Wildlife Action Plan (SWAP)	Various	WDFW State Wildlife Action Plan (SWAP) species presence/potential	Various	WDFW	2021
Wildfire Data	NOCA_Wildfire_History_2021	Wildfire data including name, date, acreage, cause, etc.	Polygon	NPS	2021
Data Outputs					
NPS (NOCA) Vegetation Assessment	NOCA Veg Groups	ESA revised NPS (NOCA) Vegetation Mapping for all areas within the SCL FERC Vegetation Study Area aggregated to the NVC Group level with modifiers	Polygon	NPS/ESA	2021

Dataset	Layer Name	Description	Data Type	Data Originator	Date
Vegetation Mapping	ESA Veg Groups	ESA Vegetation mapping at the US NVC Group level with modifiers for all other areas outside of the NPS Vegetation Assessment, but within the SCL FERC Vegetation Study Area (includes summary statistics at the polygon level for CH mean, std deviation, EVI mean, slope, RGB, Wetness, DEM mean, NDVI mean, EVI mean)	Polygon	ESA	2021
ESA Field Plots	ESA Field Plots	Field data plots for vegetation mapping. This includes linked field photos	Point	ESA	2020/2021
Vegetation Mapping Training dataset	ESA Training Data	Training data for remote sensing (Random Forest) model; combination of field-based and air-photo interpreted data	Point	ESA	2021
Vegetation Mapping Validation dataset	Validation Data	Combination of field-based and aerial-photo interpreted validation data for accuracy assessment (separate from training dataset)	Point	ESA	2021
NPS Accuracy Assessment	NPS Accuracy Assessment	Accuracy assessment and Error Matrix for NPS Vegetation Assessment	Table	NPS	2021
ESA Accuracy Assessment	Accuracy Assessment	Accuracy assessment and Error Matrix for ESA Vegetation Assessment	Table	ESA	2021
Canopy Metrics – p95	p95	95th percentile canopy height derived from LiDAR (LAS)	Raster	ESA	2021
Canopy Metrics – Rumple Index	Rumple Index	An indication of vertical and horizontal variation in canopy structure that increases with roughness of the canopy surface and with structural heterogeneity. Derived from LiDAR (LAS)	Raster	ESA	2021
Canopy Metrics – Canopy Cover	Canopy Cover	the ratio of vegetation to ground as seen from the air. Canopy height measures how far above the ground the top of the canopy is and can be derived from LiDAR LAS data.	Raster	ESA	2021
Canopy Metrics – High p95 – High Rumple	High p95 – High Rumple	Highest percent (top 20) of p95 and Rumple within the extended riparian study area	Raster	ESA	2021
ESA Survey Culturally Important Plants	BOTA_ESA_Culturally_Important Plants	Culturally important plants observed during the 2021 field season	Polygon	ESA	2021

Table G-2.   Contents of the geodatabase for the vegetation assessment.

Dataset	Layer Name	Description	Data Type	Data Originator	Date
Data Primary					
SCL FERC Vegetation Study Area	SurvVeg_Study_Area	0.5 mile buffer around FERC Project Boundary, SCL owned parcels and mitigation lands	Polygon	HDR/ESA	2020
NPS (NOCA) Revised Vegetation Assessment	DRAFT_BOTA_NPS_VEG_20210806	Final USNVC vegetation map at Association level	Polygon	NPS (PSU)/ESA Revised	2021
Vegetation Mapping	DRAFT_BOTA_ESA_VEG_20210804	ESA Vegetation mapping at the US NVC Group level with modifiers for all other areas outside of the NPS Vegetation Assessment, but within the SCL FERC Vegetation Study Area (includes summary statistics at the polygon level for CH mean, std deviation, EVI mean, slope, RGB, Wetness, DEM mean, NDVI mean, EVI mean)	Polygon	ESA	2021
USDA Crop Distribution	USDA Crop Distribution	USDA Agricultural Crops Mapping	Polygon	USDA	2018
ESA Field Plots	SurvVeg_Field_Photos	Field data plots for vegetation mapping. This includes linked field photos	Point	ESA	2020/2021
LiDAR CHM	Canopy_Height	Mosaic Canopy Height Model from HDR processed LiDAR source	Raster	Various	Various
Canopy Metrics – p95	p95	95th percentile canopy height derived from LiDAR (LAS)	Raster	ESA	2021
Canopy Metrics – Rumple Index	Rumple Index	An indication of vertical and horizontal variation in canopy structure that increases with roughness of the canopy surface and with structural heterogeneity. Derived from LiDAR (LAS)	Raster	ESA	2021
Snag Rich Density	Snag_Rich_20dbh	Predicted number of snags per acre greater the 20" dbh. Units = snags per acre	Raster	DNR	2021

VEGETATION MAPPING STUDY DRAFT REPORT

ATTACHMENT H

ACCURACY ASSESSMENT RESULTS

Table H-1. Accuracy assessment results for the North Cascades National Park.

	Map Class Name	Code	Median Elev (m)	M01E	M01W	M01Y	M20I	M19	M44	M42P	M42G	M43N	M36	M07W	M07D	M46S	M46D	M35	M33	M06	M47	M17N	M24	M15	M39H	M66	M61H	M86	M67E	M58	M70	M58S	M73	M63	M90	M91	M93	M39R	M21	M18	M51	M39S	M61S	M74S	M85	M74A	M95	M96	M97	Total	Correct	User's Accuracy
M01E	East-side deciduous floodplain & swamp forest	M01E		5	5		1																																												11	5	45%
M01W	West-side deciduous floodplain & swamp forest	M01W		4	8	1																																													13	8	62%
M01Y	Revegetating floodplains	M01Y				8																																													8	8	100%
M20I	Deciduous upland successional forest	M20I					22	1	1																																										24	22	92%
M19	Bigleaf maple debris apron forest	M19		1			1	15	1																																	6	1								25	15	60%
M44	Wet western hemlock & Douglas-fir forest	M44							16						2	2	1	1		1																															23	16	70%
M42P	Western hemlock & Douglas-fir forest with sword fern	M42P					1			12	2	2				2																																			19	12	63%
M42G	Western hemlock & Douglas-fir forest with salal	M42G								1	8																																								9	8	89%
M43N	Dry Douglas-fir forest with pinegrass	M43N					1			2	1	12	1																																						17	12	71%
M36	Ponderosa pine & Douglas-fir woodland	M36										1	23							1																															25	23	92%
M07W	Wet silver fir & western hemlock forest	M07W												14																																					14	14	100%
M07D	Mesic silver fir & western hemlock forest	M07D												5	13	2	1			2																															23	13	57%
M46S	Mountain hemlock & silver fir forest with Alaska blueberry	M46S														5	7			1																															13	5	38%
M46D	Mountain hemlock & silver fir forest with Cascade azalea	M46D														5	28																																		33	28	85%
M35	Lodgepole pine & Douglas-fir woodland	M35											2					21																																	23	21	91%
M33	Douglas-fir & subalpine fir woodland	M33													1			1	26																											1					29	26	90%
M06	Mesic subalpine forest & woodland	M06														1	6			28	1																															36	28	78%
M47	Subalpine conifer & heather woodland	M47																		1	23																									2					26	23	88%
M17N	Dry subalpine woodland, North Cascades variant	M17N																				14	7															1								1					23	14	61%
M24	Subalpine larch woodland	M24																		4	3	1	22																							1					31	22	71%
M15	Krummholz	M15																				1	1	13																											15	13	87%
M39H	Low elevation wet meadow	M39H																							7													1												8	7	88%
M66	Vegetated bald	M66																								21													1						1					23	21	91%
M61H	Tall forb meadow	M61H																									3	1																	1					5	3	60%
M86	Showy sedge & valerian meadow	M86																								1	21										1							1					24	21	88%
M67E	Green fescue meadow	M67E																							2		2	20																						24	20	83%
M58	High elevation herbaceous wetland	M58																									1		11	1															1					14	11	79%
M70	High elevation willow wetland	M70																		2									1	11																1				15	11	73%
M58S	Snowmelt depression black alpine sedge	M58S																												1	3														1					5	3	60%
M73	Herbaceous talus & fellfield vegetation	M73																														11											2	5					18	11	61%
M63	Alpine cushion plants	M63																															13	3	1									7					24	13	54%
M90	Alluvial barren	M90																							1		1						2	7	1														12	7	58%
M91	Colluvial barren	M91																																	46															46	46	100%
M93	Bedrock barren	M93																															2		2	11														15	11	73%
M39R	Riparian Sitka willow shrubland	M39R		1																																	13	5	2		2									23	13	57%
M21	Sitka alder shrubland	M21																										2									1	31	1					2					37	31	84%
M18	Vine maple shrubland	M18																																					16	1		2							19	16	84%
M51	Dry tall post-fire shrubland	M51																																						26									26	26	100%
M39S	Low elevation wet shrubland	M39S																																			1				7								8	7	88%
M61S	Thimbleberry & snowberry shrubland	M61S																																								10							10	10	100%
M74S	Subalpine heather shrubland	M74S																																									25	4					29	25	86%
M85	Big huckleberry shrubland	M85																									4	2													1		1	1	18					27	18	67%
M74A	Alpine heather shrubland	M74A																		2								1																2	22				27	22	81%
M95	Flowing water	M95																																													11	1		12	11	92%
M96	Impounded water	M96																											1																	2	15		18	15	83%
M97	Semi-permanent snow & ice	M97																																															7	7	7	100%
	Correct			5	8	8	22	15	16	12	8	12	23	14	13	5	28	21	26	28	23	14	22	13	7	21	3	21	20	11	11	3	11	13	7	46	11	13	31	16	26	7	10	25	18	22	11	15	7	0	0	
	Producer's Accuracy (%)			45	62	100	88	83	94	80	73	75	85	64	76	33	64	95	87	85	82	88	61	100	100	100	75	66	83	85	85	100	85	100	100	87	85	93	84	64	84	88	63	78	75	55	85	94	100	0	0	78.8%

Table H-2. Accuracy assessment results for outside of the North Cascades National Park.

Cover Type	Class Value	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_10	C_11	C_12	C_13	C_14	C_15	C_16	C_17	C_18	C_19	C_20	Total	U_Accuracy[1]	Kappa
G237 - North Pacific Red Alder - Bigleaf Maple - Douglas-fir Rainforest Group	C_1	20	3	0	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	66.7%	
G240 - North Pacific Maritime Douglas-fir - Western Hemlock Rainforest Group	C_2	1	62	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	66	93.9%	
G322 - Vancouverian Wet Shrubland	C_3	1	1	4	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	1	0	20	20.0%	
G851 - North Pacific Lowland Riparian Forest & Woodland Group	C_4	0	2	0	14	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	73.7%	
G853 - North Pacific Maritime Hardwood-Conifer Swamp	C_5	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	100.0%	
Developed	C_6	1	0	0	0	0	53	0	0	1	0	1	1	0	1	0	0	0	0	0	0	58	91.4%	
CGR022 Cultivated Pasture & Hay Grass Cultural Group	C_7	0	0	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	31	100.0%	
CGR MOD Cultivated Row Crops	C_8	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	9	100.0%	
Grass - dominated	C_9	0	0	0	0	0	0	1	0	33	0	0	0	0	0	0	0	0	0	0	0	34	97.1%	
Gravel (Water)	C_10	0	0	0	0	0	0	0	0	0	19	2	0	0	0	0	0	0	0	0	0	21	90.5%	
G648 - Southern Vancouverian Lowland Ruderal Grassland & Shrubland	C_11	0	0	0	0	0	1	1	0	4	0	33	0	0	0	1	0	0	0	0	1	41	80.5%	
Open Water	C_12	0	0	0	0	0	0	0	0	0	1	0	24	0	0	0	0	0	0	0	0	25	96.0%	
Conifer/native shrub (conifer dominant)	C_13	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	3	66.7%	
Invasive Shrub	C_14	0	0	0	0	0	0	0	0	0	0	1	0	0	6	0	1	0	1	0	0	9	66.7%	
Invasive Shrub/Native Shrub/Forb (Invasive shrub cover dominant)	C_15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4	100.0%	
Mixed Grass/Forb/Invasive Shrub	C_16	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	3	0	0	0	7	42.9%	
Mixed Native Shrub/Tree/Forb (co-dominants)	C_17	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	6	2	0	0	11	54.5%	
Mixed Native Shrub-tree/Invasive Shrub (native shrub cover dominant)	C_18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	6	1	0	9	66.7%	
Native Deciduous Shrub/Tree	C_19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	50.0%	
Native Shrub/Conifer (native shrub dominant)	C_20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	100.0%	
	Total	23	68	4	19	11	54	33	9	38	21	50	25	3	8	7	6	9	10	4	2	404	0.0%	
	P_Accuracy[2]	87.0%	91.2%	100.0%	73.7%	36.4%	98.1%	93.9%	100.0%	86.8%	90.5%	66.0%	96.0%	66.7%	75.0%	57.1%	50.0%	66.7%	60.0%	25.0%	50.0%	0.0%	82.9%	
	Kappa																							0.81
Cover Type	ClassValue	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_10	C_11	C_12	C_13	C_14	C_15	C_16	C_17	C_18	C_19	C_20	Total	U_Accuracy	Kappa

G524 – Western North American Ruderal Wet Shrubland, Meadow, and Marsh is not included in this table as it represents wetlands on private agricultural lands that were not accessed in the field. Therefore, no reference data points were able to be taken for this cover type.

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[1] U_Accuracy = User's accuracy
[2] P_Accuarcy = Producer's accuracy