Oregon Agricultural Conservation Easement Program (ACEP)–Wetland Reserve Easements (WRE)

Wetland Restoration Criteria and Guidelines, 2025

NRCS Oregon Wetland Easement Sites
Left side (top to bottom): Muddy Valley and Valley Junction
Right side (top to bottom): Thomas and Sevenmile

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I. INTRODUCTION

A. Purpose of Wetland Restoration Criteria and Guidelines

The Wetland Restoration Criteria and Guidelines (WRCG) for Oregon contains the technical information used to guide decision making for Agricultural Conservation Easement Program - Wetland Reserve Easements (ACEP-WRE). This includes decisions related to eligibility, ranking, selection, restoration, enhancement, and management of wetlands and associated habitats. The WRCG technical criteria and guidelines in this document have been developed in consultation with the NRCS Oregon, Oregon State Technical Advisory Committee (STAC), U.S. Fish and Wildlife Service (USFWS), Oregon Department of Fish and Wildlife (ODFW), Soil and Water Conservation Districts in Oregon, and other partners. This WRCG document is designed to serve as a basis for technical determinations and decisions related to wetland restoration activities implemented under ACEP-WRE. The WRCG is also a robust document designed to be an adaptive management resource that can be applied and updated as needed throughout the lifespan of an easement or 30-year contract.

The ACEP Manual, Wetland Restoration Definition and Principles, defines wetland restoration as the rehabilitation of degraded or lost wetland and associated habitats. Restoration reestablishes original, native vegetation and hydrology to the extent practicable or establishes a hydrologic regime and native plant community to replace the original habitat functions and values. Restoration benefits migratory waterfowl and wetland-dependent wildlife and addresses local resource concerns. (See ACEP Manual (Title 440, Part 528), Subpart N (WRE-Restoration), 528.131 A and B for further detail on above: CPM, Title 440, Part 528, Section 528.131).

B. Historical Wetlands and Wetland Loss in Oregon

A historical wetland is a wetland that existed prior to the hydrologic and vegetative manipulation generally associated with conversion to agriculture at the time of European-American colonization. While a substantial proportion of wetlands in Oregon have been manipulated or converted to uplands, some examples of historical wetlands still exist today in relatively undisturbed condition. Estimates of wetland loss in Oregon since 1850 vary by data source, area of the state, and wetland type. In Oregon overall, it is estimated that 38 percent of all wetlands have been lost (Dahl, 1990). There are 518 wetland plant communities identified by the Oregon Natural Heritage Program and 29% (151) of wetland plant communities are considered imperiled (Christy and Titus, 1997; Risser, 2000; Morlan, 2000).

Klamath Basin

The landscape around what is now Lower Klamath National Wildlife Refuge in Oregon was historically a large inland shallow lake with associated wetlands connected to the Klamath River as a source of wetland hydrology (Mayer, 2005). It is estimated that the Upper Klamath Lake area has lost approximately 30,000 acres of wetlands, and the Klamath Basin overall has lost an estimated 75% of its wetlands over the past 50 years because of altered hydrology (Akins, 1970; Fretwell et al., 1996; Morlan, 2000; Mayer, 2005).

Willamette Valley

In the Willamette Valley at the time of European colonization, the U.S. Fish and Wildlife Service (2017) estimated 340,000 acres of historical wet prairie, 240,000 acres of historical riparian forested wetlands, and 13,000 acres of historical shrub wetlands. The Temperate Pacific

Freshwater Emergent Marsh was a historic wetland type found in the Willamette Valley with groundwater hydrology sources. Christy et al. (2000) estimated 8,893 acres of freshwater emergent wetlands in the Willamette Valley. Larger historic freshwater emergent wetland areas in the Willamette Valley included littoral wetlands near Lake Labish, Lousignont Lake, and Wapato Lake (Christy and Alverson, 2011). Currently, this type only occurs as small patches in floodplains and littoral zones of ponds or lakes (Rocchio and Crawford, 2009). Estimates of historic wetland loss in the Willamette Valley due to land use change and hydrology modification are 57% overall. In addition, 98% of historic wetland prairie has been lost and 44% of the historic wetland plant communities are considered imperiled (OPB, 2000; Taft and Haig, 2003; Christy and Alverson, 2011; Fickas et al., 2016).

Tidal wetland loss
A recent study by Brophy (2019) did an analysis of historic coastal wetlands. Prior to European settlement, it is estimated that 38,052 acres of wetlands existed along the Oregon Coast, and 15 large estuaries make up approximately 96.5% of historic tidal wetlands. Historic wetlands along the Oregon Coast consisted of forested and scrub-shrub wetlands, or “tidal swamp” (58%) and emergent “tidal marsh” (42%) (Brophy, 2019). Diking has resulted in the loss of 22,034 acres (57.9%) of these historic tidal wetlands and 8,335 acres (21.9%) of these historic wetlands have been converted to another vegetation type. If you combine effects of diking that result in changes to wetland hydrology and changes to wetland vegetation, approximately 95% of forested tidal wetlands and 58.9% of tidal marsh have been lost (Brophy, 2019).

Riparian wetland loss
According to the Oregon State of the Environment Report (Risser, 2000), Oregon contains approximately 114,500 miles of streams and rivers that have associated riparian ecosystems. It is estimated that older age class, coniferous tree canopy remains in 20% of the riparian forests in the Cascades and 3% of the riparian forests in the Coast Range. Since the 1850s, in the Willamette Valley Ecoregion, it is estimated that 80% of river channel complexity and associated riparian areas along the main channel and upper tributaries of the Willamette River have been lost (Risser, 2000; OPB, 2000). Hulse et al. (2002) estimated that between 1850 and 1995, 41,000 acres of river channel and island areas have been reduced and total length of all channels have been reduced from 355 miles to 264 miles. In addition, 85% of the riparian forest along the main channel McKenzie River has been lost (Risser, 2000).

II. OREGON ECOREGIONS AND WETLAND TYPES

A. Oregon Ecoregions

This WRCG focuses on those ecoregions identified by the Oregon Department of Fish and Wildlife (ODFW), Oregon Conservation Strategy (OCS) (2016) (see OCS ecoregions website) that contain the majority of the NRCS Oregon WRE and WRP easements. These ecoregions include Blue Mountains, Coast Range, East Cascades, Northern Basin and Range, and Willamette Valley (see Figure 1).

Oregon Conservation Strategy Ecoregions

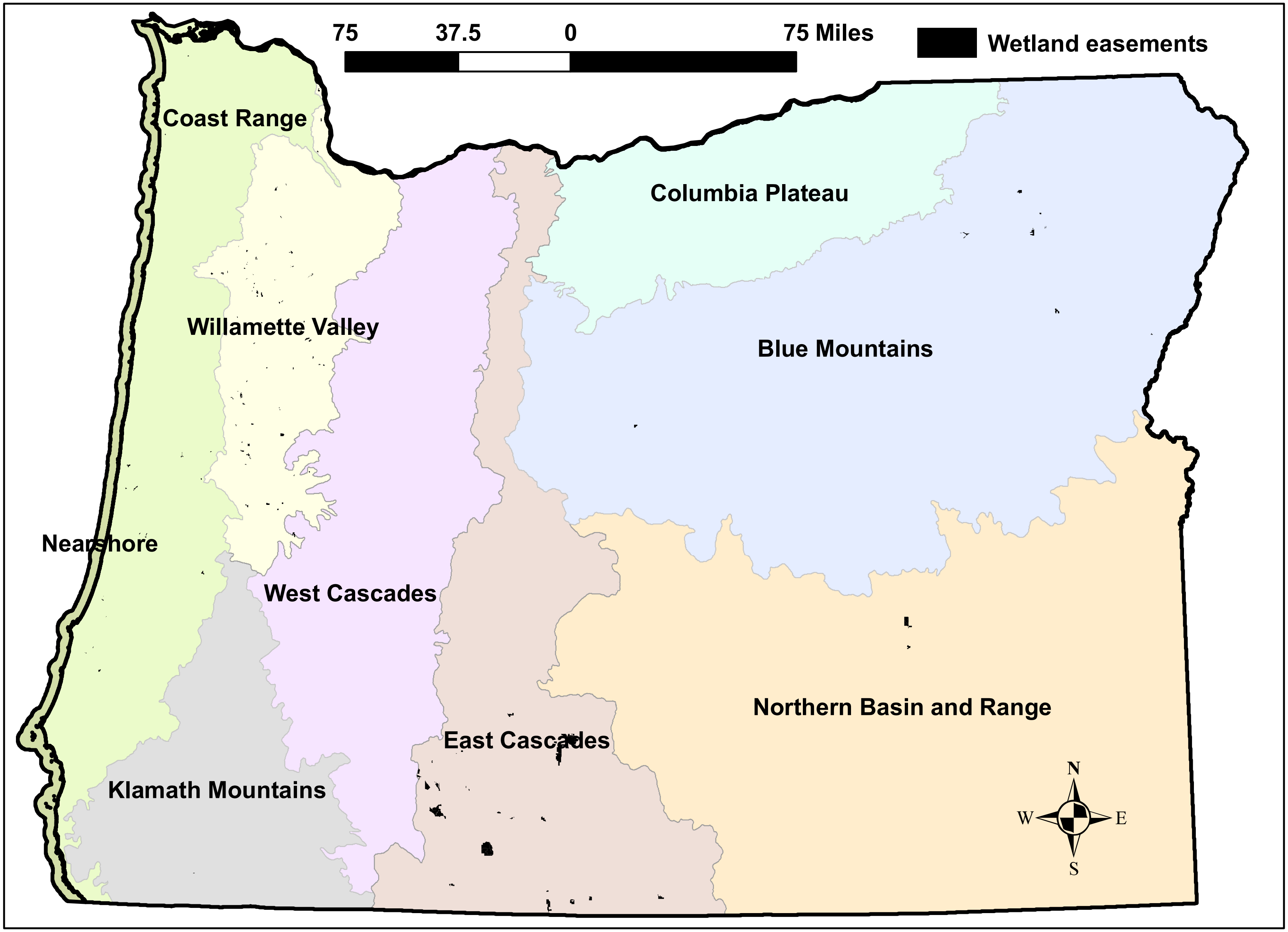

Figure 1. NRCS Oregon Wetland Easements by OCS Ecoregion (ODFW, 2016)

This section includes a general overview and conservation issues for each OCS Ecoregion (Crowe et al., 2004; Oregon Department of Fish and Wildlife, 2016). See Appendix A for maps that show NRCS wetland easements and OCS wetlands for each OCS Ecoregion. The OCS (2016) considers all wetland types a priority habitat for conservation in all ecoregions throughout the state of Oregon (see Oregon Conservation Strategy wetlands website). On page ten, Table 1 includes information on which wetland types occur in which ecoregion and a list of OCS 2016 strategy species for each ecoregion that are wetland or riparian habitat dependent. Further information on specific wetland types in Oregon is included in Section B, Oregon Wetland Types and Restoration Approaches.

Blue Mountains Ecoregion (see Blue Mountains Ecoregion)

General description: The Blue Mountains Ecoregion covers approximately 23,928 square miles and ranges in elevation from 1,000 feet at Snake River to 9,838 feet at Sacajawea Peak. The elevation difference results in a wide range of temperatures and precipitation. Summers are short and dry, winters are long and cold, and snow melt is the primary source of annual precipitation. The average annual precipitation is 8.0 to 24.3 inches (snowfall 11.2 to 87.6 inches) (OCS, 2006). Drier areas like Baker Valley get 9-16 inches of precipitation per year and wetter areas like Grande Ronde Valley can get 13-24 inches of precipitation per year. The ecoregion has a wide diversity of geology and landforms, including the Ochoco, Blue, and Wallowa mountain ranges, valleys, plateaus, glacially-cut deep canyons, gorges, and mountain lakes (above paraphrased from OCS 2016, Ecoregions).

This variation in geology, elevation, and climate also drives diversity in ecosystems and plant communities. Plant community variation due to elevation can be observed generally from north to south across the ecoregion, with ponderosa pine in mid-elevations and mixed coniferous forests at high elevations. Western juniper (*Juniperus occidentalis*) is a dominant community on the western side of the ecoregion and sagebrush and grassland steppe are dominant communities on the eastern side. Pre-European settlement vegetation communities included native Ponderosa pine savanna, sagebrush steppe, grasslands, and riparian woodland (above paraphrased from OCS 2016, Ecoregions).

Conservation issues: Water availability due to dry conditions, water diversion, and resulting low water table has impacted wetlands and riparian areas within the Ecoregion (Oregon State of the Environment, Ecoregions, 2000; OCS, Wetlands 2016).

Coast Range Ecoregion (see Coast Range Ecoregion):

General description: The Coast Range Ecoregion in Oregon covers approximately 9,263 square miles and ranges in elevation from 0 at the Pacific Ocean to 4,097 feet at Mary's Peak (OCS, 2016). The average annual precipitation is 60 to 98 inches (snowfall <1 to 2 inches), making it the wettest ecoregion in the state (OCS, 2006). The cool, moist air from the ocean and high rainfall of this ecoregion result in ecosystems such as temperate coniferous rainforests, which are highly productive. Diverse habitats in this ecoregion also include deciduous riparian forest, sand dunes, tidepools, estuaries and the highest density of streams in the state (above paraphrased from OCS, 2016). Forests in this ecoregion can include tree species such as Sitka spruce (*Picea sitchensis*, Douglas-fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), and western hemlock (*Tsuga heterophylla*) (Omernik, 1987).

Conservation issues: Development and land use change due to increasing population, oil spills, and altered hydrology due to historic diking have caused loss of habitat area and impacts to tidal marsh and coastal wetland functions along the Oregon Coast. Increased visitation from tourists to the Oregon Coast may result in increased disturbance to nesting shorebirds, tidepool communities, and other sensitive coastal habitats (OCS, 2016).

East Cascades Ecoregion (see East Cascades Ecoregion):

General description: The East Cascades Ecoregion in Oregon covers 10,603 square miles and ranges in elevation from 70 feet at Columbia River Gorge to 8,364 feet at Gearhart Mountain (USDA Forest Service, website accessed 8/23/2023: Fremont Winema NF). The annual average precipitation is 9.8 to 89.6 inches (snowfall 19.7 to 420 inches) (OCS, 2006), and the climate is generally dry with wide variations in temperature. The terrain of the East Cascades includes features such as buttes, lava flows and caves, deep ash deposits, and craters such as Crater Lake that are a result of historical volcanic activity. The northern two-thirds of the ecoregion are drained by the Deschutes River and the southern third is primarily drained by the Klamath River (above paraphrased from OCS, 2016).

The East Cascades Ecoregion has exceptional habitat diversity including lodgepole pine (*Pinus contorta*) forests on deep Mazama ash in drier areas, montane and foothill Ponderosa pine (*Pinus ponderosa*) forests, sagebrush flats, and alpine meadows (OCS, 2016; Crowe et al., 2004; Risser, 2000). The network of Klamath Basin lakes and wetlands are also known as nationally significant waterfowl habitat and are considered critical migratory staging areas for 80% of Pacific Flyway waterfowl, with peak counts to 1.6 million birds at Lower Klamath National Wildlife Refuge during the fall migration (Mayer, 2005). On an annual basis, over 30 species of waterfowl, > 3 million ducks, and ½ million geese use Klamath Basin as a migratory stop-over location (OCS, 2016 Wetlands; OCS, 2006; Gilmer et al., 2004).

Conservation issues: Water that historically maintained extensive shallow lake and emergent marsh systems and wet meadows has been drained and converted to support agriculture and urban development throughout the ecoregion (OCS, 2016).

Northern Basin and Range Ecoregion (see Northern Basin and Range Ecoregion)

General description: The Northern Basin and Range Ecoregion in Oregon covers 23,955 square miles and ranges in elevation from 2200 feet at Snake River to 9,733 feet (9738 on topo) at Steens Mountain (OCS, 2016). This ecoregion is the driest in Oregon, with 8-12 inches of precipitation per year in the southeastern part of the ecoregion. Most areas average less than 15 inches with up to 40 inches per year in higher elevations (OCS, 2006, 2016). Mountain ranges generally run north to south and often take the form of fault blocks. Soils are volcanic in origin and are generally rocky, high in minerals, thin, and low in organic matter (Crowe et al., 2004). Evaporation and drying of lakes that formed in the Pleistocene (40,000 and 10,000 years ago) has resulted in large areas of alkali flats and associated pools, shallow lakes, and wetlands that have characteristic salt and mineral deposits (OCS, 2016). Alkali flats are important habitat for migrating shorebirds that feed on abundant invertebrates.

This ecoregion is known as sagebrush desert or high desert. Unique plant communities in this ecoregion have adapted to the high salt content of salt-desert scrub and alkali flats communities. Plant species in these communities include inland saltgrass (*Distichlis spicata*) and spiny, salt-tolerant shrubs such as black greasewood (*Sarcobatus vermiculatus*), iodine bush (*Allenrolfea occidentalis*), and hopsage (*Grayia spinosa*). Widely-spaced sagebrush is typical vegetation that can be associated with bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), and other perennial bunchgrasses. Forested vegetation is rarer, but white fir stands occur in the Steens and Hart Mountain ranges. Aspen and mountain mahogany are more widespread and can be found in the Trout Creeks, Steens Mountain, Pueblo Mountains, Oregon Canyon Mountain, and Mahogany Mountains areas of the ecoregion (above paraphrased from OCS, 2016).

Conservation issues: Lakes and wetlands in this ecoregion provide critical habitat for nesting and migratory birds. Large networks of freshwater emergent marshes and wet meadows associated with Albert, Summer, Malheur, Harney Lake, and Warner Basins have been lost or reduced due to conversion to agriculture, water diversion, and altered hydrology for other land uses (OCS, 2016, Wetlands). Uncontrolled livestock grazing prior to the Taylor Grazing Act of 1934 has degraded sensitive ecological areas, riparian areas, and some areas of sagebrush steppe in the ecoregion. Fire suppression, juniper encroachment, and invasive non-native annual grass species (cheatgrass) have also impacted native riparian and sagebrush communities throughout the ecoregion (OCS, 2016).

Willamette Valley Ecoregion (see Willamette Valley Ecoregion):

General description: The Willamette Valley Ecoregion in Oregon covers approximately 5,560 square miles and ranges in elevation from 13 to 400 feet (Fickas et al., 2016). Annual precipitation ranges from 37 inches to 46 inches (Fickas et al. 2016), with snowfall of 1.7 to 6.0 inches (OCS, 2006). The topography of the Willamette Valley is characterized by broad alluvial floodplains associated with the Willamette River, fluvial terrace upslope of Willamette River bottomlands, low hills, and mountain foothills (Pater et al., 1998). Willamette Valley ecosystems include wetland prairie and Oregon white oak (*Quercus garryana*) savanna which offer unique habitats within the state of Oregon (USFWS, 2017). Wetland prairie plant species include tufted hairgrass (*Deschampsia caespitosa*), rushes (*Juncus* spp.), and sedges (*Carex* spp.), common camas (*Camassia quamash ssp. maxima*), and great camas (*Camassia leichtlinii ssp. suksdorfii*). Extensive riparian forested communities occur along the Willamette River corridor and connected tributaries with species such as Oregon ash (*Fraxinus latifolia*), black cottonwood (*Populus trichocarpa*), red alder (*Alnus rubra*), big-leaf maple (*Acer macrophyllum*), western red cedar (*Thuja plicata*), willows (*Salix* spp.) and Douglas-fir (*Pseudotsuga menziesii)* (Pater et al., 1998).

More than 150 years ago, around the time of Euro-American colonization, open prairies were the dominant vegetation community. Prairies were surrounded by oak woodlands, solitary oaks and pine trees, and coniferous forest in the foothills (Christy and Alverson, 2011; Johannessen et al., 1971; USFWS, 2017). Pre- Euro-American colonization, the Kalapuya people managed the prairie through frequent, low severity fire to maintain food resources (camas, berries, roots, acorns, filberts) and hunting grounds for deer (Boyd, 1986; Hamman et al., 2011; Johannessen et al., 1971; Taft and Haig, 2003). Euro-American settlers established commercial farming, ranching, and logging practices and suppressed the use of fire as a management tool. This resulted in ecological change to a vegetation community dominanted by oak and pine (Christy and Alverson, 2011; Connolly, 2000; Hamman et al., 2011; Taft and Haig, 2003).

Conservation issues: Since the 1850s, much of the Willamette Valley ecoregion has been altered by development (agricultural and urban), particularly affecting oak woodland, oak savanna, grassland, riverine, and wetland habitats. The Willamette River and wetlands throughout this ecoregion, including wet prairie, have been affected by altered water regimes, pollution, land use change, and invasive plants and animals. Several federally-listed plant species are associated with Willamette Wet Prairie, including Bradshaw's lomatium (*Lomatium bradshawii*) and Nelson's checkermallow (*Sidalcea nelsoniana*). The recovery zones for these species comprise the Priority Areas within the Willamette Valley Priority Geographic Region (see USFWS Recovery Plan for Prairie Species 2010). About 96 percent of the Willamette Valley ecoregion is privately-owned, presenting challenges to conservation efforts. Conservation strategies that focus on needs of individual at-risk species and key sites are particularly critical in this ecoregion (all above paraphrased from ODFW, 2016).

B. Oregon Wetland Types and Restoration Approaches

Classifying wetland types is an approach that conservation planners can use to organize and plan wetland restoration practices. There are numerous systems used to classify wetlands based on a variety of factors including: landscape position, geomorphology, dominant hydrology source, hydrologic regime, soil types, and vegetation. Wetland classification systems that have been used in Oregon include habitat and vegetation-based systems (Christy et al., 2017a; Kagan et al., 2007; Crowe et al., 2004; Cowardin et al., 1979), and hydrogeomorphic (HGM) based classification systems (Tiner et al., 2011; Adamus, 2001, 2006; Brinson, 1993). NRCS Oregon uses the National Wetland Inventory, Cowardin system (Cowardin et al., 1979); and the HGM based system (Brinson, 1993).

Wetland habitat type categories according to the ODFW OCS (2016) that are used by NRCS Oregon will be organized and described below as follows: Freshwater Wetlands, Estuaries/Tidal Wetlands, and Flowing Water and Riparian (see OCS wetlands website). The distribution of each wetland type is variable across ecoregions in Oregon, with some wetlands being ubiquitous around the state (e.g., freshwater marshes), and others (tidally influenced salt marshes) restricted to one or two ecoregions (see Table 1).

According to the Oregon Conservation Strategy (2016), wetland restoration approaches can focus on the following functions that wetlands can provide: habitat and native plant communities, water quantity, and water quality. Invasive species control and prevention for species that occur in wetlands is a priority for all wetland restoration and management work in Oregon. At potential wetland restoration sites, geospatial datasets can be used to determine most likely historic wetland type and vegetation community (See List of Additional Resources for data sets). Local reference wetlands of a similar type (landscape position, soil types, hydrologic regime, and plant community) can also help determine which hydrology and plant community functions are most likely to succeed in restoration efforts (See Appendix D for Wetland Restoration, 657 Conservation Practice Specifications Sheet).

Table 1. Wetland types and OCS strategy wetland and riparian-dependent wildlife by ecoregion

ODFW Ecoregion	Wetland types	OCS Strategy Species-Wetland and Riparian Dependent Wildlife
Blue Mountains	Alkaline Wetlands, Deciduous Swamps and Shrublands, Marshes, Vernal Pools, Wet Meadows, Wet Prairies	**Mammals:** Fisher (*Pekania pennanti*) **Birds:** Greater Sage-Grouse (*Centrocercus urophasianus*); Long-billed Curlew (*Numenius americanus*); Trumpeter Swan (*Cygnus buccinator*); Upland Sandpiper (*Bartramia longicauda*) **Amphibians:** Columbia Spotted Frog (*Rana luteiventris*); Rocky Mountain Tailed Frog (*Ascaphus montanus*); Western Toad (*Anaxyrus boreas*) **Reptiles:** Western Painted Turtle (*Chrysemys picta bellii*) **Fish:** Bull Trout (*Salvelinus confluentus)*; Fall and Spring Chinook (*Oncorhynchus tshawytscha*); Great Basin Redband Trout (*Onchorynchus mykiss newberrii*); Summer Steelhead/Columbia Basin Redband (*Oncorhynchus mykiss gairdneri*); Western Brook Lamprey (*Lampetra richardsoni*); Westslope Cutthroat Trout (*Onchorynchus clarki lewisi*) **Invertebrates:** Columbia Clubtail (*Gomphus lynnae*); Western Ridged Mussel (*Gonidea angulate*)
Coast Range	Deciduous Swamps and Shrublands, Marshes, Saltwater Marshes, Tidal Wetlands, Wet Meadows, Wet Prairies	**Birds:** Black Brant (*Branta bernicla nicgricans*); Caspian Tern (*Hydroprogne caspia)*; Harlequin Duck (*Histrionicus histrionicus*); Marbled Murrelet (*Brachyramphus marmoratus*); Tufted Puffin (*Fratercula cirrhata*); Western Snowy Plover (*Charadrius nivosus nivosus*) **Amphibians:** Coastal Tailed Frog (*Ascaphus truei)*; Columbia Torrent Salamander (*Rhyacotriton kezeri*); Cope's Giant Salamander (*Dicamptodon copei*); Clouded Salamander (*Aneides ferreus*); Del Norte Salamander (*Plethodon elongatus*); Foothill Yellow-legged Frog (*Rana boylii*); Northern Red-legged Frog (*Rana aurora*); Southern Torrent Salamander (*Rhyacotriton variegatus*); Western Toad **Reptiles:** Northwestern Pond Turtle (*Actinemys marmorata*); Western Painted Turtle **Fish:** Chum Salmon (*Oncorhynchus keta*); Coastal Cutthroat Trout (*Oncorhynchus clarkii clarkii*);Coho Salmon (*Oncorhyncus kisutch*); Eulachon (*Thaleichthys pacificus*); Fall and Spring Chinook; Green Sturgeon (*Acipenser medirostris*); Millicoma Dace (*Rhinichthys cataractae ssp.*); Pacific Lamprey (*Entosphenus tridentatus*); Summer/Winter Steelhead, Coastal Rainbow; Umpqua Chub (*Oregonichthys kalawatseti*); Western Brook Lamprey; Western River lamprey (*Lampetra ayresii*); White Sturgeon (*Acipenser transmontanus*) **Invertebrates:** Black Petaltail (*Tanypteryx hageni*); Pacific Walker (*Pomatiopsis californica*); Robust Walker (*Pomatiopsis binneyi*); Sisters Hesperian (*Hochbergellus hirsutus*); Western Ridged Mussel
East Cascades	Alkaline Wetlands, Deciduous Swamps and Shrublands, Marshes,	**Birds:** American White Pelican (*Pelecanus erythrorhynchos*); Greater Sandhill Crane (*Antigone canadensis tabida*); Long-billed Curlew; Red-necked Grebe (*Podiceps grisegena*); Trumpeter Swan; Yellow Rail (*Coturnicops noveboracensis noveboracensis*)

	Vernal Pools, Wet Meadows, Wet Prairies	**Amphibians:** Cascades Frog; Caspian Tern; Cope's Giant Salamander; Oregon Spotted Frog (*Rana pretiosa*); Western Toad **Reptiles:** Northwestern Pond Turtle; Western Painted Turtle **Fish:** Bull Trout; Coho Salmon (Klamath SMU); Goose Lake Sucker (*Catostomus occidentalis lacusanserinus*); Great Basin Redband; Lost River Sucker (*Deltistes luxatus*); Miller Lake Lamprey (*Entosphenus minima*); Modoc Sucker (*Catostomus microps*); Pacific Lamprey; Pit Sculpin (*Cottus pitensis*); Shortnose Sucker (Chasmistes brevirostris); Spring and Fall Chinook Salmon; Summer Steelhead **Invertebrates:** Archimedes Springsnail (*Pyrgulopsis archimedis*); Black Petaltail; Crater Lake Tightcoil (*Pristiloma crateris*); Dall's Ramshorn (*Vorticifex effuse dalli*); Great Basin Ramshorn (*Helisoma newberryi newberryi*); Highcap Lanx (*Lanx alta*); Klamath Ramshorn (*Vorticifex klamathensis klamathensis*); Lined Ramshorn (*Vorticifex effusa diagonalis*); Scale Lanx (*Lanx klamathensis*); Scalloped Juga (*Juga acutifilosa*); Sinitsin Ramshorn (*Vorticifex klamathensis sinitsini*); Siskiyou Hesperian (*Vespericola sierranus*); Turban Pebblesnail (*Fluminicola turbiniformis*)
Northern Basin and Range	Alkaline Wetlands, Deciduous Swamps and Shrublands, Marshes, Vernal Pools, Wet Meadows	**Birds:** American White Pelican; Black-necked Stilt (*Himantopus mexicanus*); Caspian Tern; Greater Sage-Grouse; Greater Sandhill Crane; Long-billed Curlew; Snowy Egret (*Egretta thula*); Trumpeter Swan; Western Snowy Plover **Amphibians:** Columbia Spotted Frog; Western Toad **Fish:** Alvord Chub (*Siphateles slvordensis*); Borax Lake Chub (*Siphateles boraxobius*); Bull Trout; Foskett Spring Speckled Dace (*Rhinichthys osculus ssp.*); Great Basin Redband; Hutton Spring Tui Chub (*Siphateles bicolor oregonensis*); Lahontan Cutthroat Trout (*Oncorhynchus clarkii henshawi*); Pit Sculpin; Spring Chinook Salmon; Warner Sucker (*Catostomus warnerensis*) **Invertebrates:** Borax Lake Ramshorn (*Planorbella oregonensis*); Columbia Clubtail
Willamette Valley	Deciduous Swamps and Shrublands, Marshes, Tidal Wetlands, Vernal Pools, Wet Prairies	**Birds:** Dusky Canada Goose (*Branta canadensis occidentalis*) **Amphibians:** Cascade Torrent Salamander (*Rhyacotriton cascadae*), Clouded Salamander; Columbia Torrent Salamander; Foothill Yellow-legged Frog; Northern Red-legged Frog; Oregon Slender Salamander (*Batrachoseps wright*); Southern Torrent Salamander **Reptiles:** Northwestern Pond Turtle **Fish:** Bull Trout; Chum Salmon; Coastal Cutthroat Trout; Coho Salmon; Eulachon; Fall and Spring Chinook Salmon; Pacific Lamprey; Summer/Winter Steelhead/Coastal Rainbow; Western Brook Lamprey; Western River Lamprey; White Sturgeon **Invertebrates:** California Floater (*Anodonta californiensis*); Little Stonefly (*Capnia kersti)*; Western Ridged Mussel; Winged Floater (*Anodonta nuttalliana*)

This section includes the following for each wetland type: a general description, habitat information, and restoration approaches. Information on wetland classification, hydrology, and typical plant species for each wetland habitat type have been compiled in Table 2 at the end of the section. Information in this section has all been compiled using information from OCS (2016) (see OCS wetlands website); Christy, 2017a and 2017b (see Major Wetland and Riparian Types website); and Nature Serve (NaturServ Explorer) unless otherwise referenced.

1. Freshwater Wetlands (alkaline wetlands, deciduous swamps and shrublands, marshes, vernal pools, wet meadows, and wet prairies)

ALKALINE WETLANDS (see also: Inter-Mountain Basins Alkaline Closed Depressions)
General description: Alkaline wetlands occur in intermittently saturated areas that form in depressions where alkaline soils occur. The water level can be perched due to restrictive soil layers, such as clay hardpan. These areas also accumulate salt in soil and water due to evaporation. Vegetation in these wetland types are primarily salt-tolerant species referred to as halophytes. Years with greater amounts of precipitation may result in areas that are lower in salt content where plants that are less salt-tolerant can grow.

Habitat: This wetland type is restricted to arid areas east of the Cascades. Habitat is found in flats and edges of alkaline lakes and ponds. Alkaline wetlands in Oregon are known as breeding or foraging sites for migrating birds. Many of the same species of plants and animals occur in both interior alkaline wetlands and estuarine wetlands along the coast. Unique animals associated with this wetland type are adapted to the intermittent hydrology and may emerge only every few years depending on available water and habitat conditions.

Restoration approaches: Alkaline wetlands are especially sensitive to changes in the water table, and the relationship between water availability and salinity is a key process to restore and maintain habitat quality. Commercial availability of seed for alkaline wetlands is limited. Establishment of a desirable plant community will likely require planting of commercially available species in combination with natural regeneration.

Typical restoration activities for alkaline wetlands include removal of surface or subsurface drainage features, removal of dikes and diversions obstructing runoff, and restoration of natural microtopography. Exceptional caution must be undertaken to avoid breaking through the restrictive soil layer with any earthmoving activities. Onsite investigation by a soil scientist is recommended.

Highly disturbed alkaline wetlands may be dominated by invasive species such as cheatgrass, meadow foxtail, and perennial pepperweed. These species must be controlled through mechanical and/or chemical means prior to undertaking any vegetative restoration activities. The primary long-term maintenance for alkaline wetland restoration includes control of invasive plant species. If sites are grazed, sites should be monitored closely to ensure disturbance by grazing animals does not adversely affect the plant community.

DECIDUOUS SWAMPS AND SHRUBLANDS (see also: North Pacific Shrub Swamp)

General description: Deciduous swamps and shrublands occur in depressions, adjacent to lakes and ponds, and further out on river terraces in areas that are poorly drained, where organic, muck, or mineral soils and standing water occur. Forested wetlands differ from riparian forest in their higher water tables, longer duration of soil moisture, and finer-textured soils. They are typically flooded for several weeks during the growing season (seasonal flooding). Vegetation is dominated by trees such as ash species and woody shrubs such as willows, alders, and red-osier dogwood (*Cornus sericea*). Vegetation varies by area of the state and ecoregion (see Table 2 for Eastern versus Western Oregon differences). For example, in the Willamette Valley, typical shrub species can include Hooker's or Piper's willow (*Salix hookeriana*), Sitka willow (*S. sitchensis*), Pacific river willow (*S. fluviatilis*), redosier dogwood, Douglas spiraea (*Spiraea douglasii*), and salmonberry (*Rubus spectabilis*). In the Coast Range, Oregon crabapple (*Malus fusca*), twinberry (*Lonicera involucrata*), and honeysuckle *(Lonicera* spp.) may be important components of shrub swamps.

Habitat: Habitat type is edges of rivers, streams, lakes, and ponds that are poorly drained where deciduous trees and shrubs are dominant vegetation. In Deciduous Swamps where deciduous trees and shrubs both occur, the composition of the shrub and herbaceous layers depend partly upon the degree of canopy closure. Shrublands are dominated by shrub vegetation and a diversity of sedges, grasses, rushes, and forbs may also be present in the understory.

Restoration approaches: Shrub and herbaceous species that grow under a tree canopy in deciduous swamps or herbaceous species that grow in shrublands vary depending on the hydrologic regime. Therefore, recognition of the dominant sources of hydrology is critical prior to undertaking any restoration. Depending on the source of hydrology, restoring connections to groundwater and seasonal or intermittent flooding of rivers and streams is key. Elimination of surface and subsurface drainage features, control of undesirable vegetation, and establishment of appropriate trees, shrubs, and herbaceous vegetation will be part of any restoration plan.

Sites that have been or are adjacent to disturbed areas may be dominated by the invasive species found in wetlands such as reed canary grass (*Phalaris arundinacea*), so management of invasive plants may be a priority. Mechanical and/or chemical weed control around establishing woody vegetation to reduce competition will typically be required for a period of 3-5 years or until woody plants are able to outcompete adjacent vegetation. Protection of woody seedlings from depredation by elk, deer, beavers, voles, and mice will also need to be considered.

MARSHES

General description: Freshwater marshes or emergent marshes occur in depressions and around the edges of lakes, ponds, rivers, and streams where surface water or groundwater is consistently present and the soil poorly drained. Freshwater marshes in Oregon may form from riverine processes that left abandoned oxbow channels and old side channels of nearby river and stream systems. A wide variety of vegetation can grow in freshwater marshes depending on elevation microtopography, hydrology, drainage class, and soils. Emergent freshwater marshes are dominated by emergent wetland vegetation, which refers to vegetation that grows above the water surface such as sedges, bulrushes, spike rushes, rushes, and cattails. Broadleaf herbs and shrubs may also be present. Fringes of freshwater marshes are often dominated by emergent plants. Portions of the marsh that are under water for long periods of time may have floating-leaf or deep-rooted plants within the littoral zone.

Habitat: Freshwater marshes are particularly well known as breeding, rest, and foraging sites for birds, nursery areas for a variety of fish species, and essential breeding habitat for amphibians. Habitats are found at the edges of rivers, streams, lakes, and ponds, and can be larger expanses in basins and flats.

Restoration approaches: Freshwater marshes occur in a wide variety of landscape positions and tend to have specific vegetation communities depending on hydrologic regime. Restoration hydrology targets will depend on if the marshes are lake associated, stream associated, or groundwater hydrology based. Water depth, soil conditions, and microhabitat will determine where specific plant species will grow.

Hydrology restoration is usually achieved through the decommissioning of surface and subsurface drains. In cases where the natural topography of freshwater marshes has been filled or leveled for agricultural production, it may be necessary to remove sediment and/or restore the natural microtopography of the site. For all earthmoving activities, it is important to remove and stock-pile the topsoil prior to excavating, then spread the topsoil back over the soil surface for the final grade to facilitate establishment of native vegetation and minimize problems with invasive weed encroachment and spread. It will also help maintain higher native plant richness (number of different species) and percent cover. After excavation and grading activities have been completed, vegetation restoration involves site preparation (most often, repeated chemical treatments depending on resident invasive plants) and seeding and/or planting of appropriate herbaceous plants. Availability of seed and plugs of native emergent woody and herbaceous plants may determine species to be planted.

Management of invasive species is especially critical during the establishment phase of planted vegetation. The primary invasive species that can cause significant problems in freshwater marshes is reed canarygrass, which readily forms monocultures in formerly disturbed sites and invades natural wetlands. Other invasive species include non-native Phragmites (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), and yellow flag iris (*Iris pseudacorus*). For freshwater marshes associated with grassland or other open communities where fragmentation of open habitat may be an issue, management of woody vegetation will need to occur periodically to prevent woody plants from taking over fringes of the marsh.

VERNAL POOLS

See also: Western North American Vernal Pool, Columbia Plateau Vernal Pool

General description: Vernal pools are one of the rarest wetland types in Oregon. They are found in depressions within shrub-steppe and open woodland areas of intermountain valleys and volcanic scablands of the Columbia Plateau. They form on layers of hardpan or basalt bedrock. Vernal pools can range in size from a few square meters to about an acre and are seasonally wet depending on local precipitation. Slow drying of these pools is characteristic of this wetland type and some pools only hold water every few years. Unique plants and animals associated with this wetland type have adapted to this hydrology.

Habitat: Typically, vernal pools occur in a "mound-depression" complex where the mounds are grassland, and the depressions are the vernal pools (Environmental Science Associates, 2007). Depressions or pools can be various sizes within steppe, woodland, or volcanic terrain. Distinct rings of vegetation may be present depending on water availability and drainage. These habitats are important for amphibians adapted to short timeframes of water availability. Species of flying insects and rare crustaceans, including fairy shrimps (Anostraca) are uniquely adapted to vernal pool ecosystems (Zedler, 2003).

Restoration approaches: Vernal pool restoration can be associated with wet prairie or wet meadow restoration, as these wetland types can occur within a wet prairie matrix (see also Wet Meadow, Wet Prairie sections below). Wetland features and functions that can be targeted for restoration for this wetland type include depth of pools and connectivity to water within a matrix of habitat patches. Micro-topography and variability of water are important factors to consider in restoration design. Hydrological restoration may involve breaking or disconnecting drainage tile or other sources of hydrological alteration. Linear swales to connect habitat patches and support wildlife dispersal and size diversity of vernal pools will increase habitat value for restoration designs (Environmental Science Associates, 2007). Restoration of native vegetation will generally follow the same approach as the associated wet meadow or wet prairie (see wet meadow and wet prairie restoration approaches sections below) within the same matrix as the vernal pool. Vernal pool-specific plant species will be targeted for planting in restorations if available.

WET MEADOWS

General description: Wet meadows typically occur in mountain valleys and can be found near headwaters of streams, seeps, lakes, and large river bottomlands. They may have shallow standing water for part of the year. Typical vegetation can include tufted hairgrass (Deschampsia cespitosa), sedges (*Carex* spp.), spikesedge (*Kyllinga* spp.), rushes (*Juncus* spp.), and forbs.

Habitat: This habitat type occurs along slopes, in basins, or in flats, mostly montane to subalpine and small, low-order streams can be present. This habitat type is considered important for migrating and breeding songbirds and waterbirds and other wetland-dependent wildlife. It has also been identified as significant for sage grouse breeding in the Western United States, as studies have shown that 85% of sage grouse breeding display locations (leks) occur within approximately 6 miles of wet meadows (mesic sites) (Donnelly et al., 2016).

Restoration approaches: Restoration approaches for this wetland type typically involves reconnecting natural hydrology that has been altered or reversing impacts of unmanaged grazing. Hydrology in wet meadows in eastern Oregon is often restricted by water rights. Where water rights are secured, hydrology in wet meadows is typically restored through plugging and filling of ditches, elimination of diversions, and stream habitat restoration and improvement.

Two to three years of chemical and mechanical site preparation are typically required prior to establishing native wet meadow species. If present, introduced pasture grasses, such as meadow foxtail, creeping foxtail, and Kentucky bluegrass are likely to remain in the absence of active herbaceous weed treatments. There is good availability of trees and shrubs of most of the dominant wet meadow species across Oregon. There is generally less availability of locally adapted seed, container and plug stocks (woody and herbaceous) of wetland species for Eastern Oregon relative to the west side of the State. Without pre-planning to develop needed plant materials (seed and/or plugs, container stocks), many desirable species needed for restoration of these habitats will be unavailable. It is possible that donor wet meadows could be used to supply plugs or sod mats for reestablishment of native vegetation. Establishing vegetation may require herbaceous weed treatment practices such as spot spraying, especially to control dominant invasive species.

WET PRAIRIE

General description: Wet prairies typically occur on shallow soils over bedrock or clay soils within flooded areas of the valley floor that form a perched water table (Christy and Alverson, 2011). Typical vegetation is dominated by tufted hairgrass (*Deschampsia caespitosa)* and other grasses, rushes (*Juncus* spp.), and sedges (*Carex* spp.) (USFWS, 2017).

Habitat: Wet prairies occur as a mosaic of marsh, grasslands, and vernal pools; and were maintained historically by low intensity fire (USFWS, 2017). Habitat patches vary according to micro-topography (flats, irregular surfaces) and hydrology. Small depressions (micro lows) within the wet prairie mosaic may form vernal pool plant communities interspersed throughout a matrix of sedges and tufted hairgrass. Other wet prairie plant species that prefer slightly drier conditions may grow on micro highs.

Listed species and species of conservation concern associated with the Willamette Valley Wet Prairie system include northern harrier (*Circus cyaneus*), short-eared owl (*Asio flammeus*), American grass bug (*Acetropis americana*), Bradshaw's lomatium (*Lomatium bradshawii*), shaggy horkelia (*Horkelia congesta*), Nelson's checker mallow (*Sidalcea nelsoniana*), racemed goldenweed (*Pyrrocoma racemose* var. *racemosa*), white-topped aster (*Sericocarpus rigidus*), and Willamette Valley daisy (*Erigeron decumbens*) (USFWS, 2017).

Restoration approaches: Hydrologic restoration involves plugging drainage ditches and breaking drainage tiles. The associated clay soils generally retain a restricted drainage layer to establish a perched water table and maintain wetland hydrology. Farming and land-levelling have removed much of the natural topography from former wet prairies, so construction of microtopographic features (≤ 6" height) across a site can restore topographic variation where plant diversity can establish. Natural development of tussocks by sedges and tufted hairgrass will further diversify the natural topography of a site.

Wet prairie ecosystems require regular disturbance to persist, typically on a three-to-five-year disturbance interval. Prescribed fire is the desired type of disturbance as burns help control invading trees and shrubs and invigorate the native prairie plants. If prescribed burning is not feasible then mowing, haying, or grazing will need to be used to maintain disturbance that drives wet prairie ecosystem processes.

Restoration of the plant community will be dependent upon the starting condition of the vegetation community. Sites that are relatively weed free and contain an assemblage of native wet prairie species should be spot treated for weed species followed by interseeding to rejuvenate native plants. Sites that have been subject to intensive farming will need chemical (herbicide) and mechanical (mowing, disking, harrowing) treatments for a period of 2-3 years or more to eliminate non-native plant cover and reduce the presence of non-natives in the soil seed bank. Broadcast seeding or drilling using native plant seed mixes will establish native vegetation across a diversity of hydrologic regimes at the site. Some species are better established by planting bulbs or plugs, such as camas (*Camassia quamash*), mule's ears (*Wyethia helianthoides*), and Oregon geranium (*Geranium oreganum*). Undesired species must be controlled after planting, generally two to three treatments per year (mechanical and chemical combined) to kill weeds or prevent weeds from going to seed while desired species become established.

2. Estuaries and Tidal Wetlands

SALTWATER MARSH

General description: Saltwater marshes occur in tidal zones of coastal estuaries. The saltwater marsh wetland type is distinguished from the tidal marsh wetland type by the salinity level in the water. When the salinity drops to less than 0.5 parts per thousand (ppt) as mixing with freshwater streamflow occurs, it is considered freshwater tidal marsh. The saltwater marsh is dominated by salt tolerant grasses and other herbaceous plants, while the freshwater tidal marsh is dominated by more shrubs and trees further away from the coast. The vegetation of saltwater marshes is divided into the low salt marsh zone that is more often inundated by saltwater and the high salt marsh zone with less saltwater inundation.

Habitat: The habitat type is edges of estuaries, tidal saltwater rivers and streams, and intertidal mudflats. These areas are often significant for production of shellfish and for spawning and rearing of saltwater fish. Mudflats are rich with invertebrates and seaweeds and are important feeding areas for seabirds and other waterbirds.

Restoration approaches: Saltwater intrusion, tidal influence, and intermixing are essential for saltwater marsh function and restoration. Surface elevation is a significant factor in saltwater marsh hydrology, and elevations where saltwater inundation occurs will determine where vegetation can establish (Frenkel and Morlan, 1991). Restoration may be as simple as removal of tide gates or removing or breaching existing levees. Projects that require levees and/or water control structures to avoid off-site impacts will likely require periodic maintenance to ensure continued function. Salt-water intrusion as part of restoration design would allow for establishment of a salt-loving plant community and dispersal of native saltmarsh plant propagules. Most non-native plants, such as invasive reed canarygrass, cannot tolerate salinities that occur in saltmarsh and will be replaced by native salt-tolerant plants.

TIDAL WETLANDS

General description: Freshwater tidal wetlands occur upstream of the tidal zone of estuaries in areas where salinity is less than 0.5 ppt. Distance inshore from the tidal influence varies for this wetland type and can range from 20 miles inland to 143 miles inland along the Columbia River. Freshwater tidal wetland plant communities tend to be more diverse and have more woody shrubs and trees compared to the saltwater marsh wetland type.

Habitat: Habitat type is edges of tidal rivers and streams. These areas are known to be important for fish rearing, feeding, and spawning habitats. For juvenile salmonids, these habitats provide low tide refuge and resting pools (Miller and Sadro, 2003), abundant large woody debris

(Diefenderfer and Montgomery, 2008), and abundant prey for feeding (Davis et al., 2019).

Restoration approaches: Restoration of freshwater tidal wetlands requires connection to rivers so that tidal influence and inundation from the floodplain can drive hydrology in the system. Hydrologic restoration may involve plugging drainage ditches, regrading or reshaping berms or meanders, or breaking or disconnecting drainage tiles to reconnect a stream to its floodplain. Beaver dam analogues may be installed along incised secondary channels to encourage aggradation. Restoration of microtopography may be critical in tidally influenced wetlands. Low mounds may be capable of supporting vegetation less tolerant to inundated conditions, which can greatly increase the diversity of the plant community. Caution must be taken not to create conditions for fish entrapment in depressions.

Restoration of vegetation is like the approach for the marsh wetland type. Site preparation involves a series of mechanical and chemical treatments prior to seeding and planting of appropriate herbaceous and woody plants, depending on the extent of non-native and invasive species dominance. Availability of seed and plugs of native emergent woody and herbaceous plants may determine species to be planted. Control of competitive vegetation and invasive species is critical during the establishment phase of planted native vegetation.

3. Flowing Water and Riparian

RIPARIAN WETLANDS

General description: Riparian wetlands typically occur along river corridors on stream terraces that have surface water connections during flood events (temporary flooding). Riparian vegetation communities are often dominated by trees or shrubs. These wetland types are essential for maintaining stream hydrology, nutrient processing, water temperature, and microclimate processes.

Habitat: These wetland types are important migratory corridors for many bird, amphibian, reptile, and mammal species. These wetlands can also maintain thermal regimes of streams for coldwater fish species and other aquatic species by maintaining thermal refugia or micro-climate cooling areas provided by tree canopy (Wohl et al., 2021; Olson and Burnett, 2009).

Restoration approaches: Historically, many riparian areas in Oregon were grazed intensively by livestock and soil compaction, streambank erosion, and introduction of invasive plant species may have occurred as a result. Removal of riparian buffer vegetation may also have resulted in changes to riparian micro-climate and thermal regimes. Restoration approaches for riparian wetlands should target reconnecting streams and rivers to their floodplains to maintain hydrology. Restoration of riparian vegetation will also result in removal of invasive species, stabilization of streambanks, and maintenance of thermal regimes via riparian shade and microclimate conditions.

Hydrologic restoration may involve eliminating levees, construction of setback levees, plugging drainage ditches, grading of banks and land surfaces (to allow more flooding), disconnecting drainage tile, and construction of oxbows and/or secondary channels. Historically, beavers played a large role in the dynamics of forested riparian wetlands. Consideration should be given

Table 2. Wetland type classification, hydrology, and plant species
Organized by wetland type categories: **FW**=Freshwater Wetlands; **ETW**=Estuaries and Tidal Wetlands; **FWR**=Flowing Water and Riparian

Wetland Type	Wetland Classification (HGM)	Hydrology	Plant Species
FW-Alkaline wetlands	DEPRESSIONAL	Sources may be direct precipitation and runoff; perennially to seasonally flooded	Black greasewood (*Sarcobatus vermiculatus*), inland saltgrass (*Distichlis spicata*), alkali grasses (*Puccinellia lemmonii*), bluegrass (*Poa secunda*), *Muhlenbergia* spp., beardless wildrye (*Leymus triticoides*), alkali bulrush (*Bolboschoenus maritimus*), chairmaker's bulrush (*Schoenoplectus americanus*), seaside arrow-grass (*Triglochin maritima*), and glasswort (*Salicornia* spp.)
FW-Deciduous swamps and shrublands	Multiple HGM classes: at elevation of stream: RIVERINE; if groundwater or runoff sources, DEPRESSIONAL; if groundwater source only, SLOPE HGM; if mineral soils, precipitation source, MINERAL SOIL FLATS; if brackish water, ESTUARINE FRINGE	Sources may be groundwater or streamflow; seasonal, or temporary flooding	**Western Oregon**: Trees-Oregon ash (*Fraxinus latifolia*), black cottonwood (*Populus balsamifera ssp. trichocarpa*), Pacific willow (*Salix lasiandra*), red alder (*Alnus rubra*), and western redcedar (*Thuja plicata*); Shrubs- Douglas spiraea (*Spiraea douglasii*), willows (*Salix hookeriana, S. sitchensis, S. fluviatilis*), vine maple (*Acer circinatum*), red-osier dogwood (*Cornus sericea*), common snowberry (*Symphoricarpos albus*), trailing blackberry (*Rubus ursinus*), salmonberry (*Rubus spectabilis*), and roses (*Rosa nutkana, R. pisocarpa*); Herbaceous-slough sedge (*Carex obnupta*), lady fern (*Athyrium filix-femina*), skunk cabbage (*Lysichiton americanus*), and water parsley (*Oenanthe sarmentosa*). **Eastern Oregon**: Trees-black cottonwood, quaking aspen (*Populus tremuloides*), white alder (*Alnus rhombifolia*), Lodgepole pine (*Pinus contorta*), Engelmann spruce (*Picea engelmannii*); Shrubs-Lewis' mockorange (*Philadelphus lewisii*), Wood's rose (*Rosa woodsia*), common snowberry, western serviceberry (*Amelanchier alnifolia*), willows (*Salix* spp.), black hawthorn (*Crataegus douglasii)*; Herbaceous-blue wildrye (*Elymus glaucus*), Canada bluejoint (*Calamagrostis canadensis*), sedges (*C. angustata, C. aquatilis*), cow parsnip (*Heracleum lanatum*), large-leaved avens (*Geum macrophyllum*), stinging nettle (*Urtica dioica*), and lady fern. **Groundwater driven system**: (*Carex laeviculmis*), mannagrasses (*Glyceria elata, G. striata*), skunk cabbage, and

			water parsley.
FW-Marshes	If elevation of stream, RIVERINE; if groundwater or runoff, DEPRESSIONAL; if groundwater only, SLOPE HGM; if mineral soils, MINERAL SOIL FLATS; if lakes, LACUSTRINE FRINGE	Perennially to seasonally flooded	spikerush (*Eleocharis spp*.), sedges (*Carex spp.*), bulrushes (*Schoenoplectus spp*.), bur-reeds (*Sparganium emersum* Rehmann, *Sparganium eurycarpum* Engelm., *Sparganium natans* L.), cattails (*Typha spp*.); areas that dry out: beggar ticks (*Bidens spp*.), smartweeds (*Polygonum spp.*), and curvepod yellowcress (*Rorippa curvisiliqua*); deeper areas: spatterdock or wocas (*Nuphar polysepala*), floating burred (*Sparganium augustifolium*), and wapato (*Sagittaria latifolia*).
FW-Vernal Pools	Mineral soils, precipitation source, MINERAL SOIL FLATS	Intermittently to seasonally flooded	Annual hairgrass (*Deschampsia danthonioides*), elegant calicoflower (*Downingia elegans*), waterwort (*Elatine* spp.), spikerush (*Eleocharis* spp.), denseflower willowherb (*Epilobium densiflorum*), Oregon eryngo (*Eryngium petiolatum*), inch-high rush (*Juncus uncialis*), tiny mousetail (*Myosurus minimus*), white flowered navarretia (*Navarretia leucocephala ssp. diffusa*), American pillwort (*Pilularia americana*), popcorn flower (*Plagiobothrys* spp.), dense-flowered knotweed (*Polygonum polygaloides ssp. confertiflorum*), milkwort knotweed (*Polygonum polygaloides ssp. polygaloides*), dwarf woollyheads (*Psilocarphus brevissimus*), tall woollyheads (*Psilocarphus elatior*), Oregon woollyheads (*Psilocarphus oregonus*), bowl clover (*Trifolium cyathiferum*), fool's onion (*Triteleia hyacinthine*), and purslane speedwell (*Veronica peregrina*).
FW-Wet Meadows	SLOPE	Groundwater or snowmelt typically largest source; Perennially to seasonally flooded	If saturation throughout growing season, dominated by sedges like shortbeak sedge (*Carex simulata)*; if dry later in growing season, often tufted hairgrass (*Deschampsia caespitosa*), Baltic rush (*Juncus arcticus*), Nebraska sedge (*C. nebrascensis*), and widefruit sedge (*C. angustata*) in areas that have been grazed.
FW-Wet Prairie	MINERAL SOIL FLATS, DEPRESSIONAL or SLOPE	Intermittently to seasonally flooded.	Tufted hairgrass (*Deschampsia caespitosa*), spike bentgrass (*Agrostis exarata*), California oatgrass (*Danthonia californica*), dense sedge (*Carex densa*), green-sheath sedge (*C. feta*), thick-headed sedge (*C. pachystachya*), and lateral sedge (*C. unilateralis*). Toad rush (*Juncus bufonius*), western rush (*J. occidentalis*) and Bolander's rush (*J. bolanderi*),

			camas (*Camassia quamash*), slender cinquefoil (*Potentilla gracilis*), self-heal (*Prunella vulgaris*), skullcap speedwell (*Veronica scutellata*) and Oregon geranium (*Geranium oreganum*).
ETW-Saltwater Marsh	ESTUARINE FRINGE	Tidal, regularly to irregularly flooded	Low salt marsh (zone nearest ocean): pickleweed (*Salicornia* spp.), marsh jaumea (*Jaumea carnosa*), saltgrass (*Distichlis spicata*), Lyngbye's sedge (*Carex lyngbyei*), and arrowgrass (*Triglochin* spp.). High salt marsh (less frequent inundation by saltwater): tufted hairgrass (*Deschampsia caespitosa*), Baltic rush (*Juncus arcticus*), pacific silverweed (*Potentilla pacifica*), and orache (*Atriplex patula*).
ETW-Tidal Wetlands (freshwater)	ESTUARINE FRINGE	Tidal, regularly to irregularly flooded	Sitka spruce (*Picea sitchensis*), western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), Hooker's willow (*Salix hookeriana*), Oregon crabapple (*Malus fusca*), twinberry honeysuckle (*Lonicera involucrata*), red-osier dogwood (*Cornus sericea*), Douglas spiraea (S*piraea douglasii*), western Labrador tea (*Ledum glandulosum*), Salal (*Gaultheria shallon*), willows (*Salix* spp.), slough sedge (*Carex obnupta*), and skunk cabbage (*Lysichiton americanus*).
FWR-Riparian Wetlands	RIVERINE	Streamflow, groundwater at stream elevation; Perennially to seasonally flooded	Bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), Sitka willow (*Salix sitchensis*), Pacific willow (*Salix lucida* ssp. *lasiandra*), red-osier dogwood (*Cornus sericea*), and Oregon ash (*Fraxinus latifolia*)

to encouraging beaver activity wherever site conditions allow. This can be achieved through low technology riparian restoration techniques such as beaver dam analogs (BDAs) (see Pilliod et al., 2018; Pollock et al., 2023), or simply by allowing beaver activity to occur.

Reed canarygrass (*Phalaris arundinacea*) has been widely planted for livestock forage, and this species is particularly abundant in riparian wetland systems, as its seed is readily transported by water movement. Kentucky bluegrass (*Poa pratensis*) may form the dominant ground cover in east-side riparian wetlands that have been modified for grazing or been subject to stream degradation through beaver removal, removal of natural riparian vegetation, and/or stream channelization. This rhizomatous species takes hold in areas with lowered water tables and can be difficult to control. Meadow foxtail (*Alopecurus pratensis*) and creeping meadow foxtail (*Alopecurus arundinaceus*) have also been extensively planted for livestock forage and have the potential to persist and/or invade new wetland areas. The best method of long-term control is restoration of the natural hydrologic regime and establishment of a canopy of woody vegetation to provide competition for light. Extensive chemical and mechanical weed control may also be needed before attempting to revegetate infested areas.

III. WRE PROGRAM ELIGIBILITIES

A. Eligible Land Types

All land is evaluated and determined as eligible per the ACEP manual criteria (Conservation Program Manual (CPM), Title 440, Part 528, Section 528.105). Any land not meeting the eligible land criteria described in this section or upon review of National policy, that does not meet the criteria for "adjacent lands" (see Section III, B Eligible Adjacent Lands) is considered ineligible for ACEP-WRE. Land eligibility categories may vary in different areas of Oregon.

The following includes a summary of information on eligible land types that are typically enrolled in ACEP-WRE in Oregon: Farmed, Converted, Degraded Wetlands; Riparian Areas; Lands in the Conservation Reserve Program (CRP); and Wetlands Restored or Protected Under a Private, State, or Federal Program.

1. **Farmed or Converted Wetlands** (See CPM, Title 440, Part 528, Section 528.105(C))

Farmed wetlands: Farmed under natural conditions, farmed wetlands, prior converted cropland, commenced conversion wetlands, or farmed wetland pasture. NRCS makes this determination based on Title 180, National Food Security Act Manual (NFSAM) criteria.

Converted wetlands: Land is not eligible for enrollment if the conversion was after December 23, 1985, except as provided for in CPM, Title 440, Part 528, Section 528.105(I)(6). Enrollment may be considered if all the following are true:

a. Enrollment is needed for administrative management of boundaries.
b. Economic and management needs of parcels for the landowner.
c. The landowner is willing to enroll for no compensation.
d. The landowner is willing to complete the restoration at the landowner's expense.

Degraded wetlands: The extent of degradation and the restorability of the site are considered from a hydrology standpoint to determine eligibility. For NRCS, Oregon, the site will be considered significantly degraded and eligible if more than 75 percent of the hydrology functions (e.g., surface area, depth, frequency, timing, or duration) have been altered from its historic hydrological conditions. In addition, the site will be considered substantially restorable and eligible if more than 90 percent of the identified wetland hydrology functional impacts will be restored.

2. **Riparian Areas** (See CPM, Title 440, Part 528, Section 528.105(E))

Riparian areas are eligible if they connect wetlands less than one mile apart that are currently enrolled in an ACEP-WRE program or another resource protection program, such as a State or Federal wildlife management area. If the riparian area will link already-protected wetland areas, then no additional wetland acres are required to enroll the riparian acres. Eligible riparian areas should average up to 300 feet wide maximum on one side or 600 feet for both sides. Enrollments with widths greater than 300 feet on one side and distances greater than 1 mile between enrolled wetlands may be granted a waiver by the State Conservationist (see Section V. Technical Considerations for Waivers, Riparian Widths and Distances Waiver). Greater widths and distances for riparian area enrollments may be determined based on wildlife habitat and life cycle needs and wetland ecological functions and values (see VII. List of Resources for Further Information, Wetland-Dependent Wildlife and Wetland Functions and Values). Riparian area occurrence and the boundary of the riparian areas can be determined by using soil survey information, hydrology-based indicators, and vegetation-based indicators (see VII. List of Resources for Further Information, Riparian Areas).

3. **Lands in the CRP** (See CPM, Title 440, Part 528, Section 528.105(F))

A landowner can submit a request to the Assistant State Conservationist for Programs (ASTC-P) and State Resource Conservationist (SRC) to participate in WRE program. In general, land that is currently enrolled in CRP can be enrolled in ACEP-WRE, but eligibility should be determined on a case-by-case basis related to landowner intentions for discontinuation of agricultural production. In addition, landowner applicants should consult FSA if they wish to enroll land in ACEP-WRE that is currently enrolled in CRP to avoid paying back previous rental payments during land enrollment under CRP.

It should be noted that lands established to trees under CRP are ineligible for enrollment, whether the contract is active or closed. However, the State Conservationist may grant a waiver for ACEP-WRE eligibility if trees have not been completely established and the presence of trees conforms to ACEP-WRE restoration requirements (see CPM, Title 440, Part 528, Section 528.106B(2) for further detail). For information on methods to determine if trees have been established, refer to: Title190 Forest Inventory Methods Technical Note.

4. **Wetlands Restored or Protected Under a Private, State, or Federal Program**

As described in CPM, Title 440, Part 528, Section 528.105(G), land previously restored under a local, State, or Federal program are eligible that applied restoration methods meeting NRCS restoration standards and specifications to provide benefits for wetland functions.

If a deed restriction is held by another federal agency, an agreement must be reached and documented by NRCS and OGC before NRCS may proceed with enrollment of the property into the ACEP-WRE program. The enrollment must provide additional resource protection, provide critical habitat for threatened or endangered species, and/or allow an opportunity for full restoration of wetland functions because of enrollment that could not otherwise be achieved.

B. Eligible Adjacent Lands

Lands that do not fall within the categories described above that will be considered for enrollment as eligible Adjacent Lands (see CPM, Title 440, Part 528, Section 528.105(I)) will emphasize habitats for wetland-dependent wildlife ("Associated Habitats") that are within dispersal distances to utilize the habitat to complete their life cycle. Other functions that wetlands provide that are required for aquatic and wetland ecosystem processes, such as water availability and hydrologic stability, will be considered for enrollment as Adjacent Lands. Eligibility will be determined using technical information for justification to ensure wetland functions and values and habitat objectives are achieved (see VII. List of Resources for Further Information, Wetland Functions and Values and Wetland-Dependent Wildlife).

An upper limit of 5:1 ratio (5 acres eligible adjacent land to 1 acre eligible land acre) will be considered for enrollment in the WRE program throughout Oregon. This ratio will be determined based on wetland type and functional targets for wetland restoration on a case-by-case basis. The following examples illustrate how enrolling adjacent lands may increase the benefits of functions that enrolled wetlands provide:

1. Wetlands in one location may provide water source and hydrology functions to support other wetlands in the area (wetland complexes depend on hydrology on adjacent lands).
2. Riparian areas may connect multiple wetlands along the same stream network.
3. Aquatic or wetland-dependent wildlife species may require connected patches of riparian or wetland habitat to complete their life cycles.

Specific Examples to illustrate the need for a 5:1 maximum ratio:

1)Example 1: The wet prairie habitat is adjacent to the oak woodland. The wet prairie (eligible) is breeding habitat for the amphibian egg and larval stage. The oak woodland (adjacent) provides habitat for the amphibian adult life stage.

2)Example 2: There are multiple freshwater marshes along a river corridor. Both marshes (eligible) are along the same river within adjacent, separate easements. The riparian area (adjacent) off easement provides connectivity between the marshes (eligible) on two separate easements.

3)Example 3: A hydrology, groundwater seep source exists off easement. A riparian wetland, floodplain bottomland (eligible) is downstream of a groundwater source off easement (adjacent). The riparian wetland needs the groundwater seep that is upstream as a hydrology source to function.

Acceptable Associated Habitats

The following table provides details on eligible Adjacent Lands that are considered "Associated Habitat" types to be considered because they may provide additional habitat functions for wetland-dependent wildlife and other aquatic species. These may be considered with written approval from the State Conservationist. This list of associated habitats applies to new enrollments in ACEP-WRE, existing enrollments (unclosed), and closed conservation easements under ACEP-WRE and predecessor programs. Any maintenance, management, or additional restoration after initial restoration that is completed on an ACEP-WRE easement must be consistent with these associated habitats.

Acceptable Associated Habitat	Expected Contribution to Wetland Functions & Values
Grasslands	Buffer areas to wetlands, riverine habitat, perennial and intermittent streams. Provides for wildlife cover, forage, nesting, and dispersal.
Riparian Areas	Lands that occur along watercourses and water bodies (e.g., flood plains, streambanks) with unique soil and vegetation characteristics influenced by the presence of water. Typical vegetation consists of woody species that benefit multiple wildlife species and provides shade to maintain temperature. Acts as a buffer zone for riverine areas and adjacent wetlands.
Shrublands	Cover and forage areas for migratory and nesting birds.
Forestland	Cover, nesting, and forage areas for migrating birds.
Other Aquatic Priority Habitats	Connectivity to other wetland and riparian habitats, dispersal to habitats for spawning or breeding.

C. Eligible Conservation Practices

The NRCS umbrella conservation practices that are eligible to implement on wetland easements include: Wetland Restoration (657), Wetland Wildlife Habitat Management (644), Wetland Enhancement (659), and Upland Wildlife Habitat Management (645). However, any reasonable practice or activity needed to restore, manage, and/or enhance these lands is eligible if consistent with program goals and objectives.

D. Ranking Factors and Criteria

Although much of the ranking criteria are established according to the most recent Farm Bill (2018) and set Nationally, the States have some flexibility to establish their own criteria as long as they do not violate policy and provide environmental benefits per CPM, Title 440, Part 528, Section 528.111. Environmental benefits from wetland restoration can be related to native plant community and habitat, such as providing greater habitat diversity, complexity, and connectivity within the landscape. Wetland restoration can also provide habitat benefits for specific groups or species, including migratory birds, wetland-dependent wildlife, threatened, endangered, and at-risk species. Environmental benefits from wetland restoration can also focus on water quality and quantity to maintain and restore hydrology (surface and groundwater) and manage flood flows. Environmental benefits of wetland functions related to carbon sequestration and climate resiliency can also be considered in ranking criteria.

Oregon NRCS determines ranking criteria on an annual basis, and a ranking worksheet is used to give each WRE application a ranking score. These scores are used to prioritize potential enrollments for funding. The only limitation on scoring is that 50% of the potential points awarded for environmental benefits must come from hydrology restoration potential (see Appendix B, Ranking Worksheet).

Ranking criteria for NRCS Oregon that quantify environmental benefits on the Ranking Worksheet (Appendix B) result in scores for the following: altered hydrology, restored hydrology, habitat for at risk species, and restoration of native plant communities. These ranking criteria are designed to reflect the following wetland functions: maintenance of surface hydrology, maintenance of groundwater flow, maintenance of wetland and hydric soils, habitat for wetland-dependent wildlife, availability of native plant diversity, and availability of habitat. Diversity of wetland types and connectivity of wetland habitat patches within the landscape are also reflected in ranking criteria (Habitat Diversity, Adjacent Protected Habitat, and Floodplain Connectivity). Various geospatial data layers and NRCS technical staff are potential resources available for assessment of wetland functions. Further details on the technical information used for assessment of wetland functions are listed below in Table 3 and can be found in section VII. List of Resources for Further Information, Data Sources and Wetland Functions and Values.

Table 3. Ranking criteria and associated wetland functions

Ranking Criteria	Wetland functions	Technical Information Used*
Altered and Restored Hydrology	Maintain surface hydrology	NWI data, OR Wetlands data, FEMA Floodplain data, NHD data, LiDAR data
Altered and Restored Hydrology	Maintain groundwater flow	NWI data, OR Wetlands data, NHD data, LiDAR data
Altered and Restored Hydrology	Maintain wetland and hydric soils	NWI data, OR Wetlands data, WebSoilSurvey; NRCS Soil Scientists
Habitat for At Risk Species	Habitat for wetland-dependent wildlife	Presence data, Habitat assessment data, WHEG, NRCS and USFWS Biologists
Native Plant Community	Maintain native plant diversity, habitat	Presence data (plant survey); community structure assessment, NRCS Biologists

* (see VII. List of Resources for Further Information, Data Sources and Wetland Functions and Values)

In addition to information recorded on the ranking worksheet, special considerations, Priority Areas for ranking that are currently being used by NRCS Oregon include: the USFWS Recovery Zone for Bradshaw's lomatium or Nelson's checker mallow; and the Lower Columbia River Priority Area, Priority watersheds for Oregon Coastal Coho Salmon (see Appendix C for Priority Geographic Regions for FY 2023).

IV. TECHNICAL CONSIDERATIONS FOR CUAs

A compatible use (CUA) is a use or activity conducted on a wetland reserve easement that NRCS Oregon determines is consistent with the long-term conservation and restoration goals and objectives, and wetland functions and values of the easement area. An NRCS-CPA-52 Environmental Evaluation is required for all practices and activities in a CUA in accordance with Oregon State Instruction 300 Part 393. NRCS Oregon will consider CUAs on a case-by-case basis, and CUAs will be approved by the Assistant State Conservationist or Basin Team Leaders. Each CUA is a discreet authorization subject to requirements at the time it was issued and expiration date. Technical information and parameters used for CUA assessment will be considered and developed by NRCS Oregon using an adaptive management approach and in partnership with USFWS, SWCDs, Oregon State agency partners, and others (see VII. List of References for Further Information, Compatible Use Authorization Management Tools).

NRCS Oregon CUAs will consider geographic area, activity, and wetland type to prescribe amount, method, location, timing, frequency, intensity, and duration of the compatible use per CPM, Title 440, Part 528, Section 528.152(B)(1). NRCS Oregon CUAs must not adversely affect habitat for migratory birds, at-risk species, or threatened or endangered species. Timing of activities associated with CUAs need to be considered on a case-by-case basis according to species and part of the state.

V. TECHNICAL CONSIDERATIONS FOR WAIVERS

The State Conservationist is authorized to issue waivers based on technical considerations. All other requested policy waivers can only be approved or denied by National Headquarters. The landowner may submit the request for a waiver in writing and must acknowledge certain conditions of the waiver. More information can be found at CPM, Title 440, Part 528, Section 528.142(D). Program requirements covered by the statute or the rule may not be waived. Only waiver options consistent with program policy, contained within this WRCG, or consistent with this WRCG may be requested. Existing waivers issued by the State Conservationist prior to the approval and publication of this WRCG will be allowed until expiration of such existing waiver.

Riparian Widths and Distances Waiver

Section III. B. Eligible Land Types, Riparian Areas describes the "riparian" eligible land category. Waivers for additional linkages between wetland areas, widths, or for eligible wetland areas more than 1 mile apart may be granted by the State conservationist if the riparian area can provide habitat for at-risk fish or wildlife, contribute significantly to wetland functions and values of the easement area, or improve the practical administration and management of the easement area.

Excessive Restoration Costs

Lands where the cost of restoration for the easement area will exceed the fair market value of the land are ineligible. This criterion may be waived by the State Conservationist in situations in which it is documented that the restoration may be successfully accomplished without accumulating a long-term operation and maintenance cost burden to the program. These may include habitat types that are highly degraded and are labor intensive and expensive to restore.

Early Implementation of Restoration

In general, payments are not authorized for restoration practices that are started or completed before easement recording and easement restoration agreement approval date. In very special cases and for meritorious reasons only, the State Conservationist may consider a waiver for enrollments that meet all ACEP-WRE land and landowner eligibility requirements. Meritorious reasons may include:

- Alleviation of imminent and significant environmental problems.
- Prevention of damage to life or property.
- Seasonal weather constraints.

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Pilliod, D.S. and E. Wind. (editors). 2008. Habitat management guidelines for amphibians and reptiles of the Northwestern United States and Western Canada. Partners in Amphibian and Reptile Conservation, Technical Publication HMG-4, Birmingham, AL. 139 pp.

Pacific Coast Joint Venture. 2013. Habitat and population objectives-wetland birds and waterbirds, North Puget Lowlands Ecoregion. 71 pp. (see Waterbird Habitat Pacific Coast Joint Venture)

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Mesic Habitat Planning Guide: (Working Lands for Wildlife Resource)
https://efotg.sc.egov.usda.gov/references/public/CO/Mesic_Habitat_Conservation_Planning_Guide.pdf

ODFW. 2015. Guidance for conserving Oregon's native turtles including best management practices. Oregon Dept. of Fish and Wildlife. 99 pp.

Wetland Restoration Prioritization Tools:

1) Intermountain West Joint Venture, WET Tool: https://iwjv.org/solution-based-science/wet/

   User Guide:https://iwjv.org/wp-content/uploads/2022/11/User-Guide-2.pdf
   Peer Reviewed Publication:
   https://www.frontiersin.org/articles/10.3389/fevo.2022.844278/full

Data Sources, Historic Wetland Types and Vegetation:

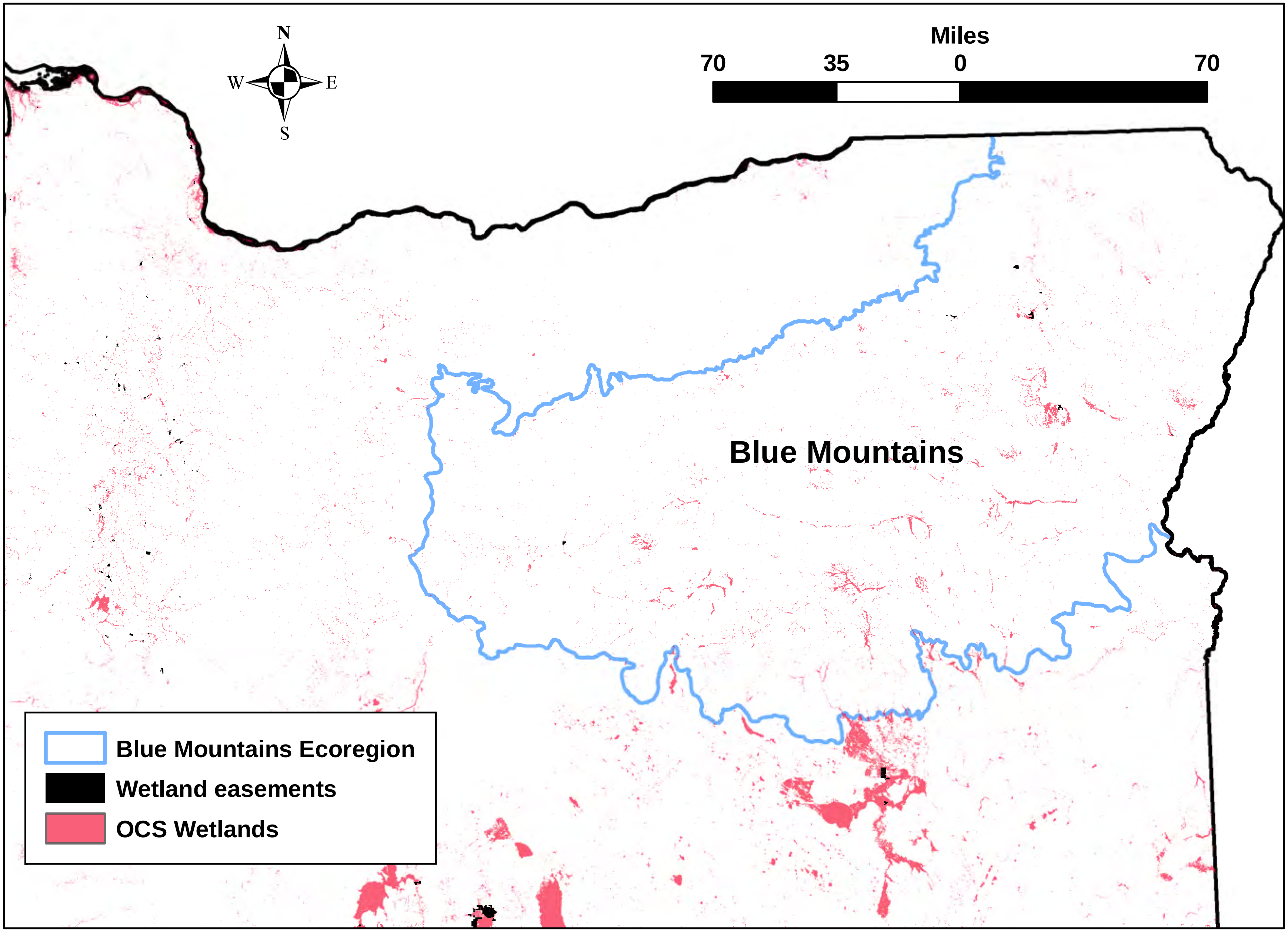
US Department of Interior, Bureau of Land Management (BLM), Survey data, Land Status & Cadastral Survey Records: https://www.blm.gov/or/landrecords/survey/ySrvy1.php

US Department of Interior, BLM General Land Office Records:
https://glorecords.blm.gov/default.aspx

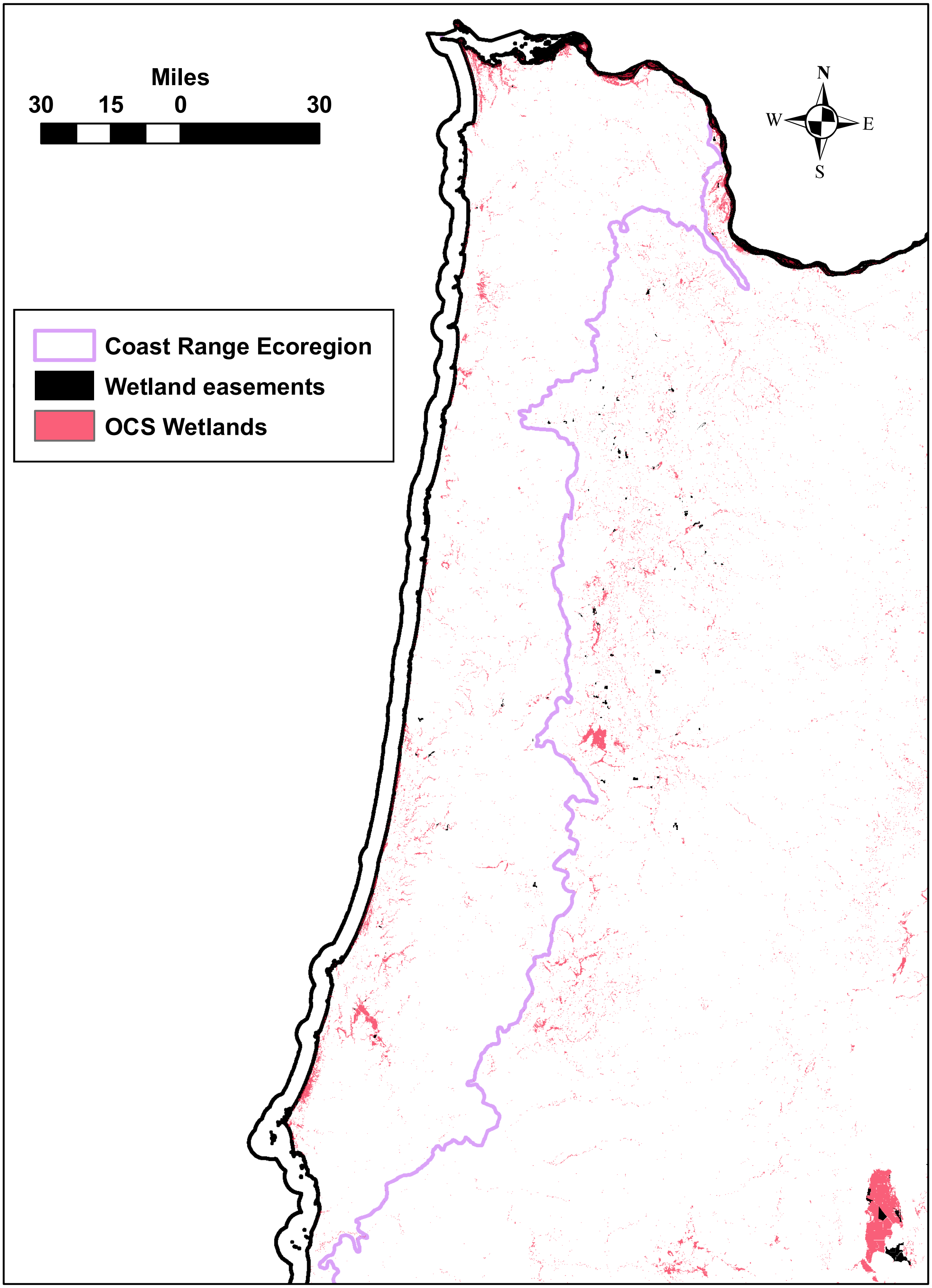
Historical vegetation maps: https://inr.oregonstate.edu/hvmp/available-maps#Oregon

LiDAR data viewer: https://gis.dogami.oregon.gov/maps/lidarviewer/

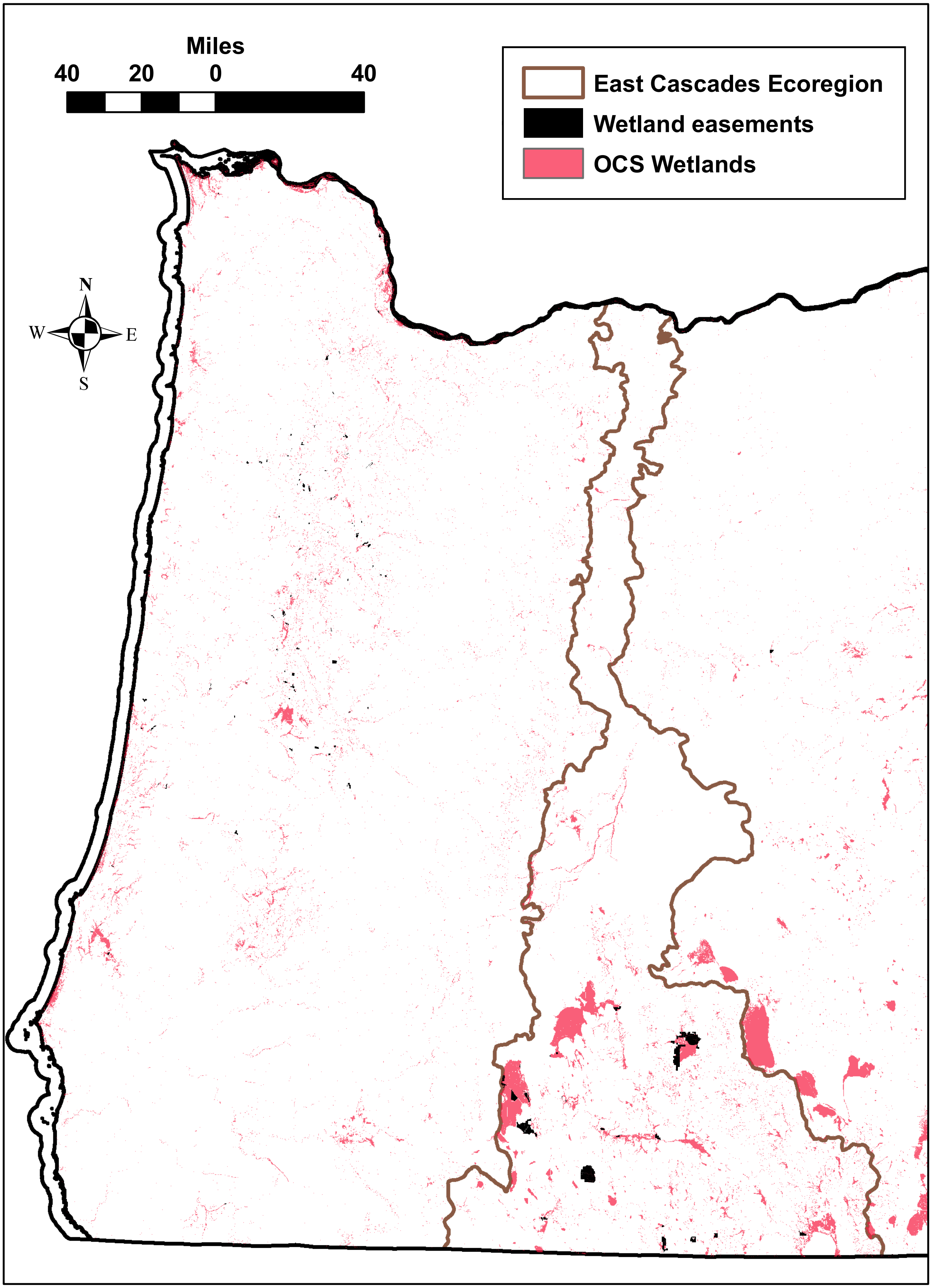
APPENDIX A: OCS Blue Mountains Ecoregion



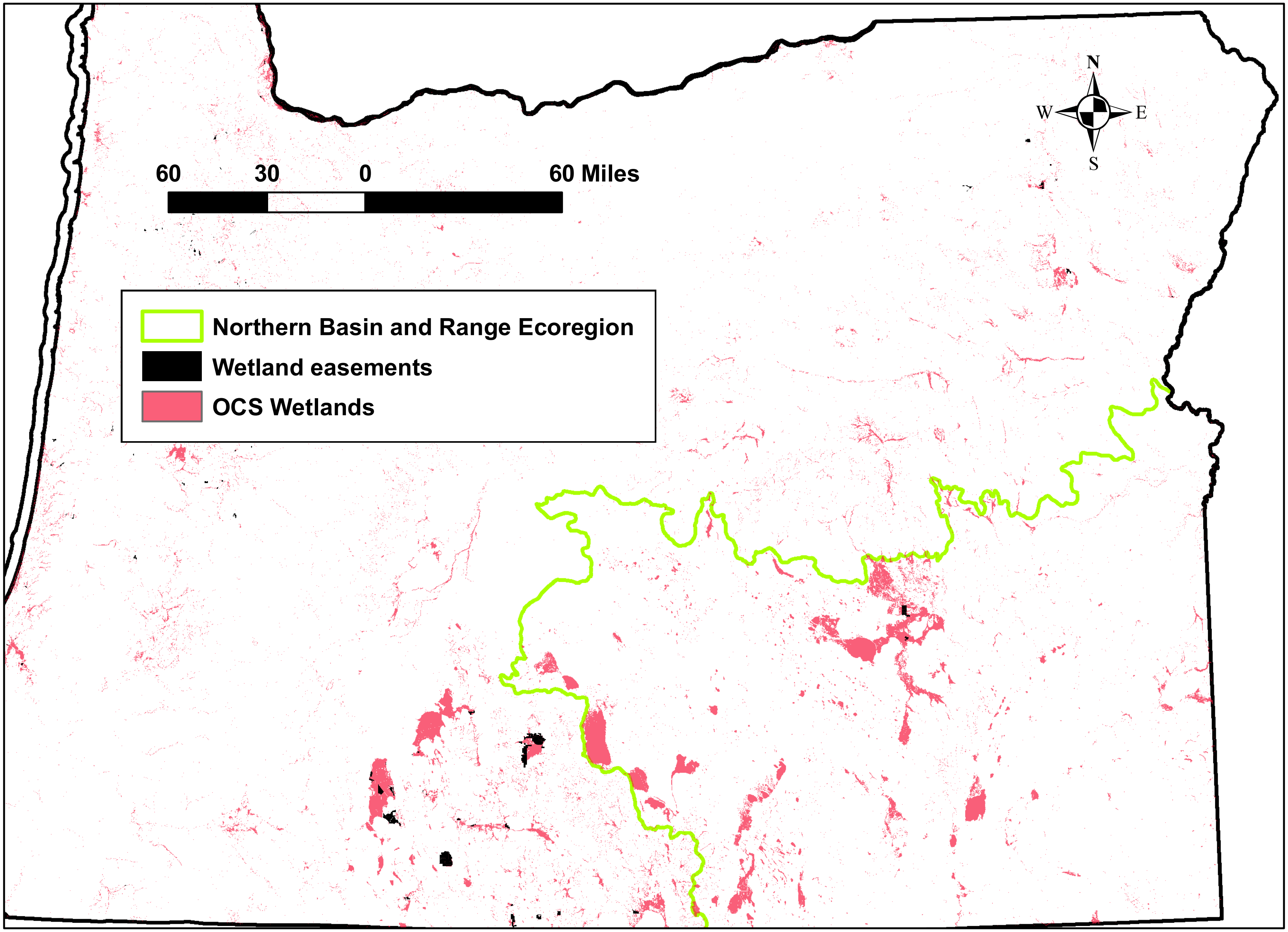
APPENDIX A: OCS Coast Range Ecoregion



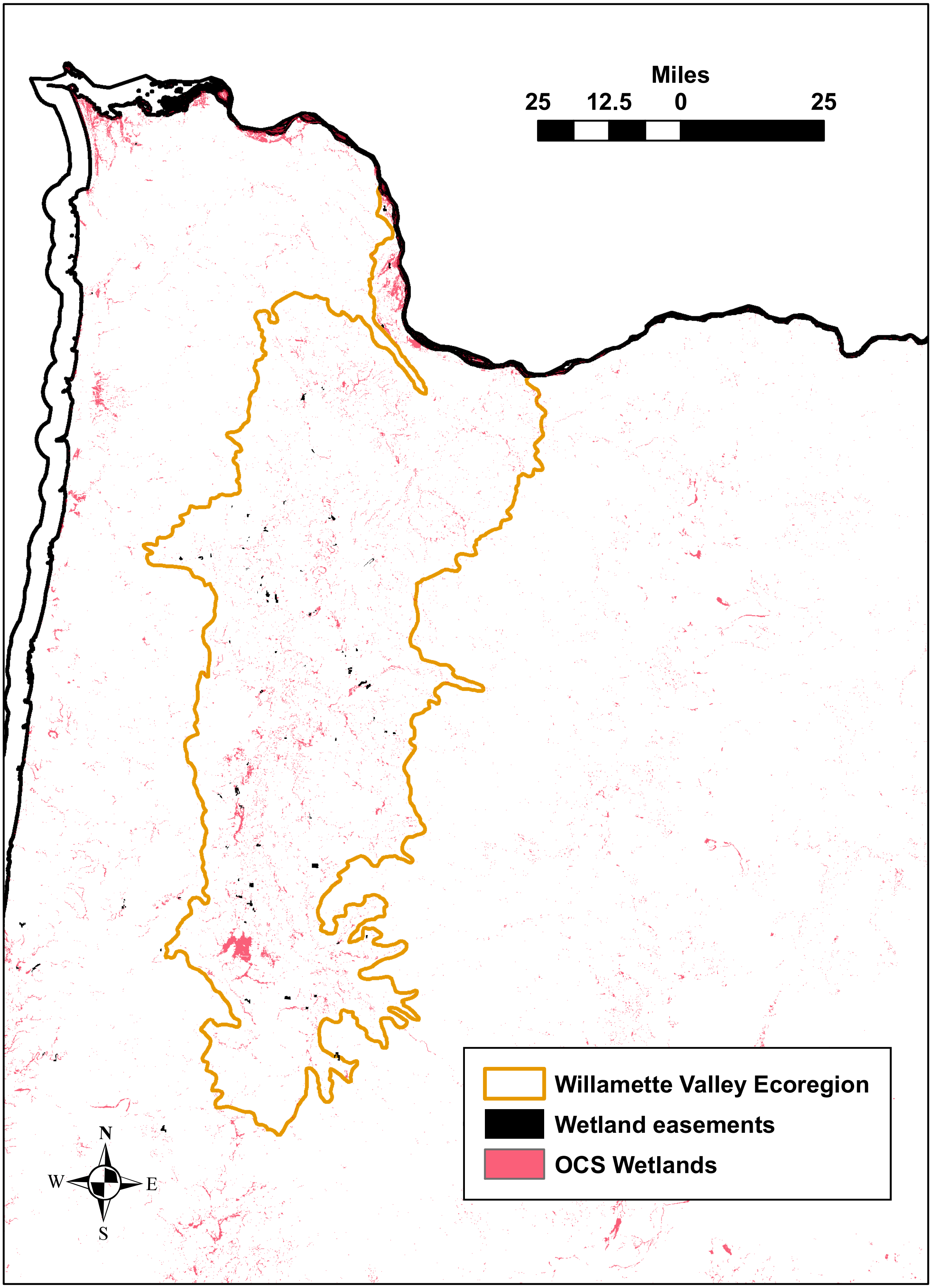
APPENDIX A: OCS East Cascades Ecoregion



APPENDIX A: OCS Northern Basin and Range Ecoregion



APPENDIX A: OCS Willamette Valley Ecoregion



APPENDIX B: Ranking Worksheet

Ranking Pool **Oregon** WRE - GEN
Program ACEP-WRE
Template ACEP-WRE General
Last Modified By Oregon NRCS
Pool Status Active
Template Status Active
Last Modified / /
Tags
National Pool No
Include States OR (Admin)

Land Uses and Modifiers

Land Use	Grazed	Wildlife	Irrigated	Hayed	Drained	Organic	Water Feature	Protected	Urban	Aquaculture
Associated Ag Land	--	x	--	--	N/A	--	--	--	--	--
Crop	--	x	--	--	--	--	--	--	--	--
Forest	--	x	--	N/A	N/A	--	--	--	--	--
Other Rural Land	--	x	--	N/A	N/A	--	--	--	--	--
Pasture	--	x	--	--	--	--	--	--	--	--
Range	--	x	N/A	--	N/A	--	--	--	--	--
Water	N/A	x	N/A	N/A	N/A	--	--	--	--	--

Resource Concern Categories

Categories			
Category	**Min %**	**Default %**	**Max %**
Aquatic habitat	10	15	80
Concentrated erosion	0	5	70
Degraded plant condition	0	10	70
Field pesticide loss	0	5	70
Field sediment, nutrient and pathogen loss	0	5	70
Fire management	0	2	5
Long term protection of land	10	10	80
Pest pressure	0	5	70
Salt losses to water	0	3	5
Source water depletion	0	5	70
Storage and handling of pollutants	0	5	70
Terrestrial habitat	10	15	80
Weather resilience	0	10	20
Wind and water erosion	0	5	15

Aquatic habitat			
Resource Concern	**Min %**	**Default %**	**Max %**
Aquatic habitat for fish and other organisms	50	67	100
Elevated water temperature	0	33	50

Concentrated erosion			
Resource Concern	**Min %**	**Default %**	**Max %**
Bank erosion from streams, shorelines or water conveyance channels	0	70	100
Classic gully erosion	0	15	50
Ephemeral gully erosion	0	15	50

Degraded plant condition			
Resource Concern	**Min %**	**Default %**	**Max %**
Plant productivity and health	0	50	100
Plant structure and composition	0	50	100

Field pesticide loss			
Resource Concern	**Min %**	**Default %**	**Max %**
Pesticides transported to groundwater	0	50	75
Pesticides transported to surface water	25	50	100

Field sediment, nutrient and pathogen loss			
Resource Concern	**Min %**	**Default %**	**Max %**
Nutrients transported to groundwater	0	35	100
Nutrients transported to surface water	0	28	100
Pathogens and chemicals from manure, biosolids or compost applications transported to groundwater	0	4	15
Pathogens and chemicals from manure, biosolids or compost applications transported to surface water	0	4	100
Sediment transported to surface water	0	29	100

Fire management			
Resource Concern	**Min %**	**Default %**	**Max %**
Wildfire hazard from biomass accumulation	100	100	100

Long term protection of land			
Resource Concern	**Min %**	**Default %**	**Max %**
Loss of functions and values	85	95	100
Threat of conversion	0	5	15

Pest pressure

Resource Concern	Min %	Default %	Max %
Plant pest pressure	100	100	100

Salt losses to water

Resource Concern	Min %	Default %	Max %
Salts transported to groundwater	0	50	100
Salts transported to surface water	0	50	100

Source water depletion

Resource Concern	Min %	Default %	Max %
Groundwater depletion	25	40	60
Surface water depletion	40	60	75

Storage and handling of pollutants

Resource Concern	Min %	Default %	Max %
Nutrients transported to groundwater	0	50	100
Nutrients transported to surface water	0	50	100
Petroleum, heavy metals and other pollutants transported to groundwater	0	--	50
Petroleum, heavy metals and other pollutants transported to surface water	0	--	100

Terrestrial habitat

Resource Concern	Min %	Default %	Max %
Terrestrial habitat for wildlife and invertebrates	100	100	100

Weather resilience

Resource Concern	Min %	Default %	Max %
Drifted snow	0	--	25
Naturally available moisture use	0	10	25
Ponding and flooding	0	45	100
Seasonal high water table	0	35	100
Seeps	0	10	25

Wind and water erosion

Resource Concern	Min %	Default %	Max %
Sheet and rill erosion	0	85	100
Wind erosion	0	15	100

Practices

Practice Name	Practice Code	Practice Type
Wildlife Habitat Planting	420	Conservation Practices
Long-Term Protection of Land - Permanent Easement	LTPPE	Easements
Structures for Wildlife	649	Conservation Practices
Long-Term Protection of Land - Maximum Duration Allowed by State Law	LTPMAS	Easements
Long-Term Protection of Land - 30-Year Easement	LTP30YE	Easements
Long-Term Protection of Land - 30-Year Contract	LTP30YC	Easements
Acquisition Process - Title Search	LTAPTS	Easements
Acquisition Process - Environmental Database Records Search	LTAPERS	Easements
Acquisition Process - Full Phase I	LTAPFP1	Easements
Acquisition Process - Appraisal	LTAPA	Easements
Acquisition Process - Appraisal Update	LTAPAU	Easements
Acquisition Process - Appraisal Technical Review First Review	LTAPTR1	Easements
Acquisition Process - Appraisal Technical Review Second Review	LTAPTR2	Easements
Acquisition Process - Boundary Survey	LTAPBS	Easements
Acquisition Process - Closing Services	LTAPCS	Easements
Brush Management	314	Conservation Practices
Clearing and Snagging	326	Conservation Practices
Conservation Cover	327	Conservation Practices
Prescribed Burning	338	Conservation Practices
Cover Crop	340	Conservation Practices
Critical Area Planting	342	Conservation Practices
Dam, Diversion	348	Conservation Practices
Well Decommissioning	351	Conservation Practices
Dike and Levee	356	Conservation Practices
Diversion	362	Conservation Practices
Pond	378	Conservation Practices
Windbreak/Shelterbelt Establishment and Renovation	380	Conservation Practices
Fence	382	Conservation Practices
Field Border	386	Conservation Practices

Practice Name	Practice Code	Practice Type
Riparian Herbaceous Cover	390	Conservation Practices
Riparian Forest Buffer	391	Conservation Practices
Filter Strip	393	Conservation Practices
Firebreak	394	Conservation Practices
Stream Habitat Improvement and Management	395	Conservation Practices
Aquatic Organism Passage	396	Conservation Practices
Dam	402	Conservation Practices
Grade Stabilization Structure	410	Conservation Practices
Grassed Waterway	412	Conservation Practices
Land Clearing	460	Conservation Practices
Land Smoothing	466	Conservation Practices
Access Control	472	Conservation Practices
Mulching	484	Conservation Practices
Tree/Shrub Site Preparation	490	Conservation Practices
Obstruction Removal	500	Conservation Practices
Pumping Plant	533	Conservation Practices
Range Planting	550	Conservation Practices
Drainage Water Management	554	Conservation Practices
Access Road	560	Conservation Practices
Trails and Walkways	575	Conservation Practices
Streambank and Shoreline Protection	580	Conservation Practices
Channel Bed Stabilization	584	Conservation Practices
Structure for Water Control	587	Conservation Practices
Nutrient Management	590	Conservation Practices
Pest Management Conservation System	595	Conservation Practices
Terrace	600	Conservation Practices
Subsurface Drain	606	Conservation Practices

Practice Name	Practice Code	Practice Type
Surface Roughening	609	Conservation Practices
Tree/Shrub Establishment	612	Conservation Practices
Underground Outlet	620	Conservation Practices
Restoration of Rare or Declining Natural Communities	643	Conservation Practices
Wetland Wildlife Habitat Management	644	Conservation Practices
Upland Wildlife Habitat Management	645	Conservation Practices
Shallow Water Development and Management	646	Conservation Practices
Early Successional Habitat Development-Mgt	647	Conservation Practices
Windbreak/Shelterbelt Renovation	650	Conservation Practices
Forest Trails and Landings	655	Conservation Practices
Constructed Wetland	656	Conservation Practices
Wetland Restoration	657	Conservation Practices
Wetland Creation	658	Conservation Practices
Wetland Enhancement	659	Conservation Practices
Forest Stand Improvement	666	Conservation Practices
Well Plugging	755	Interim Conservation Practices
Stream Crossing	578	Conservation Practices
Fuel Break	383	Conservation Practices
Woody Residue Treatment	384	Conservation Practices
Road/Trail/Landing Closure and Treatment	654	Conservation Practices
Herbaceous Weed Treatment	315	Conservation Practices

Ranking Weights

Factors	Algorithm	Allowable Min	Default	Allowable Max
Vulnerabilities	Default	10	15	50
Planned Practice Effects	Default	5	20	20
Resource Priorities	Default	20	35	70
Program Priorities	Default	15	30	30

Factors	Algorithm	Allowable Min	Default	Allowable Max
Efficiencies	Default	0	0	0

Display Group: Oregon FY 25 ACEP WRE GEN (Active)

An asterisk will be displayed to show that it is a conditional section or conditional question.

Survey: Applicability Questions

Section: Applicability		
Question	**Answer Choices**	**Points**
Is this an ACEP-WRE application that seeks to protect and restore wetlands through a 30-year or permanent conservation easement and has met Oregon workload priority to rank?	YES	--
	NO	--

Survey: Category Questions

Section: Category		
Question	**Answer Choices**	**Points**
Are the applications PLU's located in Oregon	YES	--
	NO	--

Survey: Program Questions

Section: Program		
Question	**Answer Choices**	**Points**
Easement Cost - Is there a voluntary landowner offer to accept a reduced easement value based on the compensation that the landowner would be entitled to for the enrollment type?	70 percent Fair Market Value, the GARC is 85 percent so reduce GARC by 15 percent.	10
	75 percent Fair Market Value, reduce GARC by 10 percent.	7
	80 percent Fair Market Value, reduce GARC by 5 percent.	5
	85 percent Fair Market Value, GARC, no landowner offer to reduce payment.	0
Restoration Cost -What is the total estimated restoration cost per acre that will be borne by NRCS per the preliminary restoration plan?	Less than $500 per acre.	15
	$500 to $1500/acre.	10
	$1500 to $2500/acre.	5
	More than $2500/acre.	0
Restoration Cost-Benefit - What is the cost per environmental benefit ratio? Restoration cost per acre divided by the Environmental Benefits points equals the Cost benefit ratio. Environmental Benefits are represented in the Resource Ranking Criteria section.	Less than 10	50
	10 to 20	25
	More than 20	0

Section: Program

Question	Answer Choices	Points
Operation and Maintenance - Operation, maintenance, and management requirements needed to keep structural and vegetative practices functional. Consider deterioration and damage prevention, repair, and replacement, in addition to monitoring needs.	Minimal. Restoration designed to minimize operation, maintenance, and management costs and requirements; practices have low replacement cost, easy access, and/or infrequent maintenance requirements. Examples include tile breaks, ditch fill/plug, tide gate removal, easements with high components of DWF/RFF that will be planted to trees and shrubs, or sites that have low invasive weed presence/vectors and high native plant presence at time of acquisition.	70
	Moderate. Restoration requires a moderate degree of operation, maintenance and management costs during establishment period, with less frequent inputs thereafter.	35
	High. Onsite or offsite conditions require high degree of operation, maintenance, and management and repair costs, e.g. structures requiring significant maintenance after flood events, restoration requiring frequent water management, recurring treatment needed to address erosion and, or siltation, continual noxious weed reinfestation.	0
Priority Areas - Are the PLUs within the boundary one of the Priority Geographic Regions Maps for WRE?	Project is located within a Priority Area.	20
	Project is not located within a Priority Area, however, has partner support for acquisition due to its high ecological value.	5
	Project is not located in Priority Area nor does it have partner support for acquisition.	0
Project Complexity - what is the level of project complexity? Base the answer on prelim WRPO, consider inventory, plan, and design time, level of permitting, and NEPA, ESA, SHPO consultation requirements.	Very low, less than standard planning time, permitting, and consultations.	25
	Low, standard planning time, permitting, and consultations.	15
	Moderate, requires individual ESA consultation, sites over 1,000 acres, water rights adjustments.	5
	High, requires an EA or EIS, excessive permitting time, or complex cultural resource consultation.	0
Consider connection to adjacent existing or enrolled WRE easements. If adjacent easements will be restored together as a larger easement area, then consider the area of the entire complex	Offered easement area is larger than 30 acres.	10
	Offered area is less than 30 acres.	0

Survey: Resource Questions

Section: Resource

Question	Answer Choices	Points

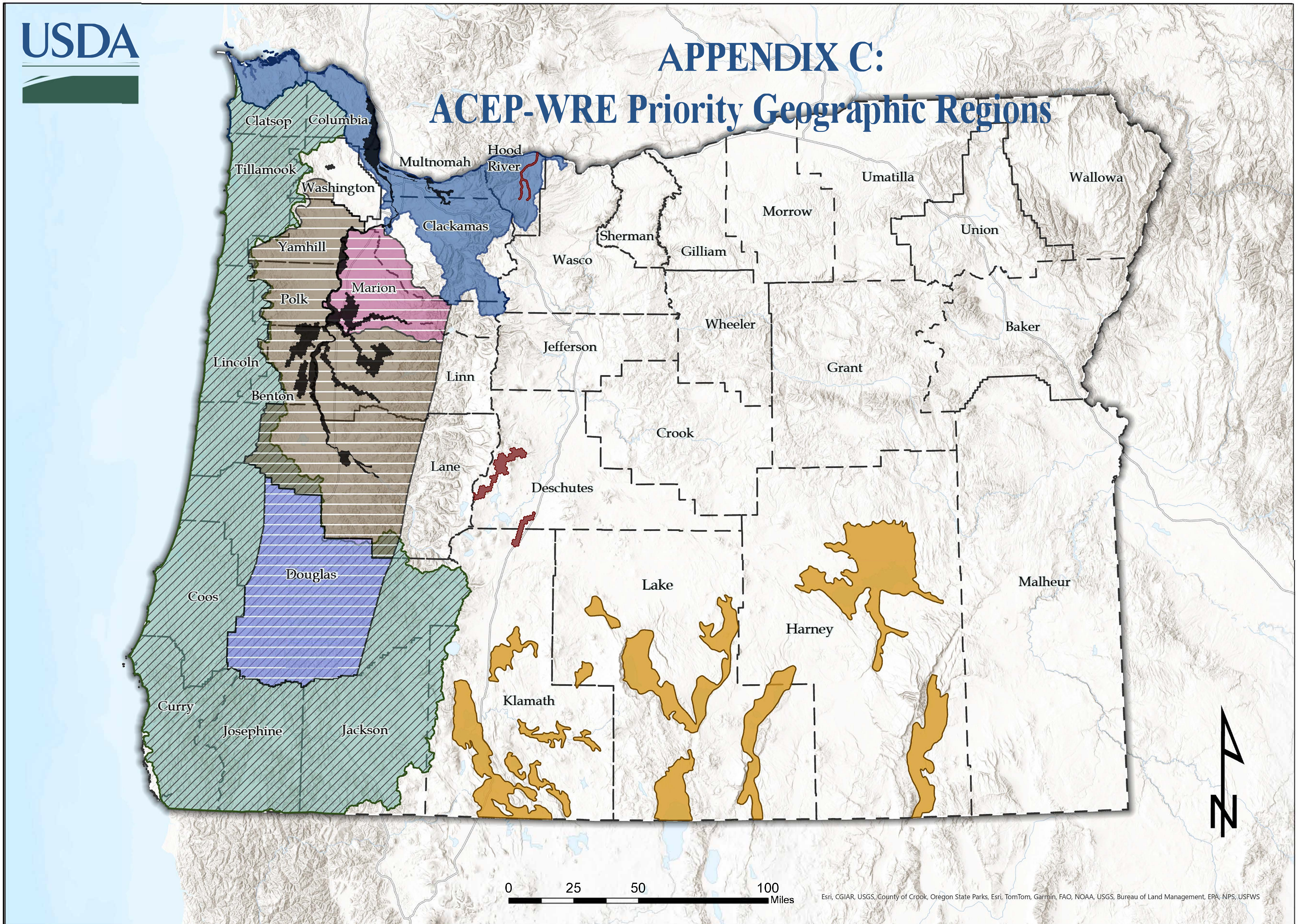
Section: Resource

Question	Answer Choices	Points
Restored Hydrology - Future Condition - What is the extent of hydrologic restoration relative to historic conditions? Percent of the Eligible Acres on which the hydrology will be restored to historic conditions suitable for the needs of the native wetland-dependent wildlife species that occurred in the area and appropriate for the wetland functions and values that existed prior to manipulation.	90 to 100 %	50
	75 to 89 %	30
	50 to 74 %	20
	Less than 50%	0
Altered Hydrology - Present Condition - What is the degree of hydrologic alteration? Use Certified Wetland Determination or wetland inventory, with input from Resource Soil Scientist and specialists, to estimate the degree of departure from original hydrology. Choose the category representing the majority of the Eligible Acres that will have hydrology restored.	Original wetland hydrology is relatively unmodified or previous hydrologic modifications have largely deteriorated such that historic hydrology is present.	50
	Original wetland hydrology is moderately degraded or modified; or original wetland hydrology was previously restored. For example, functional, or partially functional, ditches, dikes, diversions, and tiles are affecting less than or equal to 50 percent of the Eligible Acres.	25
	Original wetland hydrology is significantly degraded or modified. For example, functional ditches, dikes, diversions, and tiles are affecting the historic hydrology.	0
Habitat for At-Risk Species - What species will benefit from the easement WRPO?	Offered acres have known use by State or Federally listed Threatened, Endangered, or Candidate species	20
	Offered acres will restore, enhance, or create habitat for use by State or Federally listed Threatened, Endangered, or Candidate species.	10
	None of the above.	0
Native Plant Communities - What is the likelihood that the Total Easement Acres will return to a predominance of historic native vegetation after restoration? Take into consideration soil quality, hydrology, invasive weed vectors and existing seed bank, and logistics like plant material availability and access to site.	High Likelihood	20
	Moderate Likelihood	10
	Low Likelihood	0
Habitat Diversity - What will the post-restoration condition be within the easement? Utilize the Classification of Wetlands and Deepwater Habitats of the United States, AKA Cowardin classes. Identify the habitat types in the Prelim WRPO and the plan as existing or restored. Habitat types include Upland, Riverine, Estuarine, PFO, PEM, PSS, and Open Water.	3 or more types	10
	2 types	3
	1 type	1
Adjacent Protected Habitat - What is the proximity of proposed easement to an existing protected area? For example: other conservation easement, USFWS refuge, State or locally managed wildlife areas. List the protected areas in the Prelim WRPO.	Adjacent	20
	Less than 1 mile	10
	1 - 5 miles	5
	More than 5 miles	0
Floodplain Connectivity - Will the post restoration conditions support a functioning floodplain with river or creek having access to the floodplain?	YES	10
	NO	0
Duration of Enrollment - What will be the permanence of restored habitat?	Permanent Easement	10
	30-year Easement or 30-year Contract	5

Section: Resource		
Question	**Answer Choices**	**Points**
Water Quality - Will the protection and restoration of offered area result in reduced transfer of pollutants, sediments, or nutrients to an adjacent water body which will result in an increase of water quality? For example, halting grazing or agricultural operations that were resulting in non-point source pollution inputs or vegetating bare soil/riparian areas.	YES	10
	NO	0

Detailed Assessments

Name	Type	Jurisdiction	Status



2025 ACEP-WRE Priority Areas

USFWS Prairie Species Recovery Zone

Recovery Target

- Kincaid's Lupine
- Willamette Daisy & Fender's Blue Butterfly
- Willamette Daisy, Kincaid's Lupine, and Fender's Blue Butterfly

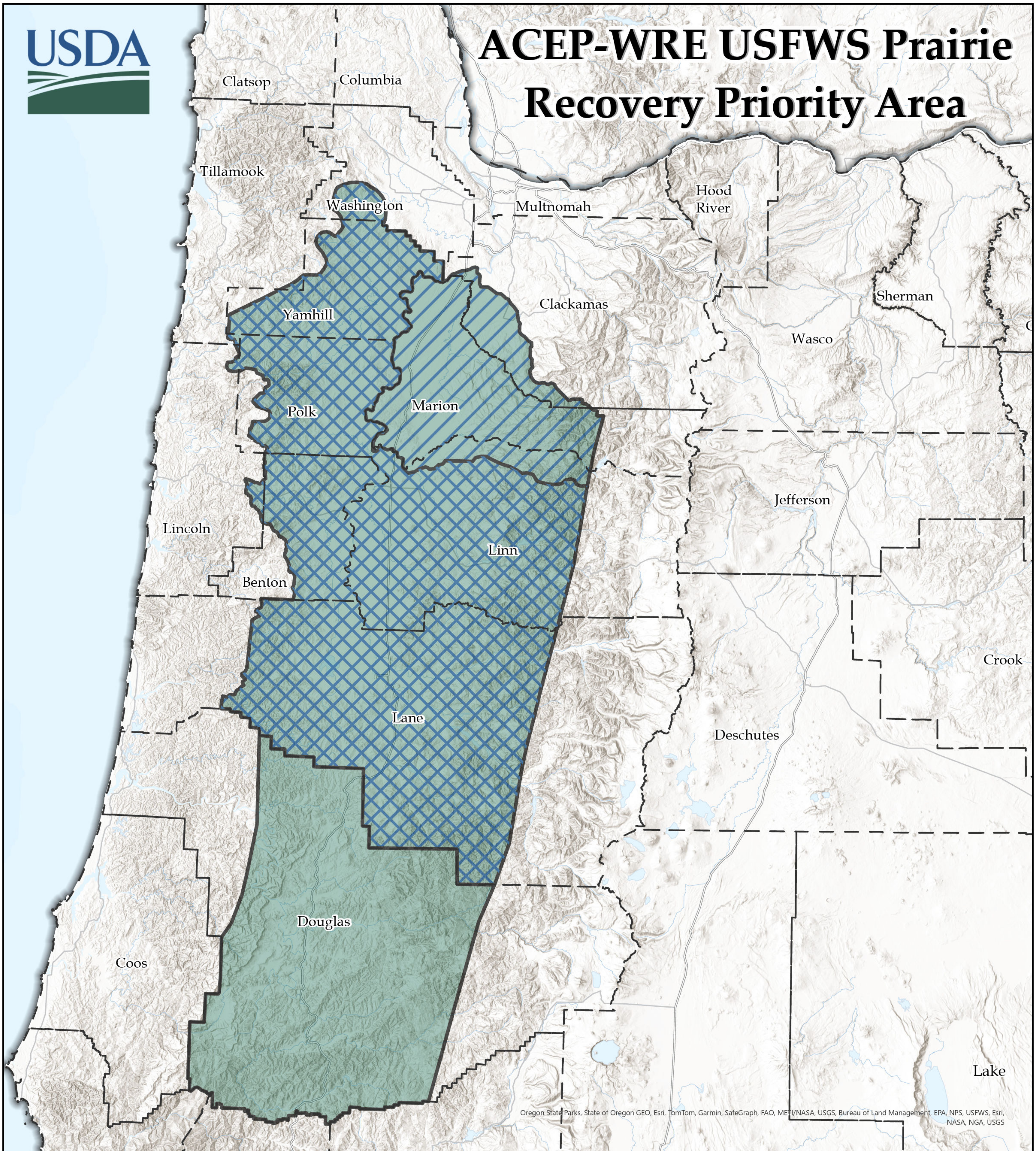
- Oregon Coast Priority Area
- Lower Columbia River Priority Area
- Turtle COA
- SONEC Priority Area
- High Desert Basin COA

Author: Eleanor Kenyon
Data Source: NRCS, ODFW, USFWS, IWJV
Spatial Reference: NAD 1983 Oregon Statewide Lambert

ACEP-WRE Oregon Coast Coho Priority Area

Date: 04/17/2024. Author: Eleanor Kenyon.
Data Source: NRCS, ODFW, USFWS.
Spatial Reference: NAD 1983 Oregon Statewide Lambert.

ACEP-WRE USFWS Prairie Recovery Priority Area



USFWS Prairie Species Recovery Zone

Recovery Target

- Willamette Daisy & Fender's Blue Butterfly
- Willamette Daisy, Kincaid's Lupine, and Fender's Blue Butterfly
- Kincaid's Lupine

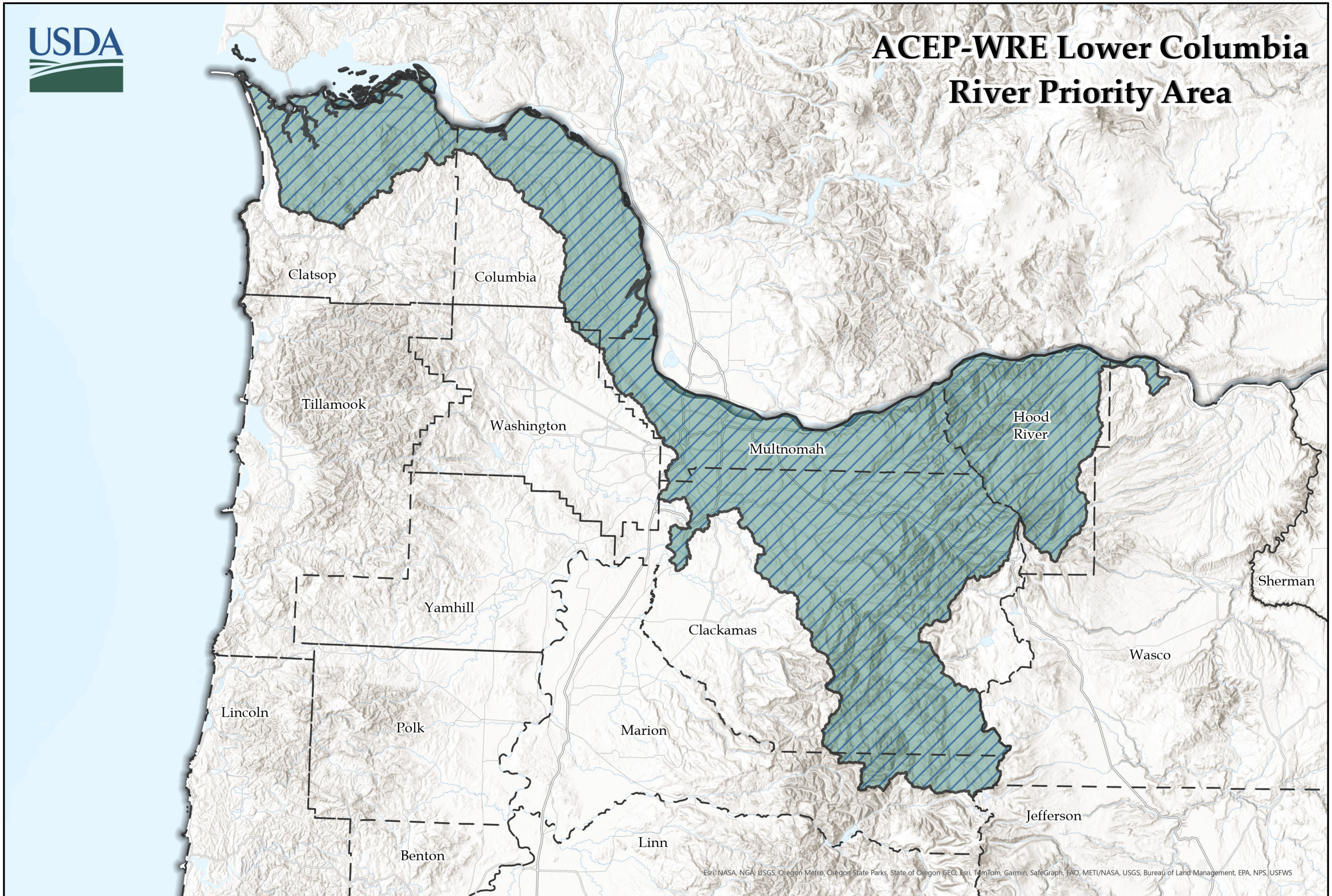
Date: 04/24/2024. Author: Eleanor Kenyon.
Data Source: NRCS, ODFW, USFWS.
Spatial Reference: NAD 1983 Oregon Statewide Lambert.

Western Pond and Northern Painted Turtle Priority Area

0 25 50 Miles

Date: 04/24/2024. Author: Eleanor Kenyon.
Data Source: NRCS, ODFW, USFWS.
Spatial Reference: NAD 1983 Oregon Statewide Lambert.

ACEP-WRE Lower Columbia River Priority Area



Critical Habitat for Lower Columbia Reach Chinook, Coho, and Steelhead.

0 25 50 Miles

Date: 04/24/2024. Author: Eleanor Kenyon.
Data Source: NRCS, ODFW, USFWS.
Spatial Reference: NAD 1983 Oregon Statewide Lambert.

N

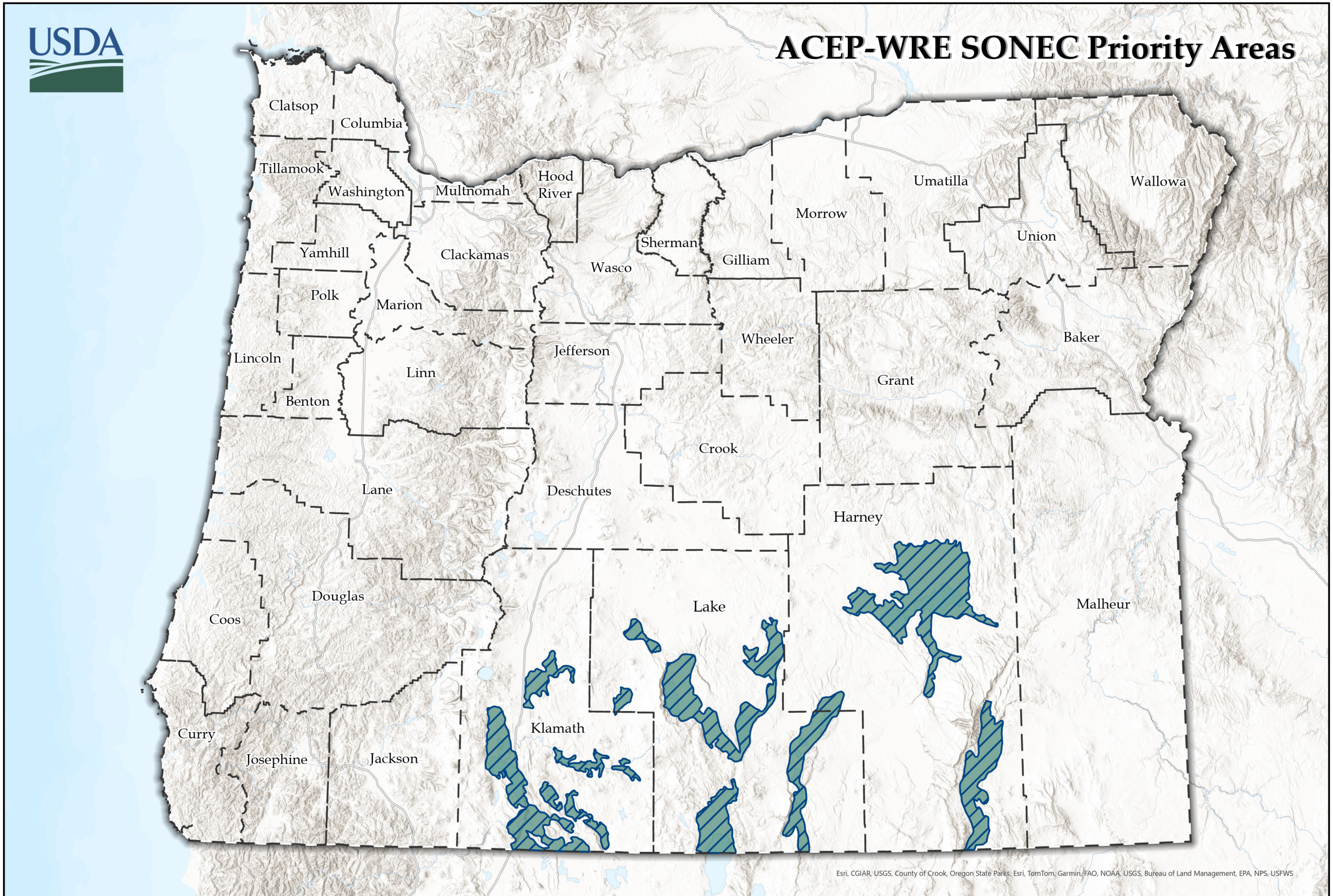
COA Name

- Hood River
- Central Cascades Crest
- Little Deschutes River

0 25 50 Miles

N

Date: 04/24/2024. Author: Eleanor Kenyon.
Data Source: NRCS, ODFW, USFWS.
Spatial Reference: NAD 1983 Oregon Statewide Lambert.



Intermountain West Joint Venture SONEC Sub-Basin

0 25 50 100 Miles

N

Date: 04/24/2024. Author: Eleanor Kenyon.
Data Source: NRCS, ODFW, USFWS.
Spatial Reference: NAD 1983 Oregon Statewide Lambert.

Appendix D: Wetland Restoration

Conservation Practice 657 – Specification Sheet

Emergent wetland in Klamath County, Oregon.

Definition

The return of a wetland and its functions to a close approximation of its original condition as it existed prior to disturbance on a former or degraded wetland site.

Purpose

To restore wetland function, value, habitat, diversity, and capacity to a close approximation of the pre-disturbance conditions by restoring:

- Conditions conducive to hydric soil maintenance.
- Wetland hydrology (dominant water source, hydroperiod, and hydrodynamics).
- Native hydrophytic vegetation (including the removal of undesired species, and/or seeding or planting of desired species).
- Original fish and wildlife habitats.

Where used

This practice applies only to natural wetland sites with hydric soils which have been subject to degradation of hydrology, vegetation, or soils.

Planning for Wetland Restoration

Wetland restoration is normally applied as part of a resource management system where a landowner's objectives are to return a wetland or wetland systems to a close approximation of the original pre-disturbance conditions. In general, the planner must 1) describe the likely original wetland conditions and contributing natural processes prior to anthropogenic disturbances, 2) characterize the extent of disturbance to the original system, and 3) determine the degree to which original conditions can be restored.

A critical step in wetland restoration planning is to identify reference wetlands of the same type as the wetland to be restored. Those reference wetlands with the least amount of anthropogenic disturbance are particularly useful as they typically exhibit high levels of function and can serve as a template for restoration. This critical step ensures the most appropriate wetland characteristics and functions are restored. In addition to reference wetlands, there are several resources that can help the planner determine the likely historical conditions of a given wetland including. These include, but not are not limited to: GLO survey notes and plat maps, soils descriptions, ecological site descriptions, old aerial photography, natural community descriptions, nearby remnant natural communities, and landowner accounts.

Most natural communities, including wetlands, exhibit a range in characteristics that are dependent upon several factors such as disturbance history and dynamic weather patterns. As such, there are usually a handful of intergrading plant communities that may be supported by a given soil type in a specific landscape position within a given ecoregion. These include both early and late successional phases. For example, in the absence of disturbance such as severe flooding or wildfire, a wet prairie community type may shift towards a shrub dominated community and ultimately a forested community. The phase that is targeted for restoration depends on site-specific capabilities and limitations, current landscape context, landowner objectives, and regional priorities. If target objectives of the project are not aligned with one of the natural phases of the historical plant community, consider using Wetland Enhancement (659) practice standard.

The amount and duration (hydroperiod) of hydrology can vary greatly among wetland types. The hydrology of a wetland may be driven by floodwater from rivers and lakes, direct precipitation, runoff from contributing upland areas, groundwater discharge, or ocean tides. Some wetlands are inherently wetter than others. Permanently inundated depressional wetlands may retain surface water in most years while vernal pools may only have surface water for a period of weeks during the wet season then dry up for the remainder of the year. Other wetland types, such as groundwater driven fens, may rarely have surface water, but can remain saturated for extended periods during the year. It is important to identify the various hydrologic influences and their impact on the wetland hydroperiod.

When analyzing hydrology, existing water rights must also be taken into consideration. The availability of sufficient water rights and the conveyance of water rights to adjacent properties should be carefully reviewed prior to restoration.

Each wetland type has a unique set of functions and values. Wetland functions include biogeochemical, hydrologic, and habitat functions. Values are those functions deemed important by society. Functions of a particular wetland may be quantified and compared to highly functional wetlands of the same type by conducting a functional assessment. The scores of a functional assessment help determine which steps need to be taken to restore a wetland to its full functional potential. Functional assessments include general assessments, such as the Oregon Rapid Wetland Assessment Protocol (ORWAP) as well as more comprehensive Hydrogeomorphic (HGM) models, which are unique to specific wetland classes. Completion of a functional assessment is a national requirement of the wetland restoration practice standard. If no suitable Functional Assessment is available, an appropriate Wildlife Habitat Evaluation Guides (WHEGs) may be used to document existing and planned conditions.

In addition to wildlife habitat, wetlands provide many ecological functions and societal values, such as water storage and flood attenuation, nutrient cycling, and sediment retention. Wetlands are important habitat to many wildlife species, and different wetland types often support a unique suite of wildlife species. The timing, depth, duration, frequency, and flow of water through a wetland have significant influences on habitats and the wildlife species they support.

When determining the restoration measures needed to restore wetland function, effects on adjacent lands must be taken into consideration. This is especially critical with hydrology. Oftentimes, existing drainage or water delivery infrastructure affects adjacent properties. Artificial drainage or conveyance infrastructure should be decommissioned to the extent practicable without adversely impacting adjacent lands. The degree to which remaining infrastructure impacts the wetland restoration must be critically evaluated. In cases where remaining infrastructure will significantly reduce the function of the restored wetland, restoration may not be practicable.

Identification of additional practices that support the wetland restoration is also important. Restored wetlands are most effective when used in combination with conservation practices that contribute to the restoration of adjacent upland areas.

Appendix D: Wetland Restoration

Conservation Practice 657 – Specification Sheet

Plans and Specifications

Site-specific requirements are listed on the specifications sheet, and associated engineering design. These specifications are used in conjunction with the Conservation Plan and Plan Map to document existing conditions and restoration actions needed to restore wetlands to the extent practicable. Refer to Conservation Practice Standard 657 – *Wetland Restoration* for additional guidance. If associated conservation practices are included in the plan, refer to individual practice specifications, as appropriate.

Operation and Maintenance

An Operation and Maintenance (O&M) Plan will be developed that describes specific actions required to ensure normal function of installed structural components over the practice lifespan. Maintenance, management and monitoring requirements needed to ensure long-term wetland function should be included in the Operation & Maintenance Plan