Critical Area Report
Wildlife Habitat Mapping & Management Plan

Wheeler Ridge LLC
Chelan County



October 2018

SCJ ALLIANCE
CONSULTING SERVICES

Wheeler Ridge Critical Area Report & Wildlife Habitat Mapping and Management Plan

Project Information

Project:	**Wheeler Ridge LLC Critical Area Report & Wildlife Habitat Mapping and Management Plan** **Wheeler Ridge LLC**
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Reviewing Agency

Jurisdiction:	Chelan County Community Development 316 Washington Street, Suite 301 Wenatchee, WA 98801

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Project Reference:	SCJ #2512.01 Path: N:\Projects\2512 Wheeler Ridge LLC\2512.01 Environmental Planning & Assessment\Deliverables

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1. INTRODUCTION

1.1 PROJECT OVERVIEW

Wheeler Ridge, LLC is proposing a 250-acre orchard development within 640 forested acres, wetland and riparian restoration, road removal, and improved perennial stream flows in spring and summer months. The Project site is located in Section 17, Chelan County, Washington State (Figure 1). The purpose of this report is to assess impacts, identify and describe environmental enhancement opportunities and/or mitigation options, comply with applicable local, state, and federal law and regulations, and aid in obtaining necessary permits for orchard development and environmental enhancements/restoration on Section 17.

Proposed project elements generally include the following:

- Orchard Development in a portion of a historic working forest
- Development of a 9.9-acre reservoir
- Improvement of 2.3 miles of an existing Chelan County Road and relocation of ¾ of a mile (Section 16 and Section 17).
- Closure and restoration of some user-built roads (i.e. non-permitted roads) to increase forage, enhance wildlife habitat, improve escapement for wildlife, and restrict public access
- Provide seasonal water to an onsite section of perennial stream during spring and summer months for elk and other wildlife
- Installation of an 8-foot deer fence around orchard development
- Wildlife corridors with tree stand buffers and connection to adjacent state-owned lands
- Wetland, riparian, and habitat enhancements in areas damaged in the past by trespassing and unauthorized recreational uses
- Wetland-meadow habitat restoration and expansion
- Habitat protection signage
- Seasonal orchard operations

Figure 1. Location of the proposed project, Wheeler Ridge, Chelan County, Washington State; location of wetland delineation and riparian assessment.

On May 16, 2018 SCJ Alliance staff with assistance from Wheeler Ridge LLC delineated a wetland/stream complex in the southern portion of Section 17. Weather on the day of the field visit was cool and sunny with occasional cloud cover. Hydrology was fully to partially expressed and conditions for effective wetland delineation were suitable. Staff documented stream sections and type (i.e. seasonal vs. perennial flow) to support current, and if needed, future water type modification requests from the Washington State Department of Natural Resources (WDNR) within Section 17.

2. METHODS AND MATERIAL

2.1 WETLAND DELINEATION REGULATIONS (FEDERAL AND STATE)

Under the Washington Administrative Code (WAC) section 173-22-035, the Washington State Department of Ecology (Ecology) requires wetland identification and delineation be completed following the approved federal wetland delineation manual and applicable regional supplements, including but not limited to the 1987 Corps of Engineers Wetland Delineation Manual and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (U.S. Army Corps of Engineers 2010).

2.2 WETLAND RATING, CLASSIFICATION, AND BUFFERS (COUNTY)

Chelan County Code defines wetland protection standards in Chapter 11.80 Wetland Areas Overlay District (WOD), which includes requirements for rating the wetland and making buffer width determinations based on rating score results. Standard mitigation sequencing applies.

As required by Chelan County code, the Washington State Wetland Rating System for Eastern Washington (WRSEW) has been applied. The version of the WRSEW referenced in code was Hruby 2004a but code also indicates "as amended" therefore wetlands associated with the project site were rated according to the 2014 WRSEW (Ecology Publication #14-06-030).

Wetlands identified as part of this project were classified according to the USFWS Cowardin classification system (Cowardin et al. 1979) and the USACE Hydrogeomorphic (HGM) classification system (Brinson 1993). Wetland buffers width are assigned relative to Wetland Category rating results, as provided below in Table 1.

Table 1. Wetland buffer widths required per wetland category.

	Buffer Width (feet)	
Wetland Category	**High Intensity (feet)**	**Low Intensity (feet)**
Category 1	300	200
Category 2	200	100
Category 3	150	75
Category 4	50	50

2.3 HABITAT MANAGEMENT PLAN REGULATIONS (COUNTY)

The Chelan County Critical Areas Ordinance, Chapter 11.78, Fish and Wildlife Habitat Conservation Areas Overlay District (FWOD) regulates development located within a Fish and Wildlife Habitat Conservation Area (FWHCA) or within 1000 feet of a mapped point location of a priority species. Standard mitigation sequencing applies.

FWHCAs include streams, riparian areas, mapped point locations of priority species wildlife habitat, and mule deer and/or elk winter range and migration corridors. Wetlands are included in the definition of Class II FWHCAs but are generally regulated primarily through Chapter 11.80.

Class I FWHCAs include or are within 1000 feet of documented habitat for state or federally listed species; Class II FWHCAs include or are within 1000 feet of documented habitat for priority species. Report requirements for a Habitat Management and Mitigation Plan are outlined in Section 11.78.100.

Stream buffers width are assigned based on Stream Type, as provided below (Table 2). Stream Type S is a Shoreline, a large, fish-bearing river system, which is also regulated under the County Shoreline Master Plan. Stream Type F is a smaller fish-bearing stream, relative to a Type S. Stream Type Np is not fish bearing but flows year-round (is a perennial stream). Stream Type Ns is a seasonal stream, with no fish.

Table 2. Stream type buffer widths.

	Buffer Width (feet)	
Stream Type	**High Intensity (feet)**	**Low Intensity (feet)**
Type S	250	200
Type F	200	150
Type Np	150	100
Type Ns	50	50

2.4 BACKGROUND MATERIALS

To help determine the site conditions that might affect stream type assessment, wetland delineation and rating results SCJ Alliance staff reviewed the following information:

- Chelan County GIS mapping database
- US Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI)
- US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Geographic database online Web Soil Service.
- Precipitation data (US Climate Data 2018)
- Washington State Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS). Database (WDFW PHS 2018)
- Washington State Department of Natural Resources (DNR) FPARS stream mapping system 2018
- Google Earth historic timeline aerial photos of the project area

3. RESULTS AND DISCUSSION

3.1 PROJECT AND SITE DESCRIPTION OVERVIEW

The proposed project site is in Section 17 (Parcel number 212017000000, 640 acres), Township 21N, Range 20E. Wheeler Ridge LLC is proposing to convert up to 250 acres of forestlands to orchard development. The purpose of this report is to describe soils, geology, wetland and stream conditions, and wildlife habitat in Section 17, particularly in the southeastern portion where higher order water resources were located. Wetlands and streams were delineated on May of 2018, and after rating the wetlands and defining the stream types, standard buffers (per Chelan County code) were applied to determine the boundaries of the orchard.

3.2 SOIL AND GEOLOGY MAPPING

3.2.1 Soil Mapping (Chelan County NRCS Soil Survey)

The dominant soil type mapped on and near the site is the Stemilt silt loam (map units StD and StE), slope classes 0-25% and 25-45% (Figure 2; Table 3). According the the NRCS standard soil series description, the Stemilt soil series is typically "very deep and deep, well drained soils that formed in mixed ash and loess over material weathered mostly from basalt or andesite. Stemilt soils are on mountains. Slopes are 0 to 75 percent. The mean annual precipitation is about 25 inches and the mean annual temperature is about 44 degrees F."

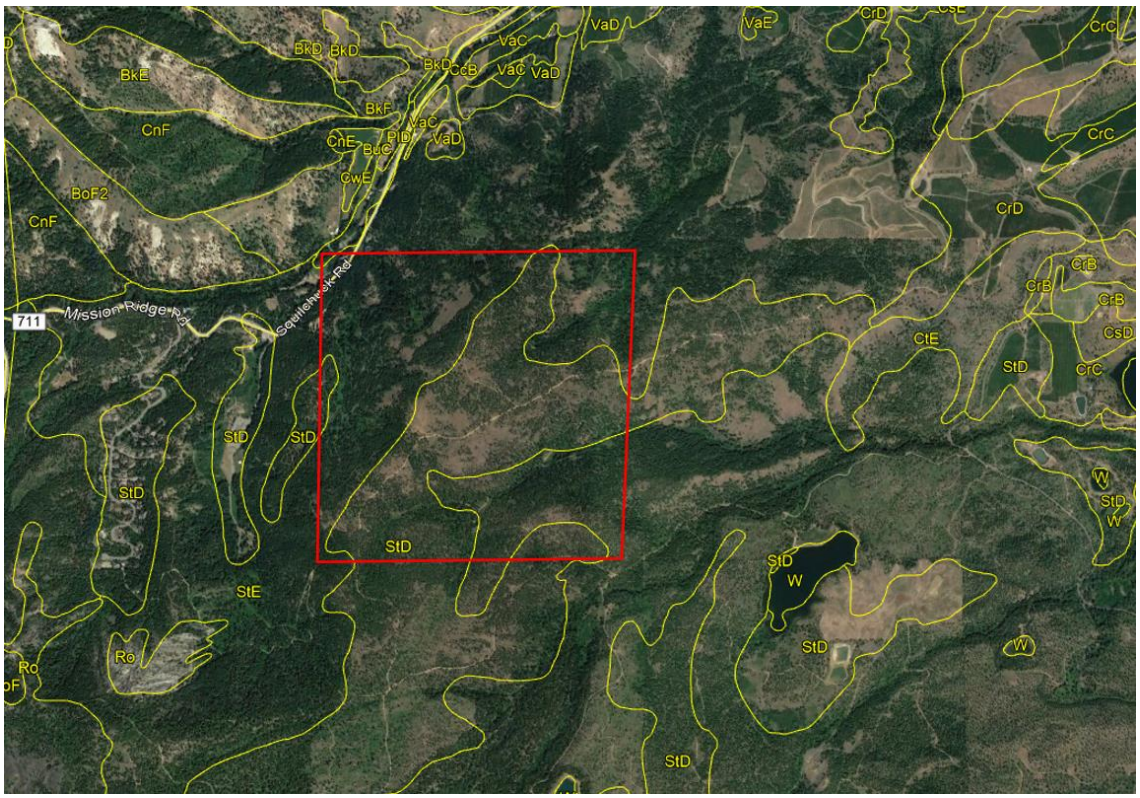


Figure 2. Soil map of area in and around Section 17.

Table 3. Soil map units and descriptions.

Soil Map Unit	Soil Name	Description
BoF2	Bjork-Rock outcrop complex, F=25% to 65% slopes, eroded	Rock outcrops – bedrock at surface
BkD, BkE, BkF	Bjork SiL, Aridic Argixeroll, D=15-25%, E=25-45%, F=45-65%	Moderately deep, well drained soils formed in loess and colluvium and residuum from schist, sandstone, or conglomerate on hillsides and mountainsides.
BuC	Burch FSL, Aridic Haploxeroll, C=8-15%	Deep, well drained soils that formed in valley fill material on terraces.
CnE	Cle Elum SiL, Ultic Haploxeralf, E=25-45%,	Moderately deep, well drained soils formed in loess and residuum and colluvium from sandstone. They are on foothills and mountain slopes.
CrB, CrC, CrD, CrE	Colockum SiL, Calcic Argixeroll, B=3-8%, C=8-15%, D=15-25%, E=25-45%,	Very deep, well drained soils that formed in loess over material weathered from basalt, sandstone, and glacial till on benches, foothills, hillslopes, canyon side slopes and lower mountain slopes.
CsD, CsE	Colockum Cobbly SiL, Calcic Argixeroll, D=15-25%, E=25-45%,	Very deep, well drained soils that formed in loess over material weathered from basalt, sandstone, and glacial till on benches, foothills, hillslopes, canyon side slopes and lower mountain slopes.
CtE	Colockum Bouldery SiL, Calcic Argixeroll, E=25-45%,	Very deep, well drained soils that formed in loess over material weathered from basalt, sandstone, and glacial till on benches, foothills, hillslopes, canyon side slopes and lower mountain slopes.
CwE	Cowiche SiL, Aridic Argixeroll, E=25-45%,	Deep, well drained soils formed in loess and residuum on uplands.
StD, StE	Stemilt SiL, Vitrandic Argixeroll, D=0-25%, E=25-45%	Very deep and deep, well drained soils that formed in mixed ash and loess over material weathered mostly from basalt or andesite on mountains.

The Stemilt soil series taxonomic classification -- loamy-skeletal, isotic, frigid Vitrandic Argixerolls – indicates that the native soils are Mollisols, which would typically have a dark, nutrient rich surface horizon and a clay-rich substrate (argillic horizon) from about 18 to 60+ inches depth. The typical

Stemilt soil profile would include surface soils to about 22 inches depth that are influenced by volcanic ash (Vitrandic). Both clay content and volcanic ash contribute to soil quality, having a higher cation exchange capacity, and more micronutrients. These soils area also expecetd to have a later start of spring growing season due to the higher elevation (frigid). The coarse fraction soil texture is described as being as high as 60% in the subsoils below about 20 inches (loamy-skeletal), which means that despite the high clay content, water holding capacity in the deeper soils may be limited, and irrigation may be needed to sustain an orchard.

Other soil types mapped nearby area are mostly wind-blown loess deposits capping basalt, sandstone or glacial till substrates – the Bjork, Cle Elum, Colockum and Cowiche soil series.

3.2.2 Geology Mapping

The dominant geology mapping (Figure 3) on and near the site is defined as Quaternary Landslide (Qls), with block slide movement toward the relatively rare Tdyo map unit. The Tdyo map unit is rather vaguely described as "Older Diamictite". According to the SandAtlas online geologic dictionary (http://www.sandatlas.org/diamictite/),

> "Diamictite is a poorly sorted or non-sorted terrigenous non-calcareous sedimentary rock that contains variously sized clasts from clay to boulders in a muddy matrix."

This description is purely illustrative, and does not explain how this material formed. However, because it is composed of poorly sorted sediment (i.e., is not sorted by water or wind), it is thought to be more likely formed from an old mudflow, or landslide, or layers from intraglacial sediments. Its landscape

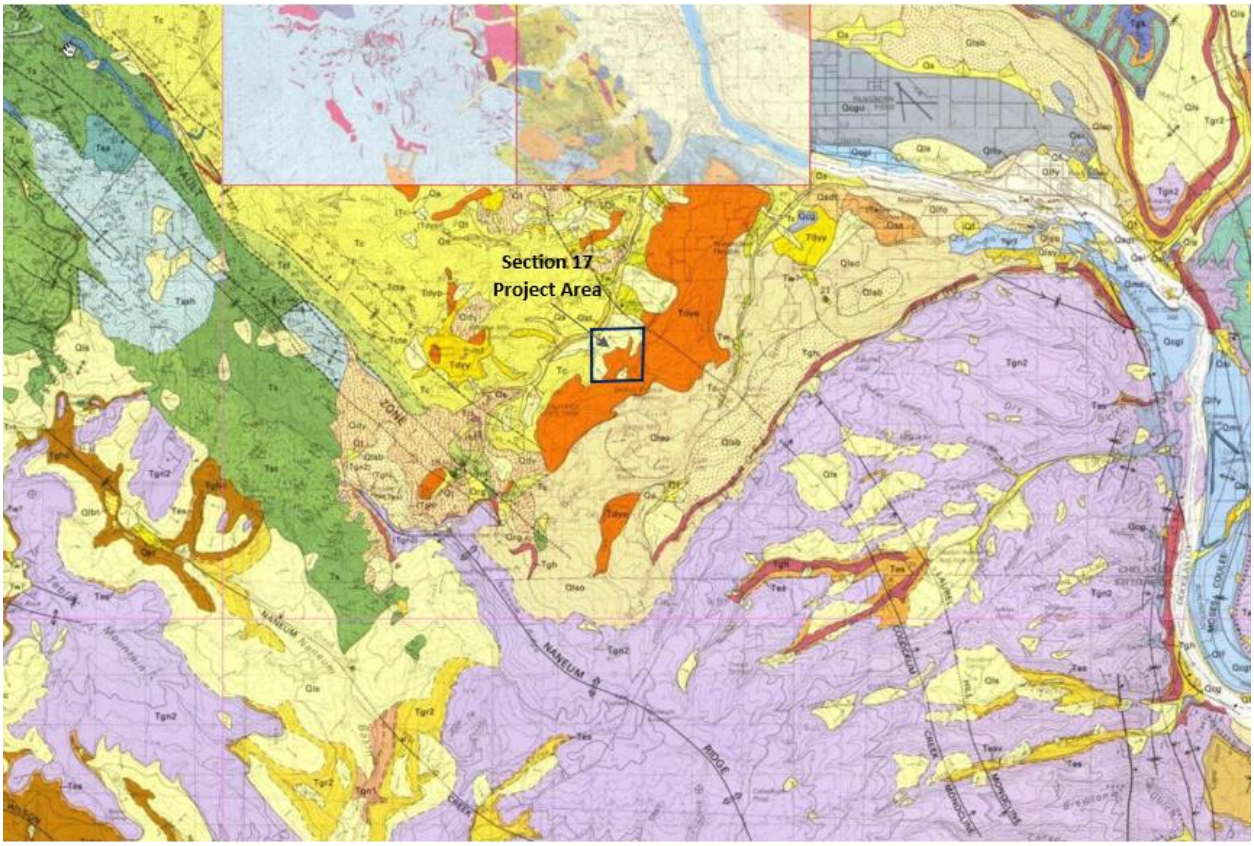


Figure 3. Geology of the surrounding area.

position suggests it could have formed from a unique combination of river flow impacts from the north in concert with lava flow impacts from the southeast.

3.3 WATERSHED AND STREAM MAPPING

The Section 17 Project area spans a drainage divide between two watersheds, the Stemilt Creek watershed to the southeast and the Squilchuck Creek watershed to the northwest. Both watersheds drain to the Columbia River about 6.5 miles north of Section 17. Figure 4 shows the outline of each watershed and where Section 17 is in the greater landscape.

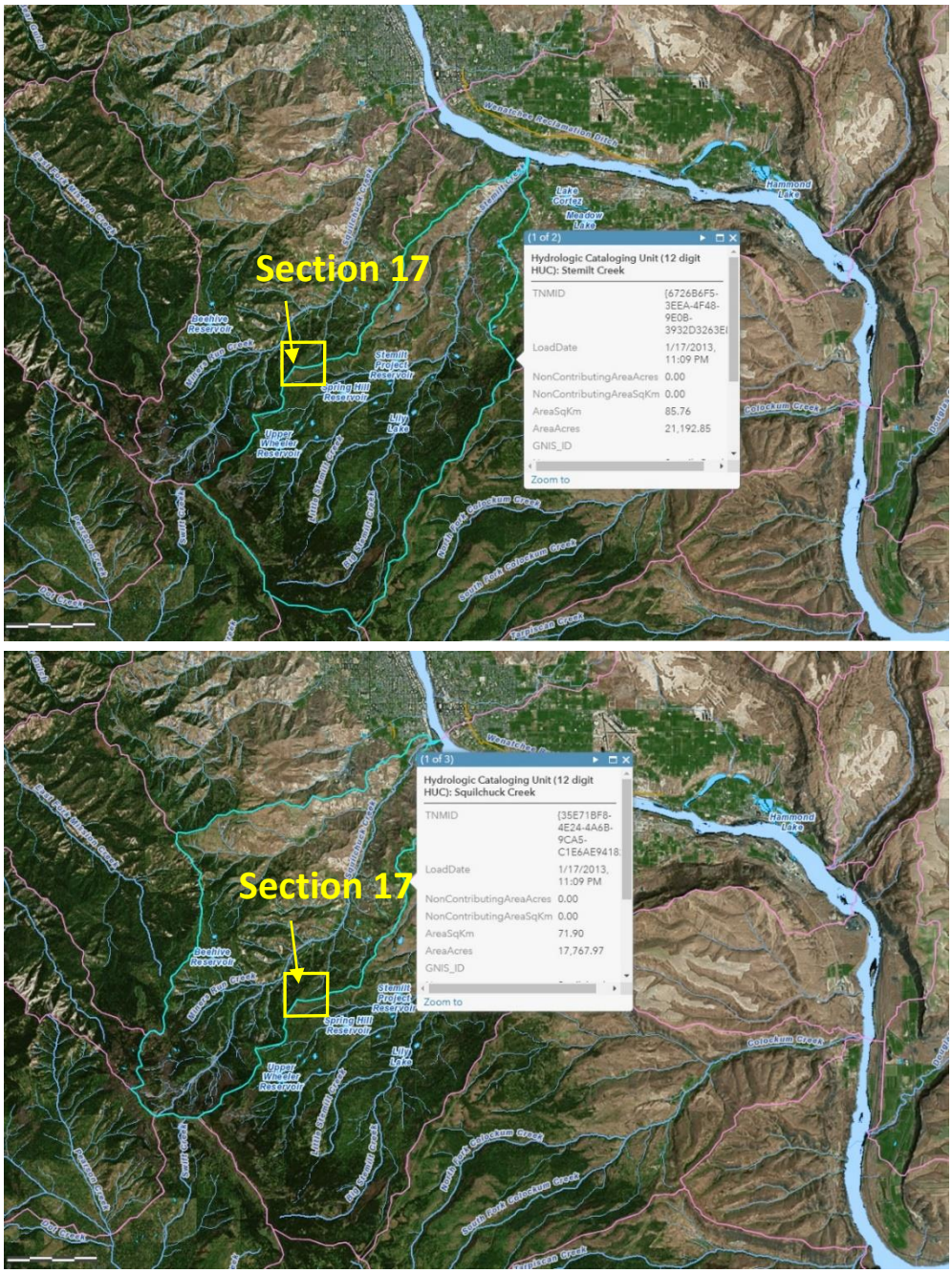


Figure 4. Stemilt Creek and Squilchuck Creek Watersheds (12-digit HUC Units).

3.3.1 WDNR Stream Type Mapping

WDNR Stream Type maps were consulted to provide an initial assessment of potential stream types in the project area. The extents and locations of various stream types in Section 17 were formally revised and updated through a standard DNR stream type assessment process following field work carried out with DNR and DFW staff assistance. The corrected and approved Stream Type classifications are displayed in Figure 5, which also shows the associated wetland overlays.

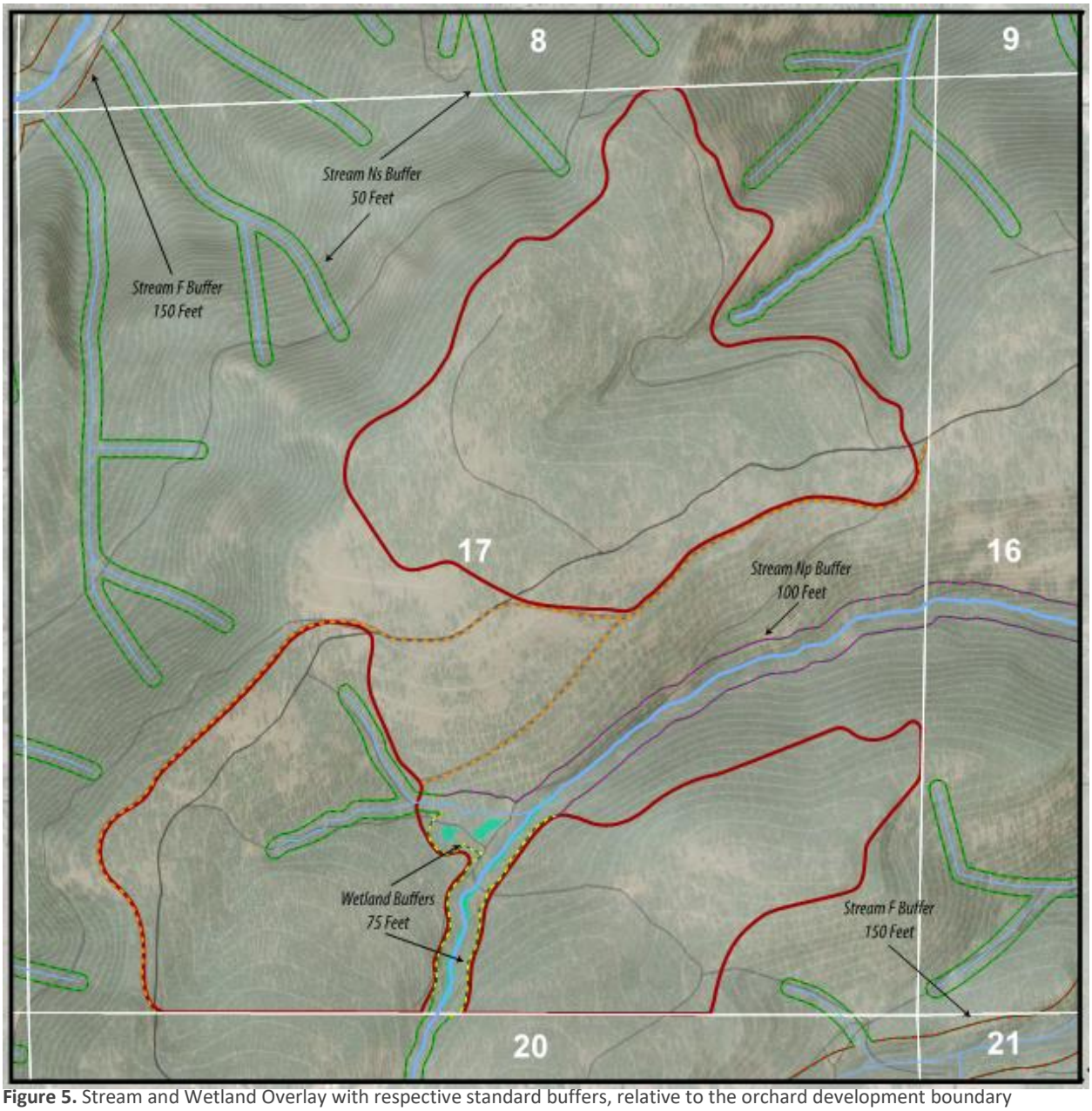


Figure 5. Stream and Wetland Overlay with respective standard buffers, relative to the orchard development boundary (outlined in red) in Section 17.

The result of this work shows that there are no Fish-bearing streams (Type F) within Section 17. However, one fish-bearing stream is located just offsite to the northwest, and another is located just offsite to the southeast. The two Type F streams have standard 150 ft buffers and are well outside of the proposed orchard development.

Because this site is at a drainage divide (see Figure 4), most of the onsite streams are small Non-Fish, Seasonal (Ns) systems, and have standard buffers of 50 feet. One section of onsite stream in the southeast quadrant of Section 17 was designated as Non-fish, Perennial (Np) by DNR and WDFW staff, although it has had no surface flow by mid to late summer in the past two seasons. That section that was designated as Np stream has a standard buffer of 100 feet. Some of the Ns stream sections in the south-central portion of the Section had associated Category III wetlands, which are assigned a standard buffer of 75 feet in low intensity development areas[1]. For those combined stream/wetland systems, the 75 ft wetland buffer is greater than the 50 ft Ns stream buffer, and therefore is the controlling buffer.

The proposed outline of the orchard development area is overlaid on the map in Figure 5. In most areas, the proposed orchard area does not include streams. However, two small Ns systems which are fed by seasonal snow melt in the southwestern quadrant are within the proposed orchard area. These two stream channels are mostly defined by flow that has eroded deeply into existing relic logging road system ruts (Figure 6), and as such, they provide minimal if any riparian habitat function. For this reason, it is proposed to capture this seasonal flow and pipe these severely disturbed sections of Ns stream to a downstream catch basin. This will eliminate the current erosion and sediment problems, feeding cleaner seasonal flow (with minimal erosion and sediment load) downstream to the previously described section of perennial stream and a proposed wetland/stream habitat enhancement area.

Figure 6. Showing severe erosion in the western Ns stream channels, where mitigation is proposed.

[1] Agriculture is regulated as Low Intensity Development in Chelan County.

To mitigate for loss of the Ns stream and buffer areas, a larger area of downstream buffers and wetland areas will be enhanced in the proposed wildlife corridor. In addition, some of the old roads in buffer and wetland areas will be abandoned. Existing roads will be moved outside of wetland and stream buffer areas as much as possible. This will greatly reduce riparian habitat impacts; only one of the several existing crossings in that area will be kept (as it is unavoidable), and that crossing will be improved to ensure that current erosion impacts from high flow diversions are eliminated. Any crossings that remain will be designed to improve hydrologic and habitat functions and will be properly permitted and reviewed. This proposed conceptual mitigation is described in more detail below. If the conceptual proposal is accepted by reviewers, a more detailed plan will be provided.

3.4 WILDLIFE HABITAT MAPPING AND MANAGEMENT PLAN

Chelan County Code, Chapter 11.78, Fish and Wildlife Habitat Conservation Areas, Section 11.78.100, Critical Areas Ordinance, requires a wildlife habitat mapping and management plan. The Washington State Department of Fish and Wildlife (WDFW) will need to approve the habitat management and mitigation plan within the context of the scope of the project footprint. This section of the report is organized to align with Section 11.78.100 requirements. Please refer to the previous section for discussion about stream and wetland systems.

3.4.1 Mapping

The study area is located on Wheeler Ridge, in Chelan County near the city of Wenatchee (Figure 6). The study area is primarily forested, but includes open prairie areas dominated by Ponderosa pine and a small mix of Douglas fir. The understory of the Ponderosa pine ecosystem includes native plants such as

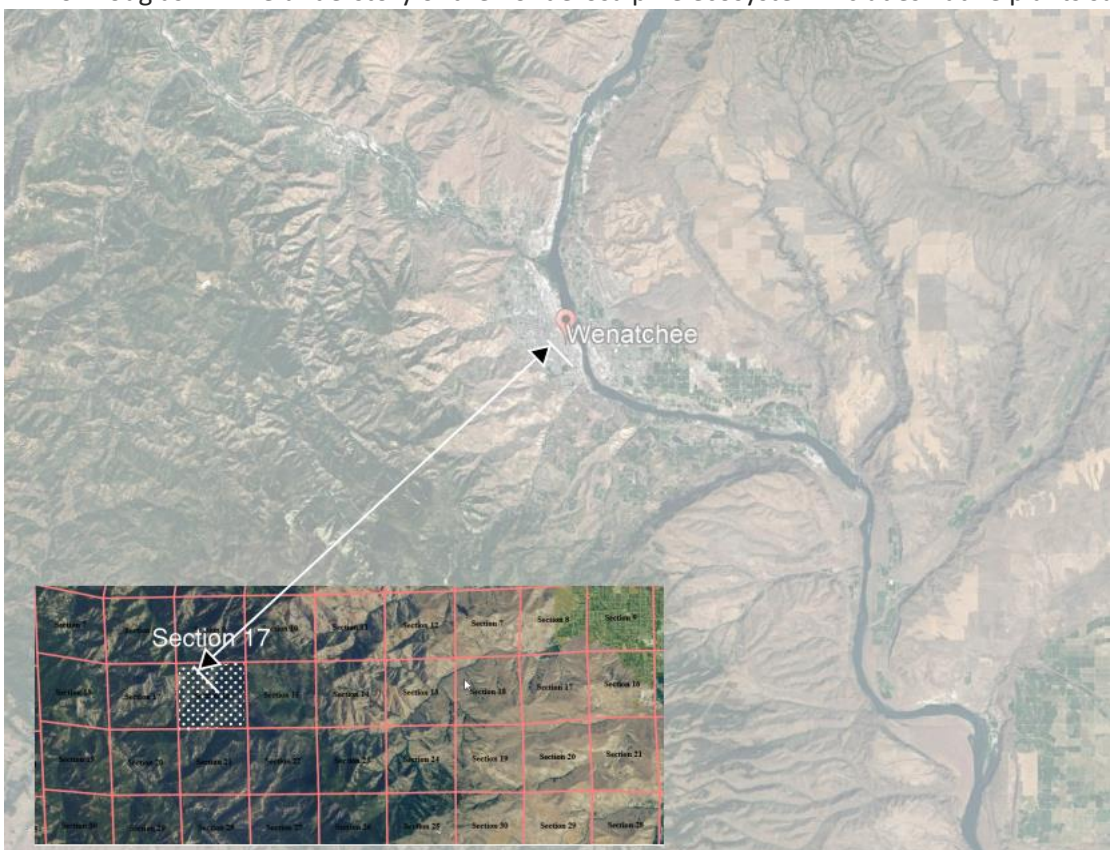


Figure 7. Location of the proposed site in relation to the City of Wenatchee.

lupine and balsamroot. The proposed orchard development is in an area designated by the Natural Resources Conservation Service as "*Farmland of Statewide Importance*", and as such is considered to have characteristics favorable to certain kinds of farming that can be used to meet the Nation's short- and long-range needs for food and fiber.

3.4.2 Summary of Land Use and Resource Management

Current Land Use and Road Access

Logging activity in this area ceased in 1996. However relic logging roads are abundant and sometimes conduct or divert water from seasonal run-off. WDFW and WDNR, in cooperation with private landowners manage a "Green-Dot[2]" system within Stemilt Hill, which uses some of those old logging roads. There are no paved or two-lane gravel roads located within the proposed project area, however, some of the existing authorized forest roads will be preserved and maintained for use in orchard operations.

A section of Chelan County Road located within Section 17 is intended to provide public access to adjacent public lands. However, this road has not been well-maintained by government management agencies. For this reason, unauthorized roads or bypasses have been illegally "built" by off-road enthusiasts to drive around impassable sections. This kind of access on Section 17 has caused damage to wildlife habitat, wetlands, and vegetation communities. Some of the areas in and near streams and wetlands that were damaged from illegal off-road access will be restored and revegetated with a suite of native plant species common to the surrounding area. This proposed mitigation/ restoration work is described in greater detail below. To protect the preserved wildlife habitat corridors and the mitigation/ restoration areas, public access within Section 17 will be restricted. Wheeler Ridge LLC will consult with adjacent State land managers to define restriction management elements on Section 17 that will maximize wildlife benefits and reduce human and wildlife conflict.

Wildlife and Recreation Access Management Plans

The Colockum Wildlife Area is adjacent to the study area (Figure 8), and includes 105,662 acres managed collaboratively by WDFW, WDNR, the U.S. Bureau of Land Management. WDFW recently purchased[3] Section 16 and Section 22 (adjacent to the Project Area Section 17) from WDNR to provide and protect[4] suitable habitat for *Oncorhynchus mykiss* (wild steelhead); Endangered Species Act (ESA)-listed *Canis lupus (*gray wolf), and prey species of the gray wolf -- *Odocoileus hemionus* (mule deer) and *Cervus elaphus nelsoni* (Rocky Mountain elk), and ESA-listed *Strix occidentalis caurina* (northern spotted owl).

The newly acquired 1,275 acres in Sections 16 and 22 have been incorporated into the Colockum Wildlife Area (Colockum Wildlife Area 2017 Management Plan Update, WDFW). Enhanced recreational opportunities are being planned for these areas per the *Draft* Stemilt-Squilchuck Recreation Plan (2018).

[2] The "Green Dot" system road located within the project is a Chelan County Road that "provides access for camping, hunting, wildlife viewing, and ATV and off-road vehicle riding, while protecting sensitive habitat from damage caused by motorized vehicles (WDFW, 2018).

[3] WDFW secured federal Endangered Species Act funding to buy the remaining two sections of DNR trust land, appraised at $1,778,000, to protect Stemilt Basin habitat for elk, deer, wolves, and other wildlife species.

[4] Methow Phase 8 Section 6 Proposal, 2008. Washington State Department of Fish and Wildlife.

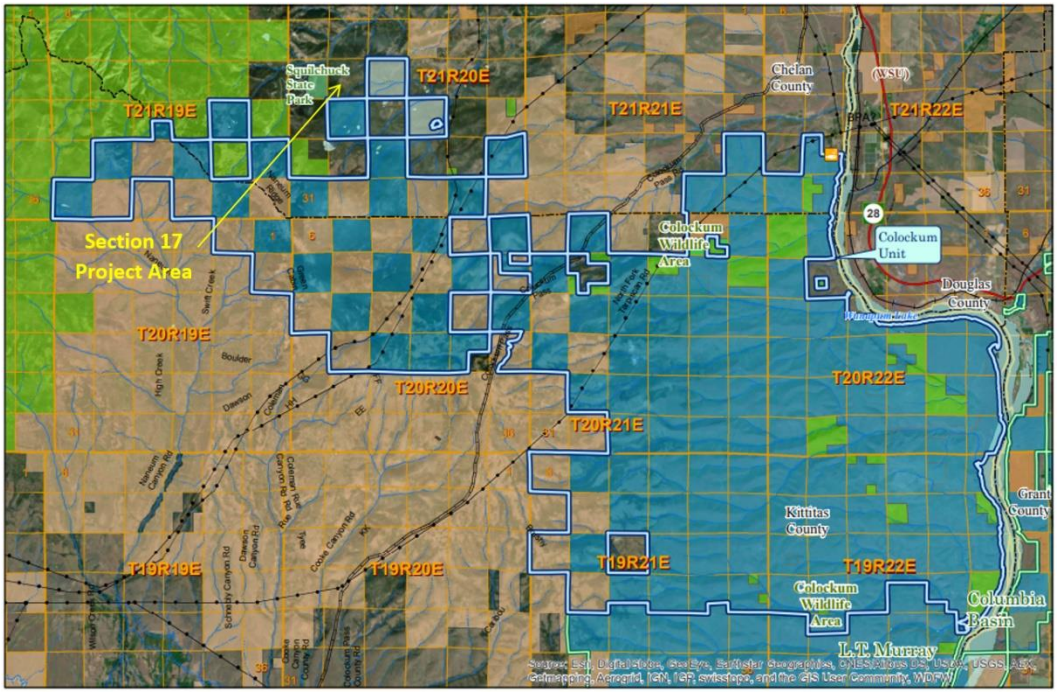


Figure 8. Colockum Wildlife Area (blue outline) in relation to the Project Site.

Current Recreation Access Planning

In 2014, WDFW and WDNR issued a State Environmental Policy Act (SEPA) Determination of Nonsignificance (DNS) for the Naneum Ridge to Columbia Ridge Recreation and Access Plan within the Naneum Ridge State Forest, Colockum Wildlife Area, and the Quilomene and Whisky Dick Wildlife Units (Figure 9).

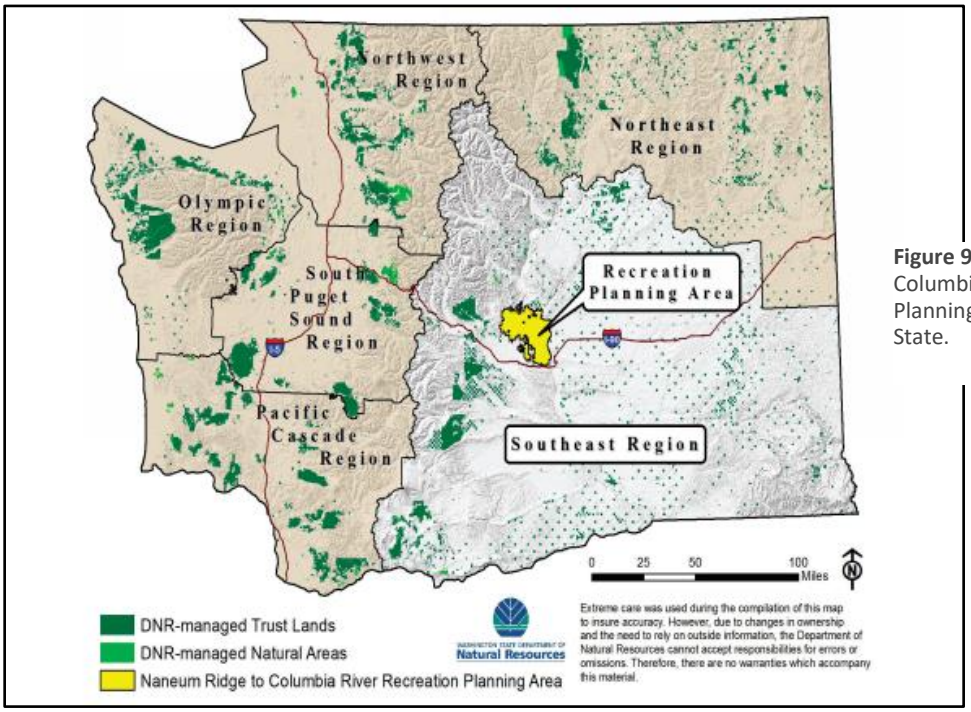


Figure 9. Naneum Ridge to Columbia River Recreation Planning Area, Washington State.

In September of 2018, the Chelan County Natural Resources Department (CCNRD) released a DRAFT Recreation Plan for the Stemilt-Squilchuck Planning Area (Figure 10). This is not a formal management plan. The purpose of the plan is to "provide guidance and recommendations for managing recreation in the Stemilt-Squilchuck basin in a manner that provides for the types of recreational opportunity desired by the community while also protecting the important values of wildlife, water, and natural resources."

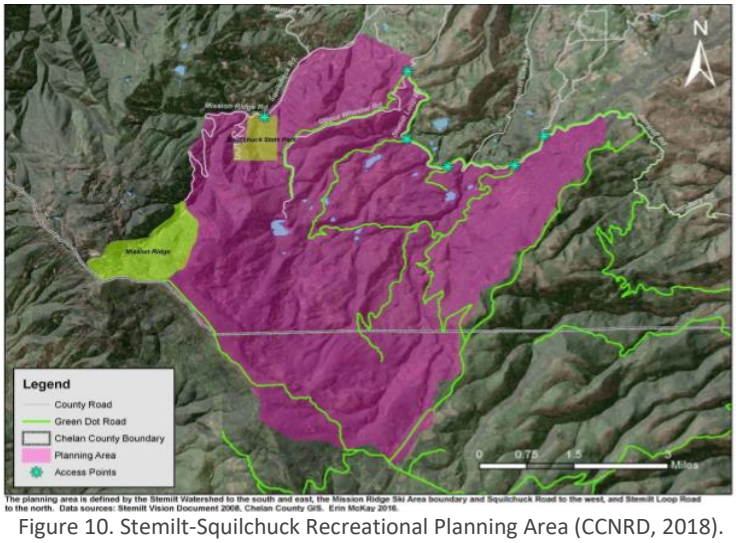


Figure 10. Stemilt-Squilchuck Recreational Planning Area (CCNRD, 2018).

The plan identifies potential recreational uses and enhancements on Section 17 and on WDFW owned properties in Sections 16 and 22 adjacent to the Wheeler Ridge LLC proposed project. WDFW provided technical guidance and "critical evaluation of impacts of recreation" to wildlife. This expansion of recreation opportunities in the area is intended to compliment on-going expansions at Squilchuck State Park and future expansion of the nearby Mission Ridge Ski Area. CCNRD is expected to have the Recreation Plan finalized by fall of 2018 if approved by the Stemilt Partnership[5]. It should be noted that Wheeler Ridge LLC is not proposing to provide recreational opportunities within Section 17, as this will avoid unnecessary impacts to preserved wildlife corridors and proposed wetland and buffer enhancement areas.

3.4.3 The Relationship of the Site to Surrounding Topographic and Built Features

The Project Site is located on Wheeler Ridge east of Squilchuck State Park. The Stemilt-Squilchuck Basin is a popular destination for recreational enthusiasts which offers an array of year-around activities including, but not limited to reservoir fishing, dispersed camping, wildlife viewing, horseback riding, biking, hiking, backcountry skiing, snowshoeing, snowmobiling, ATV riding, and hunting.

There are several lakes within the Stemilt Basin that are managed by WDFW for fishing opportunities. In the spring, WDFW stocks Clear Lake with catchable-size Rainbow trout. WDFW will occasionally plant fingerling Tiger Trout in the late spring. Clear Lake is 4-acres in size and can be accessed from Stemilt Loop Road. Another popular lake is Lily Lake, a reservoir stocked with Rainbow trout which can be accessed a mile south of Stemilt Loop Road. Black Lake is a reservoir operated by the Wenatchee

[5] The Stemilt Partnership is also led and facilitated by the CCNRD. The Stemilt Partnership objectives are as follows: (1) *Water:* Promote activities which protect and enhance instream and out-of-stream water resources; (2) *Forest Resources*: Promote activities which encourage long-term forest health and resiliency; (3) *Wildlife:* Promote activities which support the protection and enhancement of wildlife; and (4) *Recreation:* Encourage and promote recreational opportunities which support water, wildlife and forest resource goals. The Partnership is made up of 26 voting members including CCNRD.

Heights Reclamation District. Each spring WDFW plants Rainbow, Tiger, and Brown trout in Black Lake which is accessed by taking Stemilt Loop Road to Orr Creek Road.

The Colockum elk herd is scattered throughout the Squilchuck-Stemilt Basin and provides hunting opportunities to locals and visitors (WDFW, 2015). Mule deer hunting is also very popular, and Chelan County has become a destination hunting area. Other wildlife hunting in the area includes black bear, coyote, and cougar. There are some wild turkey hunting opportunities.

3.4.4 Legal Description

The project site is an entire section of land (640 acres) located on Wheeler Ridge (private property owned by Wheeler Ridge, LLC), at Township 21N; Range 20 EW; Section 17 (Figure 11). The geographic ID is 212017000000. The parcel is zoned RR20[6], and is **not** designated as Open Space or Historic Property. The Land Use Code is 88, and the Owner ID is 96173.

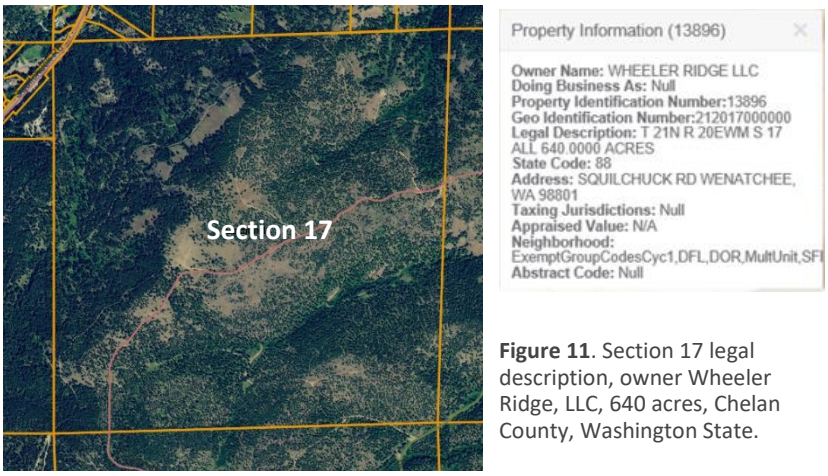


Figure 11. Section 17 legal description, owner Wheeler Ridge, LLC, 640 acres, Chelan County, Washington State.

3.4.5 The Nature and Density of the Proposed Use or Activity

Orchard development is considered Low Intensity Development in Chelan County. This orchard development is proposed in an area designated by the Nature Resources Conservation Service as "*Farmland of Statewide Importance*", which is so designated to identify lands with potential to meet the Nation's short- and long-range needs for food and fiber. The changes to the current land for this purpose include:

- In Section 16: Infrastructure and road maintenance within existing WDNR road easements.
- In Section 17:
  - Approx. 250-acres of orchard development
  - Creation of a 9.9-acre-foot reservoir

[6] *"(A) Purpose. To allow for low-intensity rural development, agricultural and forestry uses which do not require the extension of services or infrastructure. These areas provide greater opportunities for protecting sensitive environmental areas and creating open space typical of a rural setting.*
(B) Uses appropriate for these areas include: open space; residential; agriculture; and forestry. Additional uses may be considered with supplemental provisions. These provisions shall address performance standards, impacts to the surrounding area, and be consistent with the goals and policies of the comprehensive plan. Such uses may include: natural resource support facilities and services; mineral resource activities; small-scale recreational or tourist uses that rely on a rural location or setting, but that do not include a new residential component; intensification of development on lots containing existing isolated nonresidential uses; home occupations; bed and breakfasts; and community facilities."

- Improvement of and relocation of 2.3 miles of an existing Chelan County Road (Section 16 and Section 17)
- Habitat enhancements, including wetland-meadow habitat restoration and expansion, preserving and enhancing vegetation in wetland and riparian area buffers
- Preserving associated trees stands for wildlife cover and forage
- Passive habitat protection through restriction of public access and locating orchard areas outside of protected wetland and riparian buffers
- Establishment of wildlife corridors around and through orchard areas that connect to larger habitat concentrations
- Improving water quality in seasonal runoff feeding to wetlands and perennial stream sections during spring and summer months
- Piped conveyance of severely impacted seasonal flow to perennial stream sections to improve flow volumes

3.4.6 Proposed Building Locations and Arrangements

All proposed buildings, including spray sheds, loading docks, and agricultural worker housing will be within the orchard development footprint on Section 17 and not within wetland or riparian buffers. No buildings are proposed outside the orchard development area.

3.4.7 Habitat Improvements and Enhancements

A large focus of this project is to improve wetland, stream and buffer habitats that has been damaged from illegal, user-built roads and provide seasonal perennial stream flow during summer months for elk. Although about 250 acres of the 640 acres Section will be converted to orchard development, 390 acres of forest habitat will remain for wildlife use.

The primary habitat improvements and enhancements include:

- Removal of illegal, user-built roads and restoration of those impacted areas to provide additional habitat within wildlife corridors; wildlife corridors are further protected because some parts of the corridors are also in wetland and riparian buffers, which are protected under different regulations.
- Restore native vegetation habitat to encourage species diversity
- Increase the quality of forage produced in wildlife corridors
- Restrict public access to protect key wildlife species and their habitat
- Monitor and control for invasive exotic plants, including Himalayan blackberry and other noxious weeds
- Provide seasonal water to a perennial stream that is typically dry by May; this is intended to maintain flows later in spring and summer months for wildlife, primarily elk and mule deer
- Protect the remaining 390 acres of forest habitat/forage base connected to larger, protected forested habitats in adjacent areas -- primarily in Sections 16, 21, and 22
- Coordinate with WDFW to monitor summer elk movement and duration of use within the preserved 390 acres

3.4.8 Water Bodies – Reservoirs

There are several reservoirs located in the area (Figure 12), as well as seasonal streams and natural drainages that are often dry by the end of May. Please see Section 3.3 and Figure 5 for details about the onsite streams and their impacts on the proposed Land Use Plan.

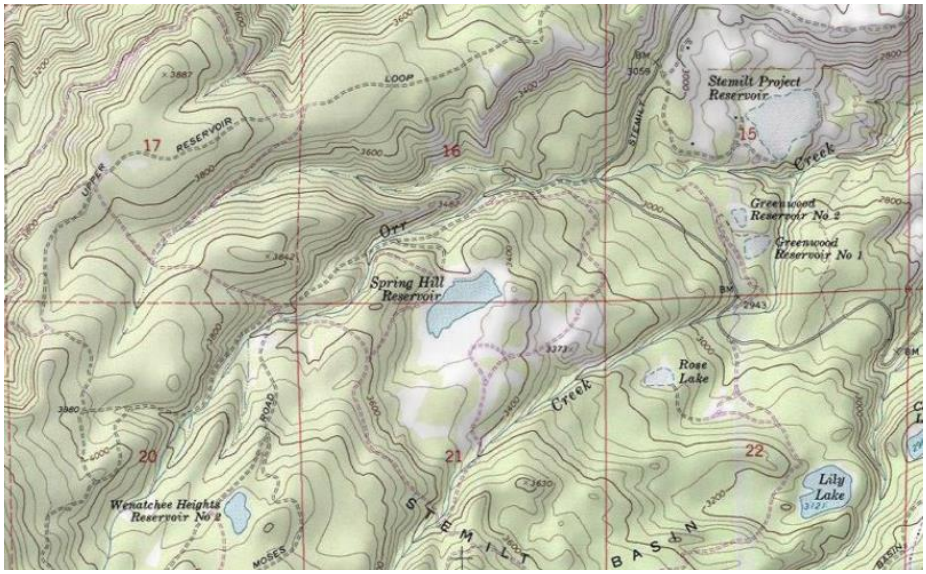


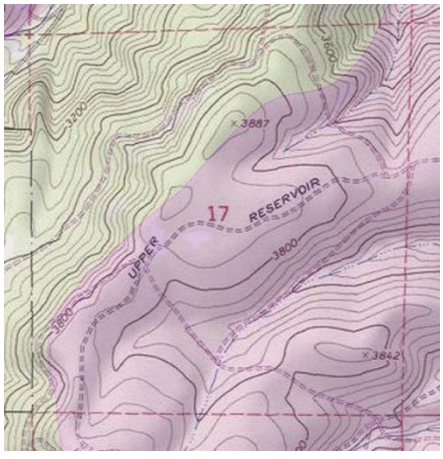
Figure 12. Reservoirs near the project area. No reservoirs are currently located within Section 17.

3.4.9 Location of Priority Habitat Types and Priority Species Point Location

Areas within the Section 17 project footprint have been classified by WDFW as Class II Fish and Wildlife Areas, based on the presence of elk calving and elk breeding habitat. There are no fish bearing streams within the project footprint, therefore impacts to fish habitat will not be discussed.

The WDFW Priority Habitat and Species (PHS) database was queried and identified the following Priority species and their associated Priority Habitats on Section 17 (Figure 13):

(1) Northern Spotted owl management buffer;
(2) Northern Spotted Owl occurrence; and
(3) Elk breeding area



Common Name	Scientific Name	Priority Area	Display Resolution	Feature Type	Full Record
Rainbow Trout (show)	Oncorhynchus mykiss	Occurrence/Migratio	AS MAPPED	Line	Show Full Record
Northern Spotted Owl (show)	Strix occidentalis	Management Buffer	TOWNSHIP	Area	Show Full Record
Northern Spotted Owl (show)	Strix occidentalis	Management Buffer	TOWNSHIP	Area	Show Full Record
Elk (show)	Cervus elaphus	Breeding Area	AS MAPPED	Area	Show Full Record
Northern Spotted Owl (show)	Strix occidentalis	Management Buffer	TOWNSHIP	Area	Show Full Record
Northern Spotted Owl (show)	Strix occidentalis	Occurrence	TOWNSHIP	Area	Show Full Record
Northern Spotted Owl (show)	Strix occidentalis	Occurrence	TOWNSHIP	Area	Show Full Record

Figure 13. Section 17 Map from WDFW Priority Habitats and Species mapping system.

Northern Spotted Owl Habitat

WDFW reports in the PHS database that the last Northern Spotted Owl (*Strix occidentalis caurina*) observation in the area was in 1993, prior to the area being logged soon after the sighting. Wheeler Ridge LLC contracted with the Washington Conservation Science Institute to conduct an Activity Center Assessment and surveys for the northern spotted owl near the project site, which is located along the eastern edge of the potential range defined for the northern spotted owl (2018). The focus of the study was two nearby historical spotted owl activity centers, and in other nearby potentially suitable spotted owl habitat. The Wheeler Ridge LLC spotted owl activity center assessment and survey protocol followed U.S. Fish and Wildlife Service guidelines (USFWS 2012). Results of the assessment and subsequent survey concluded that there are no current spotted owls, and only isolated pockets of suitable spotted owl habitat in Section 17 (Figure 14; Table 4). Therefore, no viable spotted owl habitat will be removed or impacted as a result of this proposed project (Lyons, et al., 2018).

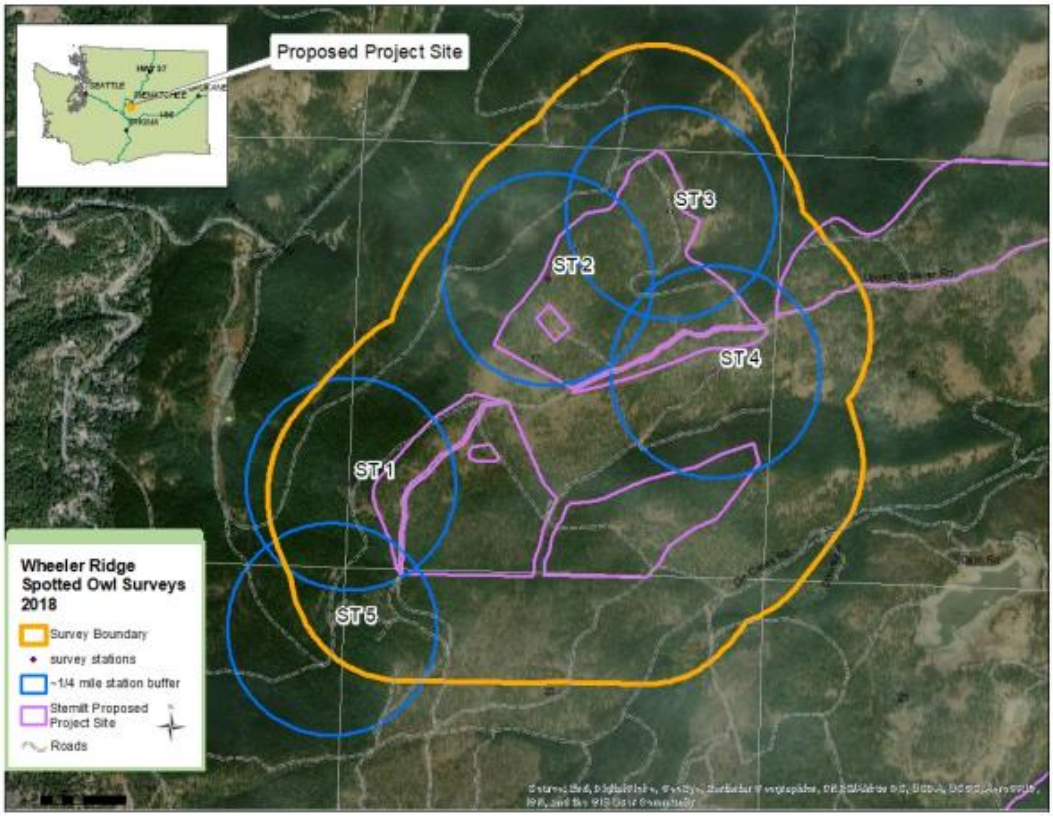


Figure 14. Spotted owl survey route and stations within the project area, overlaying older versions of the orchard layout.

Table 4. Northern Spotted Owl Results, Wheeler Ridge, LLC

Visit Number	Date	Complete Survey	Spotted Owls Detected?
1	26 April 2018	Yes	No
2	31 May 2018	Yes	No
3	11 June 2018	Yes	No
4	19 July 2018	Yes	No
5	26 July 2018	Yes	No
6	3 August 2018	Yes	No

Elk Habitat

The proposed project includes establishing wildlife corridors to ensure that migratory wildlife, such as elk (*Cervus elephus*) can move across the landscape to larger, concentrations of habitat on adjacent lands. The WDFW PHS database indicated that Section 17 provides breeding habitat for elk.

In 2008, CORE GIS was contracted by Chelan County Natural Resources Department to identify several habitat attributes to predict summer elk habitat potential in the Stemilt Basin. A total of 5,000 acres was queried to illustrate areas elk prefer during summer months (June-August) based on slope, proximity to water, and cover (Figure 15).

In

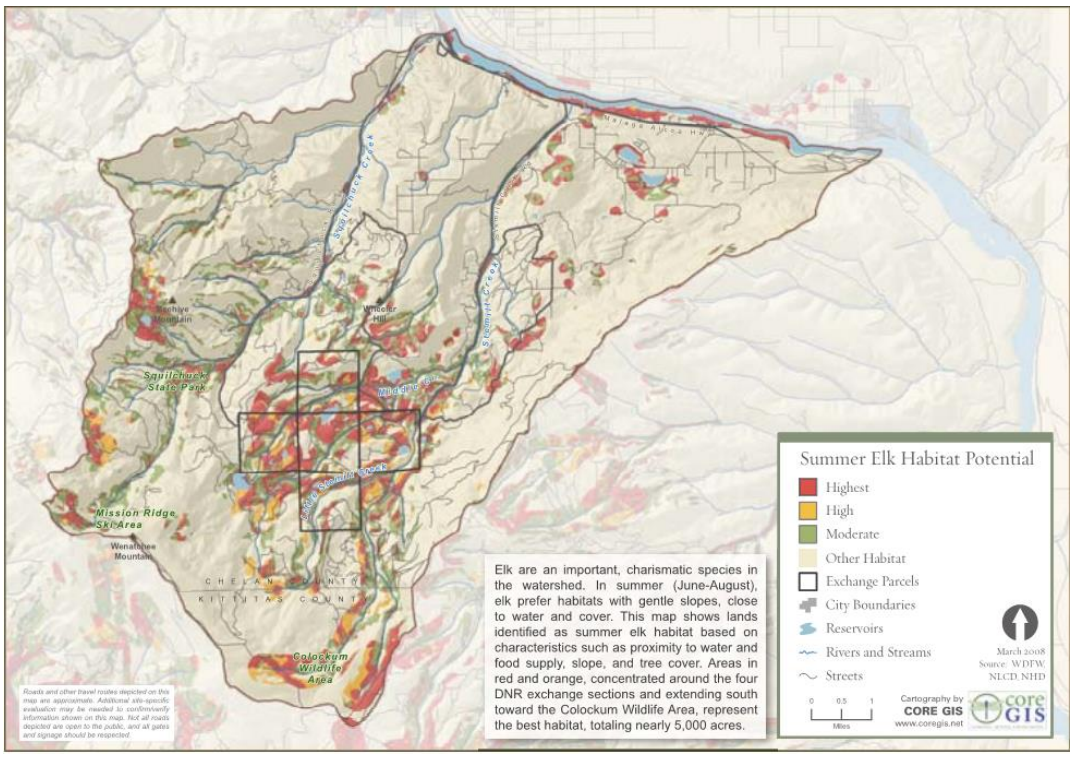


Figure 15. Results of CORE GIS 2008 model predicting potential summer elk habitat in the Stemilt Basin.

2018, SCJ Alliance conducted a similar GIS exercise, further consulting literature to develop habitat classification schemes/habitat attributes to predict summer elk habitat potential within Section 17. A subset of habitat characteristics was given quantitative ranges based on a set of known variables such as distance to roads that influence elk behavior. Classification schemes were assigned a value of low (0), medium (.5), and high (1.0) (i.e. intensity value) and then geolocated using GIS. Habitat attributes used to predict potential summer elk habitat preference was distance to roads, slope facing direction, slope (degrees), and percent canopy cover (Figure 16). These attributes were the most consistent in the literature with roads determined to be the most consistent predictor of habitat elk use/nonuse. Current hydrologic conditions indicate water is not available during summer months as streams in the area typically go dry by May. Therefore, water resource availability was not used as a predictive attribute.

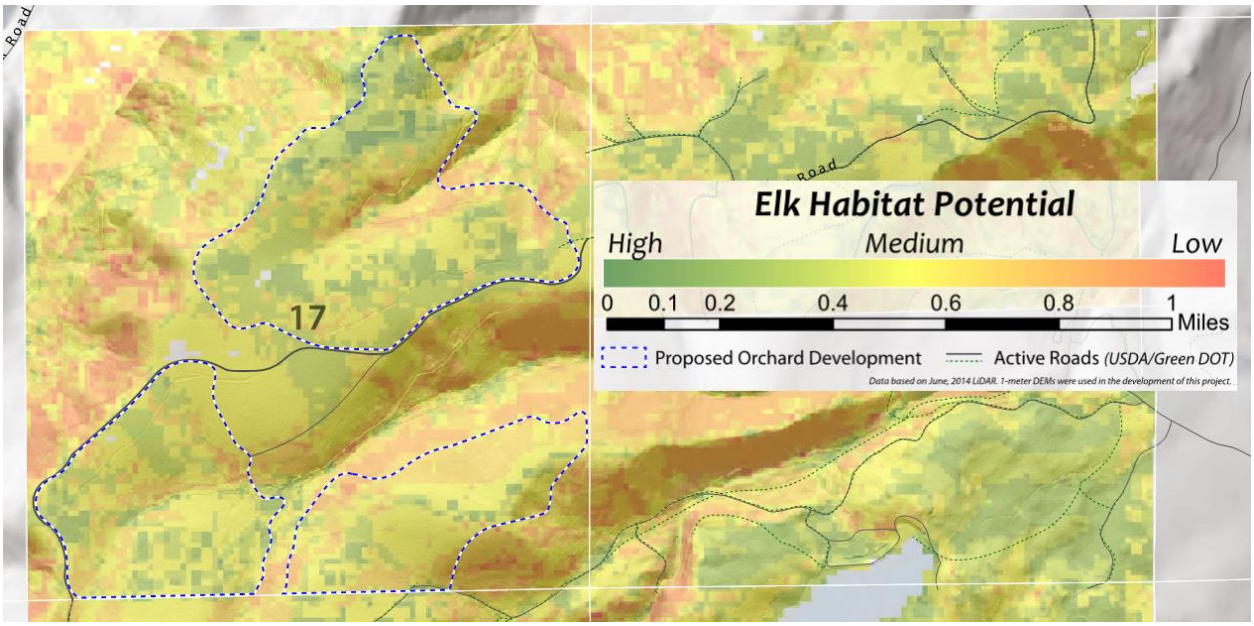


Figure 16. SCJ 2018 modeled prediction of summer elk habitat potential on Section 17.

Outside of model results discussed above, presence and signs of elk (i.e. scat and trails) have been observed regularly on Section 17 and are documented on WDFW PHS maps. Wheeler Ridge LLC staff have observed elk use of the property and have observed indications of elk presence on Section 17 and Section 16 for over 40 years as a result of elk hunting and elk shed hunting (Figure 17).

> S. Shiflett, personal communication, observations from 1978-2018). *"In the spring time when the bull elk are in Section 16 and Section 17, they stay on the south side of the canyons in little benches about ¾ up the hillside, so the sun is shining on them. … they eat the new green grass on the south side of the canyon in the spring. As it gets hotter, the bull elk move to the north side of the canyons in Section 16 and 17 to get shade and keep cool. The bulls and cows move around a lot in the summer time going through Sections 9, 10, 11, 14, 15, 16, 17, 20, 21, 22 and 23. The majority of the cow elk normally do not get into Section 17 until after calving, most of the cow elk do their calving in sections 9, 10, 11, 14, 15, 16, 21, 22 and 23."*

Figure 18 overlays this personal observational data on the 2018 GIS model results.

Figure 17. Elk presence on Section 17 and Section 16.

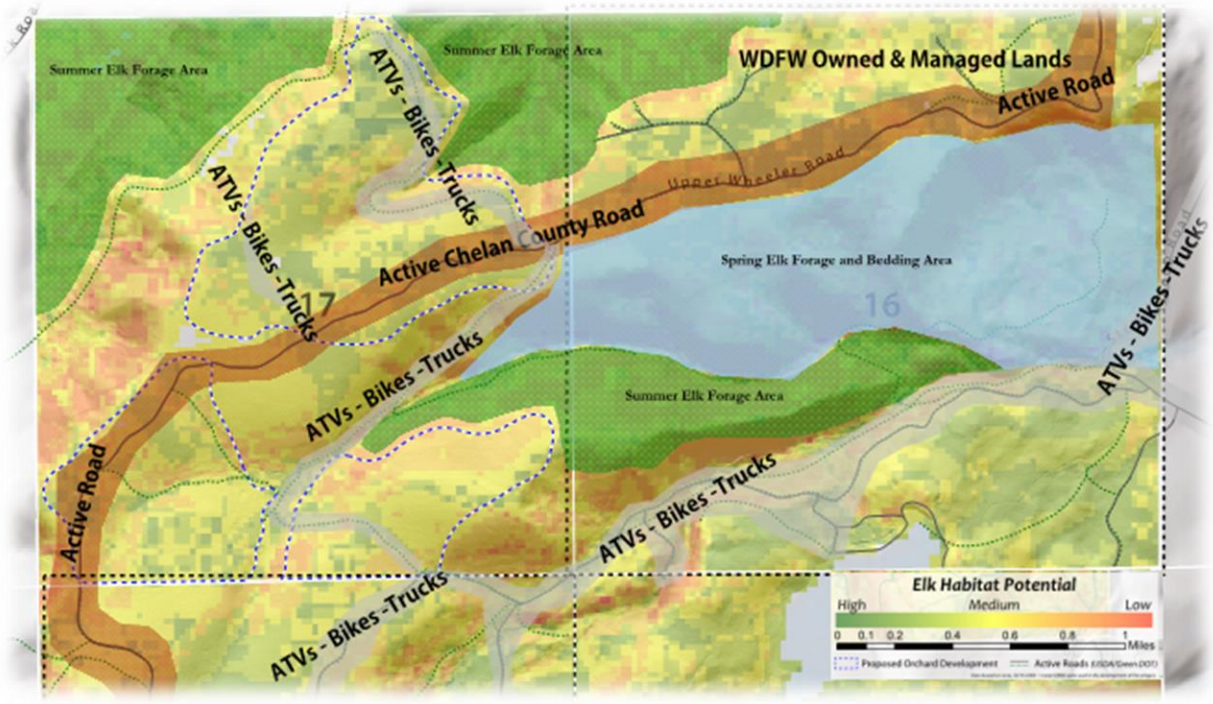


Figure 18. Spring and summer elk observational data overlaid with existing land use on Section 17.

Although both CORE GIS (2008) and SCJ Alliance (2018) had similar predictive habitat results, field observations by staff provide additional verification and proofing of the model in Section 17 -- documenting known elk habitat use and presence in certain areas in spring and summer months. Predicting summer elk habitat preference potential using GIS modeling is a good tool that provides a better understanding of where to start "looking" for elk in the absence of observational and/or radio-telemetry data. However, GIS predictive power using habitat attributes are constrained due to a lack of complete understanding of how habitat attributes combine or overlap to indicate low, medium, and high summer elk habitat potential. Human disturbances, particularly roads and traffic may be the most consistent predictor of elk habitat preference; and therefore, when roads and associated human impacts are present, they reduce the power of environmental variables used to identify potential habitat, such as percent canopy cover or aspect. Combining data sets or using other technologies such as aerial drones may provide better information in the future to document and more precisely define a specific herd's behavior, as influenced by a locally unique set of pressures.

3.4.10 Riparian Zone Habitat Description and Documentation

The Section 17 project area is in the far northwest end of Washington State Department of Ecology's Alkali/Squilchuck Creek Water Resource Inventory Area (WRIA 40). Riparian zones within the proposed project area are limited and primarily support seasonal streams. None of the streams within the proposed project area are listed as being polluted or having a TMDL standard in the Washington State Water Quality Standards database, and therefore, no specific designated use guidance applies (WAC 173-201A).

Water Quality and Flow Data Collected

In May 2018, Four Peaks Consulting collected surface water systems data in the Project Area to provide an initial characterization of baseline surface water resources in Section 17 at streams labeled as Tributary 1 and Tributary 2in Figure 19.

1. Tributary 1 is an unnamed stream in the southeast portion of Section 17, which drains into Orr Creek about a mile east of Section 17, and then to Stemilt Creek about 3 miles to the east.
2. Tributary 2 is an unnamed stream in the northeast portion of Section 17 which drains into Squilchuck Creek about a mile north of Section 17.

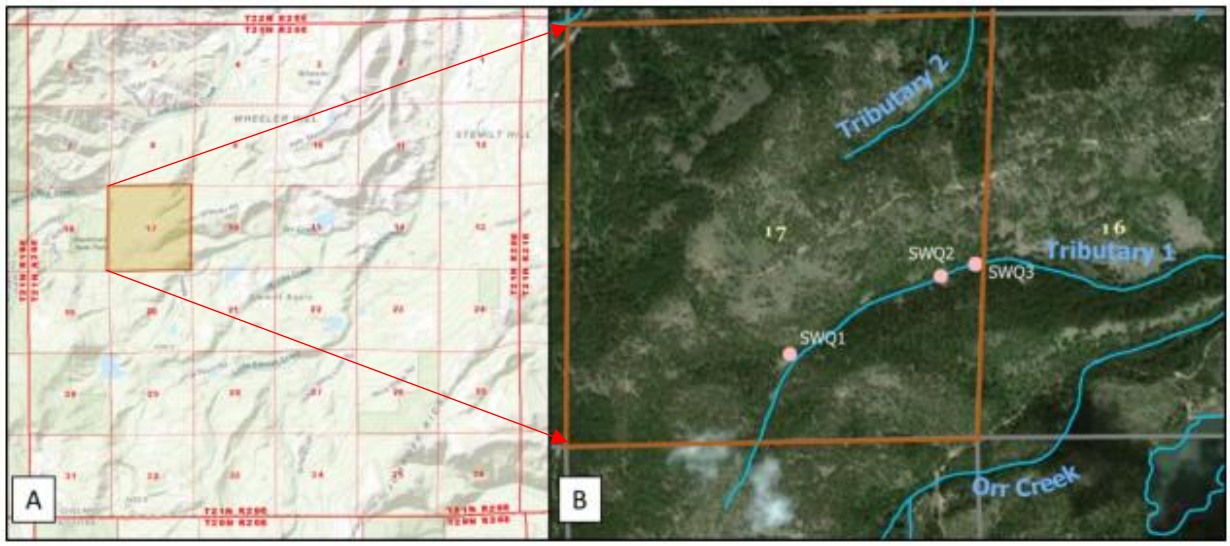


Figure 19. Data collection vicinity map, Section 17 with hydraulic and water quality locations.

Tributary 2 was dry during the May 2018 field investigation and therefore was not further evaluated. Downstream reaches of Tributary 1 had been previously defined as perennial by WDFW, but were not considered to be fish-bearing on or near the project site. There are no designated fish bearing streams within Section 17, as described previously. Fish passage data documented in WDFW SalmonScape mapping was reviewed. Tributary 1 is upstream of several passage barriers mapped on Orr Creek, which preclude anadromous fish from accessing this stream section in Section 17.

Baseline flow measurements and water quality samples were collected by Four Peaks Consulting at three sampling locations (Figure 20) along Tributary 1 on May 16, 2018 (Table 5)[7]. Flow was calculated at each of the three Tributary 1 sampling locations by multiplying the measure water velocity by the cross-sectional area of the channel. Velocity measurements were obtained with a Global Water FP 201 flow probe and the cross-sectional area of the channel was determined by measuring the channel width and depth at several locations across a transect at each site.

[7] As described previously, there was no flow in Tributary 2 during the May 2018 field visit.

Table 5. Sampling location information.

Sampling Location	Notes	Latitude**	Longitude**	Elevation**
*SWQ1	Furthest upstream sampling locations	47.30713	-120.35578	3,741
SWQ2	Located approximately 0.4 mile downstream of SWQ1	47.30984	-120.34822	3,579
SWQ3	Located approximately 0.1 mile downstream of SWQ2	47.31021	-120.3464	3,500

*SWQ are an acronym for Surface Water Quality and the number (i.e. 1, 2, or 3) refers to sequentially sampled geographic site.
**Locations were documented using a Garmin ™ *Etrex 20x* GPS Unit; Map Datum: WGS 84

Figure 20. Vicinity photographs of sampling locations SWQ1, SWQ2, and SWQ3 within Tributary 1.

During the site visit, flow in Tributary 1 was narrow (less than 3 feet wide) and shallow (only a few inches deep; Figure 20) and appeared to originate from a groundwater source near sampling location SWQ1. At each sampling location, an attempt was made to locate a relatively narrow and deep channel cross-section to improve the accuracy of the flow estimate (Table 6).

Table 6. Flow calculation parameters and flow estimates for sampling transects in Tributary 1

Sampling Location	Channel Width (ft)	Measured Velocity	Cross-sectional Area (ft^2)	Estimated Flow (ft^3/s)
SWQ1	0.42	0.5	0.03	0.02
SWQ2	1.33	0.4	0.15	0.06
SWQ3	1.00	1.5	0.10	0.14

In general, flow estimates were consistent with visual observations suggesting that flow increased from upstream to downstream sampling locations (i.e., SWQ1 had the lowest flow and SWQ3 had the highest flow). Because the channel was very shallow at all sampling locations and constrained the location of cross-sectional velocity measurements to a very limited number of points within the thalweg, the velocity estimates used in the flow calculations are likely representative of the fastest flowing water in

the channel. Assuming that the higher velocity water is heavily represented in the flow calculations, the estimated flow rates resulting from measurements at the three sampling locations are expected to be somewhat higher than the average flows in the tributary.

Field parameters including temperature, dissolved oxygen (DO), DO saturation, pH, and specific conductance were also measured at the three locations in Tributary 1, using a YSI ProDSS Handheld with a multi-parameter sonde. The equipment was calibrated[8] prior to use. Overall, the water quality measurements in Tributary 1 appeared to reflect groundwater contributions upstream (SWQ1) and then reflected increasing effects of exposure to atmospheric conditions downstream. The field parameter data collected is summarized in Table 7. The limited sampling in Tributary 1 presented variable surface water quality conditions that were representative of groundwater source and generally protective of sensitive aquatic life; respectively.

Table 7. Field water quality parameters measures on May 16, 2018.

Field Parameter	**SWQ1**	**SWQ2**	**SWQ3**
Time	8:17 AM	9:18 AM	9:50 AM
Temperature (Celcius)	5.5	10.5	10.6
Dissolved Oxygen (mg/L)[2]	6.3	8.8	9.1
Dissolved Oxygen Saturation* (%)	50.2%	94.5%	94.8%
Specific Conductance (mS/cm)[4]	0.2	0.1	0.1
pH	7.0	7.2	7.3

*Estimated based on temperature, barometric pressure (29.8 inches) and specific conductance from U.S. Geological Survey's DO Tables.

3.4.11 Description, Density, Intensity of the Proposed Use

This proposed orchard development project will operate in the late spring through early fall. The development proposal includes the project in its entirety, including habitat protection and enhancement (described in other section in more detail), logging, road maintenance and improvements, orchard planting, development and maintenance of infrastructure, utilities, reservoirs, seasonal agricultural worker support facilities, and other necessary structures such as fuel stations and spray sheds. The orchard development in Section 17 is estimated to cover about 250 acres of the 640-acre total. The area identified for orchard development will be graded to accommodate irrigated orchards, as well as other elements mentioned above. The orchard development will be fenced with an 8-foot deer fence.

3.4.12 Analysis of the Effect and Measures to Avoid, Minimize or Mitigate Impacts

Wheeler Ridge LLC is proposing to convert up to 250 acres of the 640 acres of forest lands on Section 17 into an orchard development. It is assumed that none of the future orchard development area will provide suitable habitat for wildlife. Bird deterrent cannons or scarecrows will be used seasonally to

[8] Calibration of pH was verified at pH 4, 7 and 10 using reference solutions. For DO, the barometric pressure setting was adjusted to the pressure reported in Wenatchee on the day of sampling such that the DO readings were representative of the local conditions.

deter fruit and seed-eating birds away from the orchard development, as is typically done in orchards throughout Chelan County.

An element of the proposed project is to enhance and restore existing riparian wetland-meadow habitat impacted from past illegal uses and to provide further protection by restricting public access within Section 17.

Wheeler Ridge LLC understands that water resources are vital for elk and other wildlife during summer months. One element of the proposed project is to provide seasonal water from currently disturbed areas to the perennial stream area, which is located within a wildlife corridor for elk and other wildlife. This will also enhance the wetland-meadow habitat, and thus will provide additional "green up" forage and bedding access for elk and other wildlife during the vital spring and summer months. The "green up" will increase forage availability, quality and duration near the perennial stream and within the restored wetland-meadow habitat area for elk and other wildlife.

There are no fish-bearing streams within the project area, and therefore, no significant impacts to fish habitat will occur. Only Ns and Np streams occur onsite and are primarily outside of the proposed orchard area and are concentrated in preserved wildlife areas.

Avoidance and Reduction Measures:

- 390 acres of the 640 acres will be preserved and/or enhanced (described below) to provide wildlife habitat and wildlife corridors to connect to larger, protected landscapes adjacent to the proposed project. The area proposed for orchard development is zoned to RR20, a zoning that would allow 20-acre parcel residential development (up to 32 homesites). Residential development would eliminate habitat connectivity and would greatly reduce effective forest habitat functions for elk and other wildlife.
- Wetlands and riparian areas will be avoided by assigning standard buffers, and by fencing and installing habitat protection signs in the field.
- Public access through Section 17 will be restricted to avoid further degradation of habitat currently occurring from user-built roads, mudbogging, and dispersed camping.
- No new roads are proposed in wetland or stream and their buffer areas; old roads will be abandoned and relocated outside of buffer areas.
- Large fills and cuts near steep slopes will be avoided.
- The Washington Conservation Science Institute, LLC (2018) concluded there will not be impacts northern spotted owls and spotted owl habitat.

Minimization Measures:

- An 8-foot deer fence will be installed around the orchard development to ensure wildlife are safely directed to wildlife corridors for protection and forage opportunities.
- Only 250 acres of the 640 acres are being proposed for the orchard development.
- An onsite reservoir will be developed to provide a means for fire suppression to protect the remaining 390 acres of forested habitat if threatened by fire. This will keep onsite fires from spreading to adjacent WDFW owned lands and Squilchuck State Park.
- Orchard development and operation is seasonal; thus, the site will have minimal human activity outside of the intensive harvest periods.
- Clearing of native landcover in proposed orchard areas will be minimized or entirely avoided on slopes 20 degrees or greater. Where timber must be harvested to allow for orchard

development, native grass and shrub understory will be preserved to minimize runoff, erosion, and to encourage subsurface infiltration.

- Throughout the orchard development process, appropriate short-term and long-term erosion Best Management Practices (BMPs) will be implemented to minimize erosion and sediment movement.

Mitigation Measures:

- Protect and enhance up to 48 acres of wetland-meadow habitat by restoring soil conditions and native vegetation communities in illegal, user-build roads, mudbogging areas, dispersed camping, and relic logging roads.
- Establish and preserve wildlife corridors to ensure safe wildlife passage to adjacent habitats in Section 16 and Section 20, which have been purchased and protected using USFWS Section 6 funds.
- Wheeler Ridge LLC will consult with WDFW wildlife biologists to ensure optimal use of key native plant species to enhance the wetland complex and riparian areas and to maximize wildlife benefits.
- Wheeler Ridge LLC will continue to support WDFW efforts to gain a better understanding of the Colockum Elk Herd within Wheeler Ridge.
- Two seasonal streams located within the southwest orchard development area are in deeply incised channels (up to 8 feet deep) in old logging roads. They are actively eroding, and thus contribute sediment to the perennial system downstream (Figure 21). To minimize erosion and sediment impacts to downstream areas, the eroded Ns stream channels will be piped, and the captured water will be conveyed to the head of the perennial stream, downstream to the east (Figure 22).
- Impacted wetland, stream and buffer habitat associated with the perennial stream and the protected wildlife corridor areas will also be enhanced and renovated to compensate for loss of the Ns systems. This will include abandonment and restoration of old road impacts at stream crossings and in buffer, thereby greatly improving habitat functions in those areas (Figure 22). This action will reduce sediment loads to the perennial stream, and will improve downstream water quality and stream functions.
- Current impacts to wildlife from lack of water in spring and summer months will be reduced by providing this sediment-free seasonal water to the perennial stream, increasing duration of the natural flow period. This stream typically is dry by April or May in most years.
- As mentioned above, old roads in buffer areas will be abandoned and revegetated. A new road alignment will send existing roads around rather than through a severely impacted wetland are at a confluence of small Ns stream feeding to the Np system (Figure 22; Figure 23).
- Wheeler Ridge LLC will consult with WDFW wildlife biologists to ensure use of appropriate native plant species where enhancement of buffers is proposed to maximize wildlife benefits/protect forage base for wildlife.

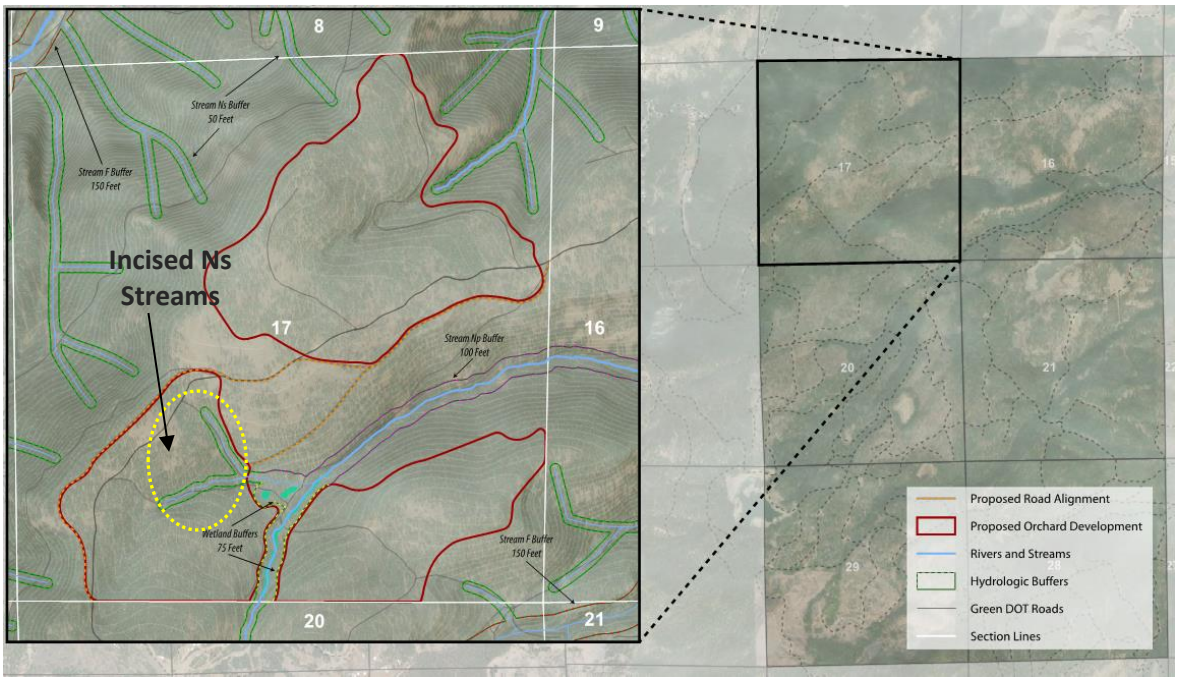


Figure 21. Showing existing conditions with proposed layout, and standard buffers associated with streams and wetlands.

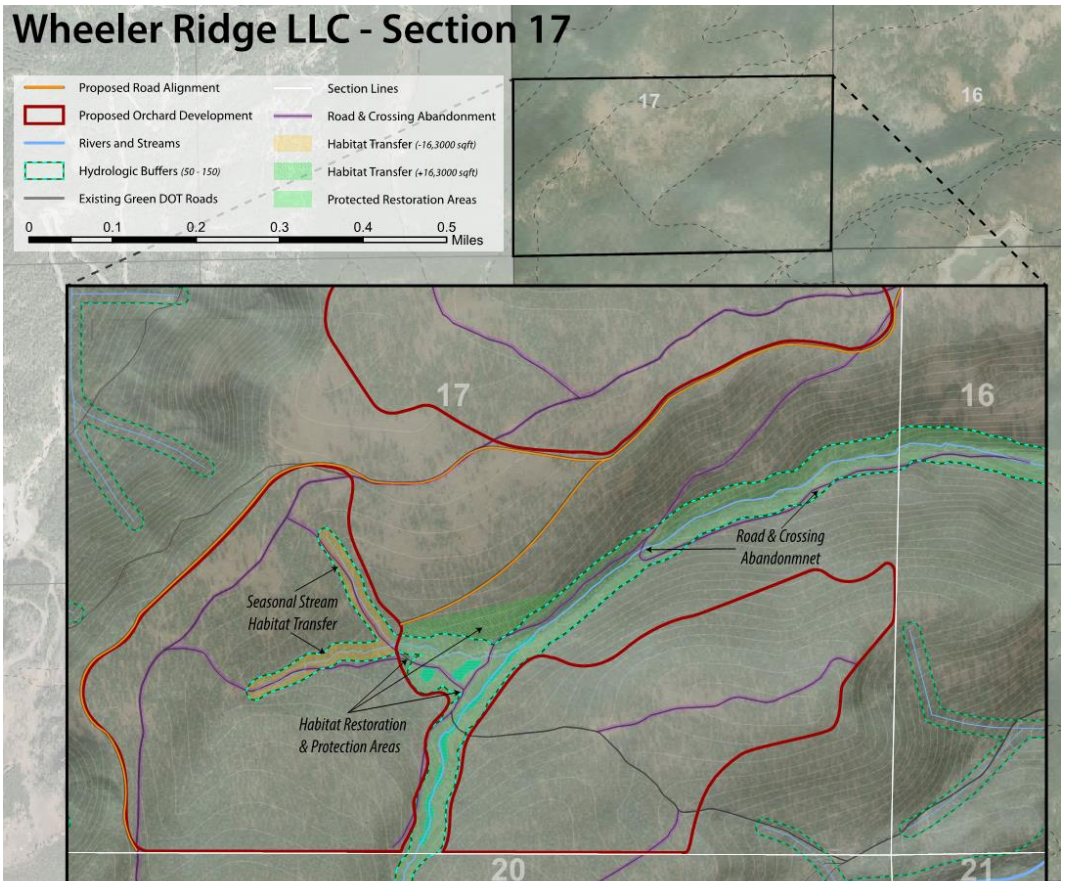


Figure 22. Showing transfer of riparian habitat from impacted stream to downstream wetland and stream habitat areas, in addition to realigning old road to reduce current impacts in wetland, stream and buffer areas.

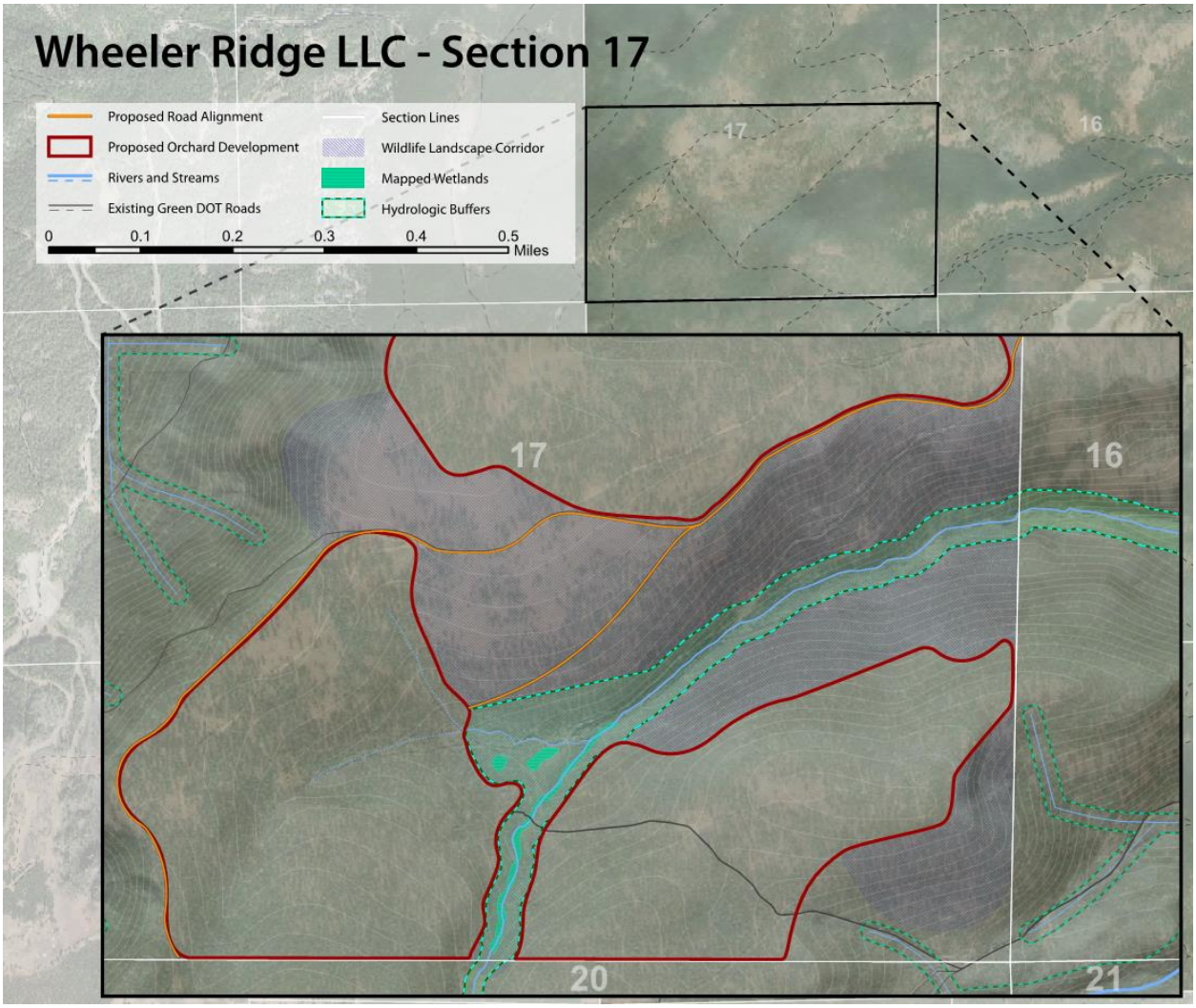


Figure 23. Showing Post-mitigation conditions in wetland and stream mitigation areas

Future (Potential) Off-Site Mitigation Measures:
If the 250 acres planted in Section 17 are successful at producing fruit, Wheeler Ridge LLC may pursue an additional 110 acres of orchard development. Wheeler Ridge LLC should consider coordinating with WDFW to exchange 218 acres of habitat in Section 21 (owned by Wheeler Ridge LLC) for 160 acres of land adjacent to other orchard development in Section 16 (owned by WDFW). Of the 160 acres proposed for a land exchange with WDFW, only 110 acres would be orchard development to provide a 50-acre buffer for wildlife. This exchange would provide 268 acres of habitat connected to larger, habitat concentrations in Stemilt Basin.

3.5 WETLAND SYSTEMS DESCRIPTION

Three wetland areas (Wetlands A, B and C, described below) were identified and flagged in the southern section of Section 17. These systems were associated to varying degrees with existing Ns and Np stream reaches in that area that were described previously in this report. Per Chelan County Code, Ns streams were assigned a buffer of 50 feet; Np streams were assigned a buffer of 100 feet. In areas where both

wetland and stream condition occur, the most restrictive buffer applies – i.e., in this case, the 75 ft wetland buffer would control.

Wetland A was associated with an Ns stream in the south-central portion of Section 17. Flagging for Wetland A started along both sides of an Ns stream at the southern property line and extended north for several hundred feet, near the start of the Np stream where the stream channel was incised enough that there were no more associated stream-side wetlands. From that point on downstream, there were no more wetlands associated with the Np stream on Section 17 (Figure 24).

Wetlands B and C were located northwest of Wetland A, and are hydrologically associated, in that a seep that emanates from Wetland C drains north and into ruts in a local forest road. The road diverts that surface flow several hundred feet to the east, then water leaves the road to flow north across a broad flat area to form Wetland B, eventually draining into a seasonal stream channel about 200-300 feet to the north. If the road drainage diversion problem is corrected, overflow from Wetland C would instead drain to the north side of the road at that same location, and a new wetland would form between the road and the seasonal stream channel about 200 feet to the north – possibly eliminating or reducing wetland conditions in what is now Wetland B. If this were to occur, we would expect no net loss of wetland.

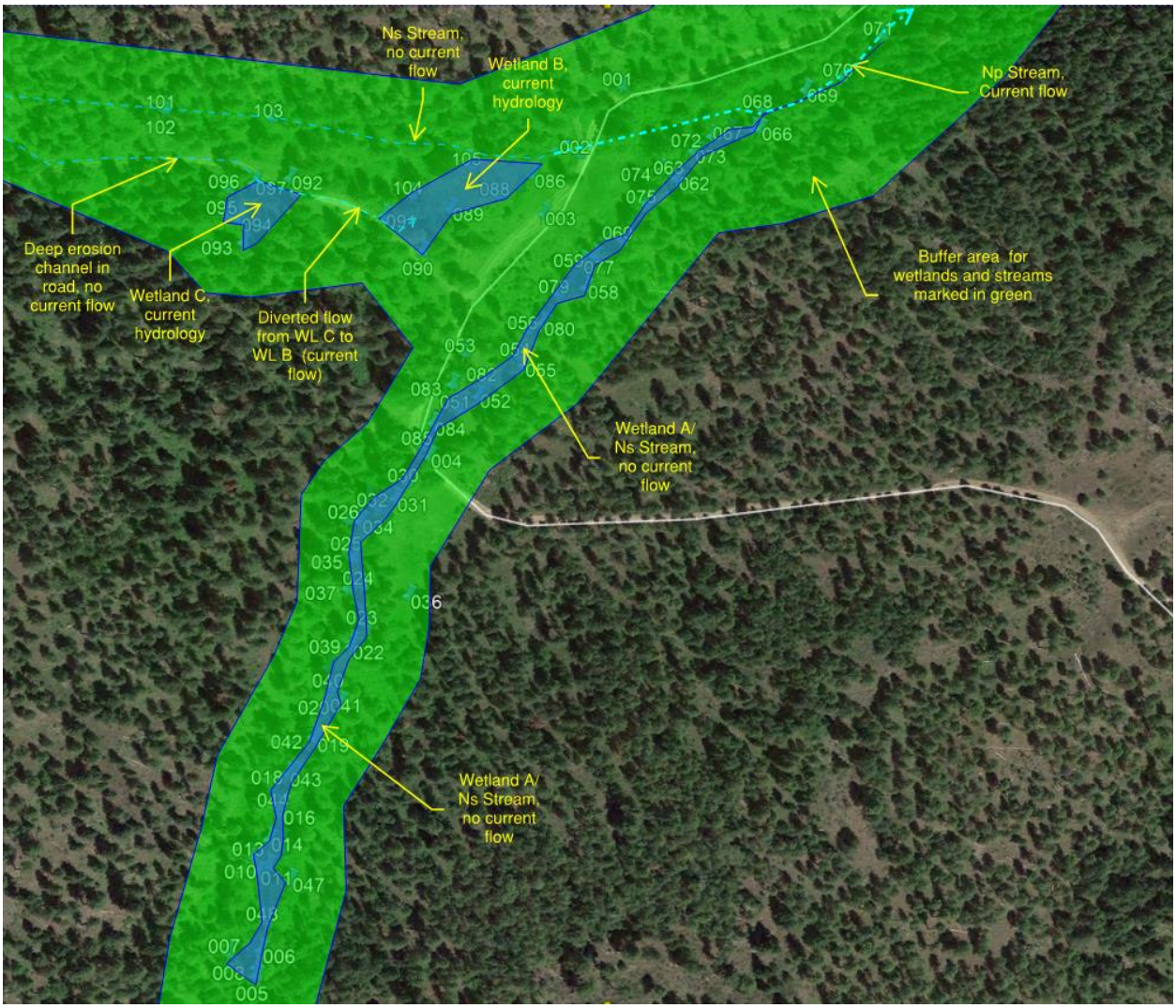


Figure 24. Showing location and extents of Wetlands A, B and C with approximate buffers in southern portions of Section 17.

There was a small wet area east of Wetland A, south of an intersection of the existing gravel road and an old logging side road scar from the south. There was some wetland vegetation in that area, but minimal hydrology and inconclusive hydric soil characteristics. The area was an old logging deck area, and vegetation appears to be responding to compacted soil conditions. Therefore, that area was not flagged as wetland.

3.5.1 Vegetation Community

The vegetation from within to outside of the wetland areas reflected a transition from wetland to upland conditions, as would be expected. But the majority of wetland vegetation was Facultative, reflecting the seasonally wet conditions expected in this area (Figure 25). Obligate vegetation was documented only in Wetland C or near road crossings where water backed up above partially blocked culverts.

Dominant wetland species include:

Trees

Quaking aspen (*Populus tremuloides*)
Red alder (*Anus rubra*)

Shrubs

Serviceberry *(Amelanchier alnifolia)*
Twinberry (*Lonicera-involucrata*)
Red osier dogwood (*Cornus sericea*)
Wild crabapple (*Malus fusca*)
Wild rose (*Rosa spp)*

Herbs, Ferns and Vines

Water parsley (*Oenanthe sarmentosa*)
Wild columbine (*Aquilegia formosa)*
Yellow lily *(Iris pseudacorus*)
Wild iris (*Iris missouriensis)*
Sedge spp (*Carex spp)*
Coltsfoot (*Tussilago farfara*)
Small-fruited bulrush (*Scirpus microcarpus*)
Horsetail (*Equisetum spp*)
Spike rush (*Eleocharis palustris*)
Spreading buttercup (*Ranunculus repens*)

Figure 25. Example of Wetland and adjacent upslope Buffer vegetation community

Dominant upland species include:

Trees

Quaking aspen (*Populus tremuloides*)
Ponderosa pine *(Pinus ponderosa*)
Red alder (*Alnus rubra*)

Shrubs

Oregon grape *(Mahonia aquifolium)*
Bitterbrush *(Purshia tridentate*)

Oceanspray (*Holodiscus discolor*)
Snowberry *(Symphoricarpos albus)*
Wild rose (*Rosa spp)*

Herbs, Ferns and Vines
Yarrow (*Achillea millefolium)*
Arrow leaf balsamroot (*Balsamorhiza sagittate*)
Violet (*Viola spp*)
Lupine (*Lupinus spp*)
Wild geranium (*Geranium maculatum*)
Bleeding heart (*Dicentra formosa*)
Trillium (*Trillium ovatum)*

3.5.2 Hydrology

Hydrology for all three wetlands is from direct precipitation (rain and snow), and subsequent concentration of stormwater and snow melt in low-lying areas (Figure 26). On the day of the site visit, groundwater was at or near the surface in Wetland A areas adjacent to the stream with only minor surface ponding. When surface elevation increased by one to two feet in the riparian area relative to the stream elevation, wetland conditions were no longer present.

Figure 26. Showing groundwater hydrology conditions in Wetland A, within 1 ft elevation of the adjacent stream channel.

Hydrology in both Wetland B and C was at the surface, but there were indications that it was diminishing as the season progressed. We assume that all of these seasonal wetlands systems have no hydrology by mid to late summer.

3.5.3 Soil Conditions

Soils in the surrounding area are very generally mapped as Stemilt ashy silt loam, which is not a wetland soil map unit. However, the map unit does contain wetland and stream areas where terrain directs seasonal water and snow melt to low lying areas or ravines.

Soils within the wetlands expressed a variety of hydric soil indicators, ranging from A11 (Depleted Below Dark Surface), to A4 (Hydrogen sulfide) to F6 (Redox Dark Surface) (Figure 27).

Figure 27. Example of Hydric Soil with Indicator F6 – Redox dark surface.

3.6 WETLAND RATING RESULTS

The wetland was rated using the 2014 Eastern Washington Rating System, as required in Chelan County code.

Wetland A's rating results indicated that it had **moderate** Site and Landscape potential to provide for water quality treatment and flood storage, but **low** Value, due to the lack of significant pollution and flooding problems – i.e., its potential to treat water quality or to store flood water was not needed in the current setting. Wetland A scored **moderate** for habitat Site and Landscape potential and **high** Value for habitat functions. The final combined score was 18 points – a Category III wetland system.

Wetlands B and C were rated as one system, partly because they were associated, but also because they were similar systems. The Wetland B/C rating results indicated that for Water Quality functions and values, these wetlands had **low** Site potential and **moderate** Landscape potential to provide for water quality treatment –due to lack of physical structure and ponding, which would provide for more effective treatment. They had **low** Value for water quality treatment due to the lack of pollutants in the area.

For Hydrologic functions and values, Wetland B/C had **low** Site and Landscape potential to provide for water storage–due to being small with minimal ponding depths. However, they had **high** Value for hydrologic functions due to helping provide off-road storage in an area that periodically floods.

Wetland B/C's final combined score was 17 points – a Category III wetland system. Per code, a Category III wetland adjacent to Low Intensity Development (agriculture) is assigned a standard buffer of 75 feet.

Mitigation described above for loss of disturbed sections of Ns systems upstream will result in enhancement, expansion and restoration of areas around these wetlands and downstream riparian areas that were damaged from past off-road activities and undersized culverts. If this proposed conceptual mitigation is accepted by County regulators, a detailed Planting, Monitoring and Maintenance Mitigation Plan will be developed and provided for additional review and approval.

Figure 28. Example of disturbed area near Wetland B that will be restored during mitigation work.

4. SUMMARY

Wheeler Ridge LLC is proposing to develop 250 acres of forest habitat within a 640 historical working forest to orchard development. Impacts to wildlife and their habitat will be avoided, minimized, or mitigated. Several elements of this proposed project aim to reduce human disturbance to wildlife and avoid further habitat degradation for illegal uses such as user-build roads, mudbogging, and dispersed camping. Road removal/restoration, public access restrictions, habitat restoration and enhancements within hydrological buffers and wildlife corridors, conveyance of seasonal water in spring and summer months for elk and other wildlife, protection of wetland and riparian buffers, wildlife corridors with appropriate tree stand buffers and forage/grasses, improving conveyance of seasonal streams to perennial stream, and connection to larger, protected wildlife corridors/habitats within the Stemilt Basin are all included as actions within this proposed project and are be non-discretionary.

Wheeler Ridge LLC will work directly with WDFW and other permitting agencies to ensure wildlife and wildlife habitat enhancements proposed are designed in such a way to maximize environmental benefits. Section 17 was originally zoned and platted for residential development. The proposed orchard development preserves a total of 390 acres of forested land for habitat, which could have been developed for housing. There is no development planned in the buffer. Work in the buffer includes reconnecting seasonal streams to a perennial stream to reduce erosion and will be implemented in consultation with local, state, and federal permitting agencies. Conceptual mitigation plans for seasonal stream conveyance will further evaluated with permitting agencies. Mitigation described above for loss of disturbed sections of Ns systems upstream will result in enhancement, expansion and restoration of areas around these wetlands and downstream riparian areas that were damaged from past off-road activities and undersized culverts. Wheeler Ridge LLC will consult with permitting agencies to ensure conceptual mitigation recommendations are implemented to maximize benefits to wildlife and their habitat.

5. REFERENCES

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Washington State Department of Natural Resources WRIA mapping database.

APPENDIX A

Project Mapping Figures

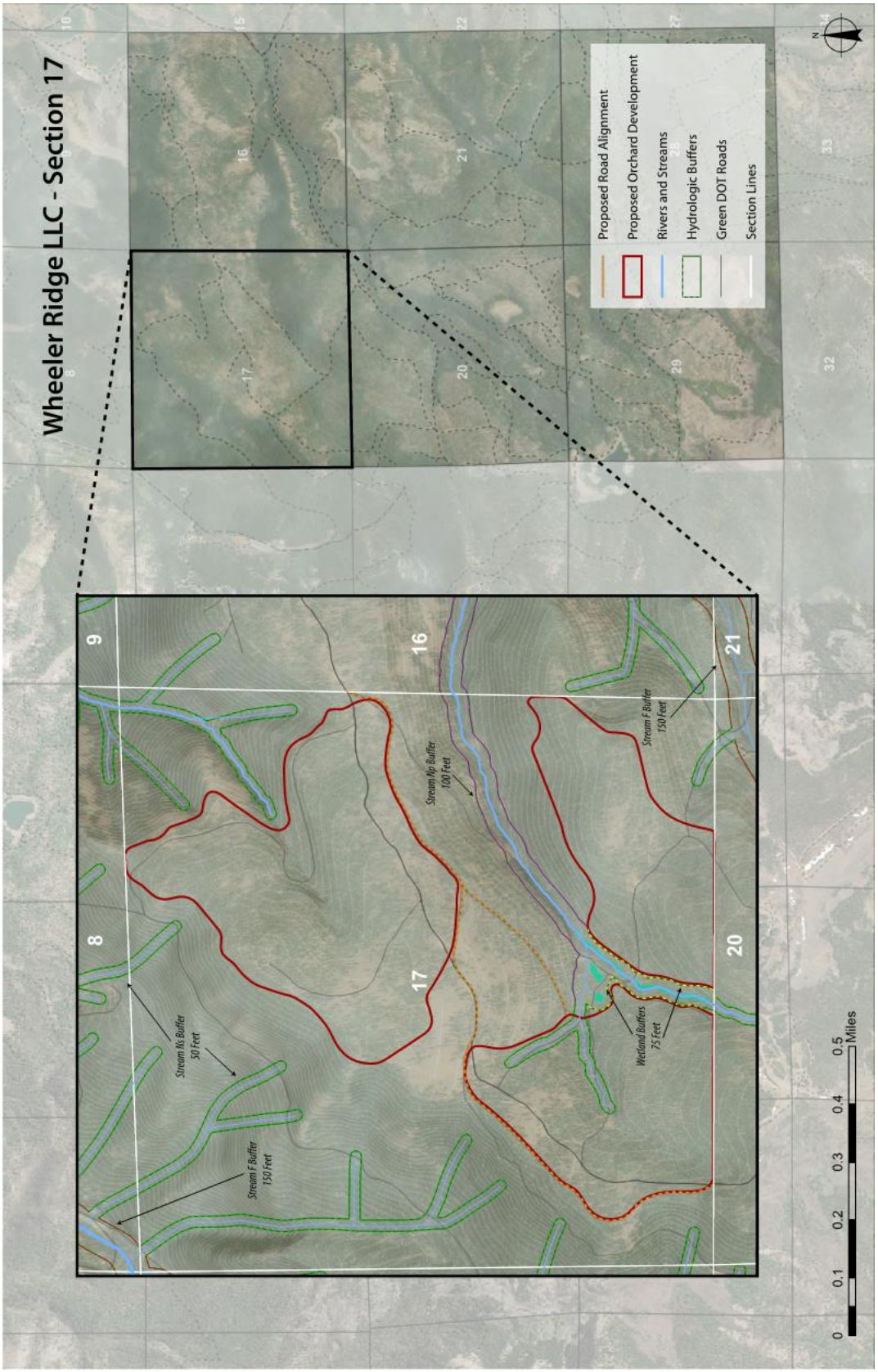


Figure A-29. Showing Corrected Stream Type mapping, and standard stream and wetland buffers.

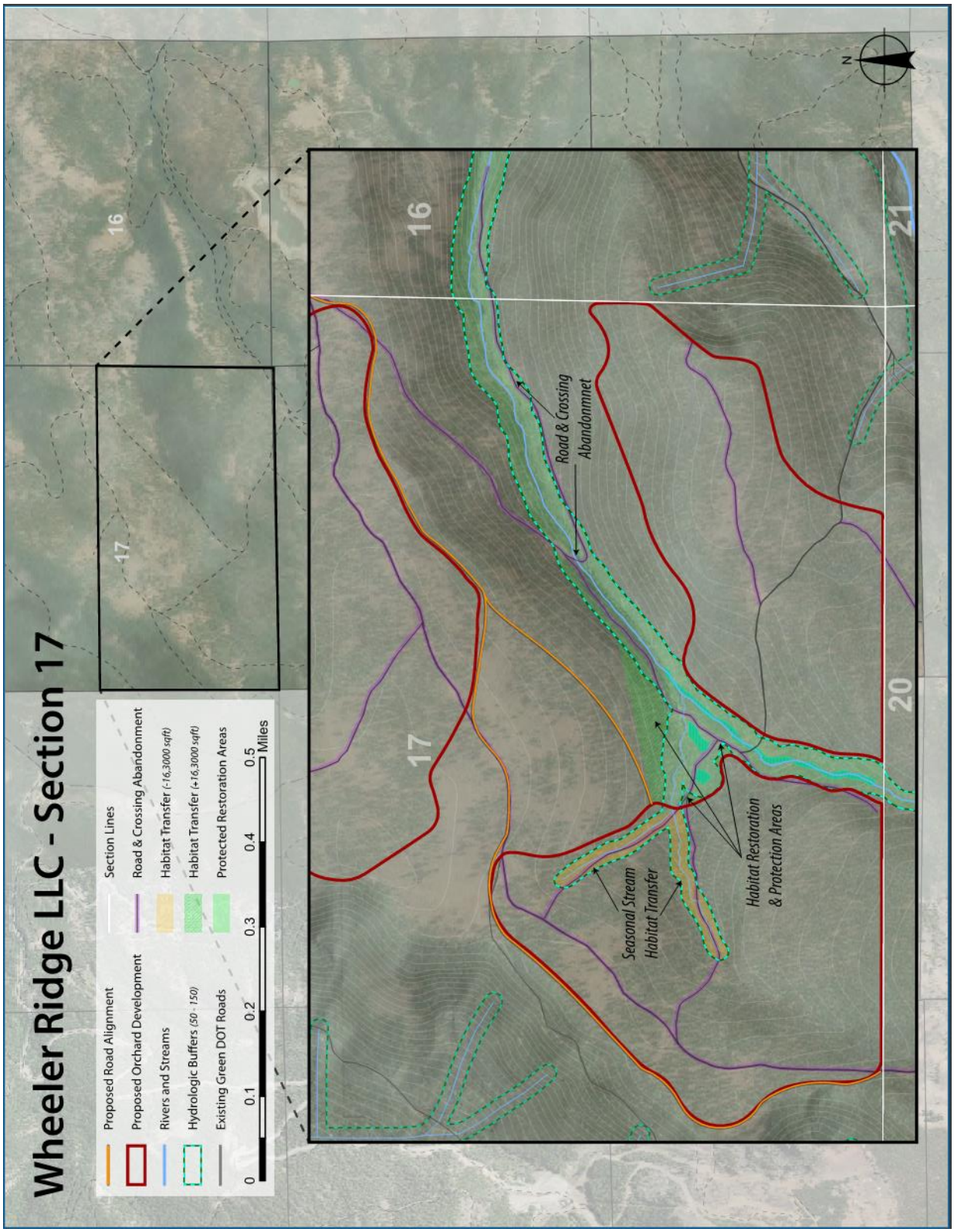


Figure A-30. Showing proposed stream habitat transfer area and proposed habitat restoration and mitigation area to the east.

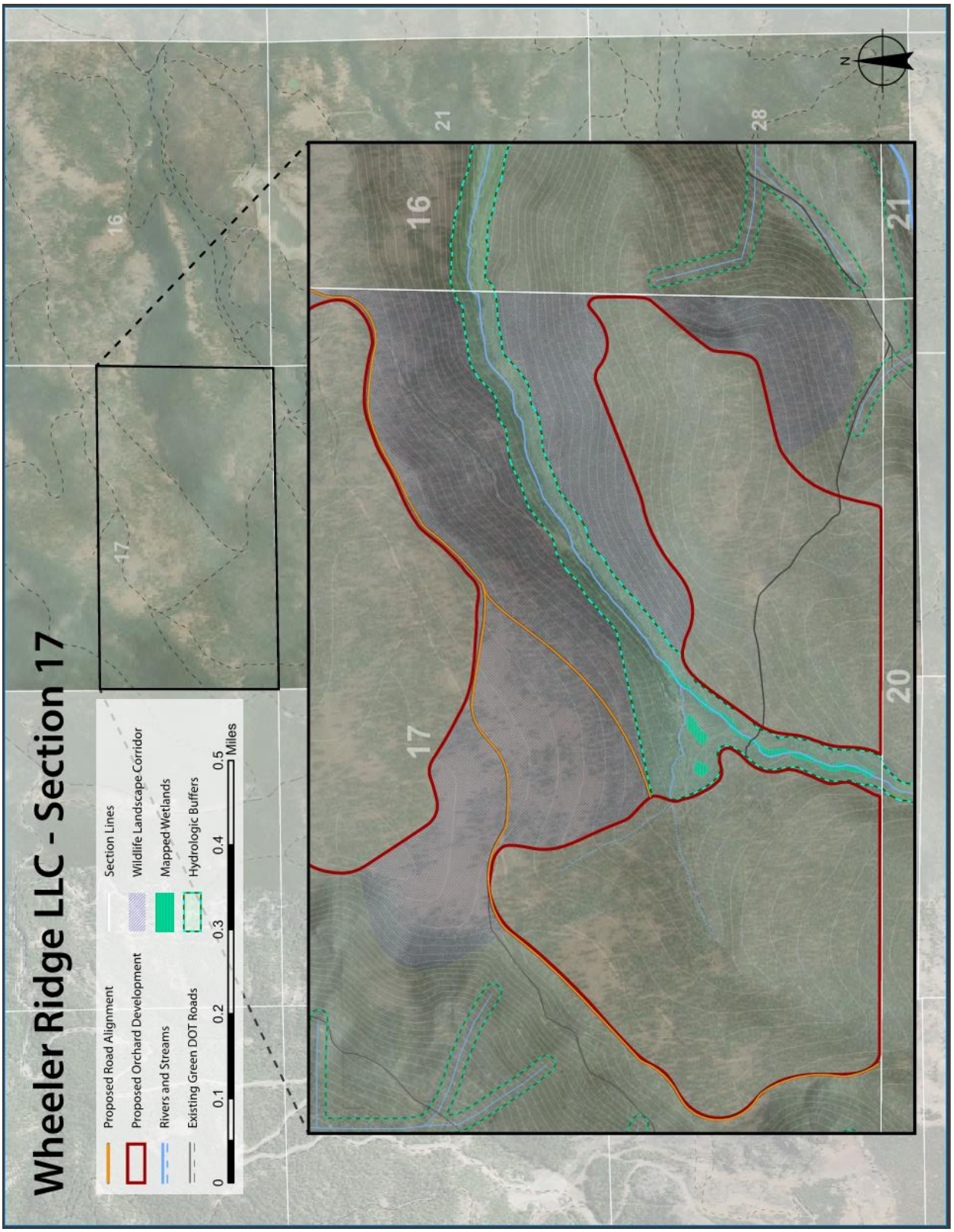


Figure A-31. Showing post mitigation conditions, with enhanced habitat area and dedicated wildlife corridor.

APPENDIX B

Wetland Rating Figures and Forms

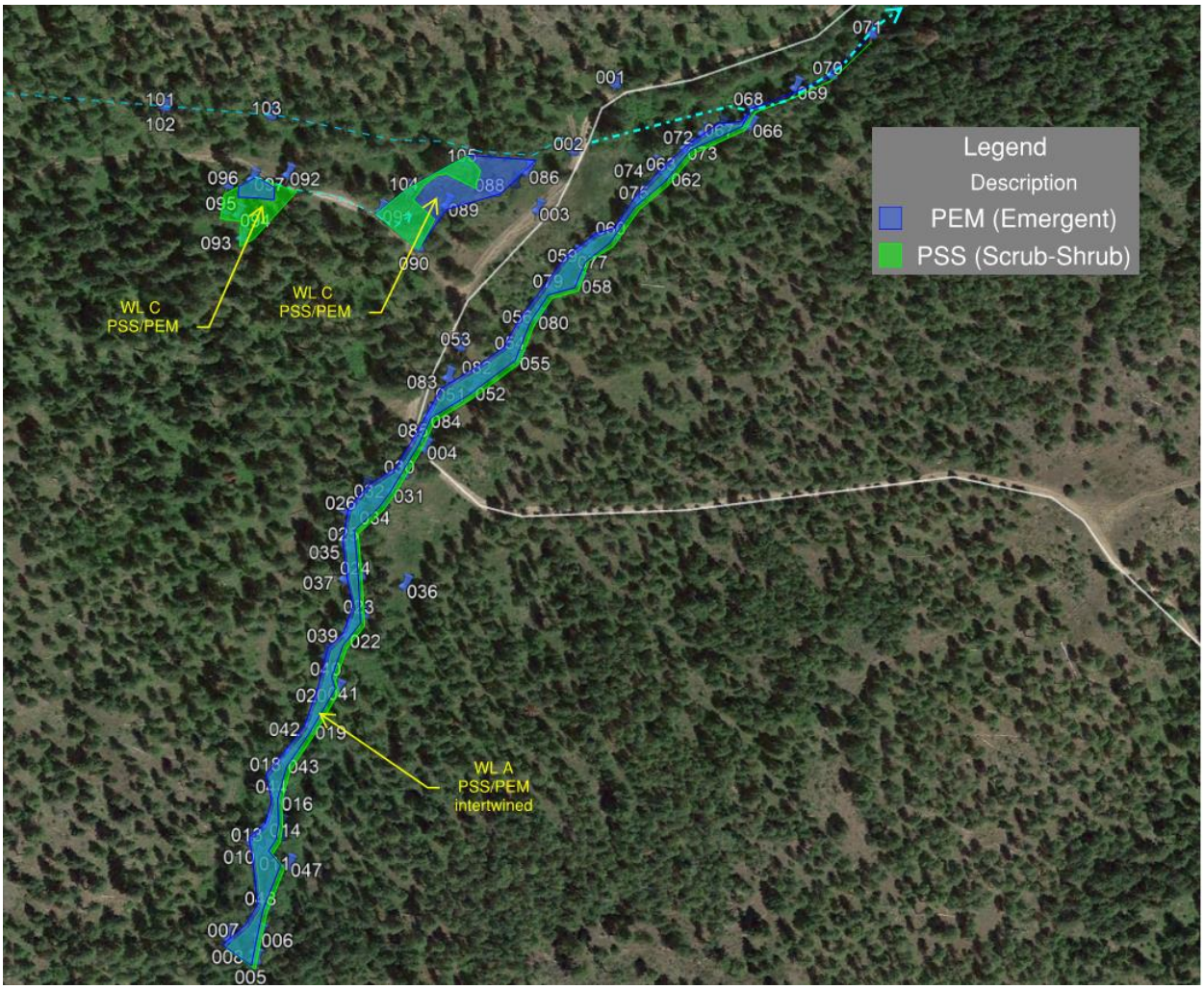


Figure A-32. Cowardin Plant Classes

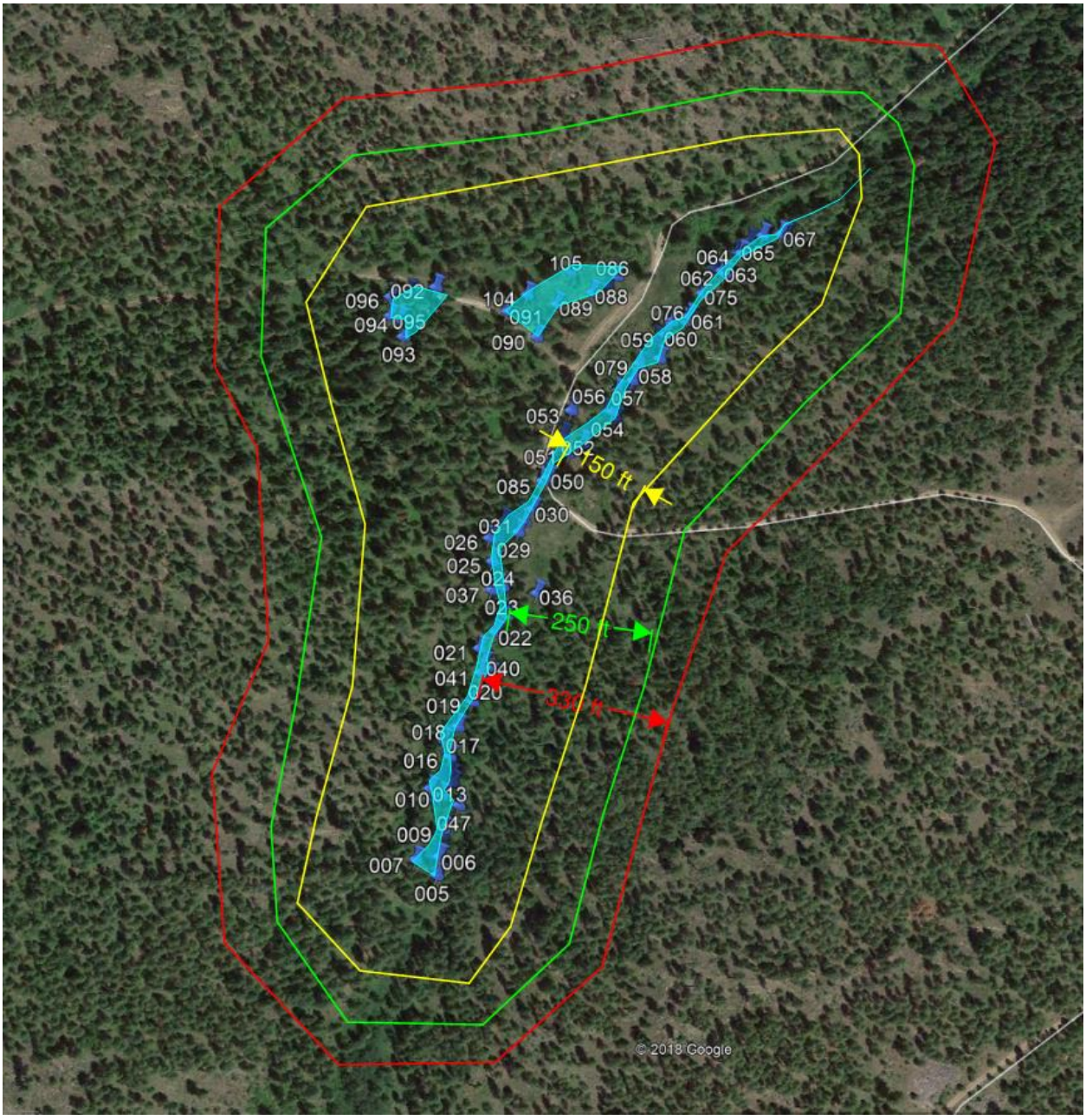


Figure A-33. Areas within 150', 250' and 330' of the wetlands.

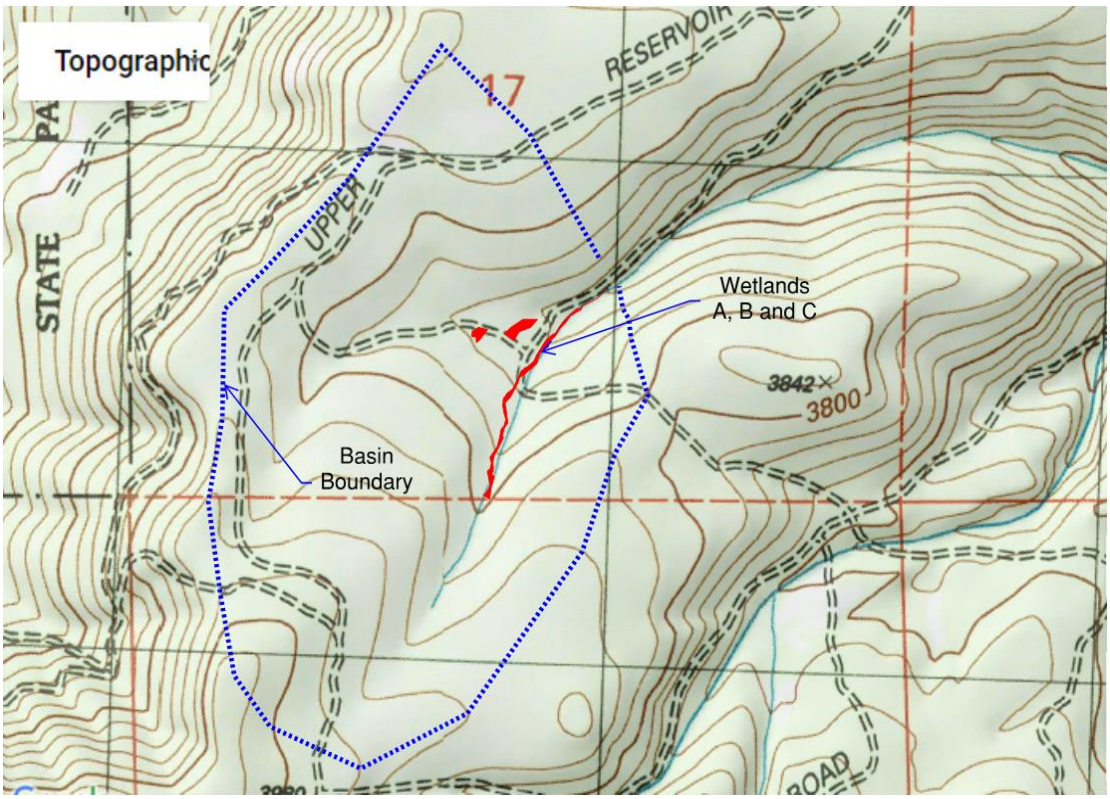


Figure A-34. Map of the Contributing Basin.

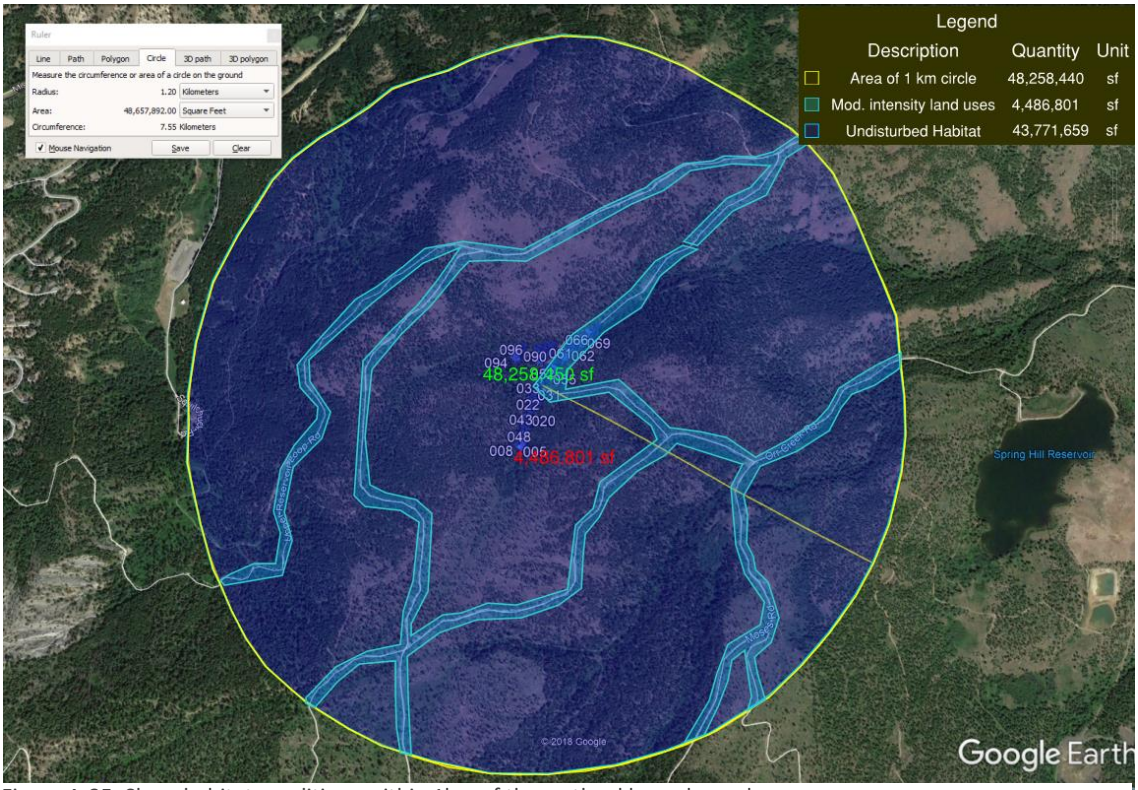


Figure A-35. Show habitat conditions within 1km of the wetland boundary edge.

Figure A-37. Showing project location relative to 303D Waters.

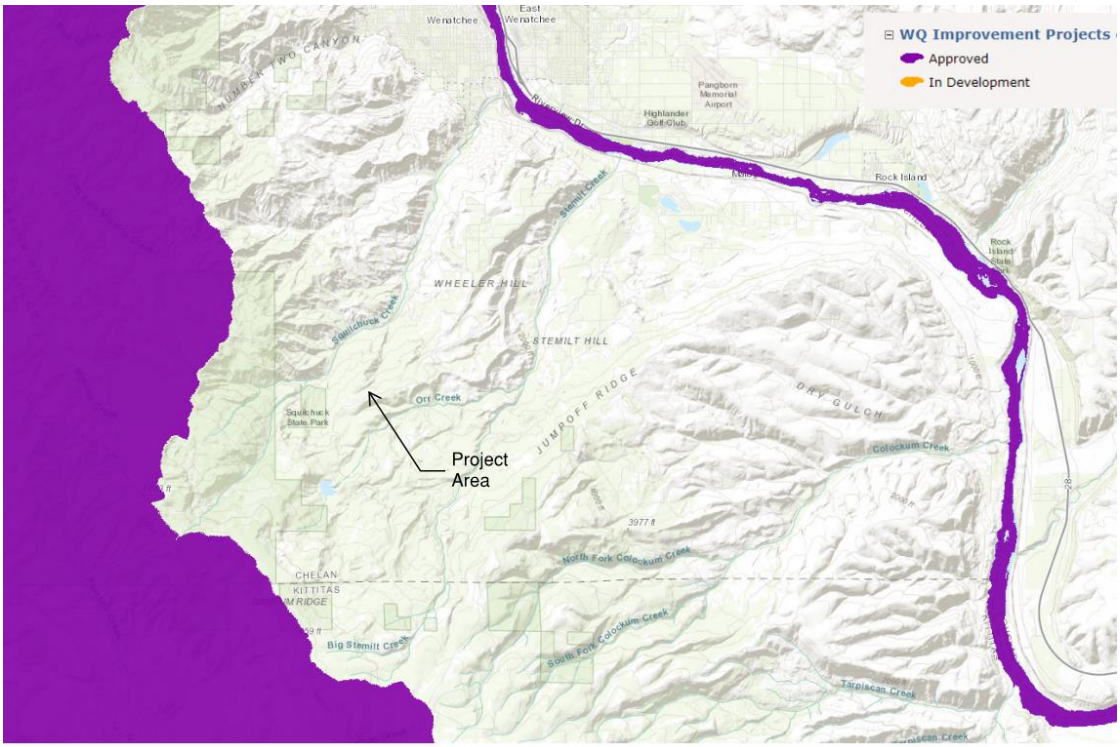


Figure A-36. Showing project location in relation the TMDL studies.

Wetland name or number Wheeler Ridge Wetland A

RATING SUMMARY – Eastern Washington

Name of wetland (or ID #): Wheeler Ridge Wetland A Date of site visit: 5/16/2018

Rated by Lisa Palazzi, PWS, CPSS Trained by Ecology? ☑ Yes ☐ No Date of training 2014

HGM Class used for rating Riverine Wetland has multiple HGM classes? ☑ Y ☐ N

NOTE: **Form is not complete without the figures requested** (*figures can be combined*).
Source of base aerial photo/map Google Earth

OVERALL WETLAND CATEGORY III (based on functions ☑ or special characteristics ☐)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 22-27

_____**Category II** – Total score = 19-21

xx_____**Category III** – Total score = 16-18

_____**Category IV** – Total score = 9-15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	Circle the appropriate ratings			
Site Potential	H **M** L	H **M** L	H **M** L	
Landscape Potential	H **M** L	H **M** L	**H** M L	
Value	H M **L**	H M **L**	**H** M L	**TOTAL**
Score Based on Ratings	5	5	8	18

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY *Circle the appropriate category*
Vernal Pools	**II** **III**
Alkali	**I**
Wetland of High Conservation Value	**I**
Bog and Calcareous Fens	**I**
Old Growth or Mature Forest – slow growing	**I**
Aspen Forest	**I**
Old Growth or Mature Forest – fast growing	**II**
Floodplain forest	**II**
None of the above	

Wetland name or number Wheeler Ridge Wetland A

Maps and figures required to answer questions correctly for Eastern Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	D 1.3, H 1.1, H 1.5	
Hydroperiods (including area of open water for H 1.3)	D 1.4, H 1.2, H 1.3	
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	H 1.1, H 1.5	Page 45
Hydroperiods	H 1.2, H 1.3	NA
Ponded depressions	R 1.1	NA
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	Page 46
Map of the contributing basin	R 2.2, R 2.3, R 5.2	Page 47
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	Page 45
Width of wetland vs. width of stream *(can be added to another figure)*	R 4.1	NA
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	Page 47
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	Page 48
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	R 3.2, R 3.3	Page 48

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	L 1.1, L 4.1, H 1.1, H 1.5	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	H 1.1, H 1.5	
Hydroperiods	H 1.2, H 1.3	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	S 3.3	

Wetland name or number Wheeler Ridge Wetland A

HGM Classification of Wetland in Eastern Washington

For questions 1-4, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-4 apply, and go to Question 5.

1. Does the entire unit **meet both** of the following criteria?
   ☐ The vegetated part of the wetland is on the water side of the Ordinary High Water Mark of a body of permanent open water (without any plants on the surface) that is at least 20 ac (8 ha) in size
   ☐ At least 30% of the open water area is deeper than 10 ft (3 m)

   NO – go to 2 ☑ ☐ **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

2. Does the entire wetland unit **meet all** of the following criteria?
   ☑ The wetland is on a slope (*slope can be very gradual*),
   ☑ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks;
   ☐ The water leaves the wetland **without being impounded**.

   NO - go to 3 ☑ ☐ YES – The wetland class is **Slope**
   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).

3. Does the entire wetland unit **meet all** of the following criteria?
   ☑ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river;
   ☑ The overbank flooding occurs at least once every 10 years.

   NO - go to 4 ☐ ☑ YES – The wetland class is **Riverine**
   NOTE: The Riverine wetland can contain depressions that are filled with water when the river is not flooding.

4. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

   NO – go to 5 ☑ ☐ YES – The wetland class is **Depressional**

5. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-4 APPLY TO DIFFERENT AREAS IN THE WETLAND UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the wetland unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM Class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine (the riverine portion is within the boundary of depression)	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number Wheeler Ridge Wetland A

RIVERINE WETLANDS **Water Quality Functions** - Indicators that the site functions to improve water quality	Points (only 1 score per box)
R 1.0. Does the site have the potential to improve water quality?	
R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event: Depressions cover >1/3 area of wetland points = 6 Depressions cover > 1/10 area of wetland points = 3 Depressions present but cover < 1/10 area of wetland points = 1 No depressions present points = 0	1
R 1.2. Structure of plants in the wetland (areas with >90% cover at person height; **not** Cowardin classes): Forest or shrub > 2/3 the area of the wetland points = 10 Forest or shrub 1/3 – 2/3 area of the wetland points = 5 Ungrazed, herbaceous plants > 2/3 area of wetland points = 5 Ungrazed herbaceous plants 1/3 – 2/3 area of wetland points = 2 Forest, shrub, and ungrazed herbaceous < 1/3 area of wetland points = 0	5
Total for R 1 Add the points in the boxes above	6

Rating of Site Potential If score is: ☐ **12-16 = H** ☑ **6-11 = M** ☐ **0-5 = L** *Record the rating on the first page*

R 2.0. Does the landscape have the potential to support the water quality function of the site?	
R 2.1. Is the wetland within an incorporated city or within its UGA? Yes = 2 No = 0	0
R 2.2. Does the contributing basin include a UGA or incorporated area? Yes = 1 No = 0	0
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? Yes = 1 No = 0	0
R 2.4. Is > 10% of the area within 150 ft of wetland in land uses that generate pollutants Yes = 1 No = 0	1
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4? Source_____ Yes = 1 No = 0	0
Total for R 2 Add the points in the boxes above	1

Rating of Landscape Potential If score is: ☐ **3-6 = H** ☑ **1 or 2 = M** ☐ **0 = L** *Record the rating on the first page*

R 3.0. Is the water quality improvement provided by the site valuable to society?	
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? Yes = 1 No = 0	0
R 3.2. Does the river or stream have TMDL limits for nutrients, toxics, or pathogens? Yes = 1 No = 0	0
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? *Answer YES if there is a TMDL for the drainage in which wetland is found*. Yes = 2 No = 0	0
Total for R 3 Add the points in the boxes above	0

Rating of Value If score is: ☐ **2-4 = H** ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

Wetland name or number Wheeler Ridge Wetland A

RIVERINE WETLANDS **Hydrologic Functions** - Indicators that site functions to reduce flooding and stream erosion	Points (only 1 score per box)
R 4.0. Does the site have the potential to reduce flooding and erosion?	
R 4.1. Characteristics of the overbank storage the wetland provides: *Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).* If the ratio is more than 2 points = 10 If the ratio is 1-2 points = 8 If the ratio is ½-<1 **points = 4** If the ratio is ¼-< ½ points = 2 If the ratio is < ¼ points = 1	4
R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have > 90% cover at person height. These are NOT Cowardin classes).* Forest or shrub for more than $^{2}/_{3}$ the area of the wetland points = 6 Forest or shrub for >$^{1}/_{3}$ area OR emergent plants > $^{2}/_{3}$ area **points = 4** Forest or shrub for > $^{1}/_{10}$ area OR emergent plants > $^{1}/_{3}$ area points = 2 Plants do not meet above criteria points = 0	4
Total for R 5 Add the points in the boxes above	8

Rating of Site Potential If score is ☐ **12-16 = H** ☑ **6-11 = M** ☐ **0-5 = L** *Record the rating on the first page*

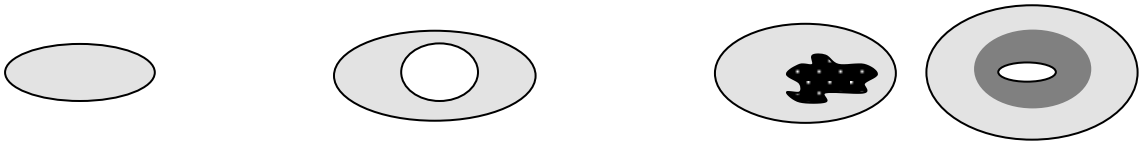
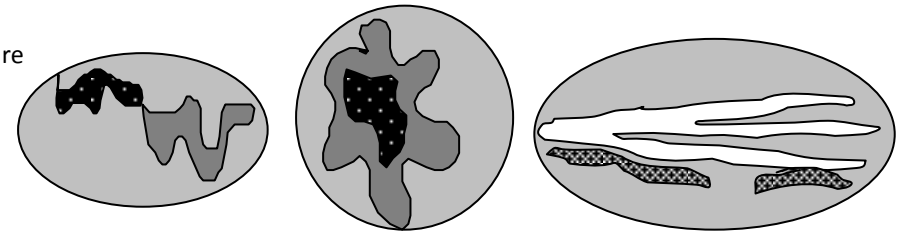
R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?		
R 5.1. Is the stream or river adjacent to the wetland downcut?	Yes = 0 **No = 1**	1
R 5.2. Does the up-gradient watershed include a UGA or incorporated area?	Yes = 1 **No = 0**	0
R 5.3. Is the up-gradient stream or river controlled by dams?	Yes = 0 **No = 1**	1
Total for R 5	Add the points in the boxes above	2

Rating of Landscape Potential If score is ☐ **3 = H** ☑ **1 or 2 = M** ☐ **0 = L** *Record the rating on the first page*

R 6.0. Are the hydrologic functions provided by the site valuable to society?		
R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site.* The sub-basin immediately down-gradient of site has surface flooding problems that result in damage to human or natural resources points = 2 Surface flooding problems are in a basin farther down-gradient points = 1 No flooding problems anywhere downstream **points = 0**		0
R 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan?	Yes = 2 **No = 0**	0
Total for R 6	Add the points in the boxes above	0

Rating of Value If score is: ☐ **2-4 = H** ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

Wetland name or number Wheeler Ridge Wetland A

These questions apply to wetlands of all HGM classes. **HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat	(only 1 score per box)
H 1.0. Does the wetland have the potential to provide habitat for many species?	
H 1.1. Structure of the plant community: *Check the Cowardin vegetation classes present and categories of emergent plants. Size threshold for each category is >= ¼ ac or >= 10% of the wetland if wetland is < 2.5 ac.* ☐ Aquatic bed ☑ Emergent plants 0-12 in (0-30 cm) high are the highest layer and have > 30% cover ☐ Emergent plants >12-40 in (>30-100 cm) high are the highest layer with >30% cover ☐ Emergent plants > 40 in (> 100 cm) high are the highest layer with >30% cover ☑ Scrub-shrub (areas where shrubs have >30% cover) ☐ Forested (areas where trees have >30% cover) 4 or more checks: points = 3 3 checks: points = 2 2 checks: points = 1 1 check: points = 0	2
H 1.2. Is one of the vegetation types Aquatic Bed? Yes = 1 No = 0	0
H 1.3. Surface water H 1.3.1. Does the wetland have areas of open water (without emergent or shrub plants) over at least ¼ ac **OR** 10% of its area during the March to early June **OR** in August to the end of September? ***A**nswer YES for Lake Fringe wetlands*. Yes = 3 points & go to H 1.4 No = go to H 1.3.2 H 1.3.2. Does the wetland have an intermittent or permanent, and unvegetated stream within its boundaries, or along one side, over at least ¼ ac or 10% of its area? *Answer yes only if H 1.3.1 is No*. Yes = 3 No = 0	3
H 1.4. Richness of plant species Count the number of plant species in the wetland that cover at least 10 ft^2. D*ifferent patches of the same species can be combined to meet the size threshold. You do not have to name the species.* *Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Russian olive, Phragmites, Canadian thistle, yellow-flag iris, and saltcedar (Tamarisk)* # of species 15 Scoring: > 9 species: points = 2 4-9 species: points = 1 < 4 species: points = 0	2
H 1.5. Interspersion of habitats Decide from the diagrams below whether interspersion among types of plant structures (described in H 1.1), and unvegetated areas (open water or mudflats) is high, moderate, low, or none. *Use map of Cowardin and emergent plant classes prepared for questions H 1.1 and map of open water from H 1.3. If you have four or more plant classes or three classes and open water, the rating is always high.*  **None** = 0 points **Low** = 1 point **Moderate** = 2 points All three diagrams in this row are **High** = 3 points  Riparian braided channels with 2 classes	Figure__ 2

Wetland name or number Wheeler Ridge Wetland A

H 1.6. Special habitat features *Check the habitat features that are present in the wetland. The number of checks is the number of points.* ☑ Loose rocks larger than 4 in OR large, downed, woody debris (> 4 in diameter) within the area of surface ponding or in stream. ☐ Cattails or bulrushes are present within the wetland. ☐ Standing snags (diameter at the bottom > 4 in) in the wetland or within 30 m (100 ft) of the edge. ☐ Emergent or shrub vegetation in areas that are permanently inundated/ponded. ☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 45 degree slope) OR signs of recent beaver activity ☑ Invasive species cover less than 20% in each stratum of vegetation *(canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)*	2
Total for H 1 — Add the points in the boxes above	11

Rating of Site Potential If score is: ☐ **15-18 = H** ☑ **7-14 = M** ☐ **0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support habitat functions of the site?	
H 2.1. Accessible habitat (only area of habitat abutting wetland). If total accessible habitat is: *Calculate:* % undisturbed habitat 90 + [(% moderate and low intensity land uses)/2] 5 = 95 % > 1/3 (33.3%) of 1 km Polygon — points = 3 20-33% of 1km Polygon — points = 2 10-19% of 1km Polygon — points = 1 <10% of 1km Polygon — points = 0	3
H 2.2. Undisturbed habitat in 1 km Polygon around wetland. *Calculate:* % undisturbed habitat 90 + [(% moderate and low intensity land uses)/2] 5 = 95 % Undisturbed habitat > 50% of Polygon — points = 3 Undisturbed habitat 10 - 50% and in 1-3 patches — points = 2 Undisturbed habitat 10 - 50% and > 3 patches — points = 1 Undisturbed habitat < 10% of Polygon — points = 0	3
H 2.3. Land use intensity in 1 km Polygon: > 50% of Polygon is high intensity land use — points = (- 2) Does not meet criterion above — points = 0	0
H 2.4. The wetland is in an area where annual rainfall is less than 12 in, and its water regime is not influenced by irrigation practices, dams, or water control structures. *Generally, this means outside boundaries of reclamation areas, irrigation districts, or reservoirs* — Yes = 3 No = 0	0
Total for H 2 — Add the points in the boxes above	6

Rating of Landscape Potential If score is: ☑ **4-9 = H** ☐ **1-3 = M** ☐ **< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose the highest score that applies to the wetland being rated* Site meets ANY of the following criteria: — points = 2 — It has 3 or more priority habitats within 100 m (see Appendix B) — It provides habitat for Threatened or Endangered species (any plant or animal on state or federal lists) — It is mapped as a location for an individual WDFW species — It is a Wetland of High Conservation Value as determined by the Department of Natural Resources — It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats within 100 m (see Appendix B) — points = 1 Site does not meet any of the criteria above — points = 0	2

Rating of Value If score is: ☑ **2 = H** ☐ **1 = M** ☐ **0 = L** *Record the rating on the first page*

Wetland name or number Wheeler Ridge Wetland A

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Please determine if the wetland meets the attributes described below and circle the appropriate category. NOTE: A wetland may meet the criteria for more than one set of special characteristics. Record all those that apply. NOTE: All wetlands should also be characterized based on their functions.

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	**Category**
SC 1.0. Vernal pools Is the wetland **less than 4000 ft²**, and does it meet at least **two** of the following criteria? ☐ Its only source of water is rainfall or snowmelt from a small contributing basin and has no groundwater input. ☐ Wetland plants are typically present only in the spring; the summer vegetation is typically upland annuals. *If you find perennial, obligate, wetland plants, the wetland is probably NOT a vernal pool*. ☐ The soil in the wetland is shallow [< 1 ft (30 cm)deep] and is underlain by an impermeable layer such as basalt or clay. ☐ Surface water is present for less than 120 days during the wet season. Yes **–** Go to **SC 1.1** No = **Not a vernal pool** SC 1.1. Is the vernal pool relatively undisturbed in February and March? Yes **–** Go to **SC 1.2** No = **Not a vernal pool with special characteristics**	NA
SC 1.2. Is the vernal pool in an area where there are at least 3 separate aquatic resources within 0.5 mi (other wetlands, rivers, lakes etc.)? Yes = **Category II** No = **Category III**	**Cat. II** **Cat. III**
SC 2.0. Alkali wetlands Does the wetland meet **one** of the following criteria? ☐ The wetland has a conductivity > 3.0 mS/cm. ☐ The wetland has a conductivity between 2.0 and 3.0 mS, and more than 50% of the plant cover in the wetland can be classified as "alkali" species (see Table 4 for list of plants found in alkali systems). ☐ If the wetland is dry at the time of your field visit, the central part of the area is covered with a layer of salt. **OR** does the wetland unit meet two of the following three sub-criteria? ☐ Salt encrustations around more than 75% of the edge of the wetland ☐ More than ⅓ of the plant cover consists of species listed on Table 4 ☐ A pH above 9.0. All alkali wetlands have a high pH, but please note that some freshwater wetlands may also have a high pH. Thus, pH alone is not a good indicator of alkali wetlands. Yes = **Category I** No= **Not an alkali wetland**	**Cat. I**
SC 3.0. Wetlands of High Conservation Value (WHCV) SC 3.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to **SC 3.2** No – Go to **SC 3.3** SC 3.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = **Category I** No = **Not a WHCV** SC 3.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes **– Contact WNHP/WDNR and go to SC 3.4** No = **Not a WHCV** SC 3.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and it is listed on their website? Yes = **Category I** No =**Not a WHCV**	**Cat. I** NA

Wetland name or number Wheeler Ridge Wetland A

SC 4.0 Bogs and Calcareous Fens Does the wetland (or any part of the wetland unit) meet both the criteria for soils and vegetation in bogs or calcareous fens? *Use the key below to identify if the wetland is a bog or calcareous fen.* ***If you answer yes you will still need to rate the wetland based on its functions.*** SC 4.1. Does an area within the wetland have organic soil horizons (i.e., layers of organic soil), either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? *See Appendix C for a field key to identify organic soils*. Yes – Go to **SC 4.3** No – Go to **SC 4.2** SC 4.2. Does an area within the wetland have organic soils, either peats or mucks, that are less than 16 in deep over bedrock or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 4.3** No = **Is not a bog for rating** SC 4.3. Does an area within the wetland have more than 70% cover of mosses at ground level AND at least 30% of the total plant cover consists of species in Table 5? Yes = **Category I bog** No – Go to **SC 4.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 5 are present, the wetland is a bog. SC 4.4. Is an area with peats or mucks forested (> 30% cover) with subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 5 provide more than 30% of the cover under the canopy? Yes = **Category I bog** No – Go to **SC 4.5** SC 4.5. Do the species listed in Table 6 comprise at least 20% of the total plant cover within an area of peats and mucks? Yes = **Is a Calcareous Fen for purpose of rating** No – Go to **SC 4.6** SC 4.6. Do the species listed in Table 6 comprise at least 10% of the total plant cover in an area of peats and mucks, AND one of the two following conditions is met: ☐ Marl deposits [calcium carbonate ($CaCO_3$) precipitate] occur on the soil surface or plant stems ☐ The pH of free water is ≥ 6.8 AND electrical conductivity is ≥ 200 uS/cm at multiple locations within the wetland Yes = **Is a Category I calcareous fen** No = **Is not a calcareous fen**	**Cat. I** **Cat. I**

SC 5.0. Forested Wetlands Does the wetland have an area of forest rooted within its boundary that meets **at least one** of the following three criteria? (*Continue only if you have identified that a forested class is present in question H 1.1*) ☐ The wetland is within the 100 year floodplain of a river or stream ☐ Aspen (*Populus tremuloides*) represents at least 20% of the total cover of woody species ☐ There is at least ¼ ac of trees (even in wetlands smaller than 2.5 ac) that are "mature" or "old-growth" according to the definitions for these priority habitats developed by WDFW *(see definitions in question H3.1)* Yes – Go to **SC 5.1** No = **Not a forested wetland with special characteristics**	
SC 5.1. Does the wetland have a forest canopy where more than 50% of the tree species (by cover) are slow growing native trees (*see Table 7*)? Yes = **Category I** No – Go to **SC 5.2** SC 5.2. Does the wetland have areas where aspen (*Populus tremuloides*) represents at least 20% of the total cover of woody species? Yes = **Category I** No – Go to **SC 5.3** SC 5.3. Does the wetland have at least ¼ acre with a forest canopy where more than 50% of the tree species (by cover) are fast growing species (*see Table 7*)? Yes = **Category II** No – Go to **SC 5.4** SC 5.4. Is the forested component of the wetland within the 100 year floodplain of a river or stream? Yes = **Category II** No = **Not a forested wetland with special characteristics**	**Cat. I** **Cat. I** **Cat. II** **Cat. II**
Category of wetland based on Special Characteristics *Choose the highest rating if wetland falls into several categories* If you answered No for all types, enter "Not Applicable" on Summary Form	

Appendix B: WDFW Priority Habitats in Eastern Washington

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland: ***NOTE:*** *This question is independent of the land use between the wetland and the priority habitat.*

☐ **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

☑ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

☐ **Old-growth/Mature forests:** Old-growth east of Cascade crest – Stands are highly variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. In general, stands will be >150 years of age, with 10 trees/ac (25 trees/ha) that are > 21 in (53 cm) dbh, and 1-3 snags/ac (2.5-7.5 snags/ha) that are > 12-14 in (30-35 cm) diameter. Downed logs may vary from abundant to absent. Canopies may be single or multi-layered. Evidence of human-caused alterations to the stand will be absent or so slight as to not affect the ecosystem's essential structures and functions. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west and 80-160 years old east of the Cascade crest.

☐ **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

☑ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☑ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

☐ **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

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

☑ **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 12 in (30 cm)in eastern Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

☐ **Shrub-steppe:** A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs (see Eastside Steppe for sites with little or no shrub cover).

☐ **Eastside Steppe:** Nonforested vegetation type dominated by broadleaf herbaceous flora (i.e., forbs), perennial bunchgrasses, or a combination of both. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is often the prevailing cover component along with Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa secunda*), rough fescue (*F. campestris*), or needlegrasses (*Achnatherum* spp.).

☐ **Juniper Savannah:** All juniper woodlands.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

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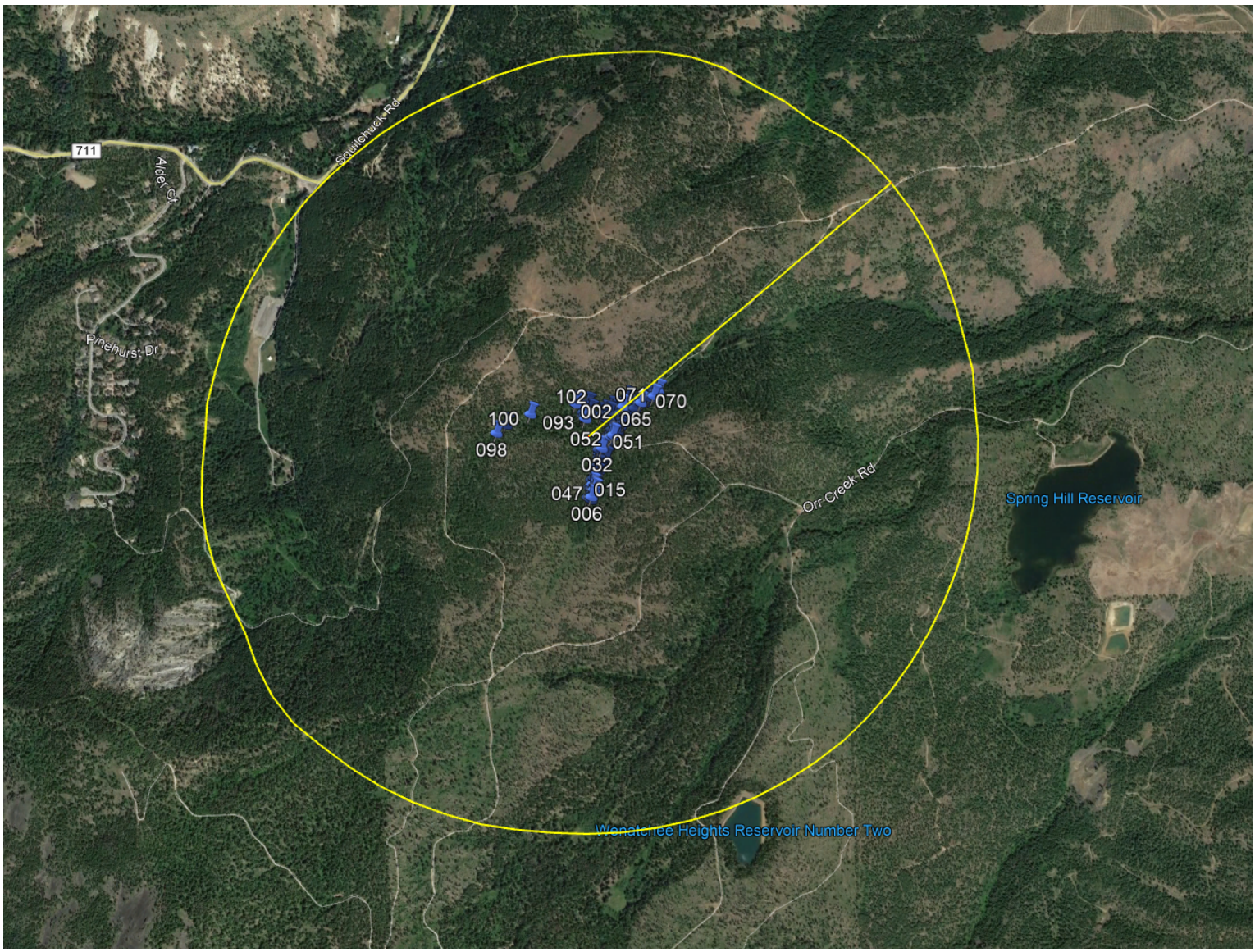

711
Alder Ct
Pinehurst Dr
Squilchuck Rd
102
071
070
100
093
002
065
098
052
051
032
047
015
006
Orr Creek Rd
Spring Hill Reservoir
Wenatchee Heights Reservoir Number Two

Wetland name or number Wheeler Ridge Wetland B and C

RATING SUMMARY – Eastern Washington

Name of wetland (or ID #): Wheeler Ridge Wetland B and C Date of site visit: 5/16/2018

Rated by Lisa Palazzi, PWS, CPSS Trained by Ecology? ☑ Yes ☐ No Date of training 2014

HGM Class used for rating Slope Wetland has multiple HGM classes? ☑ Y ☐ N

NOTE: **Form is not complete without the figures requested** (*figures can be combined*).
Source of base aerial photo/map Google Earth

OVERALL WETLAND CATEGORY III (based on functions ☑ or special characteristics ☐)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 22-27

_____**Category II** – Total score = 19-21

xx_____**Category III** – Total score = 16-18

_____**Category IV** – Total score = 9-15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	Circle the appropriate ratings			
Site Potential	H M **L**	H M **L**	H **M** L	
Landscape Potential	H **M** L	H M **L**	**H** M L	
Value	H M **L**	**H** M L	**H** M L	**TOTAL**
Score Based on Ratings	4	5	8	17

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY *Circle the appropriate category*
Vernal Pools	**II** **III**
Alkali	**I**
Wetland of High Conservation Value	**I**
Bog and Calcareous Fens	**I**
Old Growth or Mature Forest – slow growing	**I**
Aspen Forest	**I**
Old Growth or Mature Forest – fast growing	**II**
Floodplain forest	**II**
None of the above	

Wetland name or number Wheeler Ridge Wetland B and C

Maps and figures required to answer questions correctly for Eastern Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	D 1.3, H 1.1, H 1.5	
Hydroperiods (including area of open water for H 1.3)	D 1.4, H 1.2, H 1.3	
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	H 1.1, H 1.5	
Hydroperiods	H 1.2, H 1.3	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of wetland vs. width of stream *(can be added to another figure)*	R 4.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	L 1.1, L 4.1, H 1.1, H 1.5	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	H 1.1, H 1.5	Page 45
Hydroperiods	H 1.2, H 1.3	NA
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	Page 45
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	NA
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	S 2.1, S 5.1	Page 46
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	Page 47
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	Page 48
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	S 3.3	Page 48

Wetland name or number Wheeler Ridge Wetland B and C

HGM Classification of Wetland in Eastern Washington

For questions 1-4, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-4 apply, and go to Question 5.

1. Does the entire unit **meet both** of the following criteria?
   ☐ The vegetated part of the wetland is on the water side of the Ordinary High Water Mark of a body of permanent open water (without any plants on the surface) that is at least 20 ac (8 ha) in size
   ☐ At least 30% of the open water area is deeper than 10 ft (3 m)

   NO – go to 2 ☑ ☐ **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

2. Does the entire wetland unit **meet all** of the following criteria?
   ☑ The wetland is on a slope (*slope can be very gradual*),
   ☑ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks;
   ☑ The water leaves the wetland **without being impounded**.

   NO - go to 3 ☑ ☐ YES – The wetland class is **Slope**
   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).

3. Does the entire wetland unit **meet all** of the following criteria?
   ☑ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river;
   ☑ The overbank flooding occurs at least once every 10 years.

   NO - go to 4 ☑ ☐ YES – The wetland class is **Riverine**
   NOTE: The Riverine wetland can contain depressions that are filled with water when the river is not flooding.

4. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

   NO – go to 5 ☑ ☐ YES – The wetland class is **Depressional**

5. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-4 APPLY TO DIFFERENT AREAS IN THE WETLAND UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the wetland unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM Class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine (the riverine portion is within the boundary of depression)	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number Wheeler Ridge Wetland B and C

SLOPE WETLANDS **Water Quality Functions** - Indicators that the site functions to improve water quality	Points (only 1 score per box)
S 1.0. Does the site have the potential to improve water quality?	
S 1.1. Characteristics of average slope of wetland: *(a 1% slope has a 1 ft vertical drop in elevation for every 100 ft of horizontal distance*) Slope is 1% or less points = 3 Slope is > 1% - 2% **points = 2** Slope is > 2% - 5% points = 1 Slope is greater than 5% points = 0	2
S 1.2. The soil 2 in below the surface (or duff layer) is true clay or tureorganic *(use NRCS definitions)*: Yes = 3 No = 0	0
S 1.3. Characteristics of the plants in the wetland that trap sediments and pollutants: Choose the points appropriate for the description that best fits the plants in the wetland. *Dense means you have trouble seeing the soil surface (>75% cover), and uncut means not grazed or mowed and plants are higher than 6 in.* Dense, uncut, herbaceous plants > 90% of the wetland area points = 6 Dense, uncut, herbaceous plants > ½ of area **points = 3** Dense, woody, plants > ½ of area points = 2 Dense, uncut, herbaceous plants > ¼ of area points = 1 Does not meet any of the criteria above for plants points = 0	3
Total for S 1 Add the points in the boxes above	5

Rating of Site Potential If score is: ☐ **12 = H** ☐ **6-11 = M** ☑ **0-5 = L** *Record the rating on the first page*

S 2.0. Does the landscape have the potential to support the water quality function at the site?	
S 2.1. Is > 10% of the area within 150 ft on the uphill side of the wetland in land uses that generate pollutants? **Yes = 1** No = 0	1
S 2.2. Are there other sources of pollutants coming into the wetland that are not listed in question S 2.1? Other sources _____ Yes = 1 **No = 0**	0
Total for S 2 Add the points in the boxes above	1

Rating of Landscape Potential If score is: ☑ **1-2 = M** ☐ **0 = L** *Record the rating on the first page*

S 3.0. Is the water quality improvement provided by the site valuable to society?	
S 3.1. Does the wetland discharge directly to a stream, river, or lake that is on the 303(d) list (*within 1 mi*)? Yes = 1 **No = 0**	0
S 3.2. Is the wetland in a basin or sub-basin where water quality is an issue? *At least one aquatic resource in the basin is on the 303(d) list*. Yes = 1 **No = 0**	0
S 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the drainage or basin in which wetland is found*)? Yes = 2 **No = 0**	0
Total for S 3 Add the points in the boxes above	0

Rating of Value If score is: ☐ **2-4 = H** ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

Wetland name or number Wheeler Ridge Wetland B and C

SLOPE WETLANDS **Hydrologic Functions** - Indicators that the site functions to reduce flooding and erosion	Points (only 1 score per box)
S 4.0. Does the site have the potential to reduce flooding and erosion?	
S 4.1. Characteristics of plants that reduce the velocity of surface flows during storms: Choose the points appropriate for the description that best fits conditions in the wetland. *Stems of plants should be thick enough (usually > 1/8 in), or dense enough, to remain erect during surface flows*. Dense, uncut, **rigid** plants cover > 90% of the area of the wetland points = 1 All other conditions points = 0	0

Rating of Site Potential If score is: ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

S 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
S 5.1. Is more than 25% of the area within 150 ft upslope of wetland in land uses that generate excess surface runoff? Yes = 1 No = 0	0

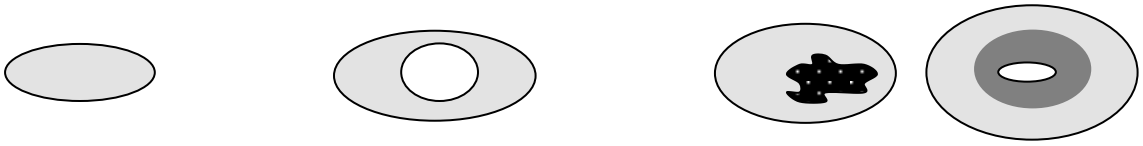
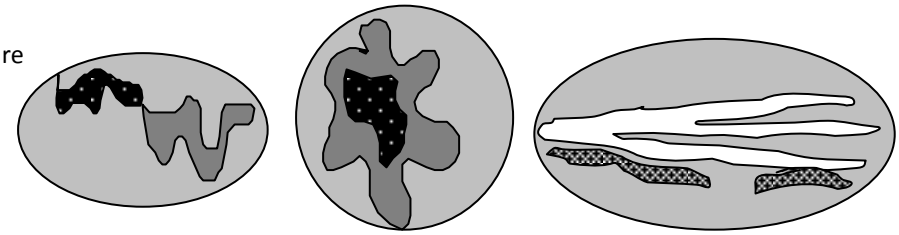
Rating of Landscape Potential If score is: ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

S 6.0. Are the hydrologic functions provided by the site valuable to society?	
S 6.1. Distance to the nearest areas downstream that have flooding problems: The sub-basin immediately down-gradient of site has surface flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 Surface flooding problems are in a sub-basin farther down-gradient points = 1 No flooding problems anywhere downstream points = 0	2
S 6.2. Has the site been identified as important for flood storage and flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for S 6 Add the points in the boxes above	2

Rating of Value If score is: ☑ **2-4 = H** ☐ **1 = M** ☐ **0 = L** *Record the rating on the first page*

NOTES and FIELD OBSERVATIONS:

Wetland name or number Wheeler Ridge Wetland B and C

These questions apply to wetlands of all HGM classes. **HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat	(only 1 score per box)
H 1.0. Does the wetland have the potential to provide habitat for many species?	
H 1.1. Structure of the plant community: *Check the Cowardin vegetation classes present and categories of emergent plants. Size threshold for each category is >= ¼ ac or >= 10% of the wetland if wetland is < 2.5 ac.* ☐ Aquatic bed ☑ Emergent plants 0-12 in (0-30 cm) high are the highest layer and have > 30% cover ☑ Emergent plants >12-40 in (>30-100 cm) high are the highest layer with >30% cover ☐ Emergent plants > 40 in (> 100 cm) high are the highest layer with >30% cover ☑ Scrub-shrub (areas where shrubs have >30% cover) ☐ Forested (areas where trees have >30% cover) 4 or more checks: points = 3 3 checks: points = 2 2 checks: points = 1 1 check: points = 0	2
H 1.2. Is one of the vegetation types Aquatic Bed? Yes = 1 No = 0	0
H 1.3. Surface water H 1.3.1. Does the wetland have areas of open water (without emergent or shrub plants) over at least ¼ ac **OR** 10% of its area during the March to early June **OR** in August to the end of September? ***A**nswer YES for Lake Fringe wetlands*. Yes = 3 points & go to H 1.4 No = go to H 1.3.2 H 1.3.2. Does the wetland have an intermittent or permanent, and unvegetated stream within its boundaries, or along one side, over at least ¼ ac or 10% of its area? *Answer yes only if H 1.3.1 is No*. Yes = 3 No = 0	3
H 1.4. Richness of plant species Count the number of plant species in the wetland that cover at least 10 ft^2. D*ifferent patches of the same species can be combined to meet the size threshold. You do not have to name the species.* *Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Russian olive, Phragmites, Canadian thistle, yellow-flag iris, and saltcedar (Tamarisk)* # of species 15 Scoring: > 9 species: points = 2 4-9 species: points = 1 < 4 species: points = 0	2
H 1.5. Interspersion of habitats Decide from the diagrams below whether interspersion among types of plant structures (described in H 1.1), and unvegetated areas (open water or mudflats) is high, moderate, low, or none. *Use map of Cowardin and emergent plant classes prepared for questions H 1.1 and map of open water from H 1.3. If you have four or more plant classes or three classes and open water, the rating is always high.*  **None** = 0 points **Low** = 1 point **Moderate** = 2 points All three diagrams in this row are **High** = 3 points  Riparian braided channels with 2 classes	Figure__ 2

Wetland name or number Wheeler Ridge Wetland B and C

H 1.6. Special habitat features *Check the habitat features that are present in the wetland. The number of checks is the number of points.* ☐ Loose rocks larger than 4 in OR large, downed, woody debris (> 4 in diameter) within the area of surface ponding or in stream. ☐ Cattails or bulrushes are present within the wetland. ☐ Standing snags (diameter at the bottom > 4 in) in the wetland or within 30 m (100 ft) of the edge. ☐ Emergent or shrub vegetation in areas that are permanently inundated/ponded. ☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 45 degree slope) OR signs of recent beaver activity ☑ Invasive species cover less than 20% in each stratum of vegetation *(canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)*	1
Total for H 1 — Add the points in the boxes above	10

Rating of Site Potential If score is: ☐ **15-18 = H** ☑ **7-14 = M** ☐ **0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support habitat functions of the site?	
H 2.1. Accessible habitat (only area of habitat abutting wetland). If total accessible habitat is: *Calculate:* % undisturbed habitat 90 + [(% moderate and low intensity land uses)/2] 5 = 95 % > 1/3 (33.3%) of 1 km Polygon — points = 3 20-33% of 1km Polygon — points = 2 10-19% of 1km Polygon — points = 1 <10% of 1km Polygon — points = 0	3
H 2.2. Undisturbed habitat in 1 km Polygon around wetland. *Calculate:* % undisturbed habitat 90 + [(% moderate and low intensity land uses)/2] 5 = 95 % Undisturbed habitat > 50% of Polygon — points = 3 Undisturbed habitat 10 - 50% and in 1-3 patches — points = 2 Undisturbed habitat 10 - 50% and > 3 patches — points = 1 Undisturbed habitat < 10% of Polygon — points = 0	3
H 2.3. Land use intensity in 1 km Polygon: > 50% of Polygon is high intensity land use — points = (- 2) Does not meet criterion above — points = 0	0
H 2.4. The wetland is in an area where annual rainfall is less than 12 in, and its water regime is not influenced by irrigation practices, dams, or water control structures. *Generally, this means outside boundaries of reclamation areas, irrigation districts, or reservoirs* — Yes = 3 No = 0	0
Total for H 2 — Add the points in the boxes above	6

Rating of Landscape Potential If score is: ☑ **4-9 = H** ☐ **1-3 = M** ☐ **< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose the highest score that applies to the wetland being rated* Site meets ANY of the following criteria: — points = 2 — It has 3 or more priority habitats within 100 m (see Appendix B) — It provides habitat for Threatened or Endangered species (any plant or animal on state or federal lists) — It is mapped as a location for an individual WDFW species — It is a Wetland of High Conservation Value as determined by the Department of Natural Resources — It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats within 100 m (see Appendix B) — points = 1 Site does not meet any of the criteria above — points = 0	2

Rating of Value If score is: ☑ **2 = H** ☐ **1 = M** ☐ **0 = L** *Record the rating on the first page*

Wetland name or number Wheeler Ridge Wetland B and C

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Please determine if the wetland meets the attributes described below and circle the appropriate category. NOTE: A wetland may meet the criteria for more than one set of special characteristics. Record all those that apply. NOTE: All wetlands should also be characterized based on their functions.

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	**Category**
SC 1.0. Vernal pools Is the wetland **less than 4000 ft²**, and does it meet at least **two** of the following criteria? ☐ Its only source of water is rainfall or snowmelt from a small contributing basin and has no groundwater input. ☐ Wetland plants are typically present only in the spring; the summer vegetation is typically upland annuals. *If you find perennial, obligate, wetland plants, the wetland is probably NOT a vernal pool*. ☐ The soil in the wetland is shallow [< 1 ft (30 cm)deep] and is underlain by an impermeable layer such as basalt or clay. ☐ Surface water is present for less than 120 days during the wet season. Yes **–** Go to **SC 1.1** No = **Not a vernal pool** SC 1.1. Is the vernal pool relatively undisturbed in February and March? Yes **–** Go to **SC 1.2** No = **Not a vernal pool with special characteristics**	NA
SC 1.2. Is the vernal pool in an area where there are at least 3 separate aquatic resources within 0.5 mi (other wetlands, rivers, lakes etc.)? Yes = **Category II** No = **Category III**	**Cat. II** **Cat. III**
SC 2.0. Alkali wetlands Does the wetland meet **one** of the following criteria? ☐ The wetland has a conductivity > 3.0 mS/cm. ☐ The wetland has a conductivity between 2.0 and 3.0 mS, and more than 50% of the plant cover in the wetland can be classified as "alkali" species (see Table 4 for list of plants found in alkali systems). ☐ If the wetland is dry at the time of your field visit, the central part of the area is covered with a layer of salt. **OR** does the wetland unit meet two of the following three sub-criteria? ☐ Salt encrustations around more than 75% of the edge of the wetland ☐ More than ¾ of the plant cover consists of species listed on Table 4 ☐ A pH above 9.0. All alkali wetlands have a high pH, but please note that some freshwater wetlands may also have a high pH. Thus, pH alone is not a good indicator of alkali wetlands. Yes = **Category I** No= **Not an alkali wetland**	**Cat. I**
SC 3.0. Wetlands of High Conservation Value (WHCV) SC 3.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to **SC 3.2** No – Go to **SC 3.3** SC 3.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = **Category I** No = **Not a WHCV** SC 3.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes **– Contact WNHP/WDNR and go to SC 3.4** No = **Not a WHCV** SC 3.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and it is listed on their website? Yes = **Category I** No =**Not a WHCV**	**Cat. I** NA

SC 4.0 Bogs and Calcareous Fens Does the wetland (or any part of the wetland unit) meet both the criteria for soils and vegetation in bogs or calcareous fens? *Use the key below to identify if the wetland is a bog or calcareous fen.* ***If you answer yes you will still need to rate the wetland based on its functions.*** SC 4.1. Does an area within the wetland have organic soil horizons (i.e., layers of organic soil), either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? *See Appendix C for a field key to identify organic soils*. Yes – Go to **SC 4.3** No – Go to **SC 4.2** SC 4.2. Does an area within the wetland have organic soils, either peats or mucks, that are less than 16 in deep over bedrock or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 4.3** No = **Is not a bog for rating** SC 4.3. Does an area within the wetland have more than 70% cover of mosses at ground level AND at least 30% of the total plant cover consists of species in Table 5? Yes = **Category I bog** No – Go to **SC 4.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 5 are present, the wetland is a bog. SC 4.4. Is an area with peats or mucks forested (> 30% cover) with subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 5 provide more than 30% of the cover under the canopy? Yes = **Category I bog** No – Go to **SC 4.5** SC 4.5. Do the species listed in Table 6 comprise at least 20% of the total plant cover within an area of peats and mucks? Yes = **Is a Calcareous Fen for purpose of rating** No – Go to **SC 4.6** SC 4.6. Do the species listed in Table 6 comprise at least 10% of the total plant cover in an area of peats and mucks, AND one of the two following conditions is met: ☐ Marl deposits [calcium carbonate ($CaCO_3$) precipitate] occur on the soil surface or plant stems ☐ The pH of free water is ≥ 6.8 AND electrical conductivity is ≥ 200 uS/cm at multiple locations within the wetland Yes = **Is a Category I calcareous fen** No = **Is not a calcareous fen**	**Cat. I** **Cat. I**

SC 5.0. Forested Wetlands Does the wetland have an area of forest rooted within its boundary that meets **at least one** of the following three criteria? (*Continue only if you have identified that a forested class is present in question H 1.1*) ☐ The wetland is within the 100 year floodplain of a river or stream ☐ Aspen (*Populus tremuloides*) represents at least 20% of the total cover of woody species ☐ There is at least ¼ ac of trees (even in wetlands smaller than 2.5 ac) that are "mature" or "old-growth" according to the definitions for these priority habitats developed by WDFW *(see definitions in question H3.1)* Yes – Go to **SC 5.1** No = **Not a forested wetland with special characteristics**	
SC 5.1. Does the wetland have a forest canopy where more than 50% of the tree species (by cover) are slow growing native trees (*see Table 7*)? Yes = **Category I** No – Go to **SC 5.2** SC 5.2. Does the wetland have areas where aspen (*Populus tremuloides*) represents at least 20% of the total cover of woody species? Yes = **Category I** No – Go to **SC 5.3** SC 5.3. Does the wetland have at least ¼ acre with a forest canopy where more than 50% of the tree species (by cover) are fast growing species (*see Table 7*)? Yes = **Category II** No – Go to **SC 5.4** SC 5.4. Is the forested component of the wetland within the 100 year floodplain of a river or stream? Yes = **Category II** No = **Not a forested wetland with special characteristics**	**Cat. I** **Cat. I** **Cat. II** **Cat. II**
Category of wetland based on Special Characteristics *Choose the highest rating if wetland falls into several categories* If you answered No for all types, enter "Not Applicable" on Summary Form	

Appendix B: WDFW Priority Habitats in Eastern Washington

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland: ***NOTE:*** *This question is independent of the land use between the wetland and the priority habitat.*

☐ **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

☑ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

☐ **Old-growth/Mature forests:** Old-growth east of Cascade crest – Stands are highly variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. In general, stands will be >150 years of age, with 10 trees/ac (25 trees/ha) that are > 21 in (53 cm) dbh, and 1-3 snags/ac (2.5-7.5 snags/ha) that are > 12-14 in (30-35 cm) diameter. Downed logs may vary from abundant to absent. Canopies may be single or multi-layered. Evidence of human-caused alterations to the stand will be absent or so slight as to not affect the ecosystem's essential structures and functions. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west and 80-160 years old east of the Cascade crest.

☐ **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

☑ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

☑ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

☐ **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

☐ **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

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

☑ **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 12 in (30 cm)in eastern Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

☐ **Shrub-steppe:** A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs (see Eastside Steppe for sites with little or no shrub cover).

☐ **Eastside Steppe:** Nonforested vegetation type dominated by broadleaf herbaceous flora (i.e., forbs), perennial bunchgrasses, or a combination of both. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is often the prevailing cover component along with Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa secunda*), rough fescue (*F. campestris*), or needlegrasses (*Achnatherum* spp.).

☐ **Juniper Savannah:** All juniper woodlands.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

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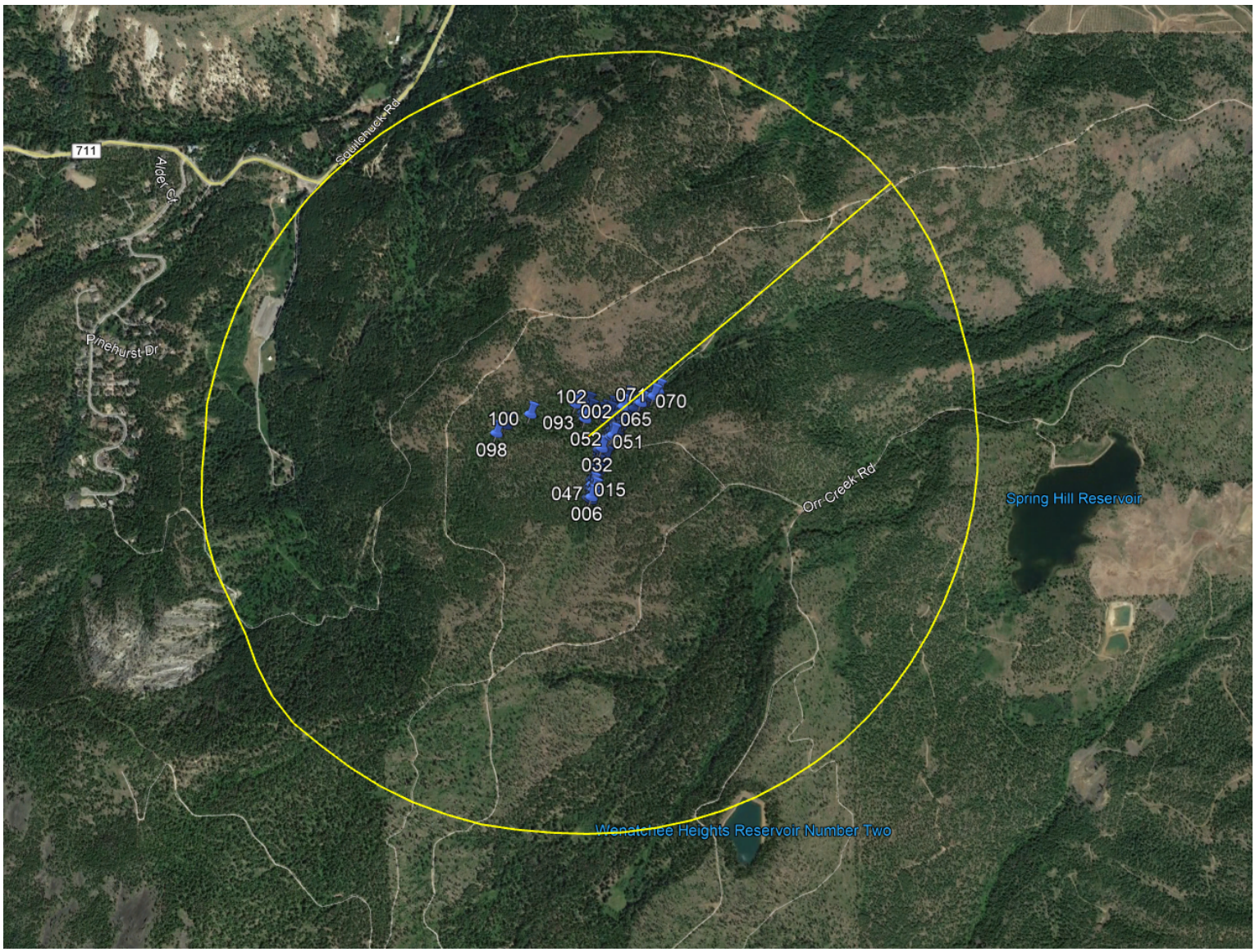
711
Alder Ct
Pinehurst Dr
Squilchuck Rd
102
071
070
100
093
002
065
098
052
051
032
047
015
006
Orr Creek Rd
Spring Hill Reservoir
Wenatchee Heights Reservoir Number Two

APPENDIX C

Field Data Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Wheeler Ridge Wetland A City/County: Chelan County near Wenatchee, WA Sampling Date: 05/16/2018

Applicant/Owner: Wheeler Ridge LLC State: WA Sampling Point: WL-A-006

Investigator(s): Lisa Palazzi, CPSS, PWS Section, Township, Range: Section 17, Township 21N, Range 20E

Landform (hillslope, terrace, etc.): Depression, Stream sideslope Local relief (concave, convex, none): Convex Slope (%): 2-5%

Subregion (LRR): LRR B Lat: 47deg 18' 35.77" N Long: 120deg 21' 57.95" W Datum: _____

Soil Map Unit Name: Stemilt Silt Loam, 0-25% slopes NWI classification: PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes XX No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes XX No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes XX No _____	**Is the Sampled Area within a Wetland?** Yes XX No _____
Hydric Soil Present?	Yes XX No _____	
Wetland Hydrology Present?	Yes XX No _____	

Remarks:
Spring growing season -- hydrology still present but waning

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Red Alder	15%	Y	FAC
2. Quaking aspen	20%	Y	FACU
3.			
4.			
	35	= Total Cover	
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. Cluster rose (Rosa pisocarpa)	25%	Y	FAC
2. Serviceberry (Amelanchier alnifolia)	10%	N	FACU
3. Twinberry (Lonicera involucrata)	15%	N	FAC
4. Red osier dogwood (Cornus sericea)	25%	Y	FACW
5. Wild crabapple (Malus fusca)	15%	N	FAC
	90	= Total Cover	
Herb Stratum (Plot size: 30 ft)			
1. water parsley (Oenanthe_sarmentosa)	20%	N	OBL
2. columbine (Aquilegia formosa)	20%	N	FAC
3. wild iris (blue) (Iris missouriensis)	25%	Y	FACW
4. sedge spp (Carex spp)	25%	Y	FAC (avg)
5. colts foot (Petasites frigidus)	25%	Y	FACW
6. horsetail (Equisetum hyemale)	20%	N	FACW
7. spikerush (Eleocharis palustris)	20%	N	OBL
8. Yellow iris (Iris pseudacorus)	15%	N	OBL
	170	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	55	x 1 =	55
FACW species	95	x 2 =	190
FAC species	115	x 3 =	345
FACU species	35	x 4 =	140
UPL species		x 5 =	
Column Totals:	300 (A)		730 (B)

Prevalence Index = B/A = 2.43

Hydrophytic Vegetation Indicators:

- ✔ Dominance Test is >50%
- ✔ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes XX No _____

Remarks:
Plants are actively growing; appears to be at least 1-2 months into the growing season

SOIL

Sampling Point: WL WP 006

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR2/1	100	NA				GrSL	
6-18	10YR4/3	75	10YR 4/6	15	C	M	GrSL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☑ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** XX **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☑ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☑ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes XX No _____ Depth (inches): 1"

Water Table Present? Yes XX No _____ Depth (inches): 5"

Saturation Present? (includes capillary fringe) Yes XX No _____ Depth (inches): 5"

Wetland Hydrology Present? **Yes** XX **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface water right by stream; farther away, subsurface only

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Wheeler Ridge Wetland A City/County: Chelan County near Wenatchee, WA Sampling Date: 05/16/2018

Applicant/Owner: Wheeler Ridge LLC State: WA Sampling Point: WL-A-007

Investigator(s): Lisa Palazzi, COSs, PWS Section, Township, Range: Section 17, Township 21N, Range 20E

Landform (hillslope, terrace, etc.): Depression, Stream swale s Local relief (concave, convex, none): Convex Slope (%): 2-5%

Subregion (LRR): LRR B Lat: 47deg 18' 35.77" N Long: 120deg 21' 57.95" W Datum: _____

Soil Map Unit Name: Stemilt Silt Loam, 0-25% slopes NWI classification: PSS (downslope from this point)

Are climatic / hydrologic conditions on the site typical for this time of year? Yes XX No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes XX No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No XX	**Is the Sampled Area within a Wetland?** Yes _____ No XX
Hydric Soil Present?	Yes _____	No XX	
Wetland Hydrology Present?	Yes _____	No XX	

Remarks:
Spring growing season -- hydrology still present but waning

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Red Alder (Alnus rubra)	25%	Y	FAC
2. Quaking aspen (Populus tremuloides)	25%	Y	FACU
3. Ponderosa pine (Pinus ponderosa)	20	Y	FACU
4. Douglas-fir (Pseudotsuga menziesii)	15	N	FACU
	85	= Total Cover	
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. Cluster rose (Rosa pisocarpa)	30%	Y	FAC
2. Oceanspray (Holodiscus discolor)	25%	Y	FACU
3. Snowberry (Symphoricarpos albus)	25%	Y	FACU
4. Oregon grape (Mahonia nervosa)	20%	N	FACU
5. Bitterbrush (Purshia tridentata)	10%	N	NI
	110	= Total Cover	
Herb Stratum (Plot size: 30 ft)			
1. Yarrow (Achillea millefolium)	20%	N	FACU
2. Columbine (Aquilegia formosa)	20%	N	FAC
3. Arrowleaf balsamroot (Balsamorhiza sagittata)	25%	Y	NI
4. Violet (Viola howellii)	25%	Y	NI
5. Bleeding heart (Dicentra formosa)	15%	N	FACU
6. Dusty miller (Senecio cineraria)	10%	N	NI
7. Lupine (Lupinus arbustus)	15%	N	NI
8. Smooth Solomon seal (Polygonatum biflorum)	15%	N	FACU
	130	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	75	x 3 =	225
FACU species	130	x 4 =	520
UPL species		x 5 =	
Column Totals:	205 (A)		745 (B)

Prevalence Index = B/A = 3.63

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No XX

Remarks:

SOIL

Sampling Point: UL -- WP 007

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR2/1	100	NA				GrSL	
8-16	10YR4/3	100	NA				GrSL	no redox features

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ **No** XX

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No XX Depth (inches): _____

Water Table Present? Yes _____ No XX Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No XX Depth (inches): _____

Wetland Hydrology Present? Yes _____ **No** XX

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Shallow water by stream only; this site is farther upslope

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Wheeler Ridge Wetland B City/County: Chelan County near Wenatchee, WA Sampling Date: 05/16/2018

Applicant/Owner: Wheeler Ridge LLC State: WA Sampling Point: WL-A-087

Investigator(s): Lisa Palazzi, CPSS, PWS Section, Township, Range: Section 17, Township 21N, Range 20E

Landform (hillslope, terrace, etc.): Depression, Stream sideslope Local relief (concave, convex, none): Convex Slope (%): 2-5%

Subregion (LRR): LRR B Lat: 47deg 18' 35.77" N Long: 120deg 21' 57.95" W Datum: _____

Soil Map Unit Name: Stemilt Silt Loam, 0-25% slopes NWI classification: PSS/ PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes XX No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes XX No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes XX	No _____	**Is the Sampled Area within a Wetland?** Yes XX No _____
Hydric Soil Present?	Yes XX	No _____	
Wetland Hydrology Present?	Yes XX	No _____	

Remarks:
Spring growing season -- hydrology still present but less than waning

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Red Alder	15%	Y	FAC
2. Quaking aspen	15%	Y	FACU
3.			
4.			
	30	= Total Cover	
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. Cluster rose (Rosa pisocarpa)	30%	Y	FAC
2. Wild crabapple (Malus fusca)	25%	Y	FAC
3. Twinberry (Lonicera involucrata)	30%	Y	FAC
4. Red osier dogwood (Cornus sericea)	10%	N	FACW
5.			
	95	= Total Cover	
Herb Stratum (Plot size: 30 ft)			
1. Moss (Oligotrichum aligerum)	25%	N	NI
2. False lily of the valley (Maianthemum dilatatum)	35%	Y	FAC
3. wild iris (blue) (Iris missouriensis)	25%	N	FACW
4. sedge spp (Carex spp)	35%	Y	FAC (avg)
5. colts foot (Petasites frigidus)	25%	N	FACW
6. horsetail (Equisetum hyemale)	15%	N	FACW
7.			
8.			
	150	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	180	x 3 =	540
FACU species	15	x 4 =	60
UPL species		x 5 =	
Column Totals:	310270 (A)		750 (B)

Prevalence Index = B/A = 2.77

Hydrophytic Vegetation Indicators:

- ✔ Dominance Test is >50%
- ✔ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes XX No _____

Remarks:
Plants are actively growing; appears to be at least 1-2 months into the growing season.

SOIL

Sampling Point: WL WP 087

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR2/1	100	NA				GrSL	
6-18	10YR4/3	75	10YR 4/6	15	C	M	GrSL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☑ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** XX **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☑ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☑ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes XX No _____ Depth (inches): 1"

Water Table Present? Yes XX No _____ Depth (inches): 5"

Saturation Present? (includes capillary fringe) Yes XX No _____ Depth (inches): 5"

Wetland Hydrology Present? **Yes** XX **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Saturated soils draining N to stream system

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Wheeler Ridge Wetland B City/County: Chelan County near Wenatchee, WA Sampling Date: 05/16/2018

Applicant/Owner: Wheeler Ridge LLC State: WA Sampling Point: WL-B-105

Investigator(s): Lisa Palazzi, CPSS, PWS Section, Township, Range: Section 17, Township 21N, Range 20E

Landform (hillslope, terrace, etc.): Slope by Ns Stream Local relief (concave, convex, none): Convex Slope (%): 2-5%

Subregion (LRR): LRR B Lat: 47deg 18' 35.77" N Long: 120deg 21' 57.95" W Datum: _____

Soil Map Unit Name: Stemilt Silt Loam, 0-25% slopes NWI classification: PSS/PEM (downslope from this point)

Are climatic / hydrologic conditions on the site typical for this time of year? Yes XX No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes XX No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No XX	**Is the Sampled Area within a Wetland?** Yes _____ No XX
Hydric Soil Present?	Yes _____	No XX	
Wetland Hydrology Present?	Yes _____	No XX	

Remarks:
Spring growing season

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ponderosa pine (Pinus ponderosa)	45	Y	FACU
2. Quaking aspen (Populus tremuloides)	15	Y	FACU
3.			
4.			
	60	= Total Cover	
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. Cluster rose (Rosa pisocarpa)	30%	Y	FAC
2. Oceanspray (Holodiscus discolor)	15%	N	FACU
3. Snowberry (Symphoricarpos albus)	45%	Y	FACU
4. Oregon grape (Mahonia nervosa)	10%	N	FACU
5. Serviceberry (Amelanchier alnifolia)	20%	Y	FACU
	100	= Total Cover	
Herb Stratum (Plot size: 30 ft)			
1. Yarrow (Achillea millefolium)	20%	N	FACU
2. Columbine (Aquilegia formosa)	20%	N	FAC
3. Pasture grasses	50%	Y	FAC (avg)
4. Violet (Viola howellii)	15%	Y	NI
5. Bleeding heart (Dicentra formosa)	15%	N	FACU
6. Lupine (Lupinus arbustus)	T	N	NI
7.			
8.			
	120	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 28% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	100	x 3 =	300
FACU species	140	x 4 =	560
UPL species		x 5 =	
Column Totals:	240 (A)		860 (B)

Prevalence Index = B/A = 3.58

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No XX

Remarks:

SOIL

Sampling Point: UL -- WP 105

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR3/2	100	NA				GrSL	
8-16	10YR4/3	100	NA				GrSL	no redox features

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ **No** XX

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No XX Depth (inches): _____

Water Table Present? Yes _____ No XX Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No XX Depth (inches): _____

Wetland Hydrology Present? Yes _____ **No** XX

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

This site is about 1-2 feet higher in elevation that wetland area

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Wheeler Ridge Wetland C City/County: Chelan County near Wenatchee, WA Sampling Date: 05/16/2018

Applicant/Owner: Wheeler Ridge LLC State: WA Sampling Point: WL-A-094

Investigator(s): Lisa Palazzi, CPSS, PWS Section, Township, Range: Section 17, Township 21N, Range 20E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Convex Slope (%): 2-5%

Subregion (LRR): LRR B Lat: 47deg 18' 35.77" N Long: 120deg 21' 57.95" W Datum: _____

Soil Map Unit Name: Stemilt Silt Loam, 0-25% slopes NWI classification: PSS/ PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes XX No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes XX No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes XX No _____	**Is the Sampled Area within a Wetland?** Yes XX No _____
Hydric Soil Present?	Yes XX No _____	
Wetland Hydrology Present?	Yes XX No _____	

Remarks:
Spring growing season -- hydrology still present but waning

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Red Alder	35%	Y	FAC
2. Quaking aspen	15%	Y	FACU
3.			
4.			
	50	= Total Cover	
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. Cluster rose (Rosa pisocarpa)	35%	Y	FAC
2. Wild crabapple (Malus fusca)	25%	Y	FAC
3. Twinberry (Lonicera involucrata)	25%	Y	FAC
4. Red osier dogwood (Cornus sericea)	15%	N	FACW
5.			
	100	= Total Cover	
Herb Stratum (Plot size: 30 ft)			
1. Moss (Oligotrichum aligerum)	50%	Y	NI
2. False lily of the valley (Maianthemum dilatatum)	35%	N	FAC
3. wild iris (blue) (Iris missouriensis)	45%	Y	FACW
4. sedge spp (Carex spp)	35%	N	FAC (avg)
5. colts foot (Petasites frigidus)	25%	N	FACW
6. horsetail (Equisetum hyemale)	20%	N	FACW
7. Small-fruited bulrush (Scirpus microcarpus)	20	N	OBL
8.			
	230	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	_____	= Total Cover	

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	105	x 2 =	210
FAC species	190	x 3 =	570
FACU species	15	x 4 =	60
UPL species		x 5 =	
Column Totals:	310 (A)		840 (B)

Prevalence Index = B/A = 2.71

Hydrophytic Vegetation Indicators:

- ☑ Dominance Test is >50%
- ☑ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes XX No _____

Remarks:
Plants are actively growing; appears to be at least 1-2 months into the growing season.

SOIL

Sampling Point: WL WP 094

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR2/1	100	NA				Mucky SL	Mucky mineral
6-18	10YR43/2	60	10YR 4/6	25	C	M	Mucky SL	Mucky mineral

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☑ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** XX **No** _____

Remarks:

This system almost meets Black Histic Indicator requirements

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes XX No _____ Depth (inches): 0.5

Water Table Present? Yes XX No _____ Depth (inches): 1

Saturation Present? (includes capillary fringe) Yes XX No _____ Depth (inches): 1

Wetland Hydrology Present? **Yes** XX **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Seeping from upslope toward road

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Wheeler Ridge Wetland C City/County: Chelan County near Wenatchee, WA Sampling Date: 05/16/2018

Applicant/Owner: Wheeler Ridge LLC State: WA Sampling Point: WL-C-093

Investigator(s): Lisa Palazzi, CPSS, PWS Section, Township, Range: Section 17, Township 21N, Range 20E

Landform (hillslope, terrace, etc.): Slope by Ns Stream Local relief (concave, convex, none): Convex Slope (%): 2-5%

Subregion (LRR): LRR B Lat: 47deg 18' 35.77" N Long: 120deg 21' 57.95" W Datum: _____

Soil Map Unit Name: Stemilt Silt Loam, 0-25% slopes NWI classification: PSS/PEM (downslope from this point)

Are climatic / hydrologic conditions on the site typical for this time of year? Yes XX No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes XX No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No XX	**Is the Sampled Area within a Wetland?** Yes _____ No XX
Hydric Soil Present?	Yes _____	No XX	
Wetland Hydrology Present?	Yes _____	No XX	

Remarks:
Spring growing season

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ponderosa pine (Pinus ponderosa)	55	Y	FACU
2. Quaking aspen (Populus tremuloides)	25	Y	FACU
3. Douglas-fir (Pseudotsuga menziesiii)	15	N	FACU
4.			
	90	= Total Cover	
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. Cluster rose (Rosa pisocarpa)	30%	Y	FAC
2. Oceanspray (Holodiscus discolor)	15%	N	FACU
3. Snowberry (Symphoricarpos albus)	45%	Y	FACU
4. Serviceberry (Amelanchier alnifolia)	10%	N	FACU
5.			
	100	= Total Cover	
Herb Stratum (Plot size: 30 ft)			
1. Pasture grasses	30%	Y	FAC (avg)
2. Columbine (Aquilegia formosa)	15%	N	FAC
3. Yarrow (Achillea millefolium)	15%	Y	FACU
4. Violet (Viola howellii)	25%	Y	NI
5. Bleeding heart (Dicentra formosa)	20%	N	FACU
6.			
7.			
8.			
	105	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	_____	= Total Cover	

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 28% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	75	x 3 =	225
FACU species	200	x 4 =	800
UPL species		x 5 =	
Column Totals:	275 (A)		1025 (B)

Prevalence Index = B/A = 3.72

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No XX

Remarks:

SOIL

Sampling Point: UL -- WP 093

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR2/2	100	NA				GrSL	
8-16	10YR4/4	100	NA				GrSL	no redox features

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ **No** XX

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No XX Depth (inches): _____

Water Table Present? Yes _____ No XX Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No XX Depth (inches): _____

Wetland Hydrology Present? Yes _____ **No** XX

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

This site is about 1-2 feet higher in elevation than wetland area