Attachment E. Draft for EQC: Use Attainability Analysis for Aquatic Life Use Designations

By: Aron Borok, Water Quality Standards and Assessments

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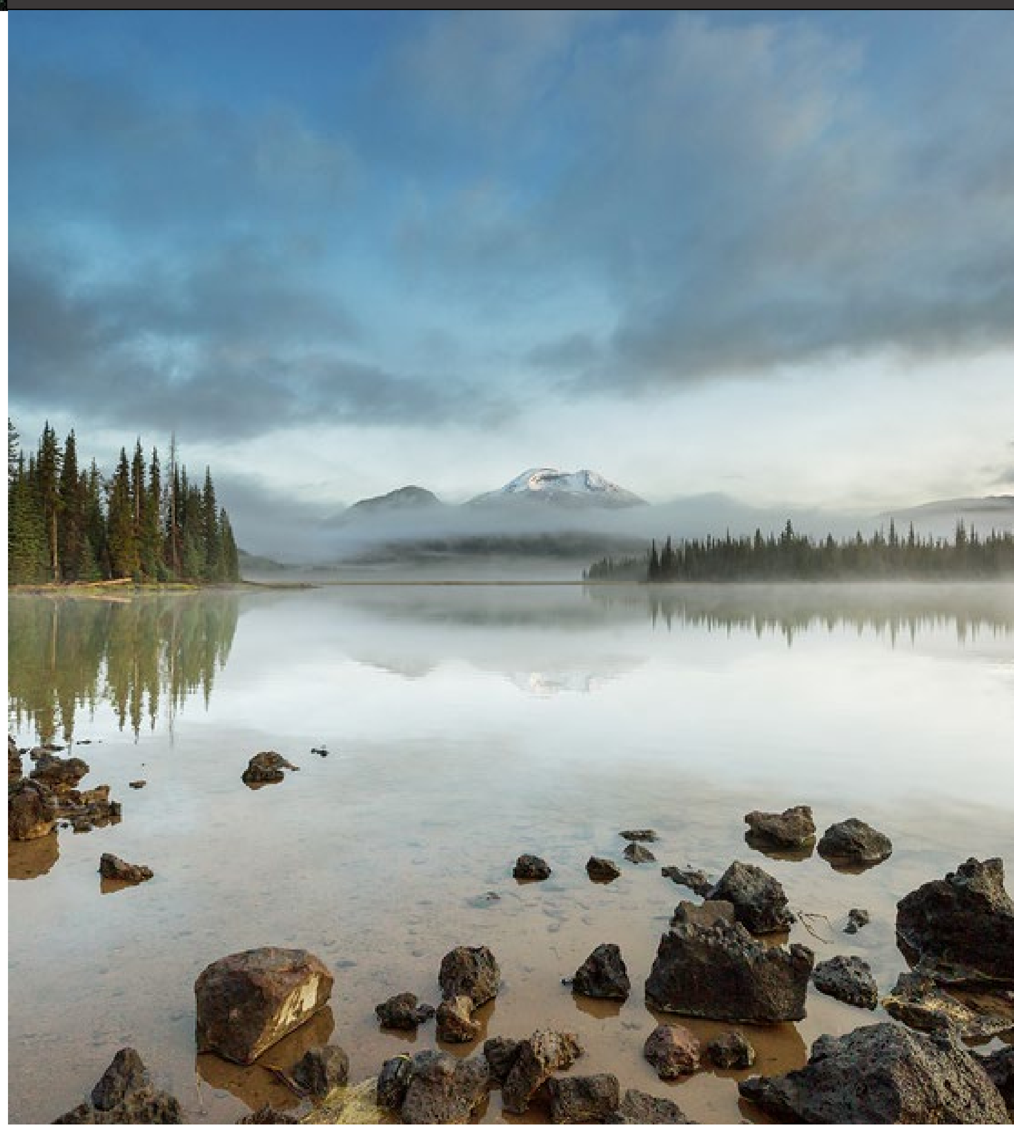

State of Oregon
DEQ Department of Environmental Quality

This document was prepared by
Oregon Department of Environmental Quality
Water Quality Standards and Assessments
700 NE Multnomah Street, Suite 600
Portland Oregon, 97232

Contact: Aron Borok
Phone: 503-229-5050
www.oregon.gov/deq

State of Oregon
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800-452-4011 | TTY: 711 | deqinfo@deq.oregon.gov

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1. Legal and policy background for use attainability analyses

'Beneficial' uses are the in-stream or out-of-stream uses of a waterbody that are protected under the Clean Water Act. Designated uses are the beneficial uses that have been designated for each water body or segment. Designated uses may also include uses that are not currently attained but represent a goal for the water body.[1] Section 101(a)(2) of the Clean Water Act and water quality standard regulations at 40 CFR Section 131 specify that fish, aquatic life, wildlife and recreational uses are a goal, wherever attainable. States and tribes also may designate subcategories of these uses to protect specific species or life stages of species. Existing uses are those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards.[2]

In 2015 updates to the Water Quality Standard regulations, EPA provided clarification on existing uses:

> "Specifically, EPA explained that existing uses are known to be 'actually attained' when the use has actually occurred and the water quality necessary to support the use has been attained. EPA recognizes, however, that all the necessary data may not be available to determine whether the use actually occurred or the water quality to support the use has been attained. When determining an existing use, EPA provides substantial flexibility to states and authorized tribes to evaluate the strength of the available data and information where data may be limited, inconclusive, or insufficient regarding whether the use has occurred and the water quality necessary to support the use has been attained."[3]

States and authorized tribes cannot remove a designated use or change a designated use to a use with less stringent criteria if it is an existing use. States also cannot remove a use or change a use to one with less stringent criteria if the use can be attained through permit limits and cost-effective and reasonable best management practices for nonpoint source control. If a state proposes to remove a designated use or use subcategory or change a designated use or use subcategory to a less stringent use, it must

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[1] 40 CFR 131.3(f)

[2] 40 CFR 131.3(e)

[3] 80 F.R. 162, p. 51027.

demonstrate that the use or use subcategory is not attainable through a use attainability analysis. A UAA is a structured scientific assessment of the factors affecting the attainment of uses specified in Section 101(a)(2) of the Clean Water Act, specifically the protection and propagation of fish, shellfish, wildlife or recreation in or on the water.

In order to justify the removal of a use or change a use to a less stringent use in a UAA, a state or authorized tribe must demonstrate that attaining the use is not feasible due to one of six factors:

1. Naturally occurring pollutant concentrations prevent the attainment of the use; or
2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or
5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
6. Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.[4]

The State must then establish for the waterbody the highest attainable use, which is the modified aquatic life, wildlife or recreation use that is: 1.) closest to the previously designated use; and 2.) attainable, based on the evaluation of the factor that precludes attainment of the use.[5]

In designating uses, the State is required to take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of water quality standards of downstream waters.[6]

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[4] 40 CFR 131.10(g)

[5] 40 CFR 131.3(m)

[6] 40 CFR 131.10(b)

2. Approach to use attainability analysis for aquatic life use updates

Oregon has defined several subcategories of fish and aquatic life uses depending on the most sensitive fish species and life stage present and their water quality needs (Table 2-1). The aquatic life use subcategories are protected by the water quality temperature criteria at OAR 340-041-0028. Uses were designated through a public rulemaking process and adopted by the Environmental Quality Commission. EQC initially designated fish and aquatic life use subcategories in 2003, and they were approved by the U.S. Environmental Protection Agency in 2004.

Table 2-1. Aquatic life use subcategories that apply to Oregon's water quality standard for temperature

Aquatic Life Use Subcategory	Associated Biologically based Numeric Criterion (measured as 7-day Average of the Daily Maximum, unless otherwise stated)
Bull Trout Spawning and Juvenile Rearing	12 °C
Salmon and Steelhead Spawning (seasonal use)	13 °C
Core Cold Water	16 °C
Salmon and Steelhead Rearing and Migration	18 °C
Migration Corridor	20 °C
Redband Trout	20 °C
Lahontan Cutthroat Trout	20 °C
Cool Water Species	No temperature increase that would impair cool water species
Borax Lake Chub	No decrease in temperature of greater than 0.3 °C below natural conditions

In its approval EPA stated:

> *"It is the intent of both Oregon and EPA that if new data is provided that demonstrates a need for revisions to Oregon's water quality standards, including the mapping of the designated uses, Oregon will revise their water quality standards. … a use refinement to specify where and when sub-categories of uses occur or potentially occur is not removing those uses that were not yet established… the interdependent suite of new salmonid uses adopted by Oregon work together to protect and support salmonid populations as a*

whole consistent with 101(a)(2) of the CWA and therefore a use attainability analysis is not needed as per 40 C.F.R. § 131.10(k).” [7]

Since 2003, the Oregon Department of Fish and Wildlife and other natural resource agencies and scientists have continued to collect data and improve our understanding of where and when various fish life uses occur. Moreover, these agencies and many public and private groups have worked to restore habitat conditions and remove barriers to fish passage. DEQ can now map those uses more accurately with improved Geographic Information System capabilities, specifically through adoption of the National Hydrography Dataset, which can map at a finer scale than the StreamNet layer used in 2003.

The currently proposed updates to the aquatic life use subcategory maps result in no changes to uses in the majority of Oregon waters (Figure 2-1). In many cases, DEQ is proposing uses with more stringent criteria based on improved data. DEQ also is newly designating seasonal Salmon and Steelhead Spawning Use where stream restoration efforts or dam improvements or removals have resulted in opening fish passage to additional spawning habitats (Figure 2-2). In some waters, DEQ has determined that the aquatic life use subcategory designated in 2003 is not an existing nor attainable use and is not needed to attain and maintain downstream water quality standards. For these waters, DEQ has prepared UAAs, as presented in this document.

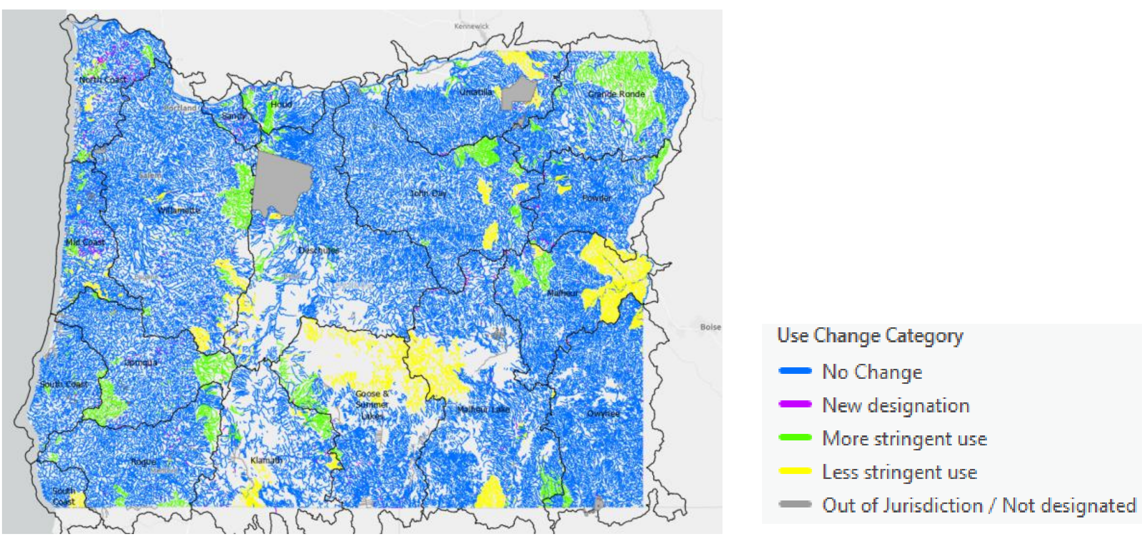

Figure 2-1. Year-round aquatic life use subcategory revisions, 2023.

[7] EPA 2004, Support Document for EPA’s Action Reviewing New or Revised Water Quality Standards for the State of Oregon. March 2, 2004. p.81-82

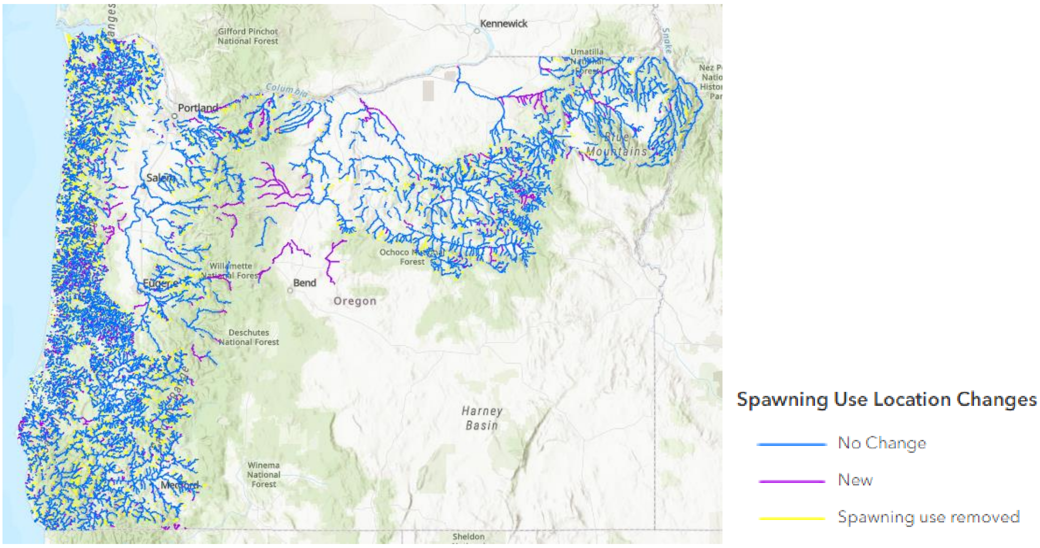

Figure 2-2. Seasonal salmon and steelhead spawning use subcategory location revisions, 2023.

In this document, DEQ presents the best available data and information to support why a currently designated use is not attainable and to identify the highest attainable use. Each chapter contains UAAs for a single use subcategory, organized by the stringency of the associated biologically based temperature criteria:

- Chapter 3 – Revisions to Bull Trout Spawning and Juvenile Rearing Use
- Chapter 4 – Revisions to Salmon and Steelhead Spawning Use
- Chapter 5 – Revisions to Core Cold Water Habitat Use
- Chapter 6 – Revisions to Salmon and Trout Rearing and Migration Use
- Chapter 7 – Revisions to Redband Trout Use

In the introduction to each chapter, DEQ provides a description of the use subcategory and the waterbody characteristics that support the use subcategory, including temperature, flow, depth, substrate, stream order, etc. These characteristics provide the basis for determining whether a use is attainable. DEQ then subdivided each chapter based on the reason for the use update, explains why the use was originally designated in 2003 and why that use subcategory is not accurate. For example, Chapter 4 is divided into UAAs for revisions to Salmon and Steelhead Spawning Use based on: 1. location changes due to passage barriers; 2. location changes in estuarine waters; and 3. temporal changes due to updated ODFW data.

In some cases, DEQ provides UAAs for a single waterbody or waterbodies within a watershed or sub-watershed. In other cases, DEQ has conducted generic use attainability analyses for a group of water bodies or waterbody segments. EPA states in the Water Quality Standards handbook that states may conduct generic UAAs provided that the circumstances relating to the segments in question are sufficiently similar to make the results of the generic analyses reasonably applicable to each segment.[8]

For each UAA, DEQ provides its justification according to the following structure:

1. Protection of existing uses.
2. UAA factor and supporting documentation.
3. Highest attainable use and supporting documentation.

A general description of each topic is provided in Sections 2.1-2.3.

DEQ has included supporting maps and an inventory table for all changes in appendices to this document. Maps for revisions to Bull Trout Spawning and Juvenile Rearing are in Appendix A; those for revisions to Salmon and Steelhead Spawning are in Appendix B, etc.

Protection of downstream waters

As noted in Chapter 1, in designating uses, the State must ensure that water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters. DEQ ensures protection of spawning waters through implementation of standards. NPDES permits, 401 certifications and TMDLs ensure that discharges and load allocations will meet standards in the near field (receiving water/mixing zone) and in the far field. The far field analysis ensures we are protecting downstream waters by meeting the standards that apply in those waters. Temperature TMDLs are conducted on a large watershed or sub-basin scale, to address the sources and contributions and to prevent or minimize potential warming upstream. The human use allowance portion of Oregon's temperature standard requires that waste load and load allocations restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.3 ℃ above applicable criteria after complete mixing and at the point of minimum impact.[9] By implementing this provision, DEQ ensures that water quality of downstream waters are protected over time, even if the uses of upstream waters are less stringent than those of downstream waters.

In addition to the description above, for year-round aquatic life use subcategories, with very few exceptions, the water quality standards of downstream waters are attained and maintained by designating more stringent uses in upstream waters. For example, if Bull Trout Spawning and Juvenile Rearing habitat is the designated use, waters upstream of that habitat are also designated for the same use to provide cold water downstream.

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[8] U.S. EPA. 2012. Water Quality Standards Handbook. Chapter 2: Designation of Uses. See page 14. Available at https://www.epa.gov/sites/default/files/2014-10/documents/handbook-chapter2.pdf

[9] OAR 340-041-0028(12)(b)(B)

Use of the Fish Habitat Database

In order to designate aquatic life use subcategories, DEQ relies on the fish habitat distribution data collected and compiled by ODFW in its Fish Habitat Distribution Database. The FHD is the authoritative database on fish habitat distribution in Oregon, compiling literature and survey reports dating back to the 1940s, more recent habitat surveys, and best professional judgment of biologists from ODFW and other organizations that have in-depth knowledge of fish habitat in Oregon gained through years of experience in research and surveying. The FHD uses a robust data standard to ensure that fish habitat classification reflects the best available information.[10] This section provides a background on how the FHD is developed and updated to ensure it incorporates the current state of knowledge regarding current and historical habitat.

Since 2002, ODFW has continued to update the FHD. In many cases, best professional judgment was used in the original FHD and now there is verified observation of accessible and suitable habitat. In other cases, habitat has become newly suitable due to stream improvement or accessible due to the removal of fish passage barriers. Information from various reports developed by ODFW, such as periodic fish status reports, are incorporated into the FHD.[11] ODFW also has revised mapping of potential Bull Trout habitat based on input from regional Bull Trout Working Groups, as described in Section 3.2.

The FHD also includes a category for historical habitat, which is defined as "areas of suitable habitat that fish no longer access and will not access in the foreseeable future without human intervention." Some of the historical habitat in the current FHD was classified as such in the initial version of the FHD that was published in 2002 and shows habitat where fish had been blocked from suitable habitat due to dams, barriers, diversions, etc., which have been in place since before 1975. **To the extent that ODFW has recharacterized any habitat from current habitat to historical habitat since 2003, DEQ is not revising the use.**

Where DEQ is proposing to revise a use to a less stringent use based on updated information in the FHD, it is not because the existing use has changed, but because we now have more accurate information based on improved data and the expertise of professional biologists. For these use changes, DEQ has provided the available information on why the water or waters cannot support the use. For the most part, either the physical conditions of the waterbody cannot (and never did) support the use, or naturally occurring temperatures, based on DEQ TMDL models or other available models or data, are

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[10] ODFW, 2020. Oregon Fish Habitat Distribution Data Standard Version 4.0 (March 2020). See page 4.

[11] Many references are included at the following website: https://nrimp.dfw.state.or.us/nrimp/default.aspx?pn=refid. Reference numbers not available there are available by contacting the ODFW GIS Coordinator.

warmer than the numeric criteria and the criteria are unattainable. The UAA considers the available scientific information to support these use changes. In addition to the ODFW FHD database, DEQ has relied upon the following sources of information to support its determination about existing uses and the highest attainable use throughout the document. In some cases, DEQ provides multiple lines of evidence from these data sources to increase the certainty that the use change is correct.

1. U.S. Fish and Wildlife Service Final Bull Trout Critical Habitat Designation (September 30, 2010)[12] and documentation is used to support determinations of existing uses and use attainability for Bull Trout Spawning and Rearing Use and Core Cold Water Habitat Use.
2. Data and professional judgment from the 2003 and current Bull Trout Working Groups were an important source of information regarding reasons why specific waters are not appropriate habitat for Bull Trout Spawning. In addition to the determinations of the Bull Trout Working Groups, as discussed in Section 3.2, members of the Working Groups provided specific data or personal communication, which is cited in the document.
3. The U.S. Forest Service NorWeST Stream Temperature Regional Database[13,] and Oregon statewide assessment temperature database have been used to ensure that DEQ is not removing uses from waters where the temperature criterion for that use is currently attained. These databases are also used to support use changes where the temperature criteria are not attainable based on UAA Factor 1 ("Naturally occurring pollutant concentrations prevent attainment of the use.") [14]
4. A joint USFS-EPA study (the "Restored Vegetation Study") utilized the NoRWeST database to model the amount of stream cooling that could be achieved through restored riparian vegetation in the following watersheds: Deschutes, John Day, Umatilla, Walla Walla and Willamette.[15] DEQ utilizes results from these studies to demonstrate that certain uses are not attainable based on UAA Factor 1. In some cases, this provides evidence in addition to other data sources.
5. The U.S. Forest Service Cold Water Climate Shield database, an extension of the NoRWeST model above, has been used as supporting information for predicting occurrence of Bull

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[12] https://www.fws.gov/pacific/bulltrout/FinalCH2010.html

[13] Isaak, D., S. Wenger, E. Peterson, J. Ver Hoef, D. Nagel, C. Luce, S. Hostetler, J. Dunham, B. Roper, S. Wollrab, G. Chandler, D. Horan, S. Parkes-Payne. 2017. The NorWeST summer stream temperature model and scenarios for the western U.S.: A crowd-sourced database and new geospatial tools foster a user community and predict broad climate warming of rivers and streams. Water Resources Research, 53: 9181-9205.

[14] https://orwater.deq.state.or.us/DataAnalysisIndex.aspx

[15] Fuller, M.R., P. Leinenbach, N.E. Detenbeck, R. Labiosa and D.J. Isaak. 2022. Riparian vegetation shade restoration and loss effects on future stream temperatures. Restoration Ecology 30(7), e13626. 17 pp.

Trout to evaluate if Bull Trout Spawning and Juvenile Rearing might be an existing use in waters that are neither critical habitat according to USFWS, nor current or potential habitat according to the statewide Bull Trout Working Groups.[16]

6. The NHD Plus database includes layers showing intermittent and ephemeral streams, stream velocity and flow and stream order, which are used in determining use attainability specific to physical conditions.[17]
7. The National Land Cover Database and online maps of the NLCD provided by the Multi-Resolution Land Characteristics Consortium has been used to examine levels of disturbance for some use revisions.[18]
8. Oregon Water Resources Department databases, including the Water Availability Reporting System and Water Rights Information System to examine potential impacts of water withdrawals and restoration of water flow with temperature.[19]
9. Additional site-specific information, such as watershed-specific Fish Status Reports generated by ODFW, geologic maps and reports, and other reports, as cited within the document.

2.1 Protection of Existing Uses

Oregon cannot change a designated use subcategory to a less stringent use if it is an existing use. An existing use means the use and the water quality conditions needed to support the use have been attained on or since November 28, 1975. EPA has acknowledged in UAA guidance that all data may not be available to determine whether a use occurred since 1975 or the water quality to support the use has been attained. The guidance notes that EPA provides flexibility to states to evaluate the strength of the available data and information where data may be limited, inconclusive, or insufficient regarding whether the use has occurred and the water quality necessary to support the use has been attained.[20]

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[16] https://www.fs.usda.gov/rm/boise/AWAE/projects/ClimateShield.html.

[17] https://www.usgs.gov/national-hydrography/nhdplus-high-resolution

[18] https://www.mrlc.gov/viewer/

[19] https://apps.wrd.state.or.us/apps/wars/wars_display_wa_tables/MainMenu1.aspx and https://www.oregon.gov/owrd/programs/waterrights/wris/pages/default.aspx.

[20] 80 F.R. 162, p. 51027 (August 21, 2015).

EPA also recognizes the importance of the best professional judgement of local biologists in determining existing uses.[21]

The FHD represents the best available information about current and historical habitat that is accessible and suitable to various fish species and life stages. The initial version of the FHD was a compilation of documented observations of fish habitat dating to the 1940s combined with professional observations by state, federal, Tribal and university fish biologists. Over the past 20 years, ODFW has replaced much of the professional opinion-based fish use mapping with protocol-based mapping for many of the species and habitat uses. ODFW has not been able to survey all waters. However, ODFW relies on their knowledge of habitats in nearby waters and their knowledge of fish behaviour and movement to make determinations based on best professional judgement, which is acceptable in determining existing uses according to EPA guidance.

DEQ has supplemented FHD data with other sources of data, such as those listed in the previous section. DEQ has relied on a weight of evidence approach for each water or group of waters to evaluate if a use is an existing use. Based on this weight of evidence approach, no use change to less stringent criteria described in this document removes an existing use. The proposed changes do not reflect any situation where a use designated in the initial use maps developed in 2003 is no longer present due to habitat degradation, loss of species, or new fish passage barriers. If the evidence indicates that a use has existed since 1975, DEQ is retaining that use to protect the existing use. Specific data sources for this weight of evidence approach are provided in the introduction of each chapter.

2.2 UAA Factor and Justification

Each proposed use change described below identifies which UAA factor from 40 CFR 131.10(g) precludes the attainment of the currently designated use and provides data and information to justify why the use cannot be attained. DEQ has included in each chapter a general description of the physical habitat characteristics, such as temperature, flow, substrate, etc., that support each use subcategory. DEQ uses that information to compare the natural characteristics of waterbodies to the habitat requirements that support the use subcategory. DEQ does not have information on all characteristics for all waterbodies but has used a weight of evidence approach to evaluate whether the given waterbody or group of waterbodies has the habitat characteristics required to support the use.

[21] U.S. EPA. 2012. Water Quality Standards Handbook. Chapter 2: Designation of Uses. See page 17. Available at https://www.epa.gov/sites/default/files/2014-10/documents/handbook-chapter2.pdf

In some cases, the use is not attainable because temperatures of the waterbody are higher than the biologically based temperature criterion associated with the aquatic life use subcategory. These determinations support a UAA based on Factor 1 ("Naturally occurring pollutant concentrations prevent attaining the use"). In these waters, DEQ has provided information indicating that the waterbody cannot attain the numeric temperature criterion corresponding to the aquatic life use subcategory, even without anthropogenic influences. For such waters, DEQ has provided available temperature modeling (generally from TMDLs that DEQ has developed, but also from other available reports) for the waterbody or nearby waters. DEQ has supplemented that information with available temperature readings and modeled current (1990 to present) temperature data from the NorWeST stream temperature model developed by the US Forest Service.

For many of the waters DEQ is updating, one or more of the physical habitat conditions needed to support the currently designated use naturally do not exist in that location and cost-effective and reasonable BMPs and required controls for point sources do not render designation achievable. These updates support a UAA based on Factor 5 ("Physical conditions related to natural features of the waterbody, such as the lack of a proper substrate, cover flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attaining aquatic life protection uses.").

For revisions to the location of Salmon and Steelhead Spawning Use (Chapter 4), DEQ relies on information in the FHD, particularly to determine the upstream extent of spawning in many waterbodies. Most of these revisions are small adjustments due to a change in the base hydrography layer from StreamNet to the National Hydrography Database. The NHD has a smaller scale, which enables DEQ's use maps to more closely match the FHD data. There has been no change to the upstream extent of spawning in these waters in the FHD data since 2003. The FHD incorporates data from field surveys following certain protocols or the best professional judgment of ODFW biologists, who have determined that one or more of the physical features (accessibility, flow, substrate, or slope) required to support spawning or access to spawning habitat is not available. In some waters, the FHD identifies a specific natural physical barrier (a waterfall or steep slope) that blocks upstream passage. In others, the FHD does not identify which habitat feature(s) limits spawning further upstream. ODFW protocols indicate that biologists consider these physical characteristics in determining upstream spawning extent, but the database records only the biologist's conclusion, not the specific factors relied upon. EPA guidance suggests that the best professional judgement of biologists should be considered in use determinations.[22] DEQ also relies on best professional judgment for revisions to timing of Salmon and Steelhead Spawning Use.

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[22] U.S. EPA. 2012. Water Quality Standards Handbook. Chapter 2: Designation of Uses. See page 17. Available at https://www.epa.gov/sites/default/files/2014-10/documents/handbook-chapter2.pdf

In two waterbodies, a portion of Lake Billy Chinook in the Deschutes Basin and the overflow channel to the West Division Main Canal in the Umatilla Basin, the current uses are unattainable under UAA Factor 4 (“Dams, diversions, or other types of hydrologic modifications preclude attaining the use, and it is not feasible to restore the waterbody to its original condition or to operate such modification in a way which would result in attainment of the use”).

2.3 Highest Attainable Use

When a state removes an aquatic life use or use subcategory or changes the use to a subcategory with less stringent criteria, it must designate the highest attainable use, based on the evaluation of factors that preclude attainment of the use and other information or analysis that were used to evaluate attainability. For the use updates described in this UAA, DEQ relies on the detailed aquatic life use subcategory framework adopted in Oregon’s water quality standards. These subcategories provide a gradation of temperature criteria that protects the most sensitive species in the use category (Table 2-1). For most of the use revisions, the highest attainable use is the next most stringent year-round use (i.e., waters are being revised from “Bull Trout Spawning and Rearing Use” to “Core Cold Water Use”). However, there are a few exceptions, which are described in the appropriate sections of this document.

3. Updates to 'Bull Trout Spawning and Juvenile Rearing' Use

Characteristics Supporting Bull Trout Spawning and Juvenile Rearing Use

Temperature: Waters with maximum summer temperature less than 12℃.
Geographic position of habitat: Very cold headwaters and spring-fed tributaries, generally 4th order streams or lower.
Substrate: Greater than 48% gravel and less than 21% fine sediment.
Mean stream velocity: 0.5 to 1.7 ft/s (west of Cascades); 0.4 to 0.8 ft/s (east of Cascades)] during spawning season.
Gradient: Mean gradient 1.5% to 3.2%.
Depth: Riffle depth 0.1 – 0.3 m.

Bull Trout Spawning and Juvenile Rearing Use is designed for the protection of moderate to high density summertime Bull Trout juvenile rearing near their natal streams in their first years of life prior to making downstream migrations.

Bull Trout (*Salvelinus confluentus*) are in the genus char within the salmonid family. Oregon is the southern extent of the char species range in North America. Bull Trout are more abundant in the colder inland climates of Idaho and Montana and north into Canada and Alaska. Bull Trout generally only spawn in headwater streams and spring-fed tributaries with maximum summer temperatures of 12 ℃.[23] Bull Trout in Oregon are adfluvial and may migrate long distances in the winter to feed in mainstem rivers and large lakes. Therefore, while they may be present in low elevation streams and rivers, they are using those waters for foraging, migration, and overwintering during the sub-adult and adult life stages and are not in those waters during the summer months. DEQ protects foraging and migration use that occurs during the summer through the Core Cold Water use designation, which has a criterion of 16°C as a 7-day average maximum.

Evaluation of existing use. In order to evaluate whether Bull Trout Spawning and Juvenile Rearing is an existing use (i.e., may have occurred since October 28, 1975), DEQ relied on the following sources of information and a multiple lines of evidence approach:

- *Physical characteristics and temperature that support the use.* To the extent that characteristics such as substrate, temperature, geographic location, etc., indicate the use is not supported, and these characteristics are naturally occurring, this is evidence that the habitat does not now and has not historically supported Bull Trout Spawning and Juvenile Rearing Use.

[23] Buchanan, D.V., M.L. Hanson, and R.M. Hooton. 1997. Status of Oregon's Bull Trout. Oregon Department of Fish and Wildlife, Portland.

- *Oregon Fish Habitat Database.* Evidence indicating the lack of existing use includes: 1. waters that are not currently, nor have ever been categorized in the FHD as supporting Bull Trout; 2. waters that are not categorized as primarily spawning or “unknown use” for Bull Trout; and 3. waters that were categorized as “historical habitat” for Bull Trout when the FHD was originally developed. Classification of historical habitat in the original FHD provides evidence the habitat was historic prior to the 1990s, which is the best available information available. The types of habitat conditions that contributed to extirpation of Bull Trout use in these habitats, such as overallocation of water and dam construction, took place prior to the 1975 existing use cutoff date. Finally, the “historical” classification doesn’t differentiate habitat that supported Spawning and Juvenile Rearing Use from that which supported subadult or adult rearing, foraging, migration and overwintering use.
- *Buchanan, et al. (1997).*[24] This report includes detailed distribution maps for Bull Trout in Oregon based on various efforts during the 1990s. This information was used in mapping Bull Trout distribution in the initial version of the FHD. If the maps indicate no use in a given stream or reach, it is a good indicator that the use is not an existing use. The distribution maps do not differentiate between Bull Trout use for spawning, rearing (juvenile or adult) or resident use. Thus, if a map indicates that a water has Bull Trout use, it does not necessarily mean that the Bull Trout Spawning and Juvenile Rearing use is an existing use. In such cases, DEQ relies on the other lines of evidence described here.
- *Cold Water Climate Shield Database.* Climate Shield is a model predicting the likelihood of Bull Trout presence in the years 1980, 2040, and 2080 based on predictively modeled NorWeST temperature data, stream slope, and flow (Figure 3-1). For the 1980 scenario, temperature predictions were set to a baseline of 1970-1999 data for flow and the 1993-2011 NoRWeST modeling scenario for temperature. In waters where the Climate Shield 1980 scenario indicates no probability of Bull Trout presence, it provides evidence that the habitat did not have conditions supporting Bull Trout Spawning and Juvenile Rearing Use within the 1975 cutoff for existing uses. DEQ has retained the use in many waters where Climate Shield data indicates at least a 0-25% probability of Bull Trout presence based on 1970-1999 conditions. Using a <25% probability is a very conservative approach. Also, the possible presence of Bull Trout does not necessarily indicate that these waters specifically supported Bull Trout Spawning and Juvenile Rearing use.[25] Therefore, in some of these waters DEQ is revising the use based on other lines of evidence.

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[24] Buchanan, D.V., M.L. Hanson, and R.M. Hooton. 1997. Status of Oregon’s Bull Trout. Oregon Department of Fish and Wildlife, Portland.

[25] https://www.fs.usda.gov/rm/boise/AWAE/projects/ClimateShield.html.

Evaluation of use attainability. To evaluate attainability of the Bull Trout Spawning and Juvenile Rearing Use, DEQ relied on the following sources of information:

- **Site-specific reports and data.** These are reports about specific populations provided by the Bull Trout Working Groups or U.S. Fish and Wildlife Service or were available on the Internet. This information is referenced in the site-specific use change sections of this Chapter below.

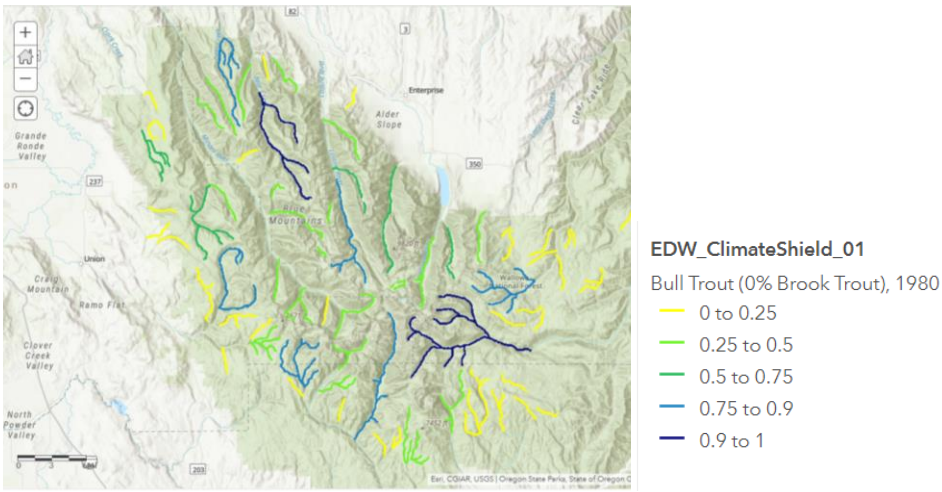

Figure 3-1. Example Climate Shield model output.

- **Temperature.** Bull Trout Spawning typically takes place between August and October when water temperatures drop below 10 ℃. Bull Trout generally only spawn in headwater streams and spring-fed tributaries with maximum summer temperatures of 12 ℃.[26] As such, Oregon's water quality criterion for Bull Trout Spawning and Juvenile Rearing is 12°C as a 7-day average of the daily maximum temperature, which must be attained during the maximum 7-day period in the summer.
  - To evaluate the attainability of 12℃ as a naturally occurring temperature (UAA Factor 1), DEQ utilized modeling results from numerous TMDLs it has developed to address temperature impairments, including TMDLs for the Grand Ronde, John Day, Umatilla, Upper Klamath, and Walla Walla Rivers, combined with NoRWeST modeling results and measured temperature data. Uncertainty in NoRWeST data is addressed in the site-specific discussions below.

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[26] Buchanan, D.V., M.L. Hanson, and R.M. Hooton. 1997. Status of Oregon's Bull Trout. Oregon Department of Fish and Wildlife, Portland.

- DEQ also utilized results from the USFS-EPA "Restored Vegetation Study" to evaluate attainability of 12℃ as a naturally occurring temperature (UAA Factor 1).[27] The spatial-scale model replaced the Canopy Cover covariate in the NoRWeST spatial stream model, based on the 2011 Canopy Cover dataset from the National Land Cover Dataset with a riparian reach shade estimate using the "Shade.xls" model.[28] In doing so, the model predicted stream temperatures that would result from restored vegetation in mid-Columbia (Deschutes, John Day, Umatilla and Walla Walla) and Oregon Coast (Willamette) watersheds, using current (1993-2011) conditions and future climate conditions. The model study outputs included a mean August temperature threshold above which there was a 90% likelihood of exceeding the criterion. This threshold was equal to 10.12 ℃ in the mid-Columbia and 10.67 ℃ in the Willamette watershed. If the result of the model using current conditions is greater than these thresholds, it provides evidence that naturally occurring temperatures exceed the Bull Trout Spawning and Juvenile Rearing Criterion.
- For some waters, such as Crescent Lake, Big Marsh Creek, and Odell Lake, DEQ cited studies reporting temperature measurements and also examined National Land Cover Database maps to determine the level of disturbance in the watersheds.

- **Physical characteristics (stream velocity, flow, gradient, elevation).** Many of the physical characteristics used to characterize attainability come from the NHD Plus database.[29] The database includes layers showing intermittent and ephemeral streams, stream velocity and flow and stream order. DEQ also was able to create a layer showing stream gradient.
  - *Intermittent/ephemeral layer.* In order for Bull Trout to spawn, there must be sufficient flow; the Cold Water Climate Shield used 1 cfs as a minimum flow to support Bull Trout habitat. Thus, in waters that are intermittent or ephemeral, there is likely insufficient flow to support Bull Trout spawning, particularly because these streams will not have flow during the dry summer months prevalent in the range of Bull Trout. DEQ used the

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[27] Fuller, M.R., P. Leinenbach, N.E. Detenbeck, R. Labiosa and D.J. Isaak. 2022. Riparian vegetation shade restoration and loss effects on future stream temperatures. Restoration Ecology 30(7), e13626. 17 pp.

[28] A description of how shade duration and quality were developed is available as part of supporting documentation for Fuller, M.R., P. Leinenbach, N.E. Detenbeck, R. Labiosa and D.J. Isaak. 2022. Riparian vegetation shade restoration and loss effects on future stream temperatures. Restoration Ecology 30(7), e13626. See Supplement S4, available at https://onlinelibrary.wiley.com/action/downloadSupplement?doi=10.1111%2Frec.13626&file=rec13626-sup-0001-supinfo.docx.

[29] https://www.usgs.gov/national-hydrography/nhdplus-high-resolution

intermittent/ephemeral layer in NHD-Plus to support some Factor 5 UAAs. A full description of how the NHD perennial and nonperennial stream classification was developed is included in Hafen, et al. (2020).[30] The following is a summary. NHD-HR stream segments were derived from streamlines on USGS 7.5-min quadrangle maps, which were surveyed by field crews between 1881 and 2000 with the majority of the surveys conducted between 1955 and 1990. Each NHD-HR streamline was assigned a classification of perennial, intermittent, ephemeral, or designated as an artificial path. These classifications are based on topographic field surveys, or interviews with local residents between 1881 and 2000. Perennial streams were defined as containing "water throughout the year, except for infrequent periods of severe drought," intermittent streams as containing "water for only part of the year, but more than just after rainstorms and at snowmelt" and ephemeral streams as containing "water only in direct response to precipitation." SPC designations made by survey crews were intended to represent stream permanence conditions across a normal range of climatic conditions, not just the conditions observed during the survey year. Locations of NHD streamlines were sometimes revised where aerial imagery was available, but these updates could only be applied to streams visible from above, which prevented updates for many headwater streams where riparian vegetation masked the channel or where the image resolution was too coarse to identify the presence or absence of water.

- *Stream velocity.* West of the Cascades, stream velocities near spawning redds range from 0.5 to 1.7 ft/s[31]; east of the Cascades, stream velocities near spawning redds range from 0.4 to 0.8 ft/s.[32] To support evaluation of use attainability, velocities in NHD Plus are estimated using the work of Jobson (1996).[33] This method uses regression analyses on hydraulic variables for over 980 time-of-travel studies, which represent about 90 different rivers in the U.S. These rivers represent a range of sizes, slopes, and channel geometries. Four principal NHDFlowline feature variables are used in the Jobson methods: drainage area, NHDFlowline

[30] Hafen, K.C., K.W. Blasch, A. Rea, R. Sando, and P.E. Gessler. 2020. "The Influence of Climate Variability on the Accuracy of NHD Perennial and Nonperennial Stream Classifications." Journal of the American Water Resources Association 56 (5): 903–916.

[31] Baxter, J.S. and McPhail, J.D. 1996. Bull Trout Spawning and Rearing Habitat Requirements: Summary of the Literature. University of British Columbia: Dept. of Zoology; Fisheries Technical Circular No. 98, Vancouver, B.C.

[32] Wissmar, R.C. and Craig, S. 1997. Bull Trout Spawning Activity, Gold Creek, Washington. Fisheries Research Institute, School of Fisheries, University of Washington, Seattle.

[33] McKay, L., Bondelid, T., Dewald, T., Johnston, J., Moore, R., and Rea, A., "NHDPlus Version 2: User Guide", 2012, citing Jobson, H. E., Prediction of Travel time and Longitudinal Dispersion in Rivers and Streams, U.S. Geological Survey Water Resources Investigations Report 96-4013 (1996), U.S. Geological Survey.

feature slope, mean annual flow, and the flow associated with the velocity (e.g., mean annual or mean monthly flow). Based on Jobson's analyses, regression equations were developed to relate velocity (meters/second) to drainage area, a dimensionless drainage area, NHDFlowline feature slope, flow, and a dimensionless relative flow.

- *Gradient.* Bull Trout redd frequency is highly correlated with stream gradient, with high frequency occurring in waters with a mean gradient of 1.5%; low frequency at 1.8% and none at gradients of 3.2%. Specifically, Bull Trout tend to spawn at the interface between low and high gradient areas, meaning they are typically found at the upper end of low gradient areas.[34] Gradient analysis was done using the Slope Spatial Analyst tool in ArcGIS Pro.[35] Gradient was calculated on a reach-by-reach scale. Percent rise was selected as the calculation method choice. For percent rise, the range is 0 to essentially infinity. A flat surface is 0 percent, a 45 degree surface is 100 percent, and as the surface becomes more vertical, the percent rise becomes increasingly larger. The slope classes were set for visualization based on the classes of interest, in this case <1% slope, 1-3.5% slope, and >3.5% slope.
- *Stream order.* Bull Trout spawning habitat is generally found in a river basin's upper reaches, typically, but not always, in waters with a stream order of 4 or greater.[36] Stream order follows the Strahler stream order numbering system.[37]
- *Substrate.* Spawning usually takes places in riffles with a high percentage (at least 48%) of small-to-medium sized gravel, low levels (less than 21%) of fine sediment, and depths of 0.1 to 0.3 meters.[38] Information on substrate was taken from geologic reports and maps, or other site-specific information found via Internet search.
- *Land cover***.** In some waters, DEQ has utilized the National Land Cover Database and online maps of the NLCD provided by the Multi-Resolution Land Characteristics Consortium to examine levels of disturbance to indicate whether current conditions are representative of

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[34] Graham, P.J., B.B. Shepard, and J.J. Fraley. 1981. Use of stream habitat classifications to identify bull trout spawning areas in streams. Pp. 186-190 *In* N.B. Armantrout (ed.) Acquisition and utilization of aquatic habitat inventory information. Symposium of the American Fisheries Society (Western Division), Portland, OR.

[35] https://pro.arcgis.com/en/pro-app/latest/tool-reference/spatial-analyst/slope.htm

[36] US EPA, 2003. EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards. EPA 910-B-03-002. Region 10 Office of Water. Seattle, WA. April 2003. 57 pp. See page 26.

[37] https://en.wikipedia.org/wiki/Strahler_number

[38] Dambacher, J.M. and K.K. Jones. 1997. Stream habitat of juvenile bull trout populations in Oregon, and benchmarks for habitat quality. Proceedings of the Friends of the Bull Trout Conference. Calgary, Alberta.

reference conditions.[39] For these analyses, DEQ utilized the 2011 CONUS (continental U.S.) land cover dataset, as this is the dataset that USFS utilized in developing the NoRWeST model, particularly with respect to Forest Canopy.[40] DEQ also utilized data from the Landfire Program (Landscape Fire and Resource Management Planning Tools) to supplement the NLCD information.[41]

Highest Attainable Use. In most waters described here, the highest attainable use is Core Cold Water Habitat use, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. If DEQ is proposing a less stringent use than Core Cold Water, DEQ has included a description of why Core Cold Water Use is unattainable and, for waters in the Powder River basin, why Salmon and Trout Rearing and Migration Use also is unattainable.

3.1 Revisions to align with USFWS Bull Trout critical habitat designations

When DEQ developed Oregon's fish use designation maps in 2003, USFWS had published draft proposed critical habitat for Bull Trout for public comment.[42] Due to a court-imposed deadline, DEQ was required to designate the states' fish uses before USFWS could finalize a Bull Trout critical habitat rule. DEQ included the USFWS draft proposed critical habitat in our Bull Trout Spawning and Juvenile Rearing use designations with the expectation that DEQ would revise the designations to align with the final federal critical habitat rule when it was completed.[43] DEQ convened the "Where and When" Technical Workgroup that included staff from EPA, ODFW, USFWS, NMFS and CRITFC to assist with the fish use designations. The workgroup, including EPA, agreed with and appreciated this precautionary approach

[39] https://www.mrlc.gov/viewer/

[40] Isaak, D., S. Wenger, E. Peterson, J. Ver Hoef, D. Nagel, C. Luce, S. Hostetler, J. Dunham, B. Roper, S. Wollrab, G. Chandler, D. Horan, S. Parkes-Payne. 2017. The NorWeST summer stream temperature model and scenarios for the western U.S.: A crowd-sourced database and new geospatial tools foster a user community and predict broad climate warming of rivers and streams. Water Resources Research, 53: 9181-9205.

[41] https://landfire.gov/about.php

[42] 67 Federal Register 71235. November 29, 2002.

[43] See DEQ 2003. EQC Staff Report, Rule Adoption: Water Quality Standards, Including Temperature Criteria, OAR Chapter 340, Division 41, December 4, 2003, EQC Meeting, Attachment H: A Description of the Information and Methods Used to Delineate the Proposed Beneficial Fish Use Designations for Oregon's Water Quality Standards. 5 pp.

and the expectation that DEQ would align the use designations with the final critical habitat rule when it was completed.

USFWS published a final Bull Trout critical habitat rule in 2010.[44] Critical habitat includes currently occupied habitat as well as additional habitat for species recovery that is not currently occupied. In the justification for its final rule, USFWS noted that it designated critical habitat for spawning and rearing in "stream reaches and associated watershed areas that provide all habitat components necessary for spawning and juvenile rearing for a local Bull Trout population."[45]

In their 2002 proposed critical habitat rule, USFWS had included all reaches that warranted further review. Many reaches were removed from the final rule following further evaluation and input from a peer review panel and technical input from States and other partners, to incorporate site-specific biological expertise with Bull Trout.[46] The USFWS concluded that the waters removed did not include a sufficient number of elements essential to conservation of the species. These elements include space for individual and population growth and for normal behavior; food, water, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing of offspring; and habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.[47] Some waters were removed from critical habitat designation for Bull Trout in the final rule. Other waters that were proposed as critical spawning and rearing habitat, were instead designated as foraging, migration, and overwintering habitat in the final rule.

USFWS has provided available site-specific information regarding changes to Bull Trout spawning and rearing critical habitat designation between the proposed 2002 rule and final 2010 rule but was unable to find documentation for all waters that were dropped from the spawning/rearing critical habitat designation in the final rule. DEQ has provided additional information to support the use change.

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[44] 75 Federal Register 63898. October 18, 2010.

[45] USFWS 2010. Bull Trout Critical Habitat Final Rule Justification. Idaho Fish and Wildlife Office, Boise, Idaho, Pacific Region, Portland, OR. 1035 pp. The portions of the document relevant to the corrections to the designation include those for the Upper Willamette Critical Habitat Unit (starting on page 217), Klamath River Basin CHU (p. 303), John Day River CHU (p. 371), Umatilla River CHU (p. 397), Walla Walla River CHU (p. 409), Grande Ronde River CHU (p. 447), Powder River CHU (p. 511), and Malheur River CHU (p. 587).

[46] See Final Critical Habitat rule *at* 75 FR 63899 and 63902.

[47] USFWS 2010. Additional Information, Final Critical Habitat Designation for Bull Trout in Idaho, Oregon, Washington, Montana and Nevada. 11 pp.

DEQ cross-checked waters that were not included in the final Bull Trout critical habitat designation with ODFW data on current and potentially restorable Bull Trout spawning and juvenile rearing habitat locations. DEQ is only proposing to remove the Bull Trout spawning use designation for those streams that are not federal critical habitat for Bull Trout Spawning and Rearing *and* the current Statewide Interagency Bull Trout Working Groups concur they do not have the potential to become Bull Trout spawning habitat through habitat restoration or reintroduction.

DEQ is also updating the Bull Trout Spawning and Juvenile Rearing Use designation for tributaries designated for Bull Trout Spawning and Juvenile Rearing use in 2003 only because they are upstream of reaches that were proposed as critical habitat. In these cases, there was no Bull Trout spawning habitat in the tributary itself based on the 2002 Bull Trout Working Groups, the current ODFW FHD, or the final critical habitat rule, nor do these waters demonstrate any probability of Bull Trout presence in the USFS Climate Shield Model.

3.1.1 Use Revisions Based on UAA Factor 1

Bull Trout Spawning and Juvenile Rearing Use is not attainable in the waters described below based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use." In these waters, natural thermal potential models or extrapolations from natural thermal potential models for nearby waters, in conjunction with NoRWeST and measured temperature data, support the conclusion that the Bull Trout Spawning and Juvenile Rearing criterion of 12℃ is not attainable.

John Day Basin (Figure A-1 in Appendix A)

Factors supporting use unattainability

Temperature (UAA Factor 1): Natural occurring temperatures greater than 12℃.
Geographic Position of habitat: Waters not located in headwaters; stream order greater than 4 in Canyon Creek.

Canyon Creek and tributaries from its mouth to Vance Creek and Pine Creek and tributaries from its mouth to upstream of Bear Creek. Canyon Creek and Pine Creek, two watersheds of the upper John Day River, were proposed as unoccupied spawning critical habitat in the proposed 2002 Critical Habitat rule. These streams were identified as historical habitat in the initial publication of the FHD (2002) and were only designated for Bull Trout Spawning and Juvenile Rearing Use in 2003 because they were in the USFWS proposed critical habitat rule. Additional evidence, as described below, indicates that the lower portion of these streams may have been historical habitat for foraging, migration and overwintering use, but not spawning and juvenile rearing. Neither DEQ's Bull Trout Working Group nor ODFW identify these waters as current or potential Bull Trout spawning and rearing habitat. Nevertheless, DEQ is retaining the use in a large portion of Canyon Creek and Pine Creek, either because information discussed below indicates the use may be an existing use or to protect downstream water quality, as required by 40 CFR 131.10(b). DEQ is removing the use in waters where: 1) the naturally occurring temperatures are greater than 12℃; and 2) there's no evidence that the Bull Trout Spawning and Juvenile Rearing Use is an existing use.

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The temperature analysis that follows indicates these waters cannot attain 12℃ as a 7-DADM, even with restored conditions, indicating they never supported Bull Trout spawning.
- Buchanan, et al. (1997) does not identify these waters as Bull Trout habitat.
- The Climate Shield model predicts a 0% probability of Bull Trout presence in these waters.

DEQ is retaining Bull Trout Spawning and Rearing Use in the Canyon Creek watershed upstream of Vance Creek because Climate Shield data indicate there was a 0-25% likelihood in Vance Creek and other tributaries, and a 25-50% likelihood in Crazy Creek, that stream conditions supported Bull Trout presence based on modeled 1970-1999 conditions.[48] Much of the Canyon Creek watershed upstream of Vance Creek shows 0% probability of Bull Trout presence in the 1980 scenario; however, DEQ is retaining the use in those waters as a precautionary approach and to ensure downstream protection of water quality. DEQ also is retaining Bull Trout Spawning and Rearing Use in the Pine Creek watershed upstream of Bear Creek because Climate Shield data indicate that there was a 0-25% likelihood that stream conditions in Pine Creek supported Bull Trout presence based on modeled 1970-1999 conditions.

Demonstration that the use is unattainable

DEQ is updating the use in the lower reaches of Canyon and Pine Creeks, two tributaries to the upper John Day River, as well as tributaries to these reaches, based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use."

The lower reaches of these waters cannot attain the Bull Trout Spawning and Juvenile Rearing Use criterion of 12 ℃ as a 7-day average maximum under restored conditions based on multiple lines of evidence. These lines of evidence include an EPA Restored Vegetation Study and extrapolation of DEQ's natural thermal potential modelling for the John Day River temperature TMDL.

Restored Vegetation Study

DEQ examined data from the Restored Vegetation Study on stream temperatures in Canyon and Pine Creeks. Based on these estimates, restored vegetation is estimated to result in mean August stream

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[48] Isaak, D.J., M.K. Young, D.E. Nagel, D.L. Horan and M.C. Groce. 2015. The cold-water climate shield: delineating refugia for preserving salmonid fishes through the 21st century. Global Change Biology 21, 2540–2553. Online maps of Climate Shield outputs are available at: https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_ClimateShield_01/MapServer.

temperatures of 13.7 – 15.3 °C in Canyon Creek between Vance Creek and its mouth. Restored vegetation is estimated to result in mean August stream temperatures of 12.3 to 15.4 °C in Pine Creek from upstream of Bear Gulch to its mouth (Tables 3-2 and 3-3). The Restored Vegetation study used 10.12 °C as the threshold above which there was a 90% probability that the stream would exceed the 12°C criterion. The restored temperatures are all 2-5 degrees higher than this threshold, indicating that restored conditions would not attain Bull Trout Spawning and Juvenile Rearing Use.

The Restored Vegetation Study did not assess impacts of flow restoration on temperature. However, based on information in the Water Availability Reporting System, current flow during the summer months is near natural stream flow, indicating there is little opportunity for flow restoration that would impact stream temperature during the hottest months. According to the Water Availability Reporting System, natural monthly streamflow (based on flow that is exceeded in 8 out of 10 years on average) in Canyon Creek is 10.40 cfs in July and 5.15 cfs in August.[49] Based on data from a flow gauge on Canyon Creek near its mouth, low flows in Canyon Creek occurring during late July and August are somewhat higher than estimates of natural streamflow (Table 3-1), potentially due to irrigation returns or releases from a reservoir in upper Canyon Creek.

Table 3-1. Monthly streamflow and 80% exceedance streamflow, OWRD gauge on Canyon Creek near Canyon City. https://apps.wrd.state.or.us/apps/sw/hydro_near_real_time/display_hydro_graph.aspx?station_nbr=14038625. Accessed October 19, 2023.

Year	2016	2017	2018	2019	2020	2021	2022	2023	80% exceedance
July	13.98	18.52	16.54	23.59	21.55	8.96	16.03	16.17	14.80
August	5.57	11.81	7.26	13.78	9.76	4.14	6.76	11.44	6.05

Extrapolation of John Day TMDL to NoRWeST data

Another line of evidence indicating that natural thermal temperatures exceed the 12°C Bull Trout criterion is examining current temperatures and estimating whether 12°C would be attainable by comparing them to the natural thermal potential modeling for the John Day River Temperature from DEQ's TMDL.

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49 https://apps.wrd.state.or.us/apps/wars/wars_display_wa_tables/display_wa_details.aspx?ws_id=205&exlevel=80&scenario_id=1. Visited October 19, 2023.

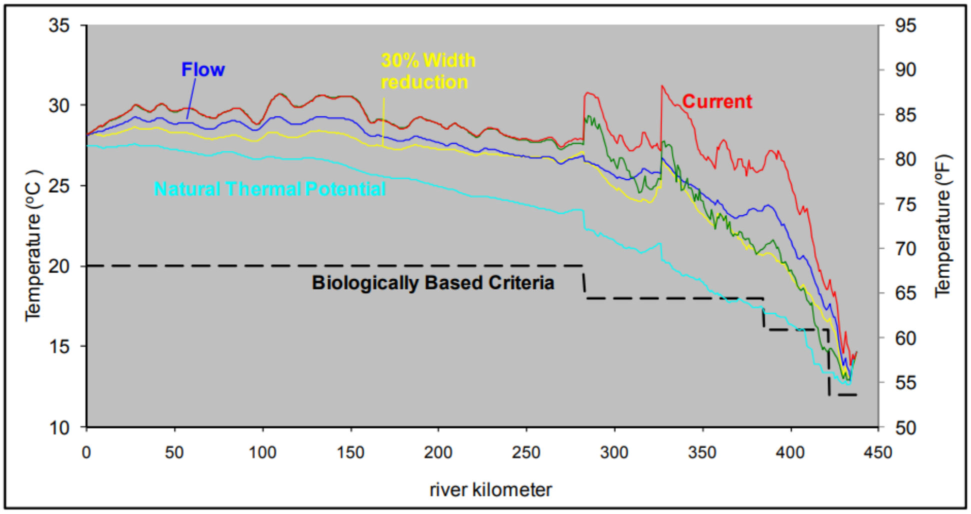

Figure 3-2. Predicted maximum 7DADM temperature profiles of the John Day River resulting from restoration scenarios during the model period, 2004. Source: DEQ, 2010. John Day River Basin TMDL Appendix B: Temperature Model Scenario Report. Figure B-3.

The John Day TMDL estimated stream temperatures that would result from restored vegetation, flow and channel morphology compared to current temperatures (Figure 3-2). In the upper reaches of Canyon Creek where DEQ is revising the use, from Gold Creek to Vance Creek, land cover is primarily evergreen forest with some grassland/herbaceous cover in valleys (Figure 3-3). In the upper reaches, the difference between NTP temperature and current temperature would likely be similar to that of the Upper John Day River above Rail Creek (RKm 430.7). In this area of the John Day, the maximum difference between NTP temperature and current temperature is approximately 3.3 °C (6 °F). DEQ adjusted the NorWest modeled current temperatures by this amount to estimate NTP temperatures in this portion of Canyon Creek (Table 3-2). Temperature differences are similar or less in TMDL models for the upper reaches of the North Fork and Middle Fork John Day Rivers, where land use is similarly dominated by forest and grassland (see Figures 3-4 and 3-5).

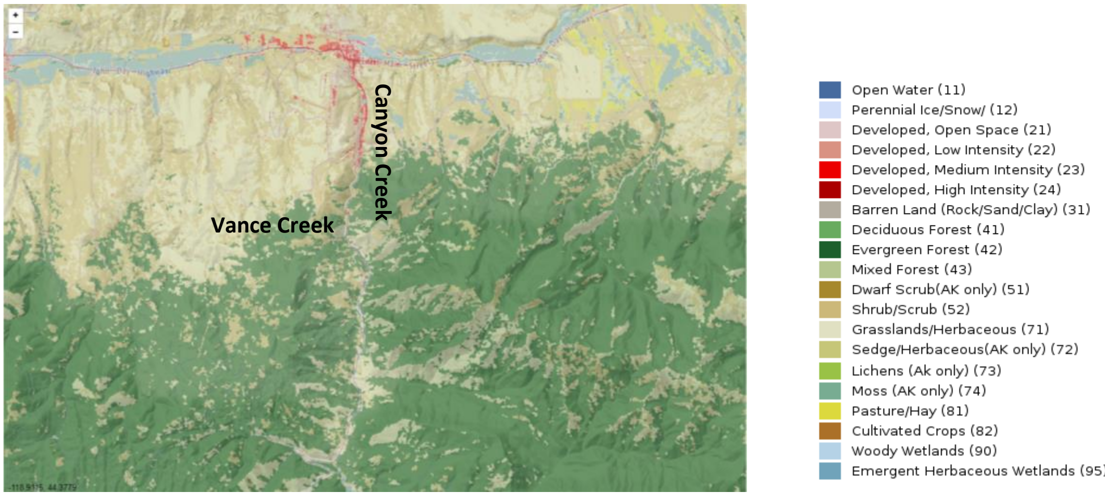

Figure 3-3. 2011 Land Cover, Canyon Creek and Pine Creek, John Day Basin. Source: National Land Cover Database.

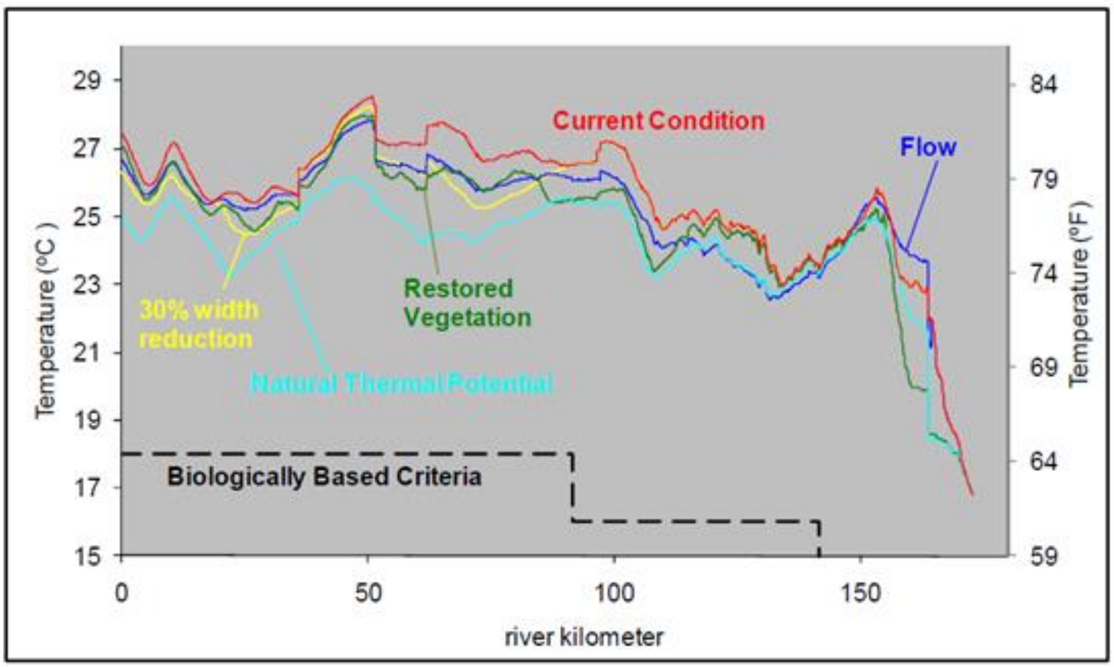

Figure 3-4. Predicted maximum 7DADM temperature profiles of the North Fork John Day River resulting from restoration scenarios during the model period, 2004. Source: DEQ, 2010. John Day River Basin TMDL Appendix B: Temperature Model Scenario Report, Figure B-18.

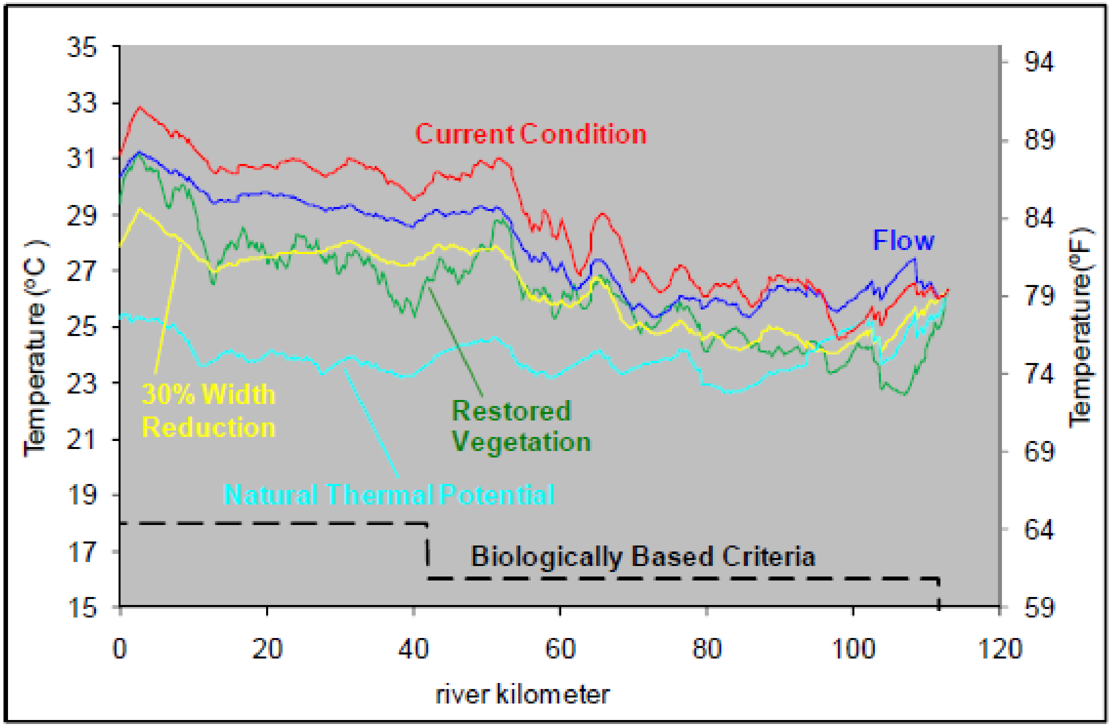

Figure 3-5. Predicted maximum 7DADM temperature profiles of the Middle Fork John Day River resulting from restoration scenarios during the model period, 2004. Source: DEQ, 2010. John Day River Basin TMDL Appendix B: Temperature Model Scenario Report, Figure B-32.

In the lower portion of Canyon Creek, downstream of Gold Creek, land cover is similar to that of the mainstem John Day, consisting primarily of grassland/herbaceous and shrub/scrub, with some developed land (Figure 3-5). At the mouth of Canyon Creek (approximately RKm 385 of the John Day River), the difference between NTP temperature and current temperature in the John Day River is approximately 10 ℃ (18 ℉) (Figure 3-2). Conservatively, DEQ extrapolated 10 ℃ as the maximum potential difference between the current 7-DADM temperatures and attainable temperature in the lower portion of Canyon Creek, from its mouth to Gold Creek (Table 3-2). More likely, the difference in the upper portion of this reach is much less, as the water exits forested land and enters grassland and shrub land, then the difference increases as it moves downstream in areas with lesser shade. Even in the lower reach, adjusting the temperature by 10 ℃ likely overestimates the difference between current and natural temperatures, given that the waters of Canyon Creek travel only a few miles from this point before entering the John Day, whereas those in the John Day River travel 45 km from the forested area. Regardless, the extrapolated natural temperatures exceed 12 °C, indicating that these waters cannot attain Bull Trout Spawning and Juvenile Rearing Use.

Table 3-2. Modeled current temperatures and temperatures with restored vegetation, Canyon Creek. Data from NoRWeST and Fuller, et al. (2022).

Location	Modeled (1993-2011) mean August Temp., ℃	Mean August Temperature with restored vegetation, ℃[50]	Modeled (1993-2011) 7-DADM Temp., ℃[51]	Extrapolated Temp. based on John Day TMDL, ℃
Canyon Creek at John Day River	16.8	15.3	26.4	16.4
Canyon Creek d/s Gold Creek	15.9	15.3	24.1	14.1
Canyon Creek u/s Gold Creek	15.8	14.9	22.9	19.6
Canyon Creek d/s Vance Creek	14.7	13.7	21.6	18.3

DEQ conducted a similar temperature analysis for Pine Creek, which enters the John Day River at approximately RKm 397. NorWeST modeled current (1993-2011) 7-DADM temperatures in this reach of Pine Creek range from 19.5 ℃ at the upper reach to 24.8 ℃ at the mouth (Table 3-3).

In these upper reaches of Pine Creek, where DEQ is revising the use (from Bear Gulch downstream to Berry Ranch Lane), land cover is similar to that of the Upper John Day River above Rail Creek (RKm 430.7). In this area of the John Day River, the maximum difference between NTP temperature and current temperature is approximately 3.3 ℃ (6 ℉) (Figure 3-2), which is also similar to differences seen in the models for the North and Middle Fork John Day Rivers (Figures 3-4 and 3-5). DEQ adjusted modeled current temperatures by this amount to estimate NTP temperatures in this portion of Pine Creek (Table 3-3). In the lower portion of Pine Creek, downstream of Berry Ranch Lane, land cover is similar to that of the mainstem John Day, consisting primarily of grassland/herbaceous and shrub/scrub, with some developed land (Figure 3-3). At the mouth of Pine Creek (approximately RKm 385 of the John Day River), the difference between NTP temperature and current temperature in the John Day River is approximately 10 ℃ (18 ℉). Conservatively, DEQ extrapolated 10 ℃ as the maximum potential difference between the current 7-DADM temperatures and attainable temperature at the mouth of

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[50] Fuller, M.R., P. Leinenbach, N.E. Detenbeck, R. Labiosa and D.J. Isaak. 2022. Riparian vegetation shade restoration and loss effects on future stream temperatures. Restoration Ecology 30(7), e13626. 17 pp.

[51] Isaak, D., S. Wenger, E. Peterson, J. Ver Hoef, D. Nagel, C. Luce, S. Hostetler, J. Dunham, B. Roper, S. Wollrab, G. Chandler, D. Horan, S. Parkes-Payne. 2017. The NorWeST summer stream temperature model and scenarios for the western U.S.: A crowd-sourced database and new geospatial tools foster a user community and predict broad climate warming of rivers and streams. Water Resources Research, 53: 9181-9205.

Canyon Creek (Table 3-2). The extrapolated natural temperatures exceed 12 ℃, indicating that these waters cannot attain Bull Trout Spawning and Juvenile Rearing Use.

Table 3-3. Modeled and adjusted current temperatures and extrapolated natural temperatures, Pine Creek, John Day Basin.

Location	Modeled (1993 – 2011) Mean August Temp., ℃	Mean August Temperature with restored conditions, ℃	Modeled (1993-2011) 7-DADM Temp., ℃	Extrapolated Temp. based on John Day TMDL, ℃
Pine Creek at John Day River	16.7	15.4	24.8	14.8
Pine Creek d/s Berry Ranch Lane	14.7	13.6	22.0	16.0
Pine Creek u/s Berry Ranch Lane	13.7	12.8	18.9	15.6
Pine Creek u/s Bear Gulch	13.4	12.3	19.4	16.1

The calculations presented in this section are based on modeled temperatures in the NoRWeST model, which results in some uncertainty, as with any model. Root mean square percentage error for the mid-Columbia unit, where these streams occur, is 0.9 ℃ and mean average percentage error was 0.60 ℃, which is more accurate than 21 of the 23 units in the NoRWeST model.[52] This accuracy is generally due to higher sample densities in the unit. As the results provided in this section are, at a minimum, two degrees warmer than the Bull Trout Spawning and Juvenile Rearing criterion, more than double the RMSPE, it is highly unlikely that these waters could attain the use.

Other evidence supporting use unattainability

Other evidence supporting unattainability of Bull Trout Spawning and Juvenile Rearing Use in these waters is geographic location. Specifically, Bull Trout spawn and juvenile Bull Trout rear in headwater streams. The waters where DEQ is revising the use are both in the lower reaches in their respective watersheds. According to NHD Plus, the stream order of this reach of Canyon Creek is 6 and that of Pine Creek is 4 (Figure 3-6). This evidence suggests these waters historically would not have provided spawning habitat, which likely would have been further upstream in the watershed where DEQ is

[52] Isaak, Daniel J.; Wenger, Seth J.; Peterson, Erin E.; Ver Hoef, Jay M.; Nagel, David E.; Luce, Charles H.; Hostetler, Steven W.; Dunham, Jason B.; Roper, Brett B.; Wollrab, Sherry P.; Chandler, Gwynne L.; Horan, Dona L.; Parkes-Payne, Sharon. 2017. The NorWeST summer stream temperature model and scenarios for the western U.S.: A crowd-sourced database and new geospatial tools foster a user community and predict broad climate warming of rivers and streams. Water Resources Research. 53: 9181-9205.

retaining the use. This is consistent with Buchanan, et al. (1997), which indicates the waters are not historic or current habitat.[53]

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation for tributaries to the reaches of Canyon and Pine Creeks where DEQ is revising the Bull Trout Spawning and Juvenile Rearing Use. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction.[54] The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area.[55] Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate.[56] Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for these reaches of Canyon and Pine Creek, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout Spawning Use from each of these reaches together with its tributaries as a unit.

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[53] Buchanan, D.V., M.L. Hanson, and R.M. Hooton. 1997. Status of Oregon's Bull Trout. Oregon Department of Fish and Wildlife, Portland.

[54] US EPA, 2012. Water Quality Standards Handbook: Chapter 2: Designation of Uses. EPA-823-B-12-002. Office of Water, Washington, DC. 39 pp.

[55] Dunham, J.B. and B.E. Rieman. 1999. Metapopulation Structure of Bull Trout: Influences of Physical, Biotic and Geometrical Landscape Characteristics. Ecological Applications 9(2):642-655.

[56] Rieman, B.E. and J.D. McIntyre. 1995. Occurrence of Bull Trout in Naturally Fragmented Habitat Patches of Varied Size. Transactions of the American Fisheries Society 124(3):285-296.

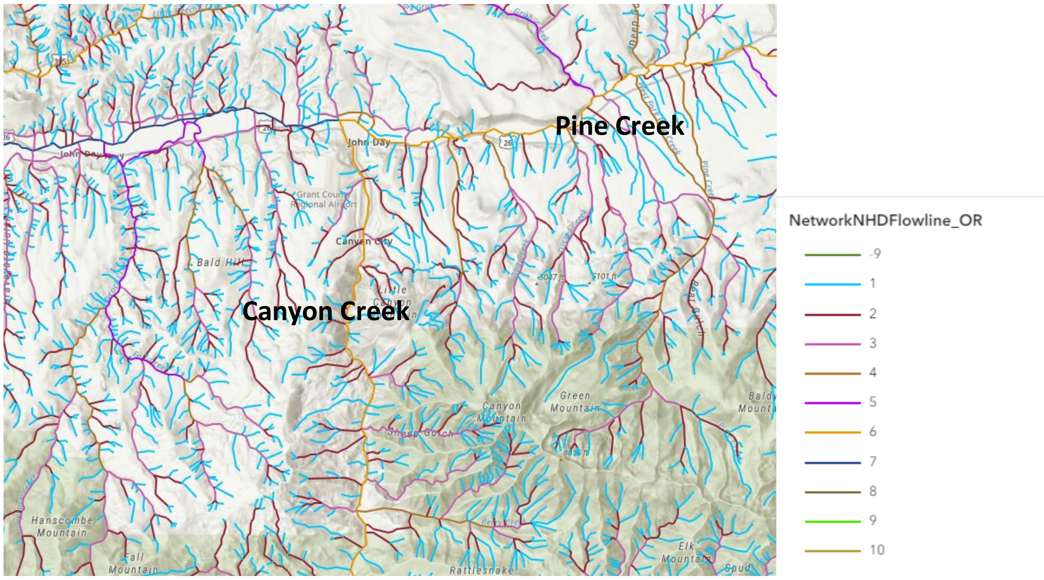

Figure 3-6. Stream order, Canyon Creek and Pine Creek

Highest attainable use

The highest attainable use for these waters is Salmon Rearing and Migration Use. According to ODFW, Bull Trout FMO use does not occur in these streams in the summer months, which is the trigger for Core Cold Water Use. As a result, Core Cold Water Use is not attainable in these waters. However, these waters do support suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead. As a result, Salmon and Trout Rearing and Migration is the highest attainable use based on the best information available.

Lake Creek/Granite Creek from North Fork John Day River to Granite, Oregon.

USFWS changed the designation in the final critical habitat rule for this reach of Lake Creek and Granite Creek from Spawning and Rearing to Foraging, Migration and Overwintering. ODFW classifies this reach as “Rearing” habitat for Bull Trout. The entirety of this reach of Granite Creek is within the Wallowa-Whitman National Forest. Most of it borders or lies within the North Fork John Day River Wilderness

Factors supporting use unattainability

Temperature (Factor 1): Natural occurring temperatures greater than 12℃.
Geographic Position of habitat: Not headwater stream; stream order greater than 4.

Area. The most recent USFS Management Plan emphasizes forest and riparian restoration.[57]

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The initial 2003 version of the FHD characterized these waters as Bull Trout subadult and adult rearing habitat, not spawning habitat.
- Climate Shield does not indicate any probability of Bull Trout presence in the waters where the use is being revised based on 1970-1999 conditions.
- The temperature analysis that follows indicates that these waters cannot attain 12℃ as a 7-DADM with restored conditions, indicating that they never supported Bull Trout spawning.

Demonstration that the use is unattainable

DEQ is revising the use in this reach of Granite and Long Creeks and their tributaries based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use."

DEQ has concluded that the lower reaches of these waters cannot attain the Bull Trout Spawning and Juvenile Rearing Use criterion of 12 ℃ under restored conditions based on multiple lines of evidence. These lines of evidence include modeling from the Restored Vegetation Study and extrapolation of the John Day River TMDL NTP model. Both of these lines of evidence indicate that Granite and Long Creeks where DEQ is revising the use cannot attain 12 ℃ as a maximum 7-DADM, which is the Bull Trout temperature criterion. In fact, these data indicate that 12 ℃ cannot be met as a mean August temperature in these reaches. Mean August temperatures tend to be several degrees lower than 7-DADM temperatures.

The Restored Vegetation study examined the potential impacts of restored vegetation on stream temperatures. Based on this study, mean August temperatures under restored conditions would exceed 13 ℃ as a mean August temperature throughout these reaches of Granite and Long Creeks. As noted in the introduction to this section, the study used 10.12 ℃ (mean August temperature) as the threshold above which there was a 90% probability of exceeding 12 ℃ 7-DADM criterion. The restored temperatures are approximately 3 degrees higher than the threshold, indicating that restored conditions would not result in attainment of Bull Trout Spawning and Juvenile Rearing Use.

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[57] USDA Forest Service, Northwest Division. 2018. Draft Record of Decision for the Malheur, Umatilla, and Wallowa-Whitman National Forests Revised Land Management Plans.

Another line of evidence indicating that natural thermal temperatures exceed the 12°C bull trout criterion is examining current temperatures and comparing them to natural thermal potential modeling from the John Day River Temperature TMDL. DEQ compared the NorWest modeled temperatures to measured temperatures available in the NorWeST database. The modeled temperatures are an average of 1.0 °C higher than measured temperatures.

Current 7-DADM temperatures along this reach according to the NoRWeST model range from a low of 22.8°C at the upstream end to 24.8°C near the center of the reach, before cooling slightly to 23.4 °C at the downstream end. For the following analysis, DEQ adjusted modeled temperatures lower by 1.0 °C to account for uncertainty.

The John Day Temperature TMDL modeled NTP temperatures in the North Fork John Day River from its headwaters to its mouth. NTP scenario incorporated restored vegetation, flow and channel morphology and compared them to current temperatures (Figure 3-7). In the area of Granite Creek, which flows into the North Fork John Day at RKm 141, the difference between NTP temperature (23.3 ℃) and current temperature (23.5 ℃) is less than 1 ℃. Granite Creek is in similarly undisturbed as the North Fork John Day. Even if the difference between current temperatures and natural temperatures were 1.2 ℃, as suggested by the Restored Vegetation Study, the natural summer temperatures of this waterbody would far exceed 20℃ (ranging from 20.6 to 21.6 ℃) and thus do not support Bull Trout Spawning and Juvenile Rearing Use.

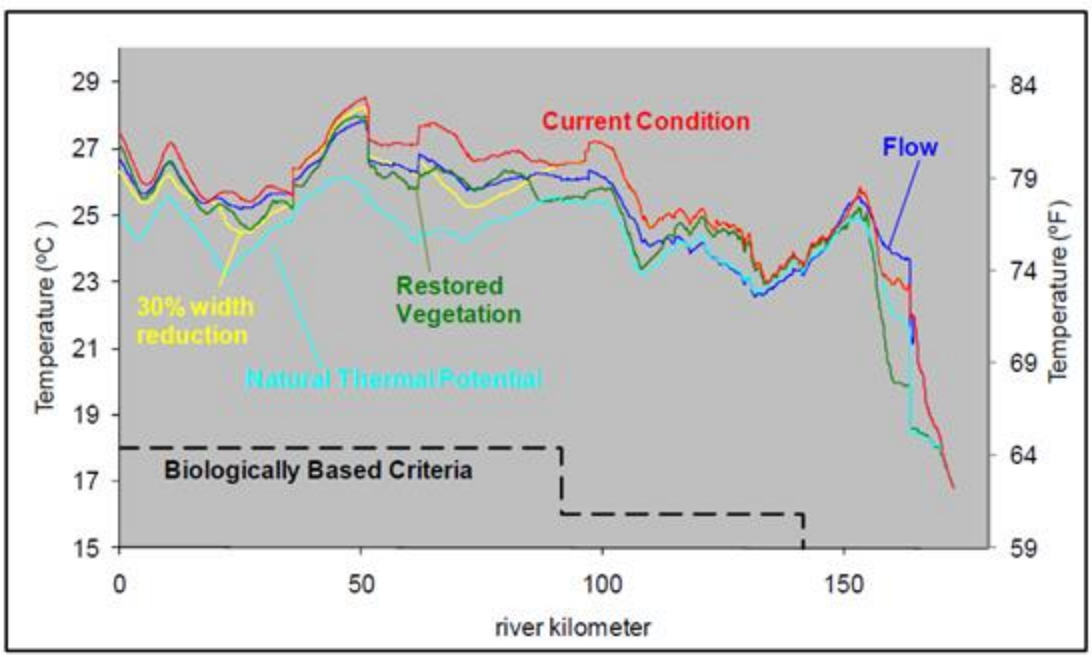

Figure 3-7. Predicted maximum 7DADM temperature profiles of the North Fork John Day River resulting from restoration scenarios during the model period, 2004. Source: DEQ, 2010. John Day River Basin TMDL Appendix B: Temperature Model Scenario Report, Figure B-18.

Other evidence supporting unattainability of Bull Trout Spawning and Juvenile Rearing Use in these waters is geographic location. Specifically, Bull Trout spawn in headwater streams and juvenile Bull

Trout rear near spawning grounds. The waters where DEQ is revising the use are lower in the watershed than where Bull Trout typically spawn; according to NHD Plus, stream order of Granite Creek and Lake Creek is 5-6 in this reach. This evidence suggests that these waters historically would not have provided spawning habitat, which likely would have been further upstream in the watershed where DEQ is retaining the use.

Desolation Creek, North Fork John Day subbasin

The USFWS changed the critical habitat designation in their final draft for a short reach of Desolation Creek from Spawning and Rearing to Foraging, Migration and Overwintering. ODFW classifies this reach as "Rearing" habitat for Bull Trout. Therefore, both fisheries agencies agree that this reach is not Bull Trout spawning habitat.

Factors supporting use unattainability

Temperature: Natural occurring temperatures greater than 12℃**.**

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The initial 2003 version of the FHD characterized these waters as Bull Trout subadult and adult rearing habitat, not spawning habitat.
- Climate Shield indicates there is no probability of Bull Trout presence in the waters where the use is being revised based on 1970-1999 conditions.
- The temperature analysis that follows indicates that these waters cannot attain 12℃ as a 7-DADM with restored conditions, indicating that they have not support Bull Trout spawning since 1975.

Demonstration that the use is unattainable

DEQ is revising the use in this reach of Granite and Long Creek and their tributaries based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use."

DEQ has concluded that this reach of Desolation Creek cannot attain the Bull Trout Spawning and Juvenile Rearing Use criterion of 12 °C under restored conditions. Desolation Creek lies entirely within Umatilla National Forest. The most recent USFS Management Plan emphasizes forest and riparian restoration.[58] There are four water rights upstream of this reach, totaling 0.6 acre-feet of storage per year. DEQ concludes these water rights would not impact stream temperature in the summer months, as they only would be used during the spring months when flow is available.

The Restored Vegetation study examined the potential impacts of restored vegetation on stream temperatures. Based on this study, mean August temperatures under restored conditions would be 14.1 - 14.5 ℃. Mean August temperatures cannot attain 12 ℃, which means that 7-DADM temperatures, which are generally a few to several degrees higher, cannot attain the criterion. As noted in the introduction to this section, the study used 10.12 ℃ (mean August temperature) as the threshold above which there was a 90% probability of exceeding 12 ℃ 7-DADM criterion. The restored temperatures are approximately four degrees higher than the threshold, indicating that restored conditions would not result in attainment of Bull Trout Spawning and Juvenile Rearing Use.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat.

Grande Ronde Basin (Figure A-2)

Catherine Creek from confluence of North and South Fork Catherine Creek to Union. The critical habitat designation of Catherine Creek was changed from SR to FMO in the final Critical Habitat Rule based on professional opinion of Paul Boehne (fish biologist, U.S. Forest Service).[59] The FHD similarly considers that this reach doesn't support spawning based on a 2021 concurrence of professional opinion between the

Factors supporting use unattainability

Temperature (primary): Natural occurring temperatures greater than 12℃.
Geographic position of habitat: Not headwater stream; stream order greater than 4.

[58] USDA Forest Service, Northwest Division. 2018. Draft Record of Decision for the Malheur, Umatilla, and Wallowa-Whitman National Forests Revised Land Management Plans.

[59] Sausen, Gretchen A. *Personal communication.* December 16, 2021.

ODFW and the Confederated Tribes of the Umatilla Indian Reservation.[60] Specifically, the concurrence of professional opinion cites the professional knowledge of the fish biologists and temperature data indicating this reach of Catherine Creek supports Bull Trout FMO use, not spawning use.

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The temperature analysis that follows indicates that these waters cannot attain 12℃ as a 7-DADM with restored conditions, indicating that they never supported Bull Trout spawning.
- The FHD characterizes these waters as supporting Bull Trout foraging, migration and overwintering habitat, not spawning habitat.
- Climate Shield does not indicate any probability of Bull Trout presence in the waters where the use is being revised based on 1970-1999 conditions.

Demonstration that the use is unattainable

DEQ is revising the use in this reach of Catherine Creek and its tributaries based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use." To analyze attainability of the Bull Trout Use, DEQ extrapolated modeled temperatures from the NoRWeST stream temperature model. Initially, DEQ compared measured annual maximum 7-DADM temperatures with annual modeled maximum 7-DADM temperatures to determine if modeled temperatures differed significantly. Based on measured data taken from this reach, modeled 7-DADM temperatures overestimate measured temperature by an average of 1.2 ℃. The NorWeST model, indicates that current 7-DADM temperatures, based on 1993-2011 data, range from 21.0 ℃ in the upper reach of Catherine Creek to 25.2 ℃ at the lower reach. For this analysis, DEQ has subtracted modeled temperatures by 1.2 ℃ to account for uncertainty.

DEQ extrapolated modeled NTP results from the Upper Grande Ronde River Basin temperature TMDL to the NorWest temperatures to examine if the Bull Trout Spawning and Rearing Criterion of 12℃ is attainable. The TMDL modeled natural thermal potential temperatures in the Upper Grande Ronde River from its headwaters to River Mile 80. The NTP scenario incorporated restored vegetation, flow and channel morphology and compared the resulting temperatures to current temperatures (Figure 3-8).

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[60] Bowers, J. 2021. RefID 53798. https://docs.cbfwl.org/StreamNet_References/ORsn53798.pdf. Visited March 7, 2023.

In the lower reaches of where DEQ is revising the use, from the town of Union to Brinker Creek, the predominate land use and cover is agriculture and grassland (Figure 3-9). 7-DADM temperatures in this reach, adjusted by 1.2 ℃ to account for uncertainty in the model, range from 21.4 ℃ at the upper portion of this reach to 23.2 ℃ at the lower portion of this reach. In this reach, potential impacts of restoration of shade, channel morphology and flow would likely be similar to the Grand Ronde River at the mouth of Catherine Creek, which has similar land use. In the Upper Grand Ronde TMDL, DEQ approximated the difference between NTP temperature and the currently modeled temperature to be approximately 15 ℉, or approximately 8.3 ℃, which is the approximate difference between NTP and the modeled temperature in the Grand Ronde River at the mouth of Catherine Creek (see Figure 3-8). Conservatively, DEQ extrapolated 8.3 ℃ as the maximum potential difference between current modeled temperatures and NTP in this portion of Catherine Creek. A decrease of 8.3 ℃ would result in a 7-DADM temperature of 13.1 ℃ at the upper end of this reach and 14.9℃ at the lower end. Based on this information, even with conservative assumptions that may overstate the potential temperature reduction, this reach would not be able to attain 12 ℃ under natural conditions.

In the upper reaches of Catherine Creek, upstream of Brinker Creek, the predominant land type is conifer forest (Figure 3-9). 7-DADM temperatures in this reach, adjusted by 1.2 ℃ to account for uncertainty in the model, range from 20.8 ℃ at the upper portion of this reach to 21.1 ℃ at the lower portion. In this reach, potential impacts of restoration are likely similar to the upper 20 miles of the Grand Ronde River, which lies in forest land. In the Upper Grand Ronde TMDL, the difference between temperature and the currently modeled temperature in this area is a maximum of approximately 10 ℉, or approximately 5.6 ℃, in the forested area around RM 159 (Figure 3-8). Conservatively, DEQ extrapolated 5.6 ℃ as the maximum potential difference between current modeled temperatures and NTP in this portion of Catherine Creek.[61] A decrease of 5.6 ℃ would result in a 7-DADM temperature of 15.2 ℃ at the upper end of this reach and 15.5℃ at the lower end. These results indicate that these waters cannot naturally attain the 12 ℃ criterion associated with the Bull Trout Spawning and Juvenile Rearing Use.

[61] The model estimated differences between current conditions and site potential conditions on a single day, August 20, 1999. DEQ expects that differences between current and system potential temperatures expressed as a 7-DADM would be somewhat lower, as taking an average temperature over a week would decrease the effect of temperatures at the extreme. Thus, extrapolating model results for one day would overestimate the actual difference between current and system potential temperatures for a week.

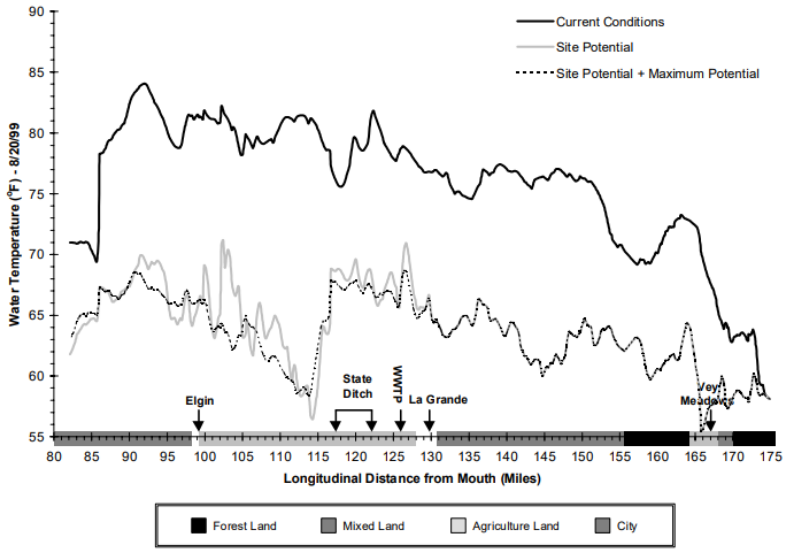

Figure 3-8. Predicted temperature profiles of the Grande Ronde River resulting from scenarios during the model period, 1999. Source: DEQ, 2000. Upper Grande Ronde River Basin TMDL, Appendix A: Temperature Scenarios. P. A-93.

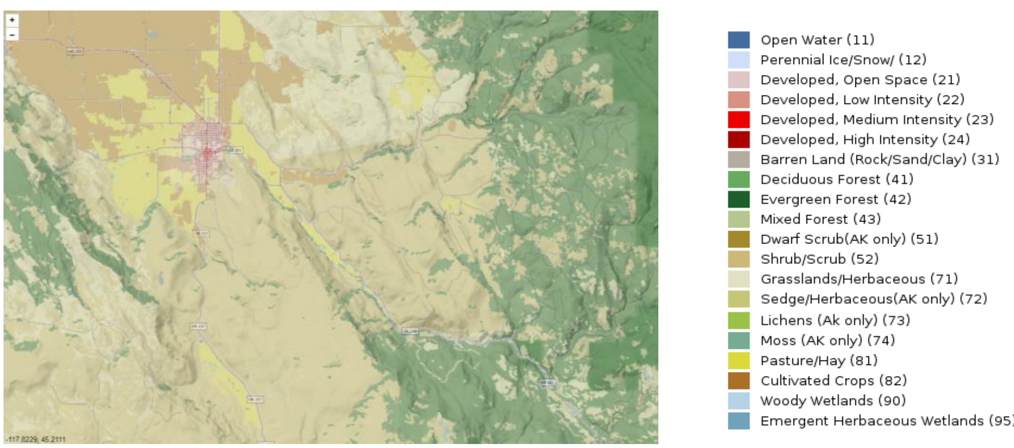

Figure 3-9. Land Cover, Catherine Creek. Data from 2011 CONUS Land Cover Dataset, National Land Cover Database. https://www.mrlc.gov/viewer/.

Other evidence supporting unattainability of Bull Trout Spawning and Juvenile Rearing Use in these waters is geographic location. Specifically, Bull Trout spawn in headwater streams (typically in stream order 4 or less) and juvenile Bull Trout rear near spawning grounds. The waters where DEQ is revising the use are lower in the watershed than where Bull Trout typically spawn; according to NHD Plus, the stream order of Catherine Creek is 6 in this reach (Figure 3-10). This evidence suggests these waters historically would not have provided spawning habitat, which likely would have been further upstream in the watershed where DEQ is retaining the use; this is consistent with FHD data and USFWS designation of these waters as supporting FMO use.

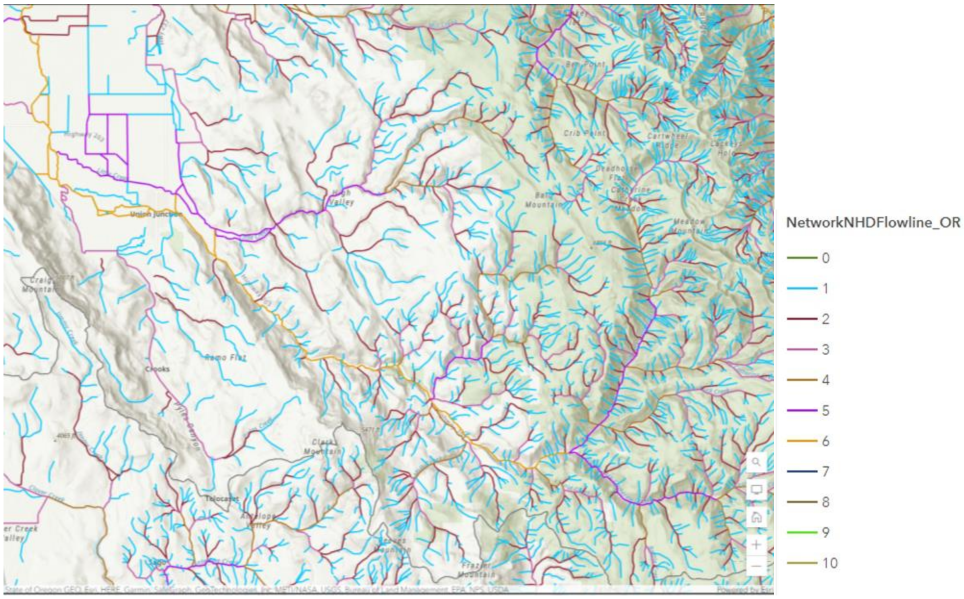

Figure 3-10. Stream order, Catherine Creek. Data from NHD Plus.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation for tributaries to the reach of Catherine Creek where DEQ is revising the Bull Trout Spawning and Juvenile Rearing Use. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout spawning and Juvenile Rearing use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for this reach of Catherine Creek, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout Spawning Use from each of these reaches together with its tributaries as a unit.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat as well as other cold water species.

Factors supporting use unattainability

Temperature: Naturally occurring temperatures exceed 12 ℃.

Lookingglass Creek and Little Lookingglass Creek, Upper Grande Ronde subbasin. The critical habitat designation of the lower portion of Lookingglass Creek and Little Lookingglass Creek was changed from SR to FMO in the final Critical Habitat Rule based in part on the professional opinion of the U.S. Forest Service.[62]

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The temperature analysis that follows indicates that these waters cannot attain 12℃ as a 7-DADM with restored conditions, indicating that they have not supported Bull Trout spawning since 1975.
- The ODFW FHD does not characterize these waters as supporting spawning habitat. This is consistent with the final USFWS Critical Habitat rule, which designates these waters as critical habitat for FMO use, not spawning use.
- Climate Shield indicates there is no probability of Bull Trout presence in these waters based on 1970-1999 conditions.

Demonstration that the use is unattainable

DEQ is revising the use in reaches of Lookingglass Creek and Little Lookingglass Creek based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use." To analyze attainability of the Bull Trout Use, DEQ utilized modeled temperatures from the NoRWeST stream temperature model.

The Forest Service has collected multiple years of temperature data from two locations in Lookingglass Creek upstream of the reach where DEQ is proposing to revise the use. DEQ compared measured annual maximum 7-DADM temperatures with annual modeled maximum 7-DADM temperatures in NoRWeST to determine if modeled temperatures differed significantly. Based on measured data taken from this reach, modeled 7-DADM temperatures overestimate measured temperature by an average of 1.0 ℃. For this analysis, DEQ has subtracted modeled temperatures by 1.0 ℃ to account for uncertainty in the NoRWeST model. The NorWeST model indicates 7-DADM temperatures range from 17.0 ℃ in the upper

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[62] USFWS 2010. Bull Trout Critical Habitat Final Rule Justification. Idaho Fish and Wildlife Office, Boise, Idaho, Pacific Region, Portland, OR. 1035 pp. See page 447.

reach of Little Lookingglass Creek, 16.8 ℃ at the confluence of Lookingglass and Little Lookingglass Creeks and 19.5 ℃ at the mouth.

Consumptive water use is minimal in Lookingglass Creek, totaling 0.08 cfs, less than 0.2% of 80% exceedance monthly flow in August. As a result, flow restoration would have little impact on stream temperatures and the only likely cooling would come from restored shade.

No modeling has been done to examine the impact of restored shade on Lookingglass Creek. The Restored Vegetation Study did not conduct modeling in the Grand Ronde watershed; however, the study did model impacts of restored vegetation in neighboring sub-watersheds of the Umatilla and Walla Walla Rivers. In order to estimate the cooling that could be achieved, DEQ examined the 2011 National Land Cover Database layer to identify nearby watersheds similar to that of Lookingglass Creek where the impact of restored vegetation has been modeled.

Throughout the Lookingglass Creek watershed, the predominant land cover is evergreen forest, including throughout the riparian corridor (Figure 3-11). The upper portion of nearby watersheds including the North and South Forks of the Walla Walla River and the upper Umatilla River (including the North and South Forks of the Umatilla River) have similar land types and canopy cover. DEQ analyzed results from the Restored Vegetation study in portions of these waters directly downstream from those in National Forests, similar to the reach where DEQ is revising the use in Lookingglass Creek. This includes the North Fork Walla Walla River from upstream of Big Meadow Canyon downstream to its confluence with the South Fork Walla Walla River; the South Fork Walla Walla River from upstream of Bear Trap Canyon to the same confluence; and the Umatilla River from just upstream of Bear Creek to Meacham Creek. DEQ calculated the difference between current mean August temperatures and restored mean August temperatures for all segments in these three reaches. DEQ then calculated the 90^{th} percentile of the difference for all segments (n=46). The 90^{th} percentile is approximately 1.1 ℃. Conservatively, DEQ used this to assess the amount that Lookingglass Creek could be cooled through restored shade. Based on this assumption, restored shade on Lookingglass Creek would result in mean August temperatures of 10.5 ℃ at the upper end, 10.0 ℃ downstream of Little Lookingglass Creek and 12.2 ℃ at the mouth.

The Restored Vegetation Study used a threshold of 10.1 ℃ as the mean August temperature above which there was a 90% chance of exceeding the 12 ℃ 7-DADM criterion in the mid-Columbia region. Thus, throughout this reach, except for a small segment downstream of Little Lookingglass Creek, using conservative assumptions, restored shade conditions would result in temperatures higher than this threshold. In the remaining segment, the restored temperature is just below this threshold, indicating that there’s still a very high likelihood that restored temperatures cannot attain the Bull Trout Spawning and Juvenile Rearing Use.

The Lookingglass Fish Hatchery discharges water to this reach of Lookingglass Creek and must comply with temperature limits through the 300J NPDES permit administered by DEQ.[63] DEQ examined whether the Hatchery Discharge might contribute to water temperatures in excess of the Bull Trout criterion. In 2016, ODFW collected continuous temperature data including discharge data and ambient data upstream of its discharge to Lookingglass Creek between April and October. During most of the day, including during times when ambient temperatures were at their peak (typically between 3 and 4 pm), the hatchery discharge temperature was cooler than ambient stream temperatures (Figure 3-12). Discharge temperatures were warmer than ambient temperatures by a maximum of 0.48 °C in July and August, and only in the late afternoon or evening when stream temperatures had decreased. Based on this information, DEQ concludes that hatchery operations do not increase maximum 7-DADM temperatures in Lookingglass Creek. Based on this information, DEQ concludes that the Bull Trout Spawning and Juvenile Rearing Use is unattainable.

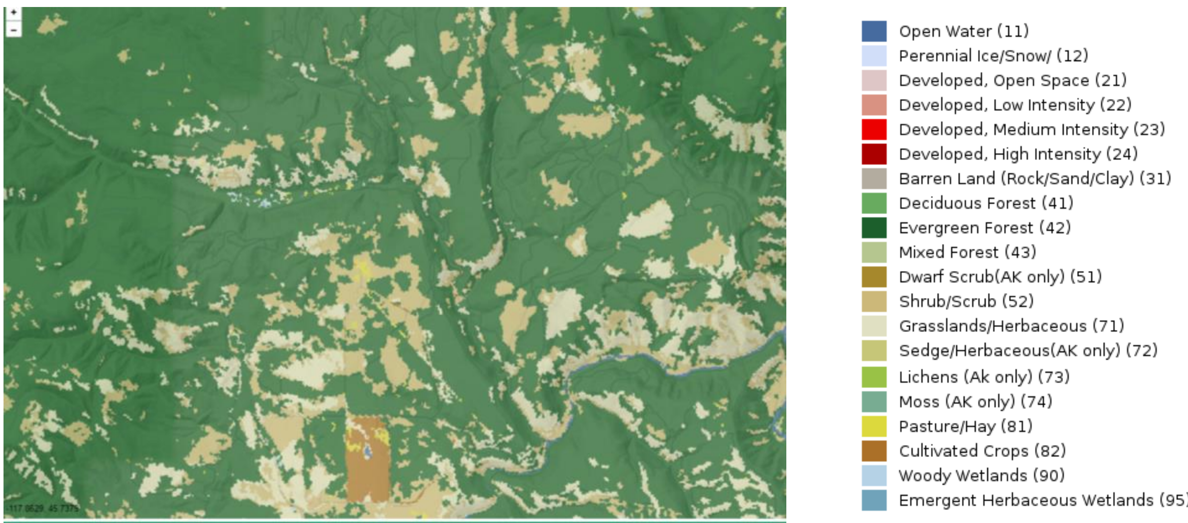

Figure 3-11. Land Cover, Lookingglass and Little Lookingglass Creeks. Data from 2011 CONUS Land Cover Dataset, National Land Cover Database. https://www.mrlc.gov/viewer/.

63 ODEQ, 2002. General Permit 300-J. Available at: https://www.oregon.gov/deq/FilterPermitsDocs/300jpermit.pdf.

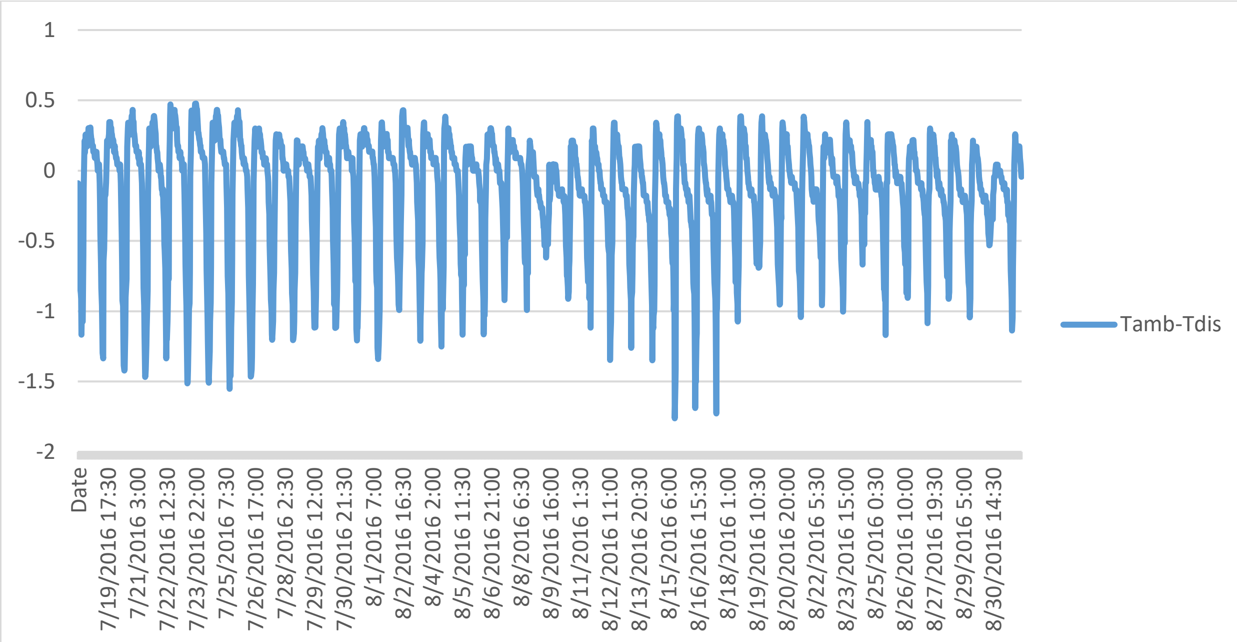

Figure 3-12. Difference between Lookingglass Creek hatchery discharge temperatures and ambient temperatures in Lookingglass Creek, July and August 2016. Data provided by ODFW.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat as well as other cold water species.

Factors supporting use unattainability
Temperature: Naturally occurring temperatures exceed 12 ℃.

Crooked Creek, Wenaha subbasin. The critical habitat designation of the lower portion of Crooked Creek was changed from SR to FMO in the final Critical Habitat Rule based in part on professional opinions of Greg Mendel, former fish biologist with the Washington State Department of Fish and Wildlife, and Paul Sankovich, fish biologist with the U.S. Fish and Wildlife Service.[64]

[64] *Pers. Comm.*, Gretchen Sausen, USFWS La Grande Field Office, Dec. 15, 2021, citing conversation with Glen Mendel and Paul Sankovich that occurred on Aug. 24, 2010.

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The temperature analysis that follows indicates that these waters cannot attain 12℃ as a 7-DADM with restored conditions, also indicating that they have not supported Bull Trout spawning since 1975.
- The ODFW FHD characterizes these waters as migration habitat, not spawning habitat. This is consistent with the final USFWS Critical Habitat rule, which indicates that these waters support FMO use, not spawning use.
- Buchanan, et al. (1997) reported that a 1996 redd count and fish observation survey found no redds or Bull Trout in the Oregon portion of Crooked Creek but did find fish and redds further upstream in the Washington portion of Crooked Creek.
- Climate Shield indicates no probability of Bull Trout presence in the waters where the use is being revised based on 1970-1999 conditions.

Demonstration that the use is unattainable

DEQ is revising the use in this reach of Crooked Creek based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use." To analyze attainability of the Bull Trout Use, DEQ utilized modeled temperatures from the NoRWeST stream temperature model.

Crooked Creek lies within the Wenaha-Tucannon Wilderness area. The area is managed for low impact wilderness. There does not appear to be any anthropogenic influence in the watershed. The Oregon portion of Crooked Creek runs through a narrow canyon. Vegetative cover in this canyon seems limited, but that appears to be a natural condition of the watershed.

The NorWeST model, indicates that current mean August temperatures range from 15.3 – 15.8 ℃ in the small segment of Crooked Creek where the use is being revised. The Restored Vegetation Study used a threshold of 10.1 ℃ as the mean August temperature above which there was a 90% chance of exceeding the 12 ℃ 7-DADM criterion. Thus, in order for the Bull Trout Spawning and Juvenile Rearing criterion to be attainable, restoration would need to decrease mean August temperatures in this reach by 5 ℃. The Restored Vegetation study found that maximum potential cooling was 2 ℃ as a mean August temperature throughout the study area. Even assuming maximum cooling, temperatures of Crooked Creek could not be sufficient to attain the Bull Trout Spawning and Juvenile Rearing Use.

Highest attainable use

The highest attainable use for Crooked Creek is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat as well as other cold water species.

Deer Creek, Wallowa Subbasin. The critical habitat designation of a small portion of Deer Creek was changed from SR to FMO in the final Critical Habitat Rule.

> **Factors supporting use unattainability**
>
> **Temperature:** Naturally occurring temperatures exceed 12 ℃.

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The temperature analysis that follows indicates that these waters cannot attain 12℃ as a 7-DADM with restored conditions, indicating that they never supported Bull Trout spawning.
- The ODFW FHD characterizes these waters as primarily rearing (e.g., adult rearing) habitat with some migration habitat, not spawning habitat. This is consistent with the final USFWS Critical Habitat rule, which indicates that these waters support FMO use, not spawning use.
- Buchanan, et al. (1997) indicates that this reach of Deer Creek is migratory habitat for Bull Trout.
- Climate Shield does not indicate any probability of Bull Trout presence in the waters where the use is being revised based on 1970-1999 conditions.

Demonstration that the use is unattainable

DEQ is revising the use in a small reach of Deer Creek and an unnamed tributary to Deer Creek based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use." To analyze attainability of the Bull Trout Use, DEQ utilized modeled temperatures from the NoRWeST stream temperature model.

This reach of Deer Creek begins on the border of where the Wallowa National Forest transitions to private land.

The NorWeST model indicates that current 7-DADM temperatures range from 16.0 – 16.9 ℃ in the reach of Deer Creek where the use is being revised; mean August temperatures range from 11.4 to 12.1 ℃. There do not appear to be any water rights on Deer Creek within or upstream of this reach. Thus, the only opportunity for cooling is through restoration of vegetation. In order to attain the Bull Trout Spawning and Juvenile Rearing criterion, any restoration must decrease 7-DADM temperatures in this reach by 4-5 ℃, or mean August temperatures by 1.3 to 2.0 ℃ to attain the 10.1 ℃ threshold above which there is a greater than 90% probability of exceeding the criterion. However, 2011 land cover data indicates that land cover is primarily evergreen forest throughout this area including in the riparian corridor (Figure 3-13). The Restored Vegetation study did not model impact of restored vegetation in this area. However, the modeled impact of restored vegetation in similarly shaded areas was less than 1 ℃, indicating that restored vegetation would not be sufficient to cool waters sufficiently in Deer Creek to attain the criterion. As a result, DEQ concludes that the Bull Trout Spawning and Juvenile Rearing Use is unattainable in the Oregon portion of Deer Creek.

Figure 3-13. Land cover, Deer Creek area, 2011. Data from National Land Cover Database. Dark Green indicates forest cover, dark tan is shrub/scrub cover; yellow line indicates reach of Deer Creek where DEQ is revising Bull Trout Spawning and Juvenile Rearing Use.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to an unnamed tributary to Deer Creek. Consistent with the decision rules used in 2003, this tributary was designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for this reach of Deer Creek, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout Spawning Use from each of these reaches together with its tributaries as a unit.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use has a temperature criterion of 16°C as a 7-DADM to protect sub-adult and adult Bull Trout use and FMO critical habitat as well as other cold water species.

Malheur Basin (Figure A-3)

Factors supporting use unattainability
Temperature: Naturally occurring temperatures exceed 12 ℃.

Little Malheur River and tributaries. USFWS agreed to propose the Little Malheur from its headwaters to its confluence with Camp Creek as critical habitat for spawning and rearing in response to public comments. However, upon further analysis, USFWS biologists determined this was not critical habitat. USFWS was not able to provide DEQ specific data or documents supporting their decision.[65]

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The FHD does not indicate that these waters have current or historical Bull Trout use.
- Buchanan et al. (1997) only notes sporadic presence of Bull Trout in these waters outside of spawning season (see below).
- The temperature of these waters do not support Bull Trout Spawning and Juvenile Rearing, as demonstrated in the following section.

In documenting the distribution of Bull Trout in the Malheur Basin, Buchanan, et al. (1997) note populations in the North and South Forks of the Malheur River, but not in the Little Malheur.[66] Two radio tagged Bull Trout were tracked one kilometer into the Little Malheur River in May or early June of 1998 and 1999, after which they returned to the North Fork Malheur River.[67] This presence indicates use of the Little Malheur as FMO habitat, meaning Core Cold Water Use is the appropriate use. DEQ's 2002 Bull Trout technical work group, which included members from ODFW, USFWS, the U.S. Forest Service, the Burns Paiute Tribe, the Bonneville Power Administration and the Bureau of Reclamation, did not identify these waters as either current or potential Bull Trout spawning habitat.

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[65] Gunckel, Stephanie. *Personal communication.* March 18, 2021.

[66] Buchanan, D.V., M. L. Hanson and R. M. Hooton. 1997. Technical Report: Status of Oregon's Bull Trout. U.S. Bonneville Power Administration, Report Number DOE/BP-34342-5. See pp. 139 and forward.

[67] Schwabe, L., M. Tiley and R. Perkins. 2000. Malheur River Basin Cooperative Bull Trout/Redband Trout Research Project, FY1999 Annual Report. Report to Bonneville Power Administration, Contract No. 00006313, Project No. 199701900, 120 pp. (BPA Report DOE/BP-00006313-1).

Demonstration that the use is unattainable

DEQ is revising the use in the upper Little Malheur River from its headwaters its confluence with Camp Creek, and tributaries to that reach of the river based on 40 CFR 131.10(g), Factor 1: "Naturally occurring pollutant concentrations prevent attaining the use." The Little Malheur River is fed primarily by snowmelt and thus has high temperatures relative to the headwaters of the North Fork and mainstem Malheur River, which are spring-fed.[68] Spring-dominated streams tend to have more stable, colder temperatures than snowmelt-dominated streams.[69] As a result of these higher temperatures, the Little Malheur does not support Bull Trout Spawning and Juvenile Rearing Use.

Modeled current mean August temperatures according to the NoRWeST model range from 9.5 ℃ at the headwaters of the Little Malheur River to 15.9 ℃ at the confluence of Camp Creek. As indicated in Table 3-4, observed 7-DADM temperatures exceed the Bull Trout Spawning and Juvenile Rearing criterion by 10 degrees or more.

Based on information in the National Land Cover database, forest canopy has yet to recover from a fire in 2002 (Figure 3-14). Because tree canopy (based on 2011 NLCD data) is a variable in the NoRWeST model, DEQ analyzed observed temperatures to determine if current NoRWeST modeled temperatures might be elevated due to the lack of tree canopy. Based on the data, it does not appear that the fire had a significant effect on stream temperatures. Stream temperatures in the Little Malheur near Hunter Creek (approximately RM 6) appear stable before and after the wildfire. Thus, DEQ has concluded that NoRWeST temperatures accurately represent pre-fire conditions.

DEQ anticipates no effects from water withdrawals, which do not occur in the upper reaches of the Little Malheur[70], or from channel modification, as these waters occur in headwater areas that have not likely been modified. Thus, the only likely cooling would come from vegetation restoration. No direct modeling has been done on the impacts of vegetation restoration on the Little Malheur River. However, the Restored Vegetation Study modeled impacts in the neighboring John Day watershed. DEQ examined the difference between modeled current and restored temperatures in the upper John Day watershed and its tributaries between the headwaters and Reynolds Creek. DEQ limited the analysis to waters in National Forests, as these would be most similar to that of the Little Malheur River. In these waters, the

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[68] *Pers. Comm.,* Dave Banks, District Biologist, Malheur District, Oregon Department of Fish and Wildlife, June 20, 2023.

[69] Lusardi, R.A.; Nichols, A.L.; Willis, A.D.; Jeffres, C.A.; Kiers, A.H.; Van Nieuwenhuyse, E.E.; Dahlgren, R.A. Not All Rivers Are Created Equal: The Importance of Spring-Fed Rivers under a Changing Climate. Water 2021, 13, 1652.

[70] Oregon Department of Environmental Quality. 2010. Malheur River Total Maximum Daily Load.

largest difference between modeled current and restored temperatures was 1.3 ℃, on the John Day River upstream of Call Creek. Conservatively, DEQ used this difference to evaluate potential impacts of restored vegetation on this segment of the Little Malheur. The Restored Vegetation Study used 10.1 ℃ as the mean August threshold at which there is a 90% chance of exceeding a 12 ℃ 7-DADM criterion. Assuming that restored vegetation could cool the Little Malheur by 1.3 ℃, current modeled temperatures would need to be below 11.4 ℃ to have more than a 10% chance of attaining the criterion. The only portion of the Little Malheur River below this temperature is in the headwaters, upstream of Elk Flat Creek. This evidence indicates that stream temperatures under natural conditions exceeds the Bull Trout Spawning and Juvenile Rearing Criterion in all but the headwaters, using conservative assumptions.

Table 3-4. Observed temperature data, Little Malheur River (data from NoRWeST database).

Location	Year	Observed 7-DADM Temperature (℃)
Little Malheur River upstream of Hunter Creek	2000	22.6
Little Malheur River upstream of Hunter Creek	2001	22.1
Little Malheur River upstream of Hunter Creek	2002	22.5
Little Malheur River upstream of Hunter Creek	2005	22.1
Little Malheur River upstream of Hunter Creek	2006	22.1
Little Malheur River upstream of Hunter Creek	2007	23.9
Little Malheur River upstream of Camp Creek	2011	21.5
Camp Creek at mouth	2003	25.7
Camp Creek at mouth	2004	25.5
Camp Creek at mouth	2005	24.4
Camp Creek at mouth	2006	25.2
Camp Creek at mouth	2007	25.9
Camp Creek at mouth	2008	23.3
Camp Creek at mouth	2010	23.3
Camp Creek at mouth	2011	22.7

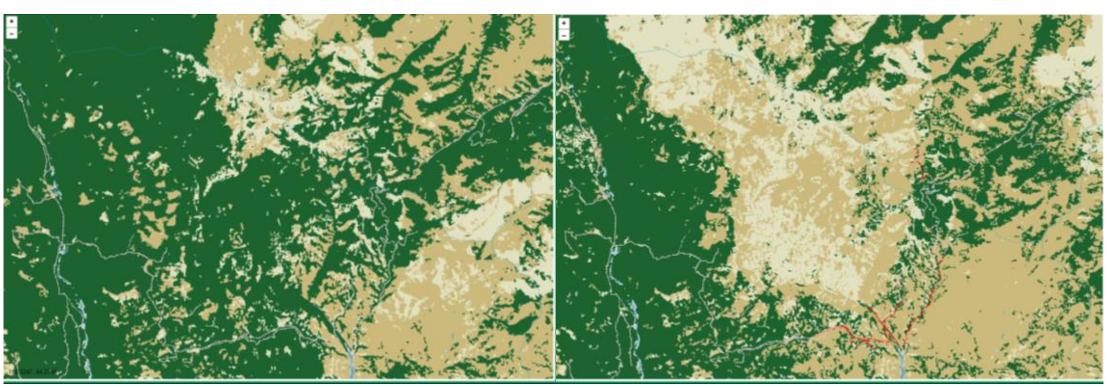

Figure 3-14. Land cover, upper Little Malheur River basin, 2001 and 2019. Data from National Land Cover Database. Dark Green indicates forest cover, dark tan is shrub/scrub cover; light tan is grassland/herbaceous cover.The Little Malheur River generally runs from the northwest of the map towards the bottom center in the area that was impacted by a 2002 fire.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to tributaries of this reach of the Little Malheur River, including the headwaters of the river itself. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for this reach of the Little Malheur River, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout Spawning Use from each of these reaches together with its tributaries as a unit.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat.

Umatilla Basin (Figure A-4)

Meacham Creek and tributaries from upstream of Line Creek to the confluence of Meacham Creek and North Fork Meacham Creek. USFWS designated this area as critical habitat for FMO use because "the maintenance of a migratory corridor to the Umatilla River is critical to the viability of the local Bull Trout population in North Fork Meacham Creek. If restored, Meacham Creek could serve as an adult overwintering habitat in the future."[71] In the final critical habitat rule, USFWS has identified this

Factors supporting use unattainability
Temperature (primary): Natural occurring temperatures exceed 12℃. **Geographic Position of habitat:** Not a headwater stream; stream order greater than 4.

[71] USFWS 2010. Bull Trout Critical Habitat Final Rule Justification. Idaho Fish and Wildlife Office, Boise, Idaho, Pacific Region, Portland, OR. 1035 pp. Discussion of streams included as FMO habitat in the Upper Willamette Critical Habitat Unit start on p. 217.

reach as having the physical characteristics for FMO use, but not for spawning use.

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The FHD does not indicate that the lower portion of these waters have current or historical Bull Trout Use. The FHD characterizes the upper portion as historical habitat, but not specifically historical habitat for spawning Bull Trout. Other evidence listed below indicates that the upper portion was historically habitat for migration, not spawning and juvenile rearing.
- Buchanan et al. (1997) characterizes these waters as supporting migrating Bull Trout, not spawning, rearing or resident Bull Trout.
- Climate Shield does not indicate any probability of Bull Trout presence in the waters where the use is being revised based on 1970-1999 conditions.
- The temperature analysis that follows indicates that these waters cannot attain 12℃ as a 7-DADM with restored conditions.
- The geographic location of these waters is outside of headwater reaches of the stream, where Bull Trout typically spawn; stream order of Meacham Creek in this reach is 7, which is well outside the typical stream order where Bull Trout spawn.

Demonstration that the use is unattainable

DEQ is revising the use in this reach of Meacham Creek and its tributaries based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use."

DEQ has concluded that natural occurring temperatures in this reach of Meacham Creek cannot attain 12 °C as a 7-DADM temperature. DEQ has made this conclusion based on multiple lines of evidence including results from the Restored Vegetation Study and extrapolation of results from the Umatilla River TMDL.

Weekly maximum temperatures in this reach of Meacham Creek according to the NorWeST model, from 24.0 °C at the upper reach to 25.6 °C at the lower reach. Mean August temperatures range from 16.8-18.7 °C in this reach. The Restored Vegetation Study used 10.1 ℃ as the mean August threshold at which there is a 90% chance of exceeding a 12 ℃ 7-DADM criterion. In order to attain the criterion exclusively through restoration of shade, mean August temperatures in Meacham Creek would need to decrease by 6.7- 8.6 ℃. Under the restored vegetation studies, the maximum temperature decrease throughout the Mid-Columbia study area was approximately 2 ℃. As a result, DEQ has concluded that Meacham Creek would not attain the Bull Trout Spawning and Juvenile Rearing criterion exclusively through vegetation restoration.

A few water rights exist on Meacham Creek within and upstream of this reach. Data from the Oregon Water Availability Reporting System indicates that consumptive water rights on Meacham Creek are *de minimis*. Median consumptive use in July and August is 0.24 and 0.20 acre-feet, respectively. This is equivalent to 1.8% and 2.3% of flow (based on 80% exceedance) or 1.2% and 1.9% of median flow in cfs.[72] Because consumptive use during July and August are *de minimis*, the potential impact of restoring these consumptive flows to Meacham Creek on stream temperature will be minimal. Thus, Meacham Creek also would not attain the Bull Trout Spawning and Juvenile Rearing criterion through a combination of vegetation restoration and restoration of stream flow.

Other evidence supporting unattainability of Bull Trout Spawning and Juvenile Rearing Use in these waters is geographic location. Specifically, Bull Trout spawn in headwater streams (typically in stream order 4 or less) and juvenile Bull Trout rear near spawning grounds. The waters where DEQ is revising the use are lower in the watershed than where Bull Trout typically spawn; according to NHD Plus, stream order of Meacham Creek is 7 in this reach (Figure 3-15). This evidence suggests that these waters historically would not have provided spawning habitat, which likely would have been further upstream in the watershed where DEQ is retaining the use; this is consistent with FHD data and USFWS designation of these waters as supporting FMO use.

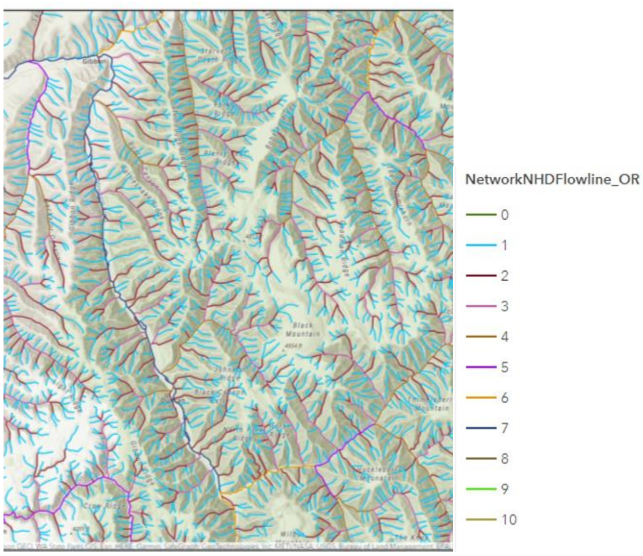

Figure 3-15. Stream order, Meacham Creek. Data from NHD Plus.

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[72] Data from Oregon Water Availability Reporting System. https://apps.wrd.state.or.us/apps/wars/wars_display_wa_tables/MainMenu1.aspx. Accessed October 12, 2023.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to tributaries of this reach of Meacham Creek. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for this reach of Meacham Creek, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout Spawning Use from each of these reaches together with its tributaries as a unit.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat.

Willamette Basin (Figure A-5)

Middle Fork Willamette River and its tributaries from Swift Creek to Hills Creek Lake. The FHD indicates that the Middle Fork Willamette River and its tributaries from Swift Creek downstream to Hills Creek Lake are primarily rearing, with some migration, rather than supporting spawning habitat. Bull Trout Working Group members indicated these waters were too warm to support Bull Trout spawning. DEQ is retaining the Bull Trout Spawning and Juvenile Rearing Use in the MF Willamette River and its tributaries upstream of Swift Creek, as well as in Echo, Noisy and Staley Creek, as discussed below.

> **Factors supporting use unattainability**
>
> **Temperatures:** Natural occurring temperatures exceed 12 °C.
> **Geographic Position of Habitat:** not in headwater reaches; stream order of 6.

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The FHD characterizes these waters as rearing habitat (i.e., for adults and subadults), not spawning habitat, for Bull Trout.
- The Climate Shield model indicates there was no probability of Bull Trout occupancy of these waters based on 1970-1999 conditions.

- The physical conditions of these waters (specifically, geographic location) do not support Bull Trout Spawning and Juvenile Rearing, as demonstrated in the following section.

DEQ is maintaining the Bull Trout Spawning and Juvenile Rearing Use in the following streams based on Climate Shield data, which indicates at least some probability of Bull Trout occurrence in these streams based on modeled 1970-1999 conditions: Echo Creek, Noisy Creek and upstream portions of Staley Creek.

Demonstration that use is unattainable

DEQ is revising the use in portions of the Middle Fork Willamette River and its tributaries based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use." Current temperatures of this reach of the Middle Fork Willamette River do not attain 12 ℃ throughout the summer and evidence indicates that any cooling that could be achieved through restoration would not result in attainment of 12 ℃. DEQ has based these conclusions on information from the Restored Vegetation Study in combination with information from the 2006 Willamette Basin TMDL.

DEQ examined observed temperatures found in the NoRWeST stream temperature database to evaluate attainability of the 12 ℃ Bull Trout Spawning Use Criterion (Table 3-5). As indicated in the table, between 2000-2011, observed 7-DADM temperatures averaged 14.5 ℃ at the upstream portion of this reach, near Staley Creek from 2000-2011 and 18.4 ℃ at the downstream portion, near Gold Creek. Mean August temperatures from the NoRWeST model ranged from 10.7 ℃ at the upper end of the reach to 14.2 ℃ at the lower end. Thus, in order to attain the Bull Trout Spawning and Juvenile Rearing criterion of 12 ℃, any potential restoration would need to reduce temperature by an average of 2.5 ℃ as a 7-DADM at the upper end of this reach and by more than 6 ℃ at the lower end.

This portion of the Middle Fork Willamette River lies entirely in the Willamette National Forest, where forest harvest is limited by the Northwest Forest Plan and where there are almost no water diversions. Consumptive use on the Middle Fork Willamette River above its confluence with the NF MF Willamette River is less than 0.5% of expected streamflow in July and August[73]. As a result, any temperatures is likely to come solely from vegetation restoration.

DEQ calculated that the difference between current shade conditions in the Middle Fork Willamette River and system potential shade conditions is 10.7%.[74] As a result, potential cooling by vegetation restoration is limited. This is supported by the Restored Vegetation study. Results from the study

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[73] https://apps.wrd.state.or.us/apps/wars/wars_display_wa_tables/MainMenu1.aspx.

[74] Oregon Department of Environmental Quality. 2006. Willamette Basin Total Maximum Daily Loads. Appendix C: Temperature. See Pace C-139.

indicates that restored vegetation would cool this portion of the Middle Fork Willamette River by less than 1 °C as a mean August temperature. The results indicate that cooling would attain a mean August temperature of approximately 10.2 °C at the upper end of this reach and 14.0 °C at the lower end. The Restored Vegetation Study used 10.7 °C as the mean August threshold at which there is a 90% chance of exceeding a 12 °C 7-DADM criterion. Thus, there is some possibility that the upper segments of this reach, upstream of Staley Creek, may attain 12 °C in years with cooler air temperatures, but the criterion is unlikely to be consistently attainable.

Table 3-5. 7-DADM temperatures, Middle Fork Willamette River

Location	Year	Observed 7-DADM Temperature (°C)
Middle Fork Willamette River near Staley Creek	2000	14.3
Middle Fork Willamette River near Staley Creek	2002	15
Middle Fork Willamette River near Staley Creek	2004	14.7
Middle Fork Willamette River near Staley Creek	2005	14.9
Middle Fork Willamette River near Staley Creek	2006	15.1
Middle Fork Willamette River near Staley Creek	2008	12.9
Middle Fork Willamette River near Staley Creek	2009	13.9
Middle Fork Willamette River near Staley Creek	2010	13.6
Middle Fork Willamette River near Staley Creek	2011	16.5
Middle Fork Willamette River near Simpson Creek	2003	15.7
Middle Fork Willamette River near Simpson Creek	2011	13.2
Middle Fork Willamette River near Fir Creek	2002	16.9
Middle Fork Willamette River near Cone Creek	2000	18.5
Middle Fork Willamette River near Gold Creek	2000	18.2
Middle Fork Willamette River near Gold Creek	2001	18.8
Middle Fork Willamette River near Gold Creek	2007	20
Middle Fork Willamette River near Gold Creek	2010	18.4
Middle Fork Willamette River near Gold Creek	2011	16.5

Other evidence supporting unattainability of Bull Trout Spawning and Juvenile Rearing Use in these waters is geographic location. Specifically, Bull Trout spawn in headwater streams (typically in stream order 4 or less) and juvenile Bull Trout rear near spawning grounds. The reaches of waters where DEQ is revising the use are lower in the watershed than where Bull Trout typically spawn. Stream order of the Middle Fork Willamette River is 6 in the part of the river where DEQ is revising the use (Figure 3-16). This evidence suggests that these waters historically would not have provided spawning habitat, which likely would have been further upstream in the watershed where DEQ is retaining the use; this is consistent with FHD data.

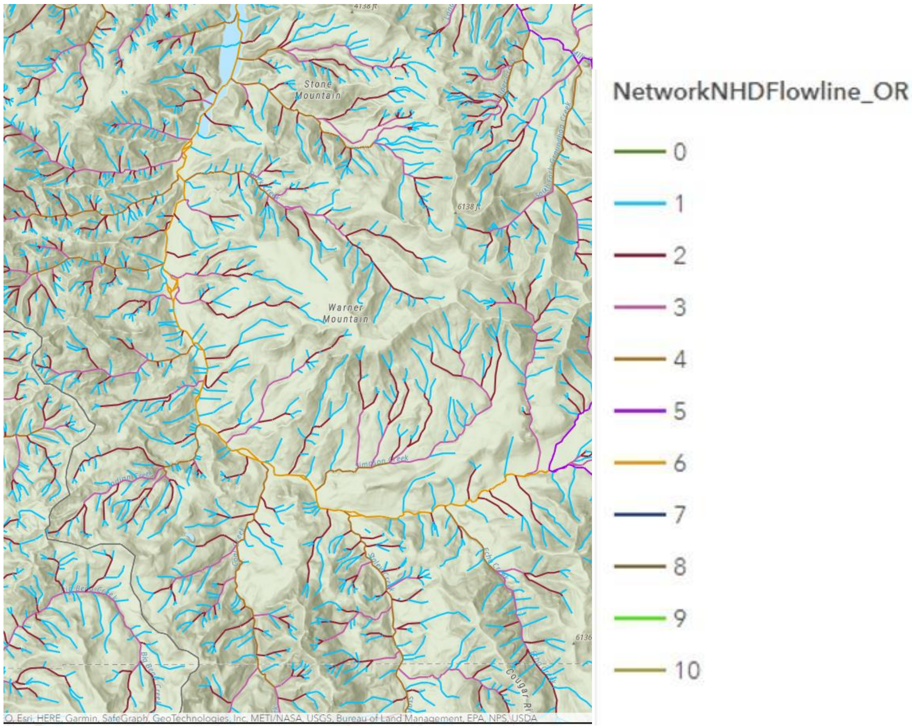

Figure 3-16. Stream Order, Middle Fork Willamette River. Data from NHD Plus.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to tributaries to this reach of the Middle Fork Willamette River. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for this reach of the Middle Fork Willamette River, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout Spawning Use from each of these reaches together with its tributaries as a unit.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat.

3.1.2 Use Revisions Based on UAA Factor 5

Bull Trout Spawning and Juvenile Rearing Use is not attainable in the waters described below based on 40 CFR 131.10(g), Factor 5: "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses." USFWS biologists determined that the following waters do not "provide all the habitat components necessary for spawning and juvenile rearing for a local Bull Trout population."[75] These habitat components are described in the introduction to chapter 3. DEQ includes the available information about why these waters were removed from the final USFWS critical habitat designation rule and, specifically, what physical conditions do not support the use. ODFW agrees that these waters are not current or potential Bull Trout spawning and juvenile rearing habitat.

Deschutes Basin (Figure A-6)

Factors supporting use unattainability

Substrate (upper portion): Substrate in upper portion of watershed is dominated by sand due to local geology, not gravel/cobble.
Gradient (upper portion): Gradient less than 1.5%.
Geographic Position of habitat (lower portion): Not a headwater stream.

Little Deschutes River. The Little Deschutes River was initially proposed for critical habitat designation in the 2002 Proposed Rule from its confluence with Crescent Creek to its headwaters as unoccupied FMO habitat essential for recovery of the species. However, USFWS these waters were not designated as critical habitat in the final rule. USFWS has not been able to provide DEQ the specific data or documents supporting their decision.[76] DEQ retained the Bull Trout Spawning and Juvenile Rearing Use from the headwaters of the Little Deschutes River to its confluence with Clover Creek, and in Clover Creek, based on Climate Shield model, which indicates there was a 50-75% probability that Bull Trout were present based on 1970-1999 conditions, even though these waters are not in the critical habitat rule and are not considered potential habitat by the interagency Bull Trout Working Groups. ODFW has concluded that reintroduction of Bull

[75] USFWS 2010. Bull Trout Critical Habitat Final Rule Justification. Idaho Fish and Wildlife Office, Boise, Idaho, Pacific Region, Portland, OR. 1035 pp. The portions of the document relevant to the corrections to the designation include those for the Upper Willamette Critical Habitat Unit (starting on page 217), Klamath River Basin CHU (p. 303), John Day River CHU (p. 371), Umatilla River CHU (p. 397), Walla Walla River CHU (p. 409), Grande Ronde River CHU (p. 447), Powder River CHU (p. 511), and Malheur River CHU (p. 587).

[76] Gunckel, Stephanie. *Personal communication.* March 18, 2021.

Trout to the Little Deschutes River is technically infeasible, due to competition from introduced Brook and Brown Trout, among other reasons.[77]

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The FHD does not indicate that the upper portion of these waters have current or historical Bull Trout use.
- Buchanan et al. (1997) characterized these waters consistent with ODFW.
- Climate Shield does not indicate any probability of Bull Trout presence in the waters where the use is being revised based on 1970-1999 conditions.
- The physical conditions of these waters do not support Bull Trout Spawning and Juvenile Rearing, as demonstrated in the following section.
- The geographic location of these waters is outside of headwater reaches of the stream, where Bull Trout typically spawn.

Demonstration that the use is unattainable

DEQ is revising the use in the Little Deschutes River based on 40 CFR 131.10(g), Factor 5: "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses." This determination is made due to several stream features, including substrate, flow, geographic position of the habitat and gradient.

In the upper portion of the Little Deschutes River, substrate does not support Bull Trout Spawning and Juvenile Rearing Use. This portion of the Little Deschutes is a Wild and Scenic River, where no planned timber harvest is allowed and commercial livestock grazing is prohibited along the riparian corridor.[78] ODFW notes that in the upper portion of this section (above Highway 58), sand is the dominant substrate.[79] Grazing occurs along this reach of the river, which raises the question of whether the

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[77] Fies, T., J. Fortune, B. Lewis, M. Manion, S. Marx. 1996. Upper Deschutes River Subbasin Fish Management Plan. Prepared by Upper Deschutes Fish District, Oregon Department of Fish and Wildlife. 383 pp.

[78] Deschutes National Forest. 2001. Big Marsh Creek & The Little Deschutes River Wild and Scenic Rivers Management Plan. Crescent Ranger District. 30 pp.

[79] Fies, T., J. Fortune, B. Lewis, M. Manion, S. Marx. 1996. Upper Deschutes River Subbasin Fish Management Plan. Prepared by Upper Deschutes Fish District, Oregon Department of Fish and Wildlife. See page 161.

substrate is the result of disturbance; however, this portion of the river is within the "Pumice Plateau Ecoregion." Soils of this ecoregion range from coarse loam to loamy coarse sand derived from ash and pumice and geology is dominated by ash and pumice underlain by lava flows, rather than river and lake deposits.[80] Thus, these waters, even if undisturbed, would not have a gravel-cobble substrate. As a result, DEQ concludes that this reach does not support Bull Trout Spawning and Juvenile Rearing Use as a result of naturally occurring physical conditions.

Stream gradient of the Little Deschutes, particularly in the area from Clover Creek and several miles downstream (approximately to the following coordinates: 43.3, -121.86) is insufficient to support Bull Trout spawning. While this portion of the Little Deschutes has spawning gravel, it has insufficient gradient to support spawning. As noted in the introduction to this chapter, Bull Trout spawn in streams with waters with gradients between 1.5 and 3.2%. DEQ analyzed stream slope on the upper portion of the Little Deschutes. As a precautionary approach, DEQ evaluated stream slopes less than 1%. Based on this analysis, it appears that this reach of the Little Deschutes River has gradient less than 1%. These conditions would not support Bull Trout Spawning and Juvenile Rearing Use (Figure 3-17).

The geographic position of this stream on the landscape also does not support Bull Trout Spawning and Juvenile Rearing Use. DEQ is maintaining the Bull Trout Spawning Use in the headwater streams, including Clover Creek and the Little Deschutes River from its headwaters to the confluence with Clover Creek, as well as in Hemlock Creek and its tributaries. However, the geographic position of the mainstem Little Deschutes River downstream of its confluence with Clover Creek is more typical of a stream supporting rearing or FMO use rather than spawning use.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat.

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[80] Upper Deschutes Watershed Council, 2002. Little Deschutes River Subbasin Assessment. Prepared by Watershed Professionals Network, Boise, ID and Corvallis, OR. 132 pp. Available at: https://www.upperdeschuteswatershedcouncil.org/wp-content/uploads/2013/06/Little-Deschutes-Assessment-with-Maps1.pdf.

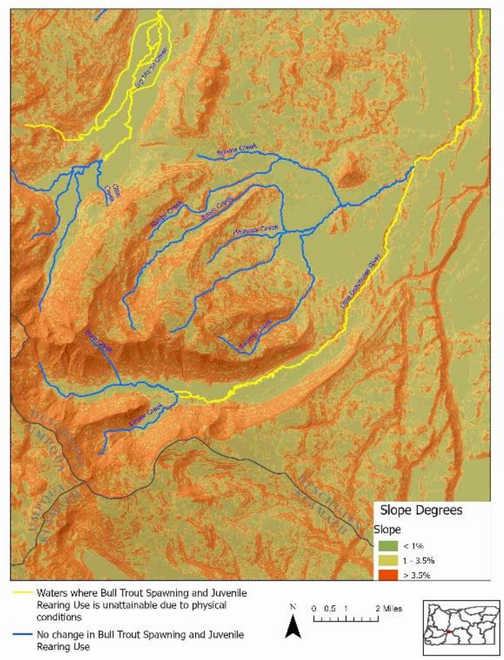

Figure 3-17. Stream gradient, Little Deschutes River.

Powder River Basin (Figure A-7)

Salmon, Pine, Rock & Big Muddy Creeks and their tributaries. The lower reaches of these four waters were included as draft critical habitat for spawning and juvenile rearing in the USFWS 2002 proposed critical habitat rule but upon further analysis, USFWS biologists determined they were not critical habitat, and they were not designated critical habitat in their final rule. ODFW does not identify these waters as current or historical habitat in the FHD database, nor did the 2002 Bull trout Work Group nor the current interagency Bull Trout working groups identify these areas as **current or potential** Bull Trout habitat. Upstream reaches of these waters, where DEQ is maintaining the Bull Trout Spawning and Juvenile Rearing Use, support resident populations of Bull Trout (Figure 3-18).[81] Finally, the Climate Shield model also indicates these waters had no probability of supporting Bull Trout presence in 1980.

Factors supporting use unattainability

Substrate (lower reaches): Alluvial sediment, not gravel/cobble substrate.
Gradient: Low gradient in lower reaches; high gradient in upper reaches.
Geographic Position of Habitat: not in headwater reaches.

[81] Northwest Power and Conservation Council. 2004. Powder River Subbasin Plan. 282 pp.

USFWS provided the following information, which supported their decision not to designate these reaches as critical habitat in the final rule:

1. Bull Trout occupancy of these streams is extremely limited & uncertain, with no connectivity.
2. These are small, isolated, relatively low-elevation drainages with very limited Bull Trout spawning habitat potential and no opportunities for expansion.
3. Lower sections of these creeks run through a broad alluvial valley (Baker Valley) where the channels have been highly altered by surrounding agricultural land uses. Many reaches are entirely devoid of riparian overstory & most of the streamflow is diverted for irrigation in the summer months. Restoration of the lower reaches of these creeks would be difficult to achieve because they run through a large number of private farms & ranches, which rely on the creeks water to irrigate their fields. [82]

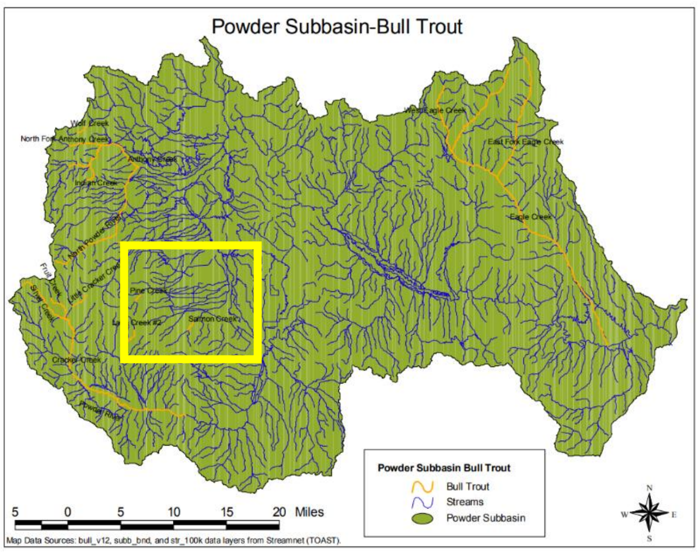

Figure 3-18. Bull Trout occupancy in Powder River Basin. Yellow box indicates waters where DEQ is updating Bull Trout Spawning and Rearing Use. DEQ is NOT revising the use where data indicates presence of Bull Trout, but only in downstream areas where there is no evidence of Bull Trout presence and the streams do not provide bull trout spawning habitat.

[82] Sausen, Gretchen A. *Personal communication.* December 16, 2021.

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The FHD does not indicate that these waters have current or historical Bull Trout use.
- Buchanan et al. (1997) characterization of these waters is consistent with the FHD.
- The Climate Shield model indicates there was no probability of Bull Trout occupancy of these streams based on 1970-1999 conditions.
- The physical conditions of these waters (specifically, substrate, gradient and geographic location in the lower reaches and gradient and geographic location in the upper reaches) do not support Bull Trout Spawning and Juvenile Rearing, as demonstrated in the following section.

Demonstration that the use is unattainable

DEQ is revising the use in Salmon Creek and portions of Big Muddy, Rock and Pine Creeks in the Powder River Basin, as well as tributaries to these waters, based on 40 CFR 131.10(g), Factor 5: "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses." This analysis is based primarily on substrate and geographic location of habitat in the lower section of these reaches, and on gradient in the upper section of these reaches.

The upper reaches of these waters, before they reach Baker Valley, are high gradient streams draining the eastern edge of the Elkhorn Mountains. As noted in the introduction to this chapter, Bull Trout do not spawn in streams with slopes having less than a 1.5% gradient. DEQ analyzed stream slope on the upper portion of these waters. As a conservative estimate, DEQ used a threshold of 1-3.5% gradient. Based on this analysis, it appears that almost all of the upper reaches of these waters have a greater than 3.5% slope. Lower reaches of these waters in the Powder Valley all have slopes of less than 1%. These conditions would not support Bull Trout spawning and juvenile rearing use (Figure 3-19).

The lower reaches of these waters are located in a broad alluvial valley. The geology of the valley is dominated by alluvium, defined as, "mainly valley fill and stream channel deposits consisting of unconsolidated silt, sand and gravel."[83] As noted in the introduction of this section, to support spawning, Bull Trout require a gravel/cobble substrate, which does not exist in the lower reaches of these waters. As a result, the physical conditions of these waters don't support Bull Trout spawning.

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[83] Brooks, H.C., J.R. McIntyre and G.W. Walker. 1976. Geology of the Oregon Part of the Baker 1° by 2° Quadrangle. State of Oregon Department of Geology and Mineral Industries Geology Map Series GMS-7. 28 pp.

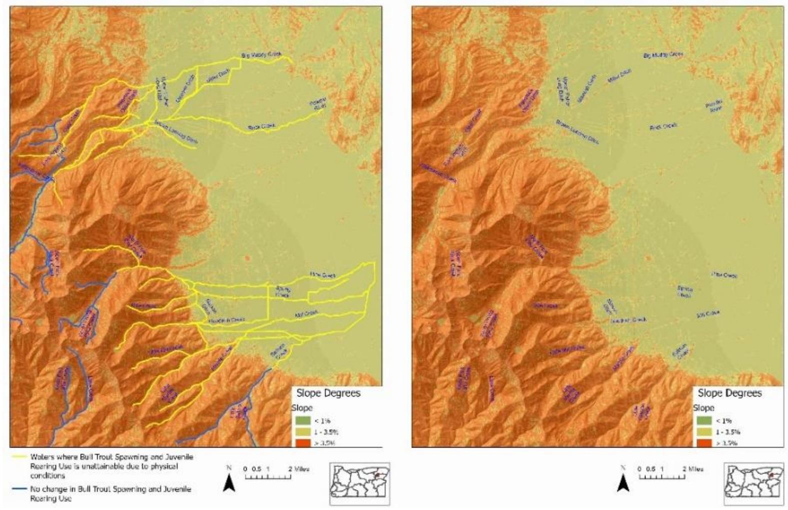

Figure 3-19. Stream gradient, Powder River tributaries.

Other evidence supporting unattainability of Bull Trout Spawning and Juvenile Rearing Use in these waters is geographic location. Specifically, Bull Trout spawn in headwater streams and juvenile Bull Trout rear near spawning grounds. The lower reaches of waters where DEQ is revising the use, particularly those in the alluvial Powder River Valley are lower in the watershed than where Bull Trout typically spawn. This evidence suggests that these waters historically would not have provided spawning habitat, which likely would have been further upstream in the watershed where DEQ is retaining the use. This is consistent with ODFW's FHD data.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to tributaries to these creeks. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for these waters, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout Spawning Use from each of these reaches together with its tributaries as a unit.

Highest attainable use

Factor 131.10(g)(5) precludes attainment of Bull Trout Spawning and Juvenile Rearing Use, as described above. Core Cold Water Use requires Bull Trout FMO use during the summer, early spring Chinook or late steelhead spawning or evidence that stream temperatures stay below 16 ℃ all summer. None of these conditions are met, nor is there any indication that they have been met since 1975. As a result, Core Cold Water Habitat Use is not attainable.

Salmon and Trout Rearing and Migration Use requires the presence of salmon, steelhead, or westside resident trout, such as rainbow of cutthroat trout. None of these fish are present in these waters, nor is there any indication that they have been since 1975 or before 1975. As a result, Salmon and Trout Rearing and Migration Use is not attainable.

Redband Trout is the next highest use. These waters do support Redband Trout, the native resident trout species in this area. As a result, Redband Trout Use is the highest attainable use.

Pine Creek Tributaries. DEQ is updating the Bull Trout Spawning and Rearing Use to portions of Clear Creek, Fish Creek and Little Elk Creek, three tributaries to Pine Creek, which is a tributary to the Snake River. DEQ designation of these three waters for Bull Trout Spawning and Juvenile Rearing Use was likely an error in 2003. USFWS included these three creeks as FMO use in both its proposed and final critical habitat rule, not spawning habitat, meaning that these creeks do not have the habitat features that support spawning use.

Factors supporting use unattainability

Substrate (Clear Creek): Silt, sand and gravel, not gravel/cobble substrate.
Gradient (Clear Creek): Less than 1% gradient.
Geographic Position of Habitat: not in headwater reaches.

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The FHD does not indicate that these waters have current or historical Bull Trout use.
- Buchanan et al. (1997) characterized these waters consistent with the FHD.
- The Climate Shield model indicates there was no probability of Bull Trout occupancy of these streams based on 1970-1999 conditions.
- The physical conditions of these waters (specifically, substrate, gradient and geographic location in the lower reaches and gradient and geographic location in the upper reaches) do not support Bull Trout Spawning and Juvenile Rearing, as demonstrated in the following section.

Demonstration that the use is unattainable

DEQ is revising the use in tributaries to the Powder River based on 40 CFR 131.10(g), Factor 5: “Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses." This analysis is based primarily on substrate in Clear Creek and geographic location of habitat in Clear Creek, Fish Creek and Little Elk Creek.

The portion of Clear Creek where DEQ is revising the use has geology dominated by alluvium, defined as, "mainly valley fill and stream channel deposits consisting of unconsolidated silt, sand and gravel."[84] As noted in the introduction of this section, to support spawning, Bull Trout require a gravel/cobble substrate, which does not exist in this portion of Clear Creek. As a result, the physical conditions of this portion of Clear Creek do not support, and never supported Bull Trout spawning.

As noted in the introduction to this chapter, Bull Trout tend to spawn in streams with slopes having less than a 2% gradient and were not found spawning at all in waters with mean gradient of 3.2%. DEQ analyzed stream gradient in these waters. As a conservative estimate, DEQ used a threshold of 1-3.5%. Based on this analysis, all of Clear Creek where DEQ is removing the use has a gradient too low to support Bull Trout Spawning and Juvenile Rearing Use; whereas those in Fish and Elk Creek have slope too high to support the use (Figure 3-20).

Other evidence supporting unattainability of Bull Trout Spawning and Juvenile Rearing Use in these waters is geographic location. Specifically, Bull Trout spawn in headwater streams (typically in stream order 4 or less) and juvenile Bull Trout rear near spawning grounds (Figure 3-21). The lower reaches of waters where DEQ is revising the use are lower in the watershed than where Bull Trout typically spawn. This evidence suggests that these waters historically would not have provided spawning habitat, which likely would have been further upstream in the watershed where DEQ is retaining the use.

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[84] Brooks, H.C., J.R. McIntyre and G.W. Walker. 1976. Geology of the Oregon Part of the Baker 1° by 2° Quadrangle. State of Oregon Department of Geology and Mineral Industries Geology Map Series GMS-7. 28 pp.

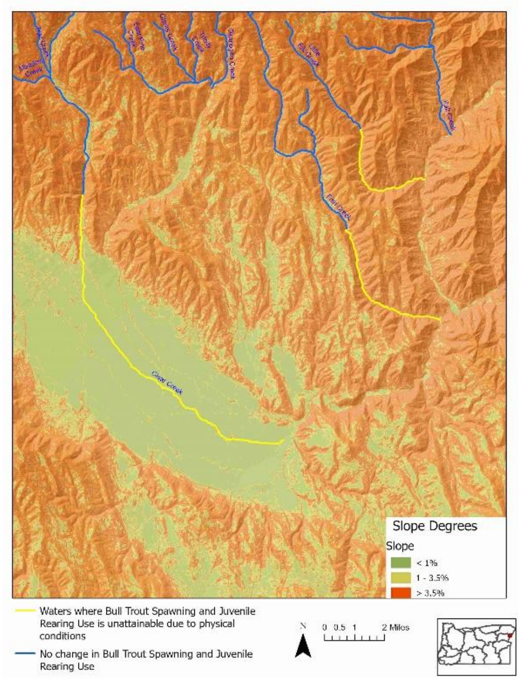

Figure 3-20. Stream Gradient, Pine Creek Tributaries.

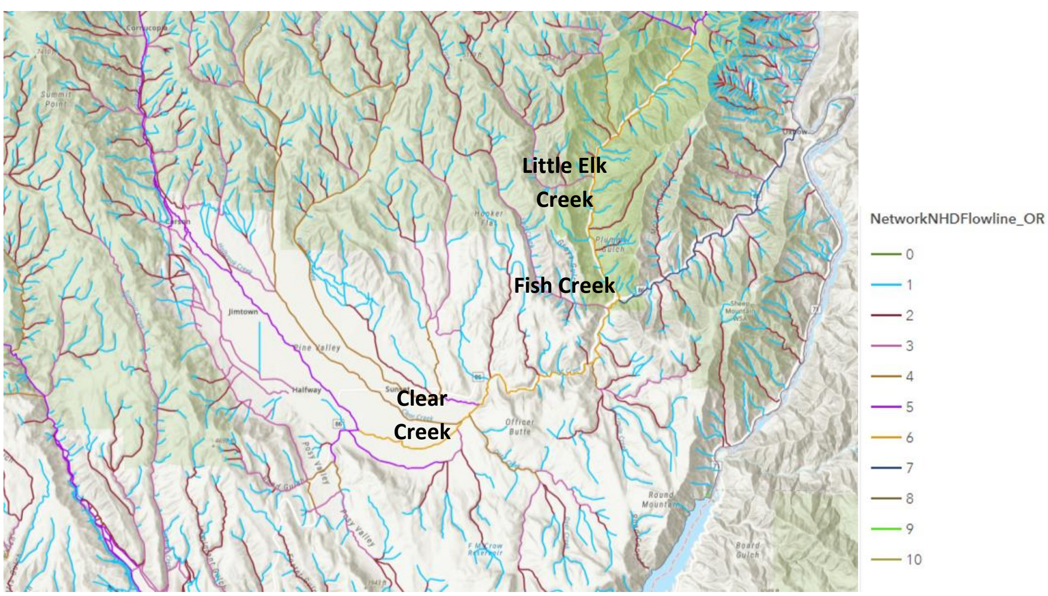

Figure 3-21. Stream order, Pine Creek tributaries.

Given the information provided, it is reasonable and defensible to conclude that Bull Trout Spawning and Rearing Use is not feasibly attainable in these reaches. These waters do not have the habitat features, such as substrate (for Clear Creek), or the geographic location (for all three creeks) needed to support bull trout spawning.

Highest attainable use

Factor 131.10(g)(5) precludes attainment of Bull Trout Spawning and Juvenile Rearing Use, as described above. Core Cold Water Use requires Bull Trout FMO use during the summer, early spring Chinook or late steelhead spawning or evidence that stream temperatures stay below 16 ℃ all summer. None of these conditions are met, nor is there any indication that they have been met since 1975. As a result, Core Cold Water Habitat Use is not attainable.

Salmon and Trout Rearing and Migration Use requires the presence of salmon, steelhead, or westside resident trout, such as rainbow of cutthroat trout. None of these fish are present in these waters, nor is there any indication that they have been since 1975 or before 1975. As a result, Salmon and Trout Rearing and Migration Use is not attainable.

Redband Trout is the next highest use. These waters do support Redband Trout, the native resident trout species in this area. As a result, Redband Trout Use is the highest attainable use.

Umatilla/Walla Walla Basin (Figure A-8)

Factors supporting use unattainability
Substrate: Gravelly silt, not gravel/cobble. **Geographic Position of Habitat:** Not in headwater reaches; stream order of 4-5.

Walla Walla River and tributaries. These waters include a portion of the mainstem Walla Walla River from upstream of Milton Freewater to the North Fork Walla Walla River, and a portion of the North Fork Walla Walla River from its mouth to just upstream of Cup Gulch. These waters are considered primarily rearing habitat in the FHD. This reach was not designated a critical habitat in the final rule based on the professional opinion of USFWS biologists regarding the presence of habitat components necessary for Bull Trout spawning. USFWS has not been able to provide DEQ specific data or documents explaining why it was proposed critical spawning habitat or their decision not to designate it in the final rule.[85]

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The FHD characterizes these waters as rearing (i.e., for subadult and adult Bull Trout) habitat, not spawning habitat.
- Buchanan et al. (1997) characterization of these waters is consistent with the FHD and specifically noted that there was no spawning found in the North Fork Walla Walla River, nor

[85] Gunckel, Stephanie. *Personal communication.* March 18, 2021.

further downstream in the mainstem Walla Walla River during spawning surveys conducted from 1994-1996.[86]

- The Climate Shield model indicates there was no probability of Bull Trout occupancy of these streams based on 1970-1999 conditions.
- The physical conditions of these waters (specifically, substrate, gradient and geographic location in the lower reaches and gradient and geographic location in the upper reaches) do not support Bull Trout Spawning and Juvenile Rearing, as demonstrated in the following section.

Demonstration that the use is unattainable

DEQ is revising the use in the Walla Walla and North Fork Walla Walla Rivers based on 40 CFR 131.10(g), Factor 5: "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses." This analysis is based primarily on substrate, stream velocity and geographic position of habitat.

The physical conditions of these waters, due to both stream velocity and substrate, do not support Bull Trout Spawning and Juvenile Rearing Use. Substrate does not support spawning and juvenile rearing use because the geology of these areas is characterized by younger alluvium, which is characterized by gravel and gravelly silt underlying flood plains.[87] This area is primarily in the Deep Loess Foothills Ecoregion, described as having highly productive, loess-rich soils.[88] As noted in the introduction of this section, to support spawning, Bull Trout require a gravel/cobble substrate, which does not exist in these waters.

Other evidence supporting unattainability of Bull Trout Spawning and Juvenile Rearing Use in these waters is geographic location. Specifically, Bull Trout spawn in headwater streams; juvenile Bull Trout rear near spawning grounds. The reaches of waters where DEQ is revising the use are lower in the watershed than where Bull Trout typically spawn. Stream order of the mainstem Walla Walla River is 5, and that of the North Fork Walla Walla River is 4 (Figure 3-22). This evidence suggests that these waters historically would not have provided spawning habitat, which likely would have been further upstream in the watershed where DEQ is retaining the use; this is consistent with FHD data.

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[86] Buchanan, D.V., M. L. Hanson and R. M. Hooton. 1997. Technical Report: Status of Oregon's Bull Trout. U.S. Bonneville Power Administration, Report Number DOE/BP-34342-5. See pp. 96.

[87] Newcomb, B.C. 1965. Geology and Ground-water Resources of the Walla Walla River Basin, Washington-Oregon. Water Supply Bulletin No. 21. Washington State Division of Water Resources. 162 pp.

[88] U.S. Environmental Protection Agency, *Draft: Level III and IV Ecoregions of the Northwestern United States*.

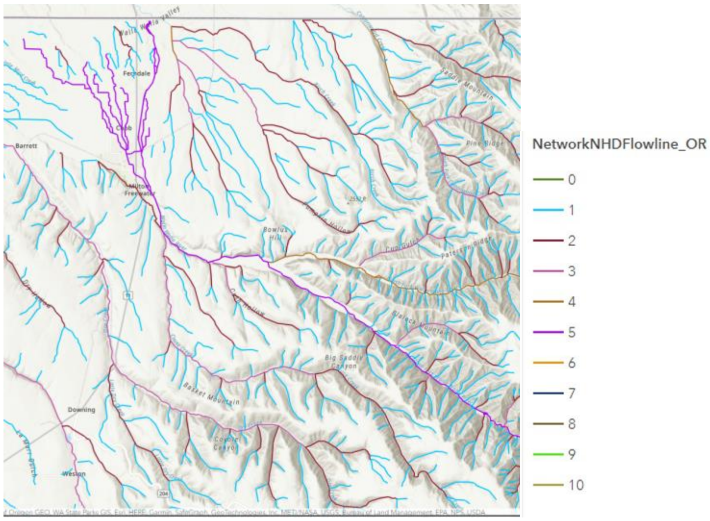

Figure 3-22. Stream order, Walla Walla River and tributaries. Data from NHD Plus.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to tributaries of this reach of the Walla Walla and North Fork Walla Walla River. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and its contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for this reach of the Walla Walla and North Fork Walla Walla Rivers, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout Spawning Use from each of these reaches together with its tributaries as a unit.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat.

3.2 Revisions to Bull Trout Spawning and Juvenile Rearing Use using Bull Trout Working Group Data

Reasons for the Use Revision

DEQ is updating Bull Trout Spawning and Juvenile Rearing Use based on the ODFW FHD database and the best available information from the 2021 Bull Trout Working Groups regarding the location of current or potential Bull Trout spawning habitat. The 2021 Bull Trout Working Groups have determined that these waters are not potential habitat for Bull Trout Spawning and Juvenile Rearing. These revisions occur in the Deschutes, Klamath, and Willamette River basins.

To update use maps, DEQ engaged with the Statewide Bull Trout Working Groups (Table 3-6) to review the potential habitat identified in 2003 and provide the professional opinion of the biologists on the current state of the science and conservation goals, including considering the suitability of habitat to support Bull Trout Spawning and Juvenile Rearing. The statewide working groups are organized jointly by ODFW and USFWS and coordinated for the agencies by Stephanie Gunckel. They are comprised of Bull Trout biologists from state, federal, tribal, academic, and private institutions.

The Bull Trout Working Groups reviewed the potential Bull Trout spawning habitat that DEQ designated because it was identified by DEQ's 2003 Bull Trout Technical Work Group as potential, not current, spawning habitat.[89] The current working groups provided input on which habitats have high potential for spawning restoration and reintroduction, which habitats do not have potential for restoration or reintroduction (i.e., where reintroduction is not attainable), and any additional habitats that should be considered as potential spawning habitat.

Table 3-6. Bull Trout Working Groups - Membership and Meeting Dates

Working Group	Meeting Date	Participating Agencies
Klamath Basin	February 7, 2022	ODFW, USFWS, USGS, USFS, TNC, NPS, Klamath Tribe, Green Diamond Resource Company, Klamath Watershed Partnership
Upper Willamette	April 14, 2022	ODFW. *Not discussed a formal working group meeting. Conference of ODFW district and research biologists only.
Clackamas	February 23, 2022	ODFW, USFWS, USFS, PGE, TU

[89] Simpson, M. 2003. Bull Trout Habitat Designation: Technical Work Group Recommendations. Water Quality Division, Oregon Department of Environmental Quality. 51 pp.

Working Group	Meeting Date	Participating Agencies
Hood	March 7, 2022	ODFW, USFWS, USFS, CTWSR, MFID, HRWC, Meridian Environmental
Upper & Lower Deschutes	January 31, 2022	ODFW, USFWS, USFS, CTWSR, PGE, Mt Hood Environmental
Odell Lake	March 8, 2022	ODFW, USFWS, USFS, Native Fish Society
John Day	February, 2022	ODFW, USFWS, BLM, CTUIR, USFS, CTWSR
Umatilla – Walla Walla	December 6, 2021	ODFW, USFWS, USFS, CTUIR, BOR, ACOE, WDFW, OSP, Tri-State Steelheaders, OWRD, SRSRB
Grande Ronde – Imnaha	January 12, 2022	ODFW, USFWS, USFS, PGE, CTUIR, Nez Perce, IPC
Powder – Pine	January 11, 2022	ODFW, USFWS, USFS, BOR, IDFG, IPC
Malheur	April 14, 2022	ODFW, USFWS, USFS, Burns Paiute Tribe, BPA, BOR

Table 9 in the Aquatic Life Use Update Technical Support Document provides the conclusions of the Bull Trout Working Groups by basin. The UAAs in the section below provides justification for those waters that the Bull Trout Working Groups removed from potential habitat, excluding those that are being retained either because information suggests Bull Trout Spawning and Juvenile Rearing is an existing use, or the waters are included in the final Bull Trout Critical Habitat Rule.

DEQ is also updating the Bull Trout Spawning and Juvenile Rearing Use designation for tributaries that were designated for Bull Trout spawning in 2003 only because they are upstream of potential habitat. In these cases, there was no Bull Trout spawning habitat in the tributary itself based on FHD data or the USFWS critical habitat rule. They were designated only because they are upstream of reaches that were proposed as potential habitat. These waters do not support Bull Trout spawning and juvenile rearing according to either USFWS or ODFW, nor is such use an existing use based on best available information.

3.2.1 Use Revisions based on UAA Factor 1

DEQ is updating uses in certain waters in the Deschutes River Basin, Klamath Basin and Willamette River from Bull Trout spawning and juvenile rearing use. DEQ also is updating waters upstream of Bull Trout spawning habitats, which were designated to protect the upstream cold water. These revisions are primarily justified under 40 CFR 131.10(g), Factor 1: “Naturally occurring pollutant concentrations prevent the attainment of the use.” For the North Fork Middle Fork Willamette River, the revisions are partially justified under Factor 1 and partially justified under 40 CFR 131.10(g), Factor 5: “Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses.” Site-specific information for these waters is provided below.

Deschutes River Basin (Figure A-9)

Factors supporting use unattainability

Temperature: 12℃ is not attainable as a 7-DADM during the summer. 16°C, the criterion for Core Cold Water Use, is also unattainable.

Crescent Creek and tributaries. The Upper and Lower Deschutes Bull Trout Working Group determined that temperatures in Crescent Creek are not suitable for Bull Trout spawning.

Protection of Existing Uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The Climate Shield model indicates there was no probability of Bull Trout occupancy of these waters based on 1970-1999 conditions.
- The temperature of these waters do not support Bull Trout Spawning and Juvenile Rearing, as demonstrated in the following section.

Demonstration that the use is unattainable

DEQ is revising the use in Crescent Creek based on 40 CFR 131.10(g), Factor 1: "Naturally occurring pollutant concentrations prevent the attainment of the use." Specifically, temperatures in Crescent Creek, an outlet to Crescent Lake are naturally much greater than the 12 ℃ criterion associated with the Bull Trout Spawning and Rearing Criterion.

Crescent Creek is the outlet from Crescent Lake, a large natural lake lying high on the east slope of the Cascades at an elevation of 4839 feet. [90] The lake is in surrounded by thick coniferous forest. There are no known point or nonpoint sources of pollution to the lake. The surrounding watershed consists almost entirely of the Diamond Peaks wilderness area and the Oregon Cascade Recreation Area, which is managed as a substantially undeveloped area (Figure 3-23).[91]

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[90] Information taken from Johnson, et al. 1985. *Atlas of Oregon Lakes*.

[91] Deschutes National Forest. 1990. Deschutes Forest Plan. See map for selected alternative: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5347258.pdf

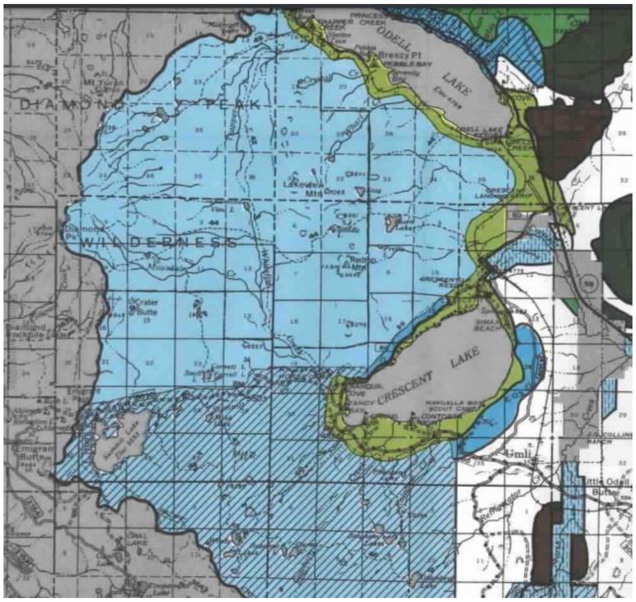

Figure 3-23. Land uses surrounding Crescent Lake. Uses include recreation (light blue), Oregon Cascade Recreation Blue (cross-hatched blue), eagle habitat (deeper blue); intensive recreation (olive), and general forest (white). Source: Deschutes National Forest. 1990. Deschutes Forest Plan.

Although Crescent Lake is a natural lake, it has been modified for irrigation use. A dam was initially constructed in Crescent Creek at the outlet of Crescent Lake in 1922 to provide water to the Tumalo Irrigation District. After the dam began to fail, the Bureau of Reclamation reconstructed the Crescent Lake Dam in 1955. The lake continues to provide irrigation water for grain, alfalfa, hay and pastureland in central Oregon.

Water quality in Crescent Lake is distinctly oligotrophic. The lake is sometimes exposed to strong winds, which produce a relatively deep (50 to 60 feet) thermocline during summer stratification. The thermocline contributes to high temperatures in the lake and at its outlet to Crescent Creek, which rise well above the 12 ℃ Bull Trout Spawning and Juvenile Rearing criterion during the summer (Figure 3-24). Average temperature in Crescent Creek between April and October 1995 was 58.1 °F (14.5 ℃), well above the criterion that applies throughout the year.[92] Dam withdrawals increase flow to Crescent Creek, cooling summer water temperatures along Crescent Creek and further downstream in the Little Deschutes River.[93] Thus, removing the water releases, would likely increase temperatures in Crescent

[92] Fies, T., J. Fortune, B. Lewis, M. Manion, S. Marx. 1996. Upper Deschutes River Subbasin Fish Management Plan. Prepared by Upper Deschutes Fish District, Oregon Department of Fish and Wildlife. 383 pp.

[93] See DEQ, 2012. Upper and Little Deschutes Subbasins TMDLs: Context for Reviewing Watershed Sciences Temperature Modeling Reports. P. 29.

Creek above those shown in the figure. As a result, Bull Trout Spawning and Juvenile Rearing Use is unattainable in Crescent Creek due to natural thermal conditions.

The Restored Vegetation Study provides another line of evidence that the Bull Trout Spawning and Juvenile Rearing Use is unattainable in Crescent Creek due to natural thermal conditions. According to the Restored Vegetation Study, restored conditions in Crescent Creek would result in cooling mean August temperatures from 19.0 °C to 17.6 °C. The Restored Vegetation Study used a threshold of 10.1 °C as the temperature above which there was a 90% chance of exceeding the 12 °C 7-DADM criterion. Thus, even with potential temperature decreases from restored vegetation, modeled temperatures are still several degrees higher than what is needed to attain the use.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing use designation to side channels to Crescent Creek just downstream of Crescent Lake. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for this reach of Crescent Creek, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout Spawning Use from each of these reaches together with its tributaries as a unit.

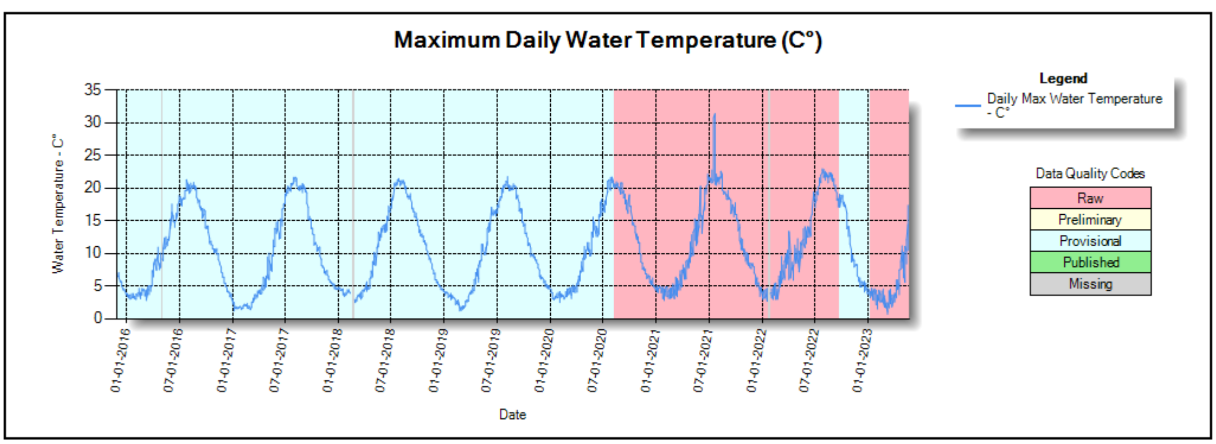

Figure 3-24. Maximum 7-day Average Daily Temperature (°C), Crescent Creek, 2011-2015. Data from Oregon Water Resources Department Near Real Time Hydrographic Data, Station ID 14060000. https://apps.wrd.state.or.us/apps/sw/hydro_near_real_time/display_hydro_graph.aspx?station_nbr=14060000.

Highest Attainable Use

The highest attainable use is Salmon and Trout Rearing and Migration, which is the next most stringent use after Core Cold Water Use. Factor 131.10(g)(1) precludes Bull Trout Spawning and Juvenile Rearing Use, as demonstrated above. Factor 131.10(g)(1) also precludes Core Cold Water Use. According to FHD, these waters are not suitable habitat to support Bull Trout FMO use, which is a trigger for Core Cold Water Use. Nor do they support early Spring Chinook spawning, another trigger for Core Cold Water Use. In addition, the Core Cold Water Criterion of 16℃ is not attainable based on the information provided above. As a result, Core Cold Water Use is not attainable. However, these waters do support suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead. As a result, Salmon and Trout Rearing and Migration Use is attainable based on current information available.

Big Marsh Creek and tributaries*.* DEQ is updating Bull Trout Spawning and Juvenile Rearing Use in the lower portion of Big Marsh Creek. The Upper and Lower Deschutes Bull Trout Working Group determined that temperatures in Big Marsh Creek are not suitable for Bull Trout spawning.

Factors supporting use unattainability

Temperature: 12℃ is not attainable as a 7-DADM during the summer. 16℃, the criterion for Core Cold Water Use, is also unattainable.

Protection of Existing Uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The FHD does not indicate that these waters have current or historical Bull Trout use.
- Buchanan et al. (1997) does not characterize these waters as Bull Trout habitat.
- The Climate Shield model indicates there was no probability of Bull Trout occupancy of these waters based on 1970-1999 conditions.
- The temperature of these waters does not support Bull Trout Spawning and Juvenile Rearing, as demonstrated in the following section.

Demonstration that the use is unattainable

DEQ is revising the use in Big Marsh Creek and its tributaries based on 40 CFR 131.10(g), Factor 1: “Naturally occurring pollutant concentrations prevent the attainment of the use.” Specifically, temperatures in Big Marsh Creek are naturally much greater than the 12 ℃ criterion associated with the Bull Trout Spawning and Rearing Criterion.

This reach was identified as potential Bull Trout spawning habitat in 2003, but the current Bull Trout Working Group for the Deschutes basin does not consider it potential habitat. Big Marsh Creek is a Wild and Scenic River from its headwaters to its mouth at Crescent Creek. The Management Plan for Big Marsh Creek has prohibited livestock grazing and timber harvest since at least 2010, if not before.[94] The current stream conditions are not degraded and are close to its expected natural condition. Therefore, the attainable condition is not expected to be significantly different from it's current condition.

A 1997 Deschutes National Forest Report indicated that there is a marsh in this reach because the river channel doesn't have the capacity to carry all of the water in the stream.[95] As a result, excess water spreads out within the marsh. Due to the higher retention time, water temperatures in the area where DEQ is updating the use are warm and thus would not support Bull Trout Spawning (Figures 3-25 and 3-26). The report notes that this section of the river likely supported Bull Trout foraging and migration, but not spawning. These data are similar to 1989 temperature data collected by USFS and reported by ODFW, indicating that average daily high temperatures in July were 47.2℉ (8.4 ℃) upstream of the marsh and 61.2 ℉ (16.2 ℃) downstream of the marsh.[96] NorWeST model data, which indicates that current (1993-2011) 7-DADM temperatures are 17.7 ℃ in the south of the marsh, 20.9 ℃ in the middle of the marsh and 21.5 ℃ in the north of the marsh. The Restored Vegetation study indicates that restoration would cool riparian temperatures in this reach to 11.7-15.7 ℃ as a mean August temperature. These temperatures exceed the 90th percent exceedance threshold of 10.1 ℃ above which there is a high likelihood that the criterion cannot be attained. As a result, DEQ has concluded that restored temperatures in this portion of Big Marsh Creek are naturally higher than the 12°C Bull Trout Spawning and Juvenile Rearing Use criterion.

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[94] Crescent Ranger District, Deschutes National Forest. 2010. Big Marsh Creek and the Little Deschutes River, Wild and Scenic Rivers Management Plan. 30 pp.

[95] Crescent Ranger District, Deschutes National Forest. 1997. Modified Level II Stream Inventory, Big Marsh Creek. 20 pp.

[96] Fies, T., J. Fortune, B. Lewis, M. Manion, S. Marx. 1996. Upper Deschutes River Subbasin Fish Management Plan. Prepared by Upper Deschutes Fish District, Oregon Department of Fish and Wildlife. 383 pp.

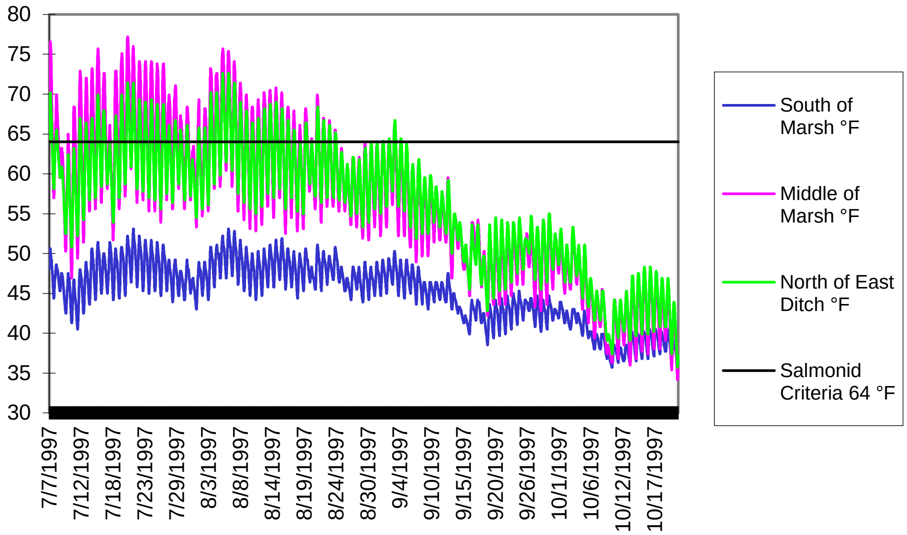

Figure 3-25. Water Temperatures, Big Marsh Creek. Source: Crescent Ranger District, Deschutes National Forest. 1997. Modified Level II Stream Inventory, Big Marsh Creek.

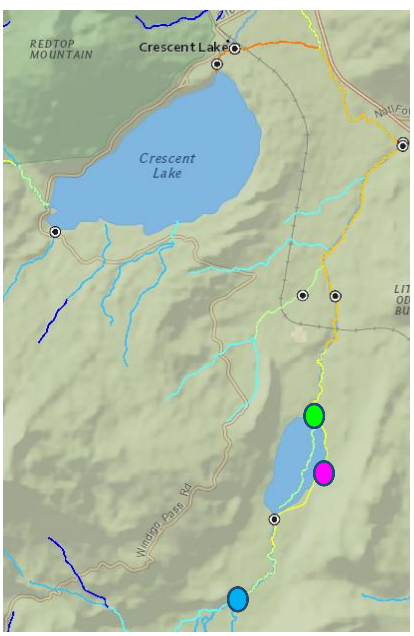

Figure 3-26. Presumed locations of North (Green), Middle (Pink) and South (Blue) locations of Big Marsh Creek data in Figure 3-6. The 1997 report did not include a map, but there is matching 1997 data in the NorWeST database at these locations.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to tributaries to Big Marsh Creek, except for Refrigerator Creek. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout spawning and Juvenile Rearing use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for this reach of Big Marsh Creek, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout spawning use from each of these reaches together with its tributaries as a unit.

Highest Attainable Use

The highest attainable use is Salmon and Trout Rearing and Migration, which is the next most stringent use after Core Cold Water Use. Factor 131.10(g)(1) precludes Bull Trout Spawning and Juvenile Rearing Use, as demonstrated above. Factor 131.10(g)(1) also precludes Core Cold Water Use. According to FHD, these waters are not suitable habitat to support Bull Trout FMO use, which is a trigger for Core Cold Water Use. Nor do they support early Spring Chinook spawning, another trigger for Core Cold Water Use. In addition, the Core Cold Water Criterion of 16℃ is not attainable based in this ecological unit on the information provided above. As a result, Core Cold Water Use is not attainable. However, these waters do support suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead. As a result, Salmon and Trout Rearing and Migration Use is attainable based on current information available.

Upper Deschutes River between Little Lava Lake and Wickiup Reservoir (Figure A-9). DEQ is proposing to revise the Bull Trout Spawning and Rearing Use designation to Salmon and Trout Rearing and Migration in the Upper Deschutes River from its headwaters downstream of Little Lava Lake to Wickiup Reservoir. The Upper Deschutes Bull Trout Working Group determined that these reservoirs and river reaches are not potential Bull Trout Spawning and Rearing habitat. DEQ is maintaining the Bull Trout Spawning and Juvenile Rearing Use in several tributaries to the two reservoirs because Climate Shield data and temperature data indicate the potential presence of Bull Trout based on modeled 1970-1999 conditions.

Factors supporting use unattainability

Temperature: 12℃ is not attainable as a 7-DADM during the summer. 16℃, the criterion for Core Cold Water Use, is also unattainable.
Substrate: Lack of adequate gravel does not support Bull Trout spawning.

Protection of Existing Uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The temperature of these waters does not support Bull Trout Spawning and Juvenile Rearing, as demonstrated in the following section.
- Crane Prairie Reservoir was originally built in 1922 and Wickiup Reservoir in 1949 indicating that the conditions in the Reservoirs that contribute to temperature increases existed before 1975.
- The Climate Shield model indicates there was no probability of Bull Trout occupancy of these waters based on 1970-1999 conditions.

Demonstration that the use is unattainable

DEQ is revising the use in portions of the upper Deschutes River based on 40 CFR 131.10(g), Factor 1: "Naturally occurring pollutant concentrations prevent the attainment of the use." Specifically, temperatures in these waters are naturally greater than the 12 ℃ criterion associated with the Bull Trout Spawning and Rearing Criterion, even if the reservoirs did not exist.

The Deschutes River flows from its headwaters near Lava Lake downstream to Crane Prairie Reservoir. There is a two mile reach downstream of Crane Prairie Reservoir before waters enter Wickiup Reservoir. Temperature data and modeling indicate that the Bull Trout Spawning and Juvenile Rearing Use criterion is not attainable in these reaches of the Deschutes River. Temperature data provided by the Upper and Lower Deschutes Working Group indicate that maximum summer 7-DADM temperatures are much higher than 12℃ in the waters where DEQ is updating Bull Trout spawning use (Table 3-7). These high temperatures are influenced strongly by water temperatures of Little Lava Lake, a natural lake fed primarily by subsurface springs that is the headwater for the Deschutes River.[97]

Maximum 7-DADM temperatures, based on eight years of data between 2001-2011, average 17.2 ℃ just downstream from the outlet from Little Lava Lake. Thus, the natural temperatures in the headwaters are several degrees higher than what is needed to attain Bull Trout Spawning and Juvenile Rearing Use. In the reach of the Deschutes River between Little Lava Lake and Crane Prairie Reservoir, temperatures decrease, possibly due to increased shade and additional input of subsurface spring water; maximum 7-DADM temperatures approximately halfway between Little Lava Lake are 1.2 ℃ cooler than at headwaters (16.8 vs. 18.0 ℃ based on three years of available data) but still several degrees warmer than the criterion. Thereafter, temperatures increase, reaching an average of 18.2 ℃ upstream of Snow

[97] Atlas of Oregon Lakes, 1985-2023. https://oregonlakesatlas.org/map?lake=17070301000867. Visited October 16, 2023.

Creek, just before entering Crane Prairie Reservoir. Downstream of Crane Prairie Reservoir, near Browns Crossing, temperatures are much higher, with maximum 7-DADM temperature averaging 23.9 ℃ based on 13 years of data from 1993-2010. These temperatures are warmer than natural due to the presence of the reservoirs. However, as the natural occurring temperatures upstream of the reservoir already exceed the Bull Trout Spawning and Juvenile Rearing criterion by more than four degrees, it is reasonable to conclude that temperatures that would exist but for the presence of the reservoir are too warm to support Bull Trout spawning and juvenile rearing.

Other evidence supporting the unattainability of Bull Trout Spawning and Juvenile Rearing Use is substrate in the upper Deschutes mainstem. Specifically, in the Deschutes River between Little Lava Lake and Crane Prairie Reservoir, only approximately 16% of the stream substrate was graded as good and the remainder marginal by a Forest Service Stream Survey.[98] Much of the gravel in the basin has embedded sediment and is therefore of poor quality, making it marginal for use in spawning.[99]

Table 3-7. Temperature data, Upper Deschutes River. Provided by Upper and Lower Deschutes Bull Trout Working Group.

	Maximum Yearly 7-Day Average Daily Temperature (℃)		
	Deschutes River at Cow Meadow Campground	***Deschutes River at Blue Pool***	***Deschutes River at Brown's Crossing***
2008			*21.8*
2010			*22.9*
2011	*16.7*		
2012	*17.3*		
2013	*19.0*	*18.4*	
2014	*18.5*	*14.2*	

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to tributaries to this reach of the Deschutes River. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as bull trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this

[98] Fies, T., J. Fortune, B. Lewis, M. Manion, S. Marx. 1996. Upper Deschutes River Subbasin Fish Management Plan. Prepared by Upper Deschutes Fish District, Oregon Department of Fish and Wildlife. See p. 126.

[99] *Personal communication,* Smita Mehta, Deschutes River Basin Coordinator, DEQ. May 24, 2023.

scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for this reach of the Deschutes River, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout Spawning Use from each of these reaches together with its tributaries as a unit.

Moreover, Bull Trout Spawning and Juvenile Rearing Use is unattainable in tributaries to Crane Prairie Reservoir due to stream intermittency during the summer. Many tributaries in the upper Deschutes basin are intermittent during the summer due to the high permeability of the Deschutes Formation.[100] DEQ compared tributaries to Crane Prairie Reservoir to the intermittent data layer in NHD Plus (Figure 3-27). Intermittent streams are indicated by the yellow lines with brown outlines. Almost all waters west of Crane Prairie Reservoir are intermittent, except for the lower portion of Cultus Creek and Little Cultus Lake and portions of its tributaries. However, there is no connectivity between Little Cultus Lake to downstream areas, precluding the Bull Trout Spawning and Juvenile Rearing Use due to lack of access. Moreover, ODFW has noted that the lack of flow precludes fall spawning in Deer and Cultus Creek.[101]

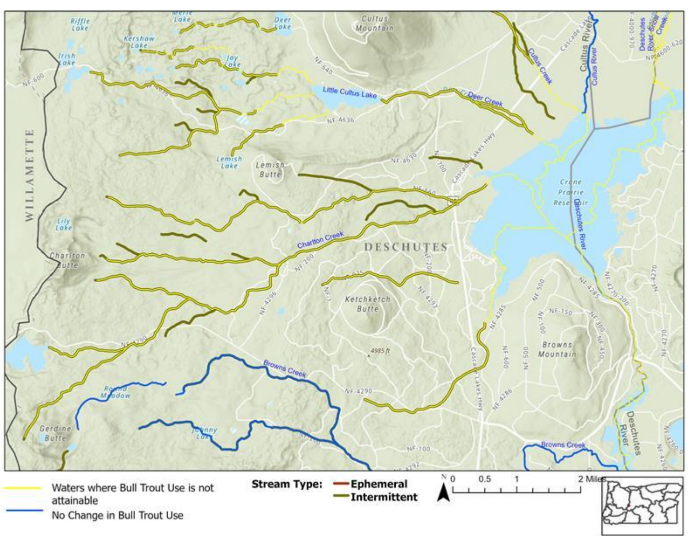

Figure 3-27. Stream intermittency, tributaries to Crane Prairie Reservoir. Data from NHD-Plus database.

[100] Gannett, M.W., Lite, Jr., K.E., Morgan, D.S., and Collins, C.A., 2001, Ground-water hydrology of the upper Deschutes Basin, Oregon: U.S. Geological Survey Water-Resources Investigations Report 00-4162, 74 p.

[101] Fies, T., J. Fortune, B. Lewis, M. Manion, S. Marx. 1996. Upper Deschutes River Subbasin Fish Management Plan. Prepared by Upper Deschutes Fish District, Oregon Department of Fish and Wildlife. See p. 124.

Highest Attainable Use

The highest attainable use is Salmon and Trout Rearing and Migration, which is the next most stringent use after Core Cold Water Use. Factor 131.10(g)(1) precludes Bull Trout Spawning and Juvenile Rearing Use, as demonstrated above. Factor 131.10(g)(1) also precludes Core Cold Water Use. The Core Cold Water Criterion of 16°C is not attainable based in this ecological unit on the information provided above; as indicated, natural stream temperatures exceed the criterion throughout this reach, including at the headwaters. According to FHD, these waters are not suitable habitat to support Bull Trout FMO use, nor do they support early Spring Chinook spawning, both triggers for Core Cold Water Use. As a result, Core Cold Water Use is not attainable. However, these waters do support suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead. As a result, Salmon and Trout Rearing and Migration Use is attainable based on the current information available.

Klamath River Basin

Factors supporting use unattainability

Temperature: 12°C is not attainable as a 7-DADM during the summer.

South Fork Sprague River and tributaries (Figure A-10). ODFW classified these waters as potential Bull Trout spawning habitat in 2003. The current Klamath Basin Bull Trout Working Group does not consider the South Fork Sprague River potential Bull Trout spawning habitat because thermal conditions are not suitable for Bull Trout spawning.

Protection of Existing Uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The Climate Shield model indicates there was no probability of Bull Trout occupancy of these waters based on 1970-1999 conditions. DEQ retained Bull Trout Spawning and Juvenile Rearing Use in Pothole Creek and its tributaries based on Climate Shield Information.
- The temperature of these waters do not support Bull Trout Spawning and Juvenile Rearing, as demonstrated in the following section.

Demonstration that the use is unattainable

DEQ is revising the use in the South Fork Sprague River and its tributaries based on 40 CFR 131.10(g), Factor 1: “Naturally occurring pollutant concentrations prevent the attainment of the use.” The waters described here cannot attain the use because naturally occurring temperatures modeled by DEQ indicate that the waters cannot attain 12 °C as a 7-DADM. Maximum 7-DADM stream temperatures far exceed the 12°C criterion associated with the Bull Trout Spawning and Rearing Use in the area of Brownsworth Creek (approximately RM 15; Figure 3-28). DEQ temperature modeling in the Upper Klamath Lake Drainage Temperature TMDL supports the conclusion that the 12° criterion is unattainable. Modeling indicates that, besides the uppermost 2-3 miles, the South Fork Sprague River has a maximum natural temperature greater than 12.0 °C (53.6 °F), accounting for potential channel width, site cover and flow (Figure 3-29). There are no point sources to the South Fork Sprague River.[102] DEQ is retaining Bull Trout Spawning and Juvenile Rearing Use in the uppermost portion of the South Fork Sprague River, as this portion is critical habitat for Bull Trout spawning and rearing.[103]

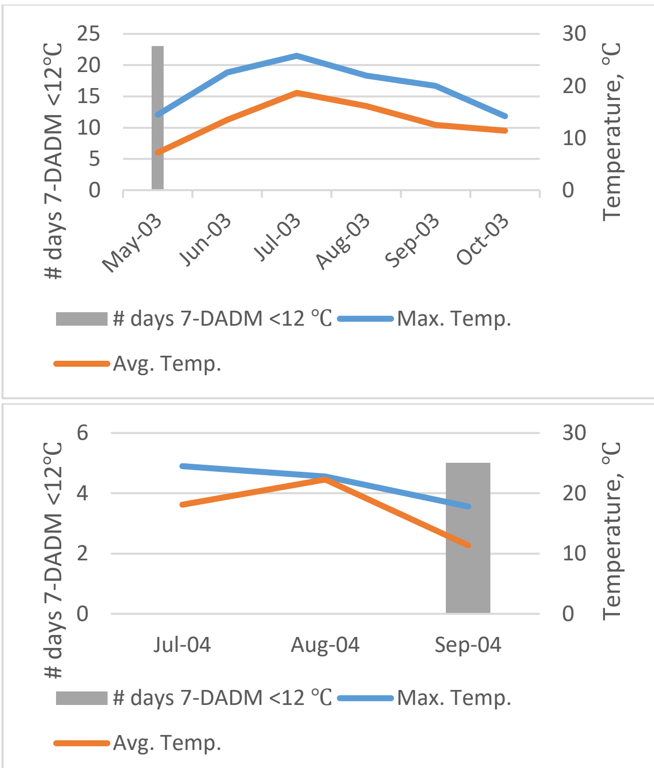

Figure 3-28. Stream temperature, South Fork Sprague River upstream of confluence with Brownsworth Creek, 2003-2004. Data provided by Klamath Basin Bull Trout Working Group.

[102] Oregon DEQ. 2002. Upper Klamath Lake Drainage TMDL and Water Quality Management Plan.

[103] USFWS 2010. Bull Trout Critical Habitat Final Rule Justification. Idaho Fish and Wildlife Office, Boise, Idaho, Pacific Region, Portland, OR. 1035 pp. Discussion of streams included as FMO habitat in the Upper Willamette Critical Habitat Unit start on p. 217.

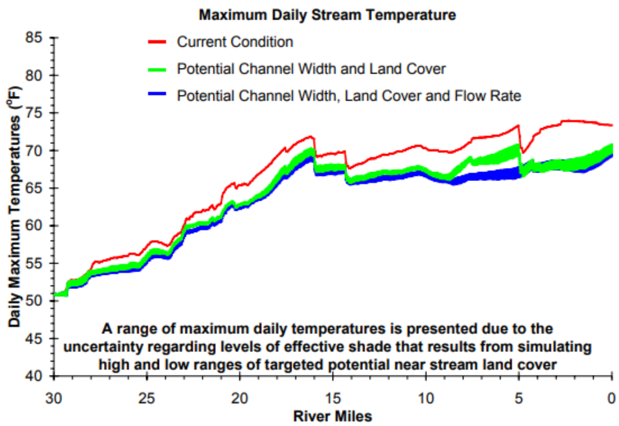

Figure 3-29. Maximum daily temperature, South Fork Sprague River under current condition and modeled conditions. Source: Oregon DEQ. 2002. Upper Klamath Lake Drainage TMDL and WQMP. The blue column represents system potential condition with no measurable surface water temperature increase resulting from anthropogenic conditions including modifications to channel width, land cover and flow.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to tributaries of this reach of the South Fork Sprague River. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout spawning use from each of these reaches together with its tributaries as a unit.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat.

Willamette Basin (Figure A-11)

McKenzie River watershed

Many of these waters were designated for Bull Trout spawning by mistake, as they were identified as rearing habitat in the original FHD. These waters serve as rearing habitat for sub-adult and adult Bull Trout, not for juvenile Bull Trout. This designation is consistent with the USFWS Critical Habitat rule, which classifies these waters as critical habitat for FMO, but not for spawning and rearing.[104]

Factors supporting use unattainability
Temperature: Natural occurring temperatures exceed 12 ℃. **Substrate:** The waters of the upper Horse Creek watershed have a boulder/cobble substrate, not a gravel substrate. **Geographic Location of Habitat:** Lower reaches where DEQ is revising the use have stream order of 5-6 and are not in headwater reaches.

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The FHD indicates that these waters are rearing habitat for adult and subadults, not habitat for spawning and juvenile rearing.
- The USFWS in both 2002 and 2010 noted that these waters were critical FMO habitat, not spawning and rearing habitat.
- Buchanan, et al. (1997) indicates that the lower portion of these waters, from the Willamette River upstream to Trout Creek, only support migrating Bull Trout.
- The analysis below indicates that natural occurring temperatures do not support Bull Trout spawning use and physical conditions in portions of these waters also do not support Bull Trout spawning use.

Demonstration that the use is unattainable

DEQ is revising the Bull Trout Spawning and Juvenile Rearing Use in parts of the McKenzie River watershed, based on UAA Factor 131.10(g), Factor 1, "Natural occurring pollutant concentrations prevent attaining the use." This reach includes portions of the McKenzie River from its confluence with the South Fork McKenzie River upstream to Lost Creek, Horse Creek from its mouth to Separation Creek

[104] USFWS 2010. Bull Trout Critical Habitat Final Rule Justification. Idaho Fish and Wildlife Office, Boise, Idaho, Pacific Region, Portland, OR. 1035 pp. Discussion of streams included as FMO habitat in the Upper Willamette Critical Habitat Unit start on p. 217.

[104] See Final Critical Habitat rule *at* 75 FR 63899 and 63902.

and all tributaries to these waters, except for Separation Creek and its tributaries. Current temperatures of these waters hover near 12 ℃ during the summer and evidence indicates that there is little opportunity for cooling of these waters. Bull Trout Working Group members noted that the waters were too warm to support spawning.[105] It's possible that these waters are not optimal for spawning due to the abundance of colder water habitat further upstream on the McKenzie River, where DEQ is retaining the use.

DEQ examined observed temperatures found in the NoRWeST stream temperature database to evaluate attainability of the 12 ℃ Bull Trout Spawning Use Criterion (Table 3-8). Observed 7-DADM temperatures average 13.7 ℃ in Horse Creek, 12.3 near the upstream portion in the McKenzie River and 13.8 ℃ at the downstream portion near the confluence of the McKenzie and South Fork McKenzie Rivers. Measured data is unavailable in the reach of Horse Creek previously considered potential habitat, but modeled current temperatures in NoRWeST is approximately 14 ℃ at the upper end of that reach.

Thus, in order to attain the Bull Trout Spawning and Juvenile Rearing criterion of 12 ℃, any potential restoration would need to reduce temperature by an average of 0.3 ℃ at the upper end of this reach in the McKenzie, 2.0 ℃ in the upper end of the reach in Horse Creek and by 1.8 ℃ at the downstream end.

Consumptive water withdrawals are minimal in this reach of the McKenzie River. Upstream of Powers Creek (within the reach where DEQ is revising the use), consumptive use is 3.73 cfs in July and 1.64 cfs in August, which are both less than 0.4% of natural stream flow. Upstream of Bear Creek (downstream of the reach where DEQ is revising the use), consumptive use is less than 0.3% of natural stream flow.[106] Thus, flow restoration will have little impact on stream temperatures.

As a result, attainment of natural conditions would come primarily from restoration of shade. DEQ has not fully modeled system potential temperature in the McKenzie River. However, results from the Restored Vegetation Study provide a direct estimate of cooling that could be attained by shade. According to the study, restored vegetation would result in a decrease of 0.2 ℃ at the upper end of the reach in the McKenzie River, essentially no cooling in Horse Creek and a 0.1 ℃ decrease on the McKenzie at its confluence with the South Fork McKenzie. Based on this information, DEQ has concluded that restored vegetation would not sufficiently cool waters in order to attain the Bull Trout Spawning and Juvenile Rearing.

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[105] *Pers. Comm.,* N. Zymonas and J. Ziller, ODFW. Aug. 23, 2023

[106] Oregon Water Availability Reporting System. https://apps.wrd.state.or.us/apps/wars/wars_display_wa_tables/MainMenu1.aspx. Calculations based on 80% flow exceedance values (monthly streamflow expected to be exceeded 80% of the time).

Table 3-8. Maximum 7-DADM temperatures, McKenzie River watershed. Data from NoRWeST database.

Location	Year	Observed 7-DADM Temperature (℃)
Horse Creek near Owl Creek	2001	13.7
Horse Creek near Owl Creek	2002	13.8
McKenzie River near Glen Creek	1995	12.1
McKenzie River near Glen Creek	1997	11.7
McKenzie River near Glen Creek	2001	12.7
McKenzie River near Glen Creek	2002	12.5
McKenzie River near Deerborn Island	2001	13.4
McKenzie River near Deerborn Island	2002	13.4
McKenzie River upstream of SF McKenzie River conf.	2003	13.9
McKenzie River upstream of SF McKenzie River conf.	2004	13.8
McKenzie River upstream of SF McKenzie River conf.	2005	13.7
McKenzie River upstream of SF McKenzie River conf.	2006	13.7

Bull Trout Spawning and Juvenile Rearing Use also is not supported due to the geographic location of these waters. Stream order in most of the waters where DEQ is updating the use is 5 or 6 (Figure 3-30). This evidence suggests that these waters historically would not have provided spawning habitat, which likely would have been further upstream in the watershed where DEQ is retaining the use; this is consistent with FHD data.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation for all tributaries to this reach of the McKenzie River and Horse Creek with the exception of Separation Creek and its tributaries. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for this reach of the McKenzie River and Horse Creek, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout spawning use from each of these reaches together with its tributaries as a unit.

Site-specific information indicates that the upper Horse Creek watershed upstream of Separation Creek, which was only designated to ensure that downstream waters were sufficiently cold, does not support Bull Trout Spawning and Juvenile Rearing Use. Specifically, the substrate, which is influenced by glacial deposits from the Sisters Wilderness, is dominated by boulders and large cobble, rather than gravel.[107] As such, this portion of Horse Creek does not support Bull Trout spawning.

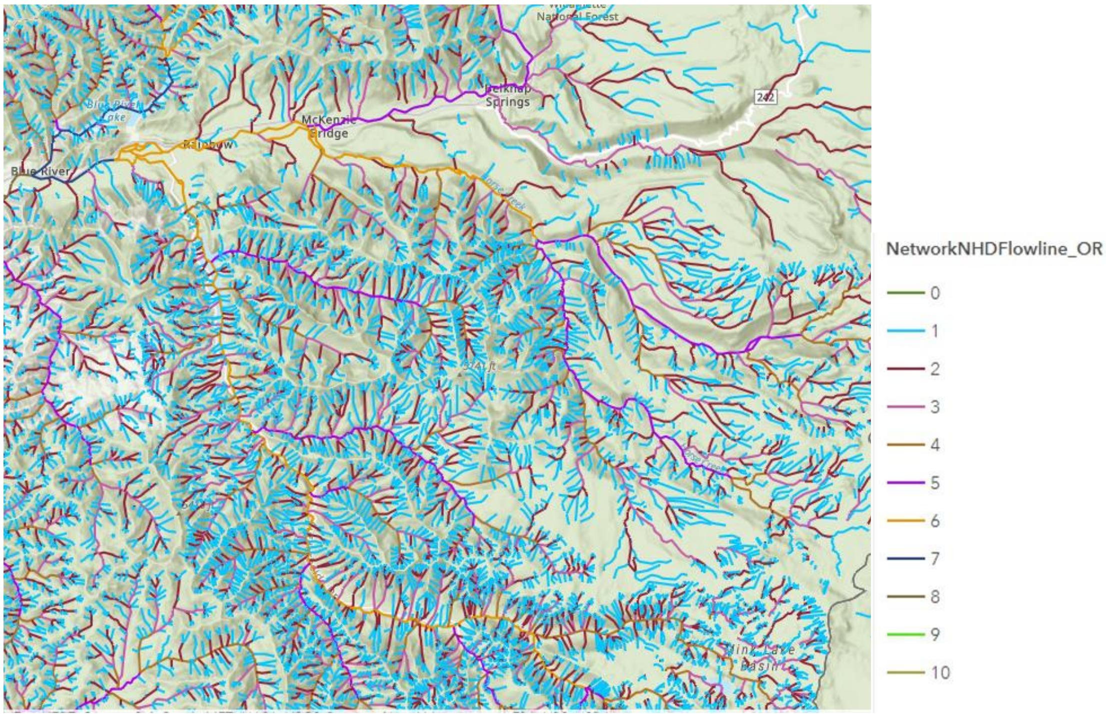

Figure 3-30. Stream order, McKenzie Watershed. Data from National Hydrography Dataset.

Highest Attainable Use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat.

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[107] Willamette National Forest. 1997. Horse Creek Watershed Analysis. Prepared by McKenzie Ranger District. See pages 8-9.

North Fork Middle Fork Willamette River watershed (Figure A-11)

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The FHD does not indicate that these waters have current or historical Bull Trout use, specifically in the N.F.M.F. Willamette River from Waldo Lake to downstream of Skookum Creek, as well as downstream of Parker Creek.
- Buchanan, et al. (1997) does not indicate that these waters support historic or current habitat.
- Climate Shield data indicate that these waters do not support Bull Trout habitat based on 1970-1999 conditions.
- The analysis below indicates that the physical conditions of these waters do not support Bull Trout use, including high gradient and temperatures warmer than 12 ℃.

Factors supporting use unattainability
Substrate: The waters of the upper Horse Creek watershed have a boulder/cobble substrate, not a gravel substrate. **Geographic Location of Habitat:** Lower reaches have stream order of 5-6 and are not in headwater reaches.

Demonstration that the use is unattainable

Upper reaches of N.F. M.F. Willamette River

DEQ is revising the Bull Trout Spawning and Juvenile Rearing Use the North Fork Middle Fork Willamette River from Waldo Lake to Skookum Creek, based on UAA Factor 131.10(g), Factor 5, "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses." In these upper reaches of the N.F. Middle Fork Willamette River, gradient is too steep to support Bull Trout spawning.

ODFW conducted a thorough study of streams in the N.F. M.F. Willamette River, Salmon Creek and Salt Creek subbasins to see which waters could support reintroduction of Bull Trout.[108] The study involved field investigations examining habitat suitability and determined that Bull Trout Spawning and Juvenile Rearing was not supported in many of these waters. In the study, ODFW did the following:

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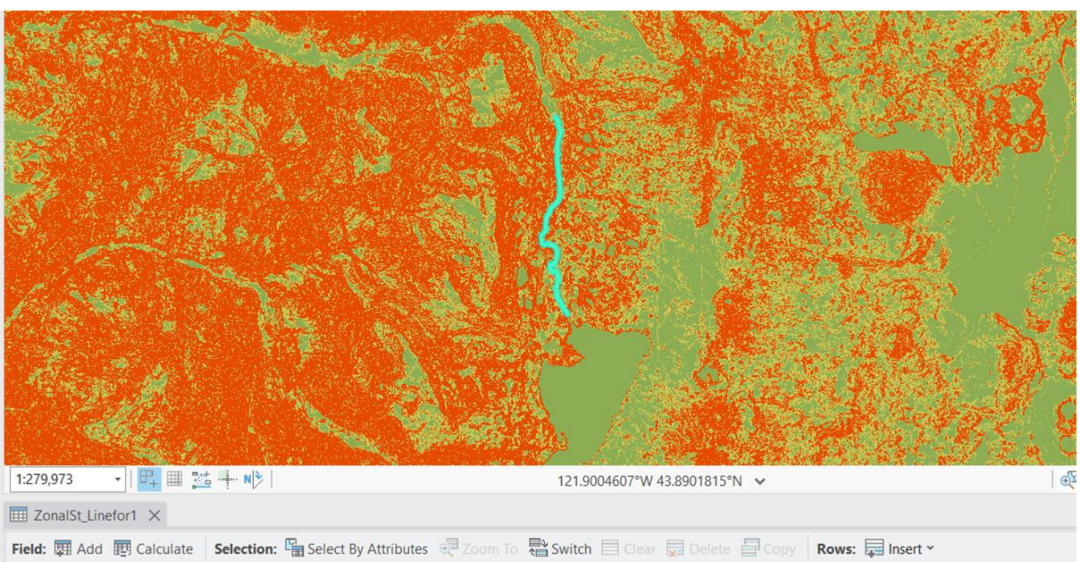
[108] Zymonas, N.D., J.V. Tranquilli, M.J. Hogansen, M.P. Scheur and A.S. Harrison. 2021. Bull Trout Research and Monitoring in the Upper Willamette Basin. ODFW Progress Report Series. Oregon Department of Fish and Wildlife. Corvallis, OR. 158 pp.

- Assessed existing information on historical and recent conditions to identify general areas and some specific tributaries potentially having cold water temperatures.
- Collected point water temperatures mid-day during July or August to characterize summertime high temperatures throughout watersheds and identify specific tributaries and reaches having sufficiently cold water and assess discharge and general habitat conditions at each site.
- For the subset of tributaries having potentially sufficient cold spring-dominated flow to support Bull Trout spawning and early rearing:
    - Identified barriers to upstream migration from the mainstem.
    - Characterized habitat throughout the accessible reaches.
    - Installed temperature loggers to collect year-round water temperature data; and
    - Characterized the fish assemblage in the reaches potentially most suitable for Bull Trout.

Based on these field investigations, ODFW revised its previous assessment of suitable Bull Trout spawning and juvenile rearing habitat in the N.F. M.F. Willamette Basin. In the upper North Fork Middle Fork Willamette Basin, the study found, "the geological setting constrained habitat suitability through the relatively high temperature of streams emanating from lakes on the High Cascades Plateau and by creating high-gradient passage barriers on the main stem and tributaries."

Based on the analysis, DEQ evaluated gradient of the upper portion of the mainstem and found that the reach of the river that runs from Waldo Lake to Skookum Creek is steeper than would support Bull Trout Spawning Use. As noted at the beginning of this chapter, Bull Trout tend to spawn in waters with gradients ranging from 1 to 3.5%. The median gradient of this portion of the N.F. Middle Fork Willamette River is approximately 22% and reaches as high as 67% (Figure 3-31). This finding is consistent with the ODFW report noting the high-gradient passage barriers on the main stem and tributaries. As a result, Bull Trout spawning is not attainable on this portion of the river.



	OBJECTID *	Permanent_Identifier	ZONE_CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM	MEDIAN	PCT90
1	1	93070725	1	1350	1453127.906244	0	67.572075	67.572075	26.580238	19.73817	35883.320822	22.934866	54.647717

Figure 3-31. Gradient, upper N.F. Middle Fork Willamette River. Blue line indicates path of river.

Lower reaches of N.F. M.F. Willamette River and Salt Creek

DEQ is revising the Bull Trout Spawning and Juvenile Rearing Use in certain reaches of the North Fork Middle Fork Willamette River and Salt Creek, and tributaries to these reaches, based on UAA Factor 131.10(g), Factor 1, ""Naturally occurring pollutant concentrations prevent the attainment of the use".

Based on the findings of the ODFW report and temperature data evaluated by DEQ, the reach of the N.F. M.F. Willamette River from Skookum Creek downstream to Fisher Creek, and portions of Salt Creek cannot support Bull Trout and Juvenile Rearing due to both natural conditions. Land cover in this area is almost exclusively evergreen forest (Figure 3-32) and consumptive water uses are less than 0.5% of the natural flow of the river[109], indicating that temperatures reported in the assessment are generally reflective of natural conditions. This is supported by the Restored Vegetation Study, which indicates that this reach would experience less than 0.2 °C of cooling from restored shade. Maximum 7-DADM stream temperatures were 13- 14 °C throughout the lower reach of the N.F. Middle Fork Willamette River where DEQ is revising the use (Figure 3-33), indicating that even with restored vegetation, this reach could not attain the 12 °C criterion.

In Salt Creek, the ODFW study found that temperatures (approximately 13-14 ℃ as a maximum 7-DADM) also would not support Bull Trout Spawning habitat. Similar to the North Fork McKenzie River, the Restored Vegetation Study predicts less than 0.4 ℃ cooling from vegetation restoration in this segment Salt Creek and, in fact, predicts that restoration will warm temperatures in the upper reaches of this reach. Based on this information, DEQ has concluded that restored vegetation would not sufficiently cool waters in order to attain the 12 °C 7-DADM criterion.

[109] Oregon Water Resources Department, Water Availability Reporting System.

Figure 3-32. Land cover, North Fork Middle Fork Willamette Basin. Data from National Land Cover Database.

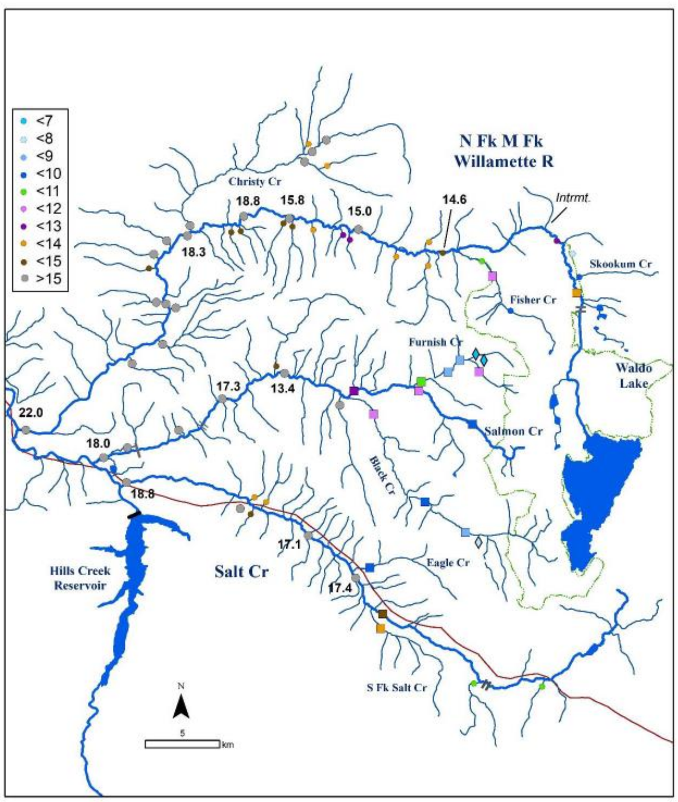


Figure 3-33. Maximum 7DADM temperatures recorded for ODFW study on the feasibility of reintroducing Bull Trout in the North Fork Middle Fork Willamette River, Salt Creek and Salmon Creek Drainages and the Santiam River Basin. Figure 63 in Zymonas N.D., J.V. Tranquilli, M.J. Hogansen, M.P. Schur and A.S. Harrison, 2021. Bull Trout Research and Monitoring in the Upper Willamette Basin, 2010-2017. ODFW Progress Report Series 2021-11.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to tributaries to these reaches of the North Fork Middle Fork Willamette River and Salt Creek. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for these reaches of the North Fork Middle Fork Willamette River and Salt Creek, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout Spawning Use from each of these reaches together with its tributaries as a unit.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat.

3.2.2 Use Revisions based on UAA Factor 4

DEQ is updating uses in certain waters in the Deschutes River Basin from Bull Trout spawning and Juvenile Rearing use to Core Cold Water Use. DEQ also is updating tributaries to these waters, which were designated in 2003 solely to protect downstream uses. These revisions are justified under 40 CFR 131.10(g), Factor 4: "Dams, diversions or other types of hydrologic modifications preclude attaining the use, and it is not feasible to restore the waterbody to its original condition or to operate such modification in a way which would result in the attainment of the use."

Metolius River/Lake Billy Chinook. (Figure A-12)

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The Round Butte Dam, which created the conditions in these waters that precludes Bull Trout Spawning Use, has operated since 1965. A description of these conditions and why the use cannot be attained is described in this

Factors supporting use unattainability

Flow: The presence of the dam precludes sufficient flow necessary for Bull Trout spawning.
Depth: The presence of the dam has increased depth of the waterbody.
Substrate: The presence of the dam has affected substrate in this reach of the Lake.

section.

- The Climate Shield model indicates there was no probability of Bull Trout occupancy in Lake Billy Chinook based on 1970-1999 conditions.

Demonstration that the use is unattainable

In 2003, DEQ designated Bull Trout Spawning and Juvenile Rearing Use in the Metolius River. The designation began just upstream of Lake Billy Chinook, based on ODFW data. Lake Billy Chinook was formed by construction of the Round Butte Dam, a hydroelectric dam, in 1965. The dam is jointly operated by Portland General Electric and the Confederated Tribes of Warm Springs. It was relicensed in 2004 with requirements for several improvements for water temperature and fish passage.

When DEQ initially designated the waters upstream of the reservoir for Bull Trout Spawning and Rearing Use, ODFW did not have accurate information regarding the upper extent of the Metolius arm of Lake Billy Chinook or the lower extent of the Metolius River. As a result of improved surveying, the location of suitable spawning habitat in ODFW's distribution database has shifted upstream by approximately one mile. Climate Shield data indicate no probability of Bull Trout presence in this reach based on modeled 1980 conditions. DEQ is updating the extent of Bull Trout Spawning and Juvenile Rearing Use to align with the survey data and not include this one-mile reach now known to be part of the reservoir. The reservoir reach does not have appropriate physical habitat conditions, such as gravel substrate, cover, depth, channel stability and streamflow velocities to support Bull Trout spawning.

It is not feasible to restore original conditions in this one-mile reach of the river. The Round Butte dam was built in 1965. It is the largest hydropower complex completely in Oregon and is needed to provide energy to Oregon residences and businesses. It is not currently feasible to modify operations to allow spawning in the one-mile reach of the waters where DEQ is updating Bull Trout Rearing and Migration use. As a result of the 2005 renewal of their FERC License and re-certification under the Clean Water Act, the project has significantly modified operations to allow for salmon restoration and improve water quality. These improvements included construction of a selective water withdrawal tower. The withdrawal tower creates currents that attract salmon and steelhead into collection facilities so they can be transported around the dams. The facility allows the water released below the dam to more closely match thermal and flow conditions that would be expected absent the dam, while continuing to allow electricity generation.[110] Further modifications to restore Bull Trout Spawning Use to a one-mile reach of the Metolius would require lowering the lake level from August through May and would impact these

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110 https://assets.ctfassets.net/416ywc1laqmd/3XGy89Dj28GqLCJzh8jzDa/362c67509c368b5d871e6be4eb42c1d6/selective-water-withdrawal-tower.pdf. Visited April 12, 2022

efforts. Moreover, reservoir levels must be maintained at a certain elevation under the licensing agreement for the reservoir. Specifically, the reservoir must be kept at full pool (1944' surface elevation) from May 15 to September 15, which coincides with the beginning of Bull Trout spawning season for summer recreation and at a minimum of 1925' the remainder of the year. Moreover, as Lake Billy Chinook is considered a run of river reservoir and not a storage reservoir, the discharge to the Deschutes River needs to be within +/- 10% of the inflows in the upper basin, meaning that the reservoir cannot be drawn down more than licensing allows.[111]

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to tributaries of this reach of Lake Billy Chinook. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for this reach of Lake Billy Chinook, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout spawning use from each of these reaches together with its tributaries as a unit.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat.

[111] *Pers. Comm.*, Beth Bailey, Biologist, Portland General Electric, June 1, 2023.

3.2.3 Use Revisions based on UAA Factor 5

Bull Trout Spawning and Juvenile Rearing Use is not attainable in the waters described below based on 40 CFR 131.10(g), Factor 5: "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses." These waters do not have one or more of the physical characteristics that support Bull Trout Spawning Use that were described in the introduction to this chapter (see inset for summary of these characteristics). DEQ has included available information from as to what physical conditions do not support the use. None of these waters is included as Spawning and Rearing habitat in the final USFWS critical habitat rule.

> **Characteristics Supporting Bull Trout Spawning and Juvenile Rearing Use**
>
> **Geographic position of habitat:** Very cold headwaters and spring-fed tributaries, generally 4th order streams or lower.
> **Substrate:** Greater than 48% gravel and less than 21% fine sediment.
> **Mean stream velocity:** 0.5 to 1.7 ft/s (west of Cascades); 0.4 to 0.8 ft/s (east of Cascades)]

Deschutes Basin (Figure A-13)

North Davis Creek and Whitefish Creek

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The FHD does not indicate that these waters have current or historical Bull Trout use.
- Buchanan, et al. (1997) does not indicate present or historical Bull Trout use in these waters.
- These waters are naturally intermittent during the spawning season due to high permeability of the geology.
- North Davis Creek is an isolated water body with no surface connection to waters with Bull Trout presence.

> **Factors supporting use unattainability**
>
> **Flow:** These streams are naturally intermittent and do not flow in August due to the high permeability of underlying geologic formations.

Demonstration that the use is unattainable

DEQ is updating the Bull Trout Spawning and Juvenile Rearing Use in Whitefish Creek and North Davis Creek in the Upper Deschutes Basin based on UAA Factor 131.10(g), Factor 5, "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses." Specifically, these waters are intermittent or have insufficient flow to support Bull Trout spawning.

East of the Cascades, Bull Trout require water velocities from 0.4 to 0.8 fps near spawning redds. Many smaller tributaries in the upper Deschutes basin are intermittent during the spawning period, due to the high permeability of the Deschutes Formation, which prevents discharge until groundwater hits the low permeability rock of the John Day formation in the area by Pelton Dam.[112] DEQ compared streams in the upper Deschutes to the intermittent data layer in NHD Plus[113]. See Figures 3-34 and 3-35. Streams currently designated for Bull Trout Spawning and Juvenile Rearing Use that are intermittent are indicated by the yellow lines with brown outlines. Upstream of Crescent Lake, a portion of Whitefish Creek is not intermittent; however, ODFW notes that the flow of Whitefish Creek is 0.5 ft^3/s during the summer and may go subsurface, which would preclude Bull Trout spawning.[114]

In addition to being intermittent, North Davis Creek is an isolated waterbody with no apparent surface connection to any other waterbody. The mainstem of Davis Creek drains into subsurface lava tubes before its water enter Wickiup Reservoir.[115] There is no information as to whether North Davis Creek also has subsurface flow; however, given its proximity, it may also experience this phenomenon.

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[112] Gannett, M.W., Lite, Jr., K.E., Morgan, D.S., and Collins, C.A., 2001, Ground-water hydrology of the upper Deschutes Basin, Oregon: U.S. Geological Survey Water-Resources Investigations Report 00-4162, 74 p.

[113] See description of how the intermittent stream layer was created in the introduction to Chapter 3.

[114] Fies, T., J. Fortune, B. Lewis, M. Manion, S. Marx. 1996. Upper Deschutes River Subbasin Fish Management Plan. Prepared by Upper Deschutes Fish District, Oregon Department of Fish and Wildlife. See p. 172.

[115] Hatton, R.H. 1980. High Country of Central Oregon. Binford & Mort, Publishers. Portland. 226 pp.

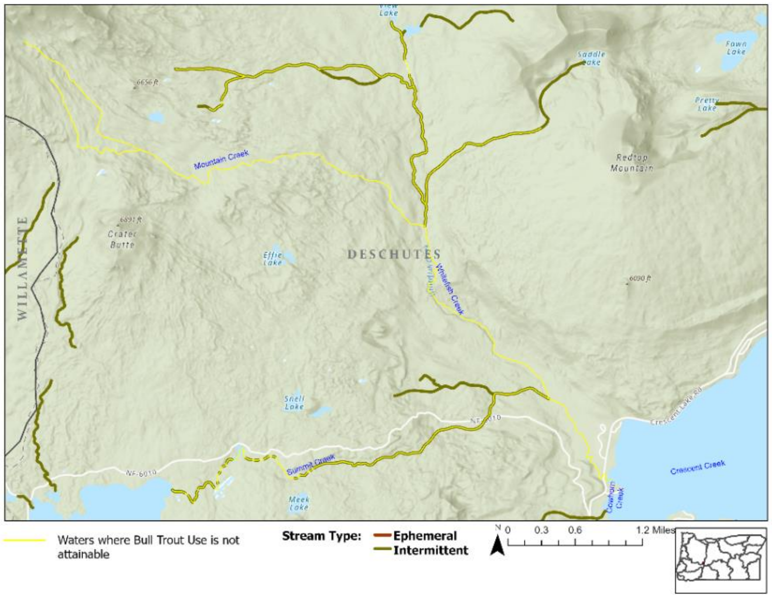

Figure 3-34. Intermittent streams near Crescent Lake.

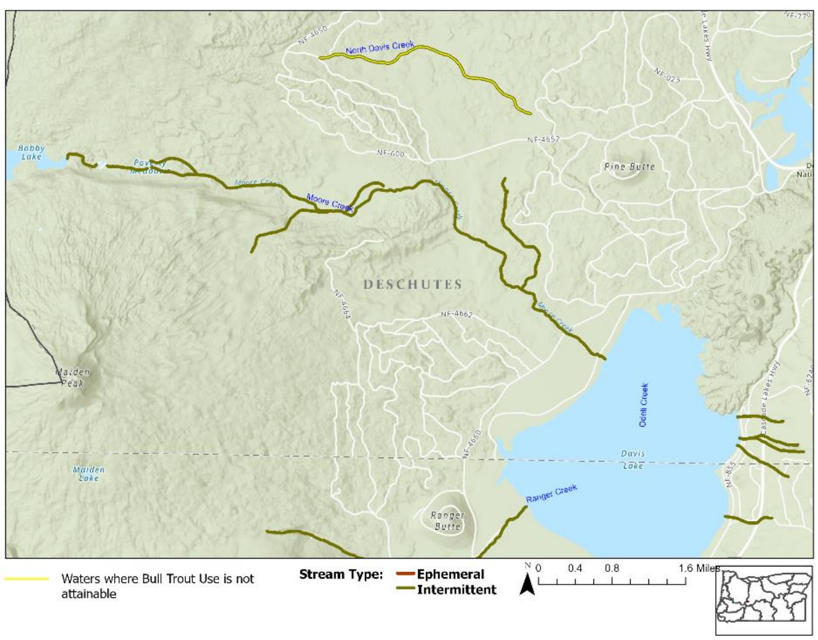

Figure 3-35. Intermittent stream, North Davis Creek.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to tributaries to Whitefish Creek. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as bull trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for Whitefish Creek, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout spawning use from each of these reaches together with its tributaries as a unit.

Highest attainable use

The highest attainable use is Salmon and Trout Rearing and Migration, which is the next most stringent use after Core Cold Water Use. Factor 131.10(g)(5) precludes Bull Trout Spawning and Juvenile Rearing Use, as demonstrated above. Factor 131.10(g)(5) also precludes Core Cold Water Use. According to FHD, these waters are not suitable habitat to support Bull Trout FMO use, which is a trigger for Core Cold Water Use. Nor do they support early Spring Chinook spawning, another trigger for Core Cold Water Use. As a result, Core Cold Water Use is not attainable. However, these waters do support suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout. As a result, Salmon and Trout Rearing and Migration Use is the highest attainable use based on best information available.

Odell Lake

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The FHD indicates these waters are primarily rearing habitat with some migration, not spawning habitat.
- Waters in natural lakes cannot support Bull Trout Spawning Use due to depth, insufficient flow, improper substrate and other natural physical characteristics.

Factors supporting use unattainability

Depth: Depths do not support Bull Trout spawning and juvenile rearing, which occurs at depths of 0.1-0.5 m.
Substrate: These waters do not have substrate to support Bull Trout spawning.

Demonstration that the use is unattainable

DEQ is revising the Bull Trout Spawning and Juvenile Rearing Use in Odell Lake based on UAA Factor 131.10(g), Factor 5, “Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses.” It is unclear why this lake was designated for Bull Trout Spawning and Juvenile Rearing Use in 2003.

Odell Lake is a moderately large, deep natural lake located in the Oregon Cascades Range, adjacent to Willamette Pass. The lake was formed as a glacial trough during the ice-age approximately 11,000 years ago. Three major tributaries and several intermittent streams flow into Odell Lake. The lake's surface water discharges through the outlet at Odell Creek on the east end. As noted in the introduction to this section, Bull Trout spawning and juvenile rearing requires stable stream channels, moderate flow, clean spawning and rearing gravel, and complex and diverse cover. These physical conditions do not exist in a natural lake. Specifically, Bull Trout are found in waters with depths of 0.1-0.5 m, far shallower than what is found in Odell Lake, which reaches a maximum depth of 280 feet. Moreover, spawning occurs in flowing riffle habitat, which does not exist in a lake. As a result, Bull Trout Spawning and Juvenile Rearing Use is not attainable in Odell Lake.

DEQ is also revising the Bull Trout Spawning and Juvenile Rearing Use designation to several tributaries of Odell Lake. Consistent with the decision rules used in 2003, these tributaries were designated for Bull Trout spawning only to provide cold water to the downstream habitat. The tributaries were never identified as Bull Trout spawning habitat by the USFWS, ODFW or the Bull Trout working groups. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Bull Trout Spawning and Juvenile Rearing Use and is how we are treating them for the proposed use correction. The catchment, including the main tributary and it's contributing secondary waters, is the relevant ecological unit. Bull Trout occurrence is positively related to catchment area. Smaller patches (at this scale, singular tributary reaches) have low probability of supporting populations or recolonization through dispersal from surrounding Bull Trout populations, even if they have sufficient flow, and appropriate gradient and substrate. Bull Trout disperse downstream from spawning habitat to foraging and overwintering reaches. If the mainstem of a catchment is not suitable habitat for Bull Trout spawning and juvenile rearing, as indicated for Odell Lake, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Bull Trout spawning use from each of these reaches together with its tributaries as a unit. To be conservative, DEQ is retaining the Bull Trout Spawning and Juvenile Rearing Use in tributaries where Climate Shield data indicate a possibility of Bull Trout presence based on modeled 1970-1999 conditions, including Wharf Creek and a small portion of Crystal Creek near its mouth.

Highest attainable use

The highest attainable use for all waters described here is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat.

Klamath River Basin (Figure A-14)

Sycan River Core Area

Protection of existing uses

The following information supports the conclusion that Bull Trout Spawning and Juvenile Rearing is not an existing use in these waters:

- The waters of Sycan Marsh do not have appropriate substrate or flow to support Bull Trout spawning.
- The Climate Shield model indicates no probability of Bull Trout presence based on 1970-1999 conditions.

Factors supporting use unattainability
Substrate: The waters of Sycan Marsh do not have appropriate substrate or flow velocity to support Bull Trout spawning.

Demonstration that the use is unattainable

DEQ is revising the Bull Trout Spawning and Juvenile Rearing Use in Sycan Marsh, based on UAA Factor 131.10(g), Factor 5, "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses." Specifically, the substrate of Sycan Marsh and lack of flow do not provide suitable spawning conditions for Bull Trout.

In 2003, DEQ designated waters in Sycan Marsh for Bull Trout spawning based on the best information available at the time regarding spawning distribution in the area. Since then, ODFW expended significant effort to monitor Bull Trout migratory behavior and distribution.[116] While there are Bull Trout upstream of Sycan Marsh, ODFW did not monitor Bull Trout within the marsh, because it does not have the appropriate gravel substrate or flow velocity to support Bull Trout spawning.[117]

Highest attainable use

The highest attainable use for Sycan Marsh is Core Cold Water Habitat, which is the next most stringent year-round use after Bull Trout Spawning and Juvenile Rearing Use. Core Cold Water Habitat Use protects sub-adult and adult Bull Trout use and FMO critical habitat.

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[116] ODFW. 2005. Oregon Native Fish Status Report – Volume II: Assessment Methods & Population Results. 573 pp. Discussion of Bull Trout in the Klamath Lake Species Management Unit begins on page 463.

[117] *Pers. Comm.*¸ Ben Ramirez, District Biologist, Klamath District, Oregon Department of Fish and Wildlife, June 22, 2023.

4. Revisions to Seasonal Salmon and Steelhead Spawning Use

Characteristics Supporting Salmon and Steelhead Spawning Use

Accessibility: Must not be blocked by waterfall or steep slopes.
Geographic position of habitat: Varies by species.
Substrate: Sufficient spawning gravel; amount and size varies by species.
Flow: Must have sufficient flow and depth for incubation.
Temperature: Waters with maximum temperature less than 13℃ during spawning and early emergence.

All salmonid species need adequate flow and water quality, spawning riffles and pools, a functional riparian zone, and upland conditions that favor stability. Some of these specific needs vary by species, such as preferred spawning areas and gravel. Although some overlap occurs, different salmon species and/or stocks of the same species within a river are often staggered in their use of a particular type of habitat. Some are staggered in time, and others are separated by location.[118]

When surveying salmon and steelhead spawning habitat, in addition to identifying spawning fish and redds, ODFW considers the physical habitat characteristics of spawning habitat to determine whether the habitat is suitable and accessible. This information includes an evaluation of upstream migration barriers, spawning gravel (amount and distribution), and a habitat ranking, which considers gravel size, quantity, flow, tail outs, and gradient. The survey form also includes a space for general comments about habitat.[119] At some point in the headwaters of every watershed, the streams will become too steep, shallow, or narrow to support salmon and steelhead spawning. This information is compiled and considered by ODFW district biologists, which is then documented in the FHD when mapping spawning reaches including the upper extent of spawning. Above this point, the physical characteristics, whether flow, gravel size or the presence of a barrier, preclude attainment of the use.

Evaluation of existing use. Evaluation of existing use for these waters relies primarily on the following information in the FHD:

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[118] King County and Washington State Conservation Commission. 2000. Habitat Limiting Factors and Reconnaissance Assessment Report, Green/Duwamish and Central Puget Sound Watersheds, Volume 1.

[119] Oregon Department of Fish and Wildlife. 2016. Oregon Adult Salmonid Inventory and Sampling (OASIS) Project: Salmon Spawning Survey Procedures Manual. 110 pp. Spawning survey and instructions found on page 37.

- DEQ is revising the Salmon and Steelhead Spawning Use in some streams because the upper extent of spawning is limited by a natural barrier, such as waterfalls or streams with steep slopes, that prevent salmonid passage. These natural barriers are physical conditions that have existed since before 1975.
- For waters in estuaries, DEQ is revising the Salmon and Steelhead Spawning Use because DEQ and ODFW now have a standard method to classify estuarine waters that wasn't available in 2003. The physical conditions of estuaries that prevent spawning use attainment are natural and thus have existed since well before 1975.
- DEQ is revising the timing of Salmon and Steelhead Spawning Use because either: 1. ODFW has replaced provisional data used for the FHD prior to 2003 with survey data better characterizing the timing of spawning and egg incubation; or 2. DEQ has replaced conservative assumptions used in 2003, when there was less information on spawning timing, with more accurate timing information, as described in the Technical Support Document for the Aquatic Life Use Updates. Evidence indicates that spawning timing has not shifted by more than a few days since the 1950s and the Technical Advisory Committee for the rulemaking did not provide any information that timing had shifted.

Evaluation of use attainability. To evaluate attainability of the Salmon and Steelhead Spawning Use, DEQ relied primarily on information in the FHD, including information on the upstream spawning extent, the presence of natural fish passage barriers, spawning timing, and identification of estuarine habitat. A description of the physical features of estuarine habitat that prevents use attainment is included in that discussion with references to scientific literature (Section 4.2).

Highest Attainable Use. In all waters described here, the highest attainable use is the year-round aquatic life use subcategory. To the extent the year-round aquatic life use subcategory is being revised to either a more or less stringent use, the revised use is the highest attainable use. For waters where DEQ is changing the timing when Salmon and Steelhead Spawning Use applies, the year-round use will remain the highest attainable use during the time when the Spawning Use no longer applies. For example, if the Spawning Use end date is changing from June 15 to May 15, the year-round use will continue to apply from May 15-June 15.

Maps and Inventory Table.

Maps and a table with an inventory of stream reaches for which Salmon and Steelhead Spawning Use designations have been corrected due to improved hydrography or changes in ODFW data is included in Appendix B, including the year-round use that remains in place for these waterbodies.

4.1 Refinements to spawning use location above natural passage barriers

> **Factors supporting use unattainability**
>
> **Passage:** Natural barriers, such as waterfalls, block passage for spawning, as demonstrated in FHD Fish Passage Barrier dataset.

Reason for the Use Update

DEQ is refining the spatial extent of the state's Salmon and Steelhead Spawning Use designations in many locations at the upstream end of spawning reaches, where those locations coincide with natural passage barriers, such as waterfalls or streams with high gradient, as identified in ODFW's fish passage barrier database (Figures B-1 – B-11).

DEQ initially proposed refining the spatial extent of Salmon and Steelhead Spawning Use in numerous other waters. Most of these refinements were due to DEQ changing the GIS hydrography base layers DEQ uses for mapping Oregon's streams. Oregon has transitioned from using the StreamNet hydrography in 2003 (1:100,000 scale) to the of NHD-High Resolution National Hydrography Data Set (1:24,000 scale). DEQ also proposed refining the spatial extent of Salmon and Steelhead Spawning Use designations based on ODFW data that has been revised since 2003. Since DEQ initially designated Salmon and Steelhead Spawning Use in 2003, ODFW has done additional surveying of spawning habitat and adjusted the upstream extent of spawning habitat in many streams. However, DEQ is only moving forward with those refinements associated with natural fish passage barriers, as there is insufficient information to support the other use refinements under UAA regulations. DEQ may move forward with the remaining use refinements in the future should additional information become available.

Protection of existing uses

The refinements to the spatial extent of the Salmon and Steelhead Spawning Use designations described in this section do not remove existing uses. DEQ is refining the spatial extent of spawning upstream of natural passage barriers, such as waterfalls, that prevent Salmon and Steelhead Spawning and have historically. These waters were only designated in 2003 because DEQ designated such waters based on the old hydrography layer, or because ODFW had not identified the passage barriers at that time.

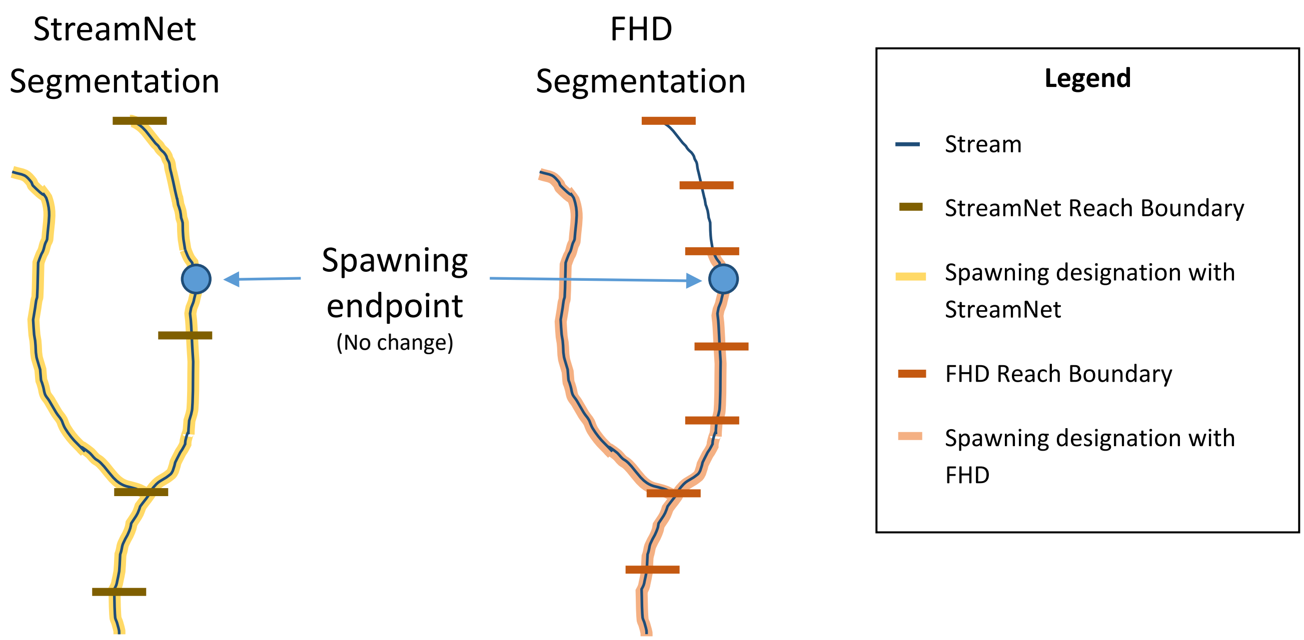

Figure 4-1. Illustration depicting spawning endpoints in 2003 vs. those proposed in 2023. The ODFW data has not changed, but DEQ's maps now more accurately match the ODFW data.

Demonstration that the use is unattainable

These updates to Salmon and Steelhead Spawning Use are justified based on 40 CFR 131.10(g), Factor 5: "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses." Spawning use is not attainable in these waters either because they are not accessible due to a natural barrier, such as a waterfall or steep gradient. In the inventory table for this section, DEQ has referenced the Fish Passage Barrier Number from the FHD.

In streams where artificial barriers, such as culverts or small dams, block fish passage, DEQ is not revising the spawning use designation. It may be feasible to replace the culvert and restore passage in the future through ODFW's fish passage barrier program, thus allowing spawning further upstream. In these waters, DEQ will maintain Salmon and Steelhead Spawning Use in order to protect the water quality in such waters as potential future spawning habitat. DEQ has included a description of the procedure it used to identify manmade versus natural barriers in Appendix B.

Highest attainable Use

In waters where the seasonal Salmon and Steelhead Spawning Use does not occur and the designation is being removed, the year-round use remains as the highest attainable designated use. Factor 131.10(g)(5) precludes attainment of the seasonal Salmon and Steelhead Spawning Use but does not preclude attainment of the year-round use.

4.2 Use revisions due to improved mapping of estuarine waters and tidally influenced freshwaters

Reason for the Use Revision

> **Factors supporting use unattainability**
>
> **Physical characteristics:** Substrate associated with estuaries, lack of flow, and other characteristics do not support salmonid spawning.

DEQ is correcting the geographic extent of spawning use designations located within estuarine and tidally influenced reaches (Figures B-4, B-5, B-9, and B-10). There was no intent in 2003 to designate reaches below head of tide for spawning use. Spawning is not an attainable use in these reaches because habitat conditions do not support salmon and steelhead spawning, except in site-specific cases where it is identified as spawning habitat by ODFW in the current FHD. In 2003, when DEQ developed the initial aquatic life subcategory use maps, there was insufficient information to accurately delineate the extent of tidal influence in coastal streams. Therefore, ODFW had to estimate where the lower extent of spawning distribution occurred. As a result, ODFW and DEQ in turn, designated some reaches for spawning use in error. ODFW has corrected this information in the FHD and DEQ is likewise proposing to correct the spawning designations consistent with the FHD.

Protection of Existing Uses

The updates to Salmon and Steelhead Spawning Use described in this section do not remove an existing use. The changes described here are corrections to spawning use based on improved surveying of spawning habitat in estuarine waters. These waters have had the physical characteristics of estuaries since well before 1975. Waters described here cannot attain Salmon and Steelhead Spawning Use due to the physical conditions that predominate in estuaries, which are described in the following section.

Within some tidally influenced waters, salmonid spawning is known to occur in some microhabitats, such as side channels and gravel bars. DEQ has retained or added Salmon and Steelhead Spawning use where the FHD indicates it occurs and where it is expected to remain stable throughout the egg incubation through emergence period.

Demonstration that the use is unattainable

These corrections are justified based on 40 CFR 131.10(g), Factor 5: “Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses.”

DEQ is revising the Salmon and Steelhead Spawning Use in these waters to be consistent with information in the Fish Habitat Database, which indicates that there is no salmonid spawning. Since 2003, ODFW has put significant resources into mapping salmon and steelhead habitat and uses as a result of several initiatives including the Oregon Plan for Salmon and Steelhead, the listing of the coho salmon as threatened under the Endangered Species Act, and other initiatives. ODFW estimates that it has surveyed 90-95% of salmon and steelhead habitat.[120] Most of the waters that ODFW has not characterized are in less accessible habitat in headwater streams, not the mainstem and estuarine habitats described here.

The waters described here are in estuarine waters according to the Coastal and Marine Ecological Classification Standard implemented for Oregon in the Coastal Atlas by the Department of Land Conservation and Development. CMECS is a federal classification standard developed jointly by the USGS, NOAA, and the EPA to delineate estuary zones and is used to implement multiple coastal management programs by federal, state, and local agencies.

Salmon and steelhead spawning is not attainable in the vast majority of estuarine and tidally influenced freshwaters for several reasons. Stream reaches influenced by tides have slowed flow velocities, or even no or reserved flow, during a significant portion of each day, and they tend to be depositional reaches. Therefore, the substrate is generally sand, fines or soft mud, rather than the gravel substrate needed for redd construction. Moreover, sand and sediment deposition can clog redds, decreasing the dissolved oxygen needed for embryo survival.[121] The riffle habitats needed for spawning are not present and flow velocities in tidal waters are not sufficient to aerate redds. Salmonid redds are typically bowl-shaped depressions with a deeper, more abrupt depth gradients at the leading edge (upstream), gradually tapering to shallower depths on the tail end (downstream). This redd geometry facilitates intrusion of oxygenated water from the overlying flow into the redd and its gravels (Figure 4-2). The slack water or flow reversal that occurs in a tidally influenced river or stream, does not achieve the flow conditions necessary to adequately circulate the intergravel water. In addition, estuarine waters and marine waters are generally lower in dissolved oxygen than free flowing upland waters.

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[120] *Pers. Comm.,* Jon Bowers, ODFW, Aug. 22, 2023.

[121] Burril, S.E., Zimmerman, C.E., and Finn, J.E., 2010, Characteristics of fall chum salmon spawning habitat on a mainstem river in Interior Alaska: U.S. Geological Survey Open-File Report 2010-1164, 20 p.

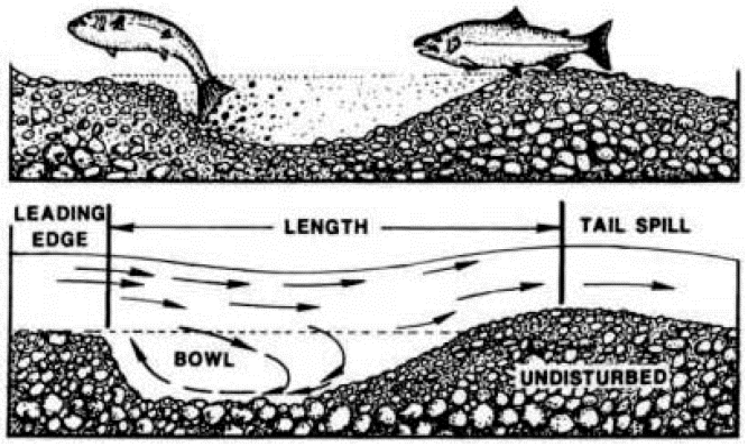

Figure 4-2. From: Lorenz and Eiler 1989. Spawning habitat and redd characteristics of Sockeye Salmon in the Glacial Taku River, British Columbia and Alaska. Transactions of the American Fisheries Society, 118: 495-502

As noted above, the FHD identifies salmonid spawning in some tidally influenced microhabitats, such as side channels and gravel bars. DEQ has retained or added Salmon and Steelhead Spawning Use where the FHD indicates it occurs and where it is expected to remain stable throughout the egg incubation through emergence period.

Highest attainable use

In waters described here where the seasonal Salmon and Steelhead Spawning Use does not occur and is being removed, the year-round use remains the designated use. Factor 131.10(g)(5) precludes attainment of the seasonal Salmon and Steelhead Spawning Use but does not preclude attainment of the year-round use. For the tidally influence fresh waters, the year-round use is Salmon and Steelhead Rearing and Migration. In waters within the geographic boundary of a bay, the year-round use is "oceans and bays" for purposes of applying the temperature standard.

4.3 Miscellaneous revisions to spawning use locations

DEQ is revising spawning use locations in isolated waters in the Rogue and Umpqua subbasins that do not fit within the justification for the use revisions in Sections 4.1 or 4.2. These reaches are addressed individually below. NHD reach codes are provided for each revision.

4.3.1 Cascade Canal, Rogue River Basin

Reason for the Use Revisions

DEQ is removing the Salmon and Steelhead Spawning Use in two reaches of Cascade Canal (NHD Reach Codes 17100307005952, 17100307005953 and 17100307005954, Figure B-7), which connects Fish Lake in the Rogue River Basin to Fourmile Lake in the Klamath Basin.

Cascade Canal was constructed between 1910 and 1915 to convey water from Fourmile Lake, in the Klamath watershed to Fish Lake in the Rogue Watershed. The water was needed to aid irrigation in the Rogue Valley. Prior to the construction of the Canal, Fish Lake Dam was constructed to ensure the extra water transferred from Fourmile Lake via the Canal could be stored.[122]

DEQ also is removing the spawning use in Fish Lake, the headwaters for North Fork Little Butte Creek in the Rogue River Basin. Fish Lake is a natural lake and is therefore subject to the "Natural Lakes" narrative temperature criterion at OAR 340-041-0028(6). Natural lakes are not salmon and steelhead spawning habitat. The previous map showing the streamline continuing through the lake was a GIS mapping error. DEQ's intent was to show the streamlines under lakes in grey, as we did in the other lakes in the Rogue basin, but this one was apparently missed, likely because it is smaller and was difficult to see.

Protection of existing uses

The following information provides evidence that existing uses are protected in Cascade Canal:

- A dam has existed on Fish Lake, downstream of Cascade Canal, since 1908 and the canal was constructed between 1910 and 1915.
- The FHD database does not consider Cascade Canal to be historic habitat for spawning.

Demonstration that the use is unattainable

DEQ is revising the spawning use in the two reach codes of Cascade Canal (approximately 2 river miles) based on 40 CFR 131.10(g), Factor 4: "Dams, diversions or other types of hydrologic modifications preclude attaining the use, and it is not feasible to restore the waterbody to its original condition or to operate such modification in a way which would result in the attainment of the use."

According to ODFW's FHD database, Canal Creek is neither historic nor current salmon and steelhead spawning habitat. Historically, there was no salmon or steelhead passage above Fish Lake. Canal Creek is at the top of the watershed divide between the Rogue and Klamath basins. It is partially in a natural drainage way and partially constructed, and it does not have the appropriate substrate or flow to support salmon and steelhead spawning. As a result, DEQ concludes that spawning is not attainable in Canal Creek.

[122] https://en.wikipedia.org/wiki/Cascade_Canal. Accessed November 30, 2023.

Highest attainable use

In Canal Creek, the year-round use, which is Core Cold Water Use remains the designated use. Factor 131.10(g)(4) precludes attainment of the seasonal Salmon and Steelhead Spawning Use but does not preclude attainment of the year-round use. As noted already, in Fish Lake, the Natural Lakes criterion applies.

4.3.2 Upper extent of Roberts Creek, Umpqua Watershed (South Umpqua Subbasin)

Reason for the Use Revisions

DEQ is removing the Salmon and Steelhead Spawning Use in the upper extent of Roberts Creek, a tributary to the South Umpqua River in the Umpqua River Watershed (Figure B-10, Reach Code 17100302073307).

Protection of existing uses

The following information provides evidence that existing uses are protected in this waterbody:

- Physical conditions related to the natural features of this waterbody, including its ephemeral nature, its slope and its estimated flow do not support salmon and steelhead spawning. Because these are natural features, they have not supported spawning since 1975 or before 1975.

Demonstration that the use is unattainable

DEQ is revising the spawning use in this waterbody on 40 CFR 131.10(g), Factor 5: "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses."

Information in NHD Plus indicates that this waterbody does not have the physical features to support spawning. NHD Plus indicates the segment is ephemeral and has a slope of 22%. Chinook salmon and steelhead spawning is blocked by gradients above 16% and 20%, respectively.[123] Finally, mean annual

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[123] Sheer, M.B., and A. Steel. 2006. Lost watersheds: Barriers, aquatic habitat connectivity, and salmon persistence in the Willamette and Lower Columbia River basins. Transactions American Fisheries Society 135: 1654-1669.

flow according to NHD Plus is 0.59 cfs. Cutthroat trout, rainbow trout (and by extension, steelhead) need a minimum of 1 cfs annual flow for spawning.

Highest attainable use

The year-round use, which is Salmon and Trout Rearing and Migration Use, remains the designated use. Factor 131.10(g)(5) precludes attainment of the seasonal Salmon and Steelhead Spawning Use but does not preclude attainment of the year-round use.

4.4 Use timing refinements based on changes to FHD timing tables or decision rules

Reason for the Use Revision

DEQ is proposing revisions to the timing of Salmon and Steelhead Spawning Use designations in some waters (Figures B-12 - B-24). These updates reflect revisions to the ODFW timing tables for salmon and steelhead spawning based on new data, as well as revisions to the decision rules for timing of salmonid spawning designation. The resulting changes more accurately characterize when spawning through egg incubation occurs. Timing information was still being assembled and reviewed when the use maps were developed in 2003.

Factors supporting use unattainability

Physical conditions: Physical characteristics prevent spawning from occurring at times indicated in 2003 use designations.

In 2003, when initially designating aquatic life use sub-categories specific to the water quality standard for temperature, DEQ designated seasonal Salmon and Steelhead Spawning Use based on the available ODFW life-stage activity timing data if spawning began before Oct. 15. The timing table data shows salmon or steelhead spawning through egg incubation for each species and each timing unit (Figure 4-3). Sometimes this resulted in more than 30 different spawning date ranges for one administrative basin. To simplify the use designations, and because DEQ and EPA assumed that the 13 °C spawning criterion would be attainable by Oct. 15, DEQ applied a start date of Oct. 15 for salmon populations that began spawning on or after Oct. 15.

Refinements to timing of Salmon and Steelhead Spawning Use due to changes in ODFW data. Since DEQ initially designated Salmon and Steelhead Spawning Use in 2003, ODFW has conducted additional surveys of spawning habitat and has updated their timing table data on the timing of spawning and egg incubation. The timing tables are based on documented and undocumented occurrences of spawning based on surveys and professional opinion. The timing data is identified by timing unit, which can be a relatively large area. If spawning begins within the timing unit, it will be noted even though spawning in other reaches may begin later or end earlier.

Refinements to spawning start date due to changes in decision rules. In 2003, DEQ used a default start date of no later than Oct. 15. This was done to simplify the number of spawning use date ranges. The Oct. 15 date was based primarily on information about spring Chinook spawning available at the time. DEQ assumed, absent wide availability of fall temperature data for waterbodies across the state, that most waterbodies in Oregon would attain the spawning criterion by this date. With the increased availability and accuracy of spawning timing available from ODFW, DEQ analyzed actual start timing for spawning of native salmon populations and found that Oct. 15 is approximately the median start date for salmon populations across the state. Many populations of salmon including fall Chinook, and especially Coho and Chum, begin spawning on Nov. 1 or later. To use the increased availability of information on the actual start of spawn timing for salmon populations since 2003, DEQ proposes to start spawning timing at the start of peak spawning use or two weeks after the start of lesser use, whichever is earlier according to ODFW's updated timing table information, but no later than Nov. 1.

Refinements to spawning end date due to changes in decision rules. DEQ has revised the spawning through emergence end date for fall spawning salmon populations to April 30. Where steelhead are present, which includes the majority of spawning streams, the emergence end dates have not changed; they are May 15, or June 15 if the year-round use for the reach is Core Cold Water. Using ODFW's improved habitat distribution data and life-stage timing information, DEQ has identified multiple reaches where spring spawning steelhead populations do not co-occur with fall spawning salmon populations. Therefore, DEQ is proposing to apply the spawning use end date of April 30 in reaches with only fall spawning populations. Analysis of statewide timing of egg incubation through fry emergence in ODFW's 2022 timing table database showed the emergence for fall-spawning salmon populations, including Chinook, Chum, Coho, and Sockeye Salmon, is concluded before April 30.

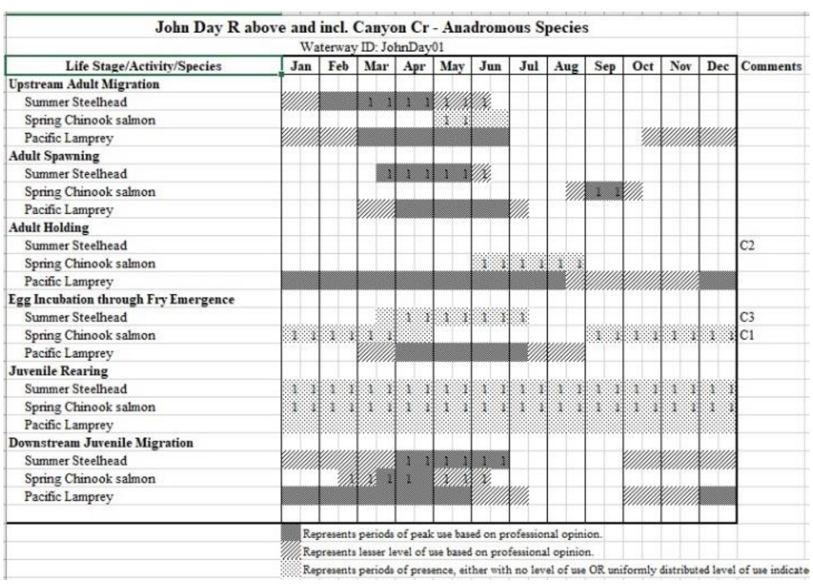

Figure 4-3. Example ODFW spawning timing table.

Protection of existing uses

The revisions to the timing of Salmon and Steelhead Spawning Use described in this section do not remove an existing use. DEQ is revising the timing of the Salmon and Steelhead Spawning Use either because ODFW has replaced provisional data with on-the-ground survey data that better characterizes the timing of spawning and early emergence; or DEQ has replaced conservative assumptions used in 2003 with more accurate information about when spawning occurs, as described in the decision rules the Technical Support Document for the Aquatic Life Use Update.

DEQ analyzed available literature regarding historical shifts to salmonid spawning timing in relation to higher water temperatures and hydrological modifications to evaluate if there is evidence indicating that timing has shifted in these waters. The studies DEQ evaluated indicate that, at most, shifts in spawning timing, if any, have been on the order of a few days to a week. This amount of change is within the two-week scale of ODFW's timing table data used for the current and proposed spawn timing designations. For example, higher numbers of Fall Chinook migrating to spawning grounds upstream of Bonneville Dam on the Columbia River sought thermal refugia during periods of warmer water temperatures; however, most fish continued migration in spite of these warmer temperatures.[124] Mean timing of redd construction by Fall Chinook on the Hanford Reach was found to have shifted later by approximately 8 days since 1950.[125] Coho and Chinook salmon from hatcheries in the Lake Washington watershed have shifted earlier in the fall since the 1940s and 1950s, countering temperature trends.[126] Higher water temperatures are associated with slower migration times for Columbia River steelhead;[127] however, there is no information suggesting that this affects timing of spawning, as summer-run steelhead mature for several months in freshwater before spawning.[128]

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[124] Goniea, T.M., M.L. Keefer, T.C. Bjornn, C.A. Peery, D.H. Bennett and L.C. Stuehrenberg. 2006. Behavioral Thermoregulation and Slowed Migration by Adult Fall Chinook Salmon in Response to High Columbia River Water Temperatures. Transactions of the American Fisheries Society 135(2): 408-419.

[125] Hayes, D.B., B.J. Bellgraph, B.M. Roth, D.D. Dauble and R.P. Murphy. 2014. Timing of Redd Construction by Fall Chinook Salmon in the Hanford Reach of the Columbia River. River Research Applications 30:1110-1119.

[126] Quinn, T.P., J.A. Peterson, V.F. Gallucci, WK. Hershberger and E.L. Brannon. 2002. Artificial Selection and Environmental Change: Countervailing Factors Affecting the Timing of Spawning by Coho and Chinook Salmon. Transactions of the American Fisheries Society 131:591-598.

[127] Keefer, M.L., C.A. Peery, T.C. Bjornn and M.A. Jepson. 2004. Hydrosystem, Dam, and Reservoir Passage Rates of Adult Chinook Salmon and Steelhead in the Columbia and Snake Rivers. Transactions of the American Fisheries Society 133:1413-1439.

[128] Oregon Department of Fish and Wildlife. 2023. Steelhead. Website visited June 27, 2023.

The Technical Advisory Committee for the rulemaking did not express any concerns about the refinements or provide any information that the changes to timing were incorrect. DEQ relies on the ODFW timing tables for the best available data on the timing of spawning through egg incubation. The changes described here are corrections to the temporal extent of spawning use in the waterbody based on improved ODFW data, or due to changes in decision rules as described above.

Demonstration that the use is unattainable

The proposed refinements are based on 40 CFR 131.10(g), Factor 5: “Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses.”

The timing of upstream migration from the ocean is a hereditary trait of Pacific salmon that has developed through natural selection over many generations.[129] Conditions thought to trigger upstream migration include day length, river temperature and flow. [130] A drop in river temperature in mainstem streams is thought to be important for triggering upstream migration of salmon.[131] Migration into low-order channels typically occurs during periods of higher flow, often correlated with the first fall rains. [132]

The proposed refinements reflect more accurate spawn timing data or changes to the decision rules to align with the existing timing data. Research indicates that spawning has shifted by a few days, at most, over the past 50-70 years. As ODFW’s life-stage timing data is presented in two-week timing intervals, the shifts in spawn timing are less than the scale of timing built into DEQ’s process. Because the timing of salmonid spawning, as indicated in the previous paragraph, is a genetic trait built over many generations, the earlier spawning is not attainable because one or more of the physical conditions related to the natural features of the waterbody do not provide and have not historically provided appropriate triggers or conditions to support migration from the ocean into freshwaters or migration

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[129] Quinn, TP. 2018. The behavior and ecology of Pacific salmon and trout. 2nd edition. Seattle, WA: University of Washington Press.

[130] Dusek Jennings, E. and A. N. Hendrix. 2020. Spawn Timing of Winter-run Chinook in the Upper Sacramento River. San Francisco Estuary and Watershed Science. 18(2). 16 pp.

[131] Bergendorf, D. 2002. The Influence of In-stream Habitat Characteristics on Chinook Salmon (*Oncorhynchus tshawytscha*). Report prepared for Northwest Fisheries Science Center, National Oceanic and Atmospheric Association. Seattle, WA. 46 pp.

[132] Beechie T, Moir H, Pess GR. 2008. Hierarchical physical controls on salmonid spawning location and timing. American Fisheries Society Symposium 65:83–101.

upstream to spawning grounds or the onset of spawning activity at the times currently designated indicated in the inventory table for this chapter.

Highest attainable use

The year-round use continues to apply in streams when the seasonal spawning through emergence use does not occur. For example, if the spawning start date has been refined from Oct. 15 to Nov. 1, the year-round use continues to be the most sensitive use until Nov. 1, after which the Salmon and Steelhead Spawning Use will be the most sensitive use. Factor 131.10(g)(5) precludes attainment of the seasonal Salmon and Steelhead Spawning Use during those times but does not preclude attainment of the year-round use. To the extent that DEQ is proposing updates to the year-round use in any of these streams or stream segments, those changes are documented in the appropriate sections of this document.

5. Revisions to Core Cold Water Habitat Use

Characteristics Supporting Core Cold Water Habitat Use

Temperature: Waters with maximum summer temperature less than 16℃.
Habitat: Supports salmon, steelhead and Bull Trout, including Bull Trout habitat for foraging, migration and overwintering during the summer; early Spring Chinook spawning; and late steelhead spawning.

DEQ is proposing to revise several waters from Core Cold Water Use to Salmon and Trout Rearing and Migration Use. Core Cold Water Use is defined as "waters expected to maintain temperatures generally considered optimal for salmon and steelhead rearing, or that are suitable for Bull Trout migration, foraging and sub-adult rearing that occurs during the summer." The objective of Core Cold Water Habitat Use is to maintain cold temperatures to support Bull Trout FMO Use or to ensure that downstream waters are cold enough for their designated uses. Under the aquatic life use update project, "triggers" for Core Cold Water Use include the following:

- Waters where Spring Chinook salmon spawning occurs early; **begins on or before** September 15.
- Waters where winter or summer steelhead spawning occurs late; **ends on or after** June 1.
- Waters having sub-adult and adult Bull Trout presence during July or August but are not also Bull Trout spawning and rearing streams.
- Waters upstream of the areas identified in the above bullets that also support salmon & steelhead rearing or provide cold water to these areas, unless those which can be designated for the Bull Trout Spawning & Juvenile Rearing Use subcategory.
- Waters where water temperature data meeting DEQ's data quality requirements indicate that the warmest 7-day average maximum stream temperature is at or below 16.0°C.

Evaluation of existing use and use attainability. In order to evaluate whether Core Cold Water Habitat Use is an existing use (i.e., may have occurred since October 28, 1975) in these waters, as well as to evaluate attainability of uses, DEQ relied primarily on the following sources of data:

- *Oregon Fish Habitat Database.* Evidence indicating the lack of existing use includes: 1.) waters that are not currently, nor have ever been categorized in the FHD as supporting Bull Trout FMO Use; waters that are not categorized for early (on or before September 15) Chinook Spawning Use or late (on or after June 1) Steelhead Spawning Use.
- *Temperature.* Oregon's water quality criterion is 16°C, which must be attained as a 7-day average maximum during the maximum temperature period in the summer. For some streams, DEQ has information that 16°C as a 7-day average maximum is attainable. To evaluate attainability of 16℃ as a naturally occurring temperature (UAA Factor 1), DEQ utilized process-based models that DEQ has developed in various TMDLs throughout the state. For streams that were not modeled, DEQ utilized measured data that are available in the NoRWeST database and

modeled current conditions from the NoRWeST model. Uncertainty in NoRWeST data are addressed when such data are used for determinations of attainability.

- **Land cover.** In some waters, DEQ has utilized the National Land Cover Database and online maps of the NLCD provided by the Multi-Resolution Land Characteristics Consortium to examine levels of disturbance indicating whether current conditions are representative of reference conditions.[133] For these analyses, DEQ utilized the 2011 CONUS land cover dataset, as this is the dataset that USFS utilized in developing the NoRWeST model, particularly with respect to Forest Canopy.[134]
- **Intermittent stream dataset.** DEQ utilized the layer available on the National Hydrography Dataset Plus database regarding intermittent streams for certain streams.[135]

Other site-specific data is incorporated into the relevant section, as needed.

Highest Attainable Use. In all waters described here, the highest attainable use is Salmon and Trout Rearing and Migration Use, which is the next most stringent use to Core Cold Water Habitat Use.

Maps and Inventory Table. Maps and a table showing revisions to Core Cold Water Use are included in Appendix C.

5.1 Use Revisions based on UAA Factor 1

DEQ is updating Core Cold Water Use in certain waters because the best available information indicates these waters cannot attain the Core Cold Water criterion of 16 ℃ under natural conditions. These waters occur in the John Day, South Coast and Umatilla Basins.

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[133] https://www.mrlc.gov/viewer/

[134] Isaak, D., S. Wenger, E. Peterson, J. Ver Hoef, D. Nagel, C. Luce, S. Hostetler, J. Dunham, B. Roper, S. Wollrab, G. Chandler, D. Horan, S. Parkes-Payne. 2017. The NorWeST summer stream temperature model and scenarios for the western U.S.: A crowd-sourced database and new geospatial tools foster a user community and predict broad climate warming of rivers and streams. Water Resources Research, 53: 9181-9205.

[135] https://www.usgs.gov/national-hydrography/nhdplus-high-resolution

John Day Basin (Figure C-1)

Upper John Day River

Protection of Existing Uses

> **Factors supporting use unattainability**
>
> **Temperature:** Waters cannot attain 16 ℃ under natural conditions.

The updates to Core Cold Water Use described in this section do not remove an existing use. Based on TMDL modeling that DEQ has conducted for the waterbodies described below, these waters have naturally-occurring temperatures that exceed the 16°C criterion and therefore do not support Core Cold Water Habitat Use. The modeled natural condition temperatures account for system potential shade, natural or augmented flow, and changes in stream morphology. DEQ did not update the use if temperature data or modelling evaluated as part of this project indicated that the Core Cold Water Use criterion of 16℃ has been or can be attained (i.e., is an existing use).

Demonstration that the use is unattainable

DEQ is updating Core Cold Water Use on the upper John Day River between Canyon Creek (RKm 384.70) and Indian Creek (RKm 400.05) (Figure C-1). These updates are justified based on 40 CFR 131.10(g), Factor 1: “Naturally occurring pollutant concentrations prevent attainment of the use.”

Temperature modeling that DEQ has conducted for the John Day River TMDL indicates that the upper John Day River in this section of the river cannot attain the Core Cold Water criterion of 16℃, which protects Bull Trout FMO use (Figure 5-1). This is consistent with the final USFWS critical habitat rule, which did not designate this portion of the John Day River as Bull trout FMO habitat, and the Bull Trout Working Groups (see Section 3-2), which determined that this portion of the John Day doesn’t support FMO use during the summer.

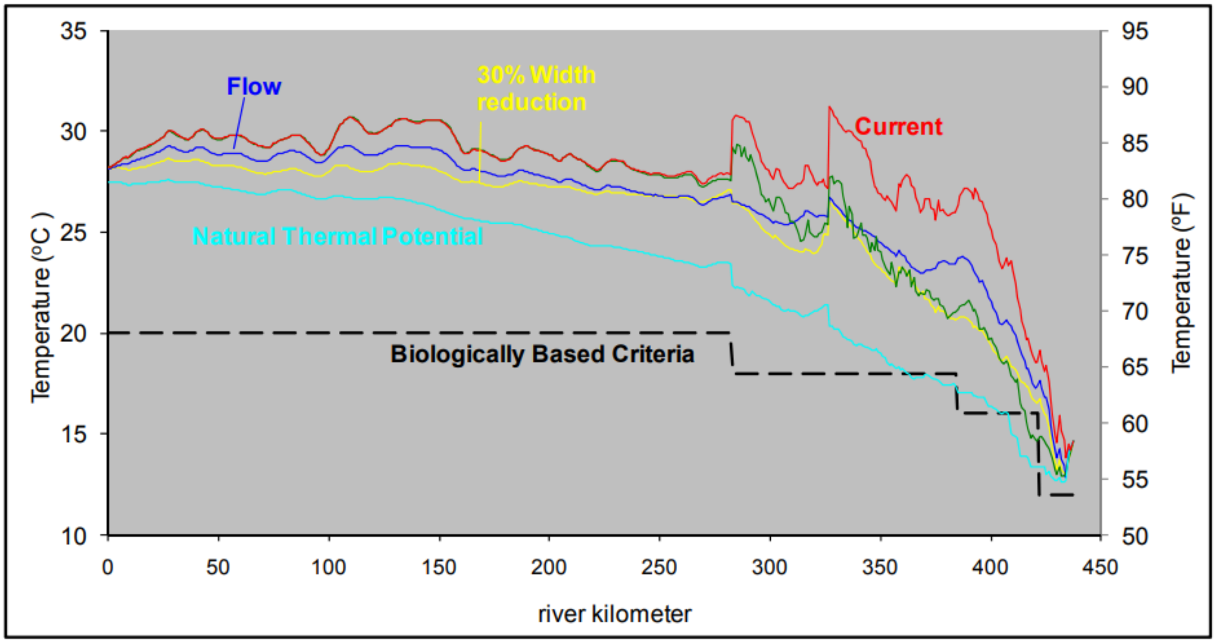

Figure 5-1. Predicted maximum 7DADM temperature profiles of the John Day River resulting from scenarios during the model period, 2004. Source: DEQ, 2010. John Day River Basin TMDL Appendix B: Temperature Model Scenario Report. P. 6. Waters where DEQ is revising the use corresponds to the area between RKm 385 and 400 where it indicates that the biologically based criterion of 16 °C isn't attainable under the Natural Thermal Potential model.

DEQ is also revising the Core Cold Water Habitat Use designation to tributaries to these waters. Consistent with the decision rules used in 2003, these tributaries were designated for Core Cold Water Use only to provide cold water to the downstream habitat. The tributaries were never identified as supporting Bull Trout FMO Use or early Spring Chinook spawning use. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Core Cold Water use and is how we are treating them for the proposed use correction. If the mainstem of a catchment is not suitable habitat, as indicated for this portion of the John Day River, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Core Cold Water Use from each of these reaches together with its tributaries as a unit.

Highest attainable use

Based on the best available data and the decision rules used for this rulemaking, the highest attainable year-round use in the waters described here is Salmon and Trout Rearing and Migration, which is protected by a criterion of 18°C and is the next most stringent use after Core Cold Water Use. Factor 131.10(g)(1) precludes attainment of Core Cold Water Use but does not preclude attainment of Salmon and Trout Rearing and Migration Use. Criteria associated with Salmon and Trout Rearing and Migration Use protect waters that provide suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead. This use designation also protects other cold-water biota that co-occur with salmonids.

Middle Fork John Day River

Protection of Existing Uses

> **Factors supporting use unattainability**
>
> **Temperature:** Waters cannot attain 16 ℃ under natural conditions.

The updates to Core Cold Water Use described in this section do not remove an existing use. Based on TMDL modeling that DEQ has conducted for the waterbodies described below, these waters have naturally-occurring temperatures that exceed the 16°C criterion and therefore do not support Core Cold Water Habitat Use. The modeled natural condition temperatures account for system potential shade, natural or augmented flow, and changes in stream morphology. DEQ did not update the use if temperature data or modelling evaluated as part of this project indicated that the Core Cold Water Use criterion of 16℃ has been or can be attained (i.e., is an existing use).

Demonstration that the use is unattainable

DEQ is updating Core Cold Water Use on the Middle Fork John Day River between Granite Creek (RKm 42) and Cross Hollow (RKm 61) (Figure C-1). These updates are justified based on 40 CFR 131.10(g), Factor 1: "Naturally occurring pollutant concentrations prevent attainment of the use."

The Middle Fork John Day River is an Oregon State Scenic River, which restricts development along most of the river, including the reach where DEQ is revising the use. According to the NoRWeST model, current 7-DADM temperatures along this reach of the Middle Fork John Day River range from 27.1 to 29.1 ℃. There is little temperature data available in this reach; however, data that is available indicates that current temperatures range from 24.9 to 29.4 ℃. In order to attain the Core Cold Water criterion, temperatures under natural conditions, restoration must decrease temperatures by 9-13 ℃.

Temperature modeling that DEQ conducted for the EPA-approved John Day River TMDL indicates that this reach of the Middle Fork John Day River cannot attain the Core Cold Water criterion of 16℃ (Figure 5-2).[136] In fact, the modeling indicates that the entire river cannot attain this temperature. However, DEQ is maintaining the Core Cold Water Use upstream of Cross Hollow, because ODFW timing tables indicate that those waters support Bull Trout FMO use in July or August.

DEQ is revising the Core Cold Water Habitat Use designation to tributaries to this reach of the Middle Fork John Day River. Consistent with the decision rules used in 2003, these tributaries were designated for Core Cold Water Use only to provide cold water to the downstream habitat. The tributaries were

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[136] U.S. EPA, 2010. "Approval of the John Day Subbasins, Oregon Temperature and Bacteria TMDLs." Letter received Dec. 17, 2010.

never identified as supporting Bull Trout FMO Use or early Spring Chinook spawning use. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Core Cold Water Use and is how we are treating them for the proposed use correction. If the mainstem of a catchment is not suitable habitat, as indicated for this portion of the Middle Fork John Day River, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Core Cold Water Use from each of these reaches together with its tributaries as a unit.

Table 5-1. Measured and modeled temperatures, Middle Fork John Day River between Granite Creek and Cross Hollow. Source: NoRWeST database.

Location	Year	Observed 7-DADM Temperature (℃)	Modeled 7-DADM Temperature (℃)	Difference
Middle Fork John Day River d/s of Slide Creek	2001	29.4	28.9	-0.5
Middle Fork John Day River u/s of Bullrun Creek	2002	28.3	28.9	0.6
Middle Fork John Day River u/s of Granite Creek	2009	26.4	29.1	2.7
Middle Fork John Day River u/s of Granite Creek	2011	24.9	26.9	2.0

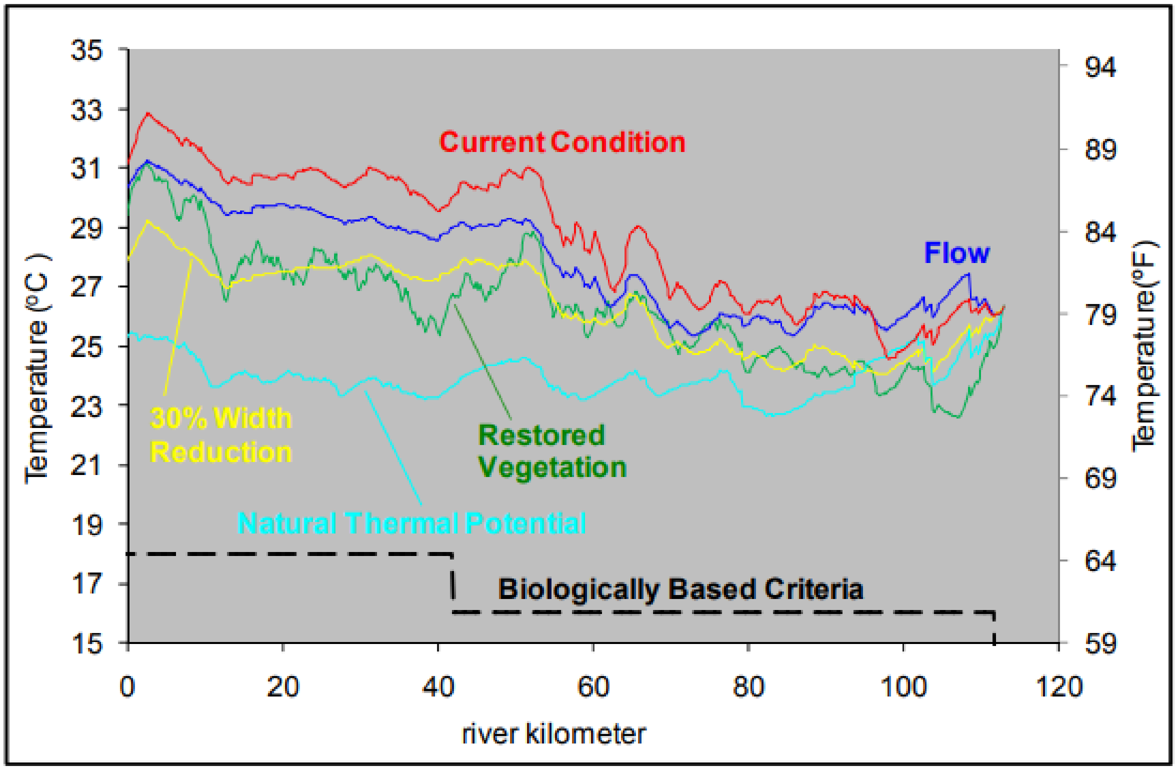

Figure 5-2. Predicted maximum 7DADM temperature profiles of the Middle Fork John Day River resulting from scenarios during the model period, 2002. Source: DEQ, 2010. John Day River Basin TMDL Appendix B: Temperature Model Scenario Report. P. 33.

Highest attainable use

Based on the best available data and the decision rules used for this rulemaking, the highest attainable year-round use in the waters described here is Salmon and Trout Rearing and Migration, which is protected by a criterion of 18°C and is the next most stringent use after Core Cold Water Use. Factor 131.10(g)(1) precludes attainment of Core Cold Water Use but does not preclude attainment of Salmon and Trout Rearing and Migration Use. Criteria associated with Salmon and Trout Rearing and Migration Use protect waters that provide suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead. This use designation also protects other cold-water biota that co-occur with salmonids.

Mid Coast Basin (Figure C-2)

Olalla Creek and West Olalla Creek

Protection of Existing Uses

The updates to Core Cold Water Use described in this section do not remove existing uses. In the waters of Olalla Creek and West Olalla Creek, Core Cold Water Use is not attainable and was never attainable as a

Factors supporting use unattainability

Temperature: Waters cannot attain 16 °C under natural conditions.

result of naturally occurring temperatures, which have occurred since before 1975 based on the best available information.

Demonstration that the use is unattainable

Waters of Olalla Creek and its tributaries, a tributary to the Yaquina River near Toledo, Oregon, cannot attain Core Cold Water Habitat Use (Figure C-2). These revisions are justified under 40 CFR 131.10(g), Factor 1: “Naturally occurring pollutant concentrations prevent attaining the use.” Temperatures in this creek’s watershed cannot attain the Core Cold Water Criterion of 16 °C, despite much of the watershed being in a reference condition. It is not clear why these waters were designated for Core Cold Water Use in 2003, as there is no indication that they met any of the decision rules for Core Cold Water. Moreover, all surrounding waterbodies, including many that begin at higher elevations, were designated for Salmon and Trout Rearing and Migration Use, not Core Cold Water Use.

NoRWeST modeled temperatures in Olalla Creek range from 18.9 °C at its headwaters to 21.3 °C at its mouth. Modeled temperatures in West Olalla Creek range from 21.3 °C at its headwaters at the outlet to Olalla Reservoir to 21.0 °C at its mouth. Land use data indicates that the riparian corridor in Olalla Creek may be somewhat impacted by forest harvest (Figure 5-3). In addition, the initial temperature of West Olalla Creek is influenced by the reservoir. However, temperatures at the headwaters of Olalla Creek and the other two tributaries are well above 16 °C. The headwaters of Olalla Creek appear to have relatively full forest cover with tree height primarily ranging from 10-25 m (Figure 5-4). This indicates these temperatures are close to natural condition.

Moreover, no other waters in this part of the basin have Core Cold Water Use, support early Spring Chinook spawning, or have data indicating they attain 16 °C during the summer. As a result, based on the best information, these waters cannot attain 16 °C even fully restored.

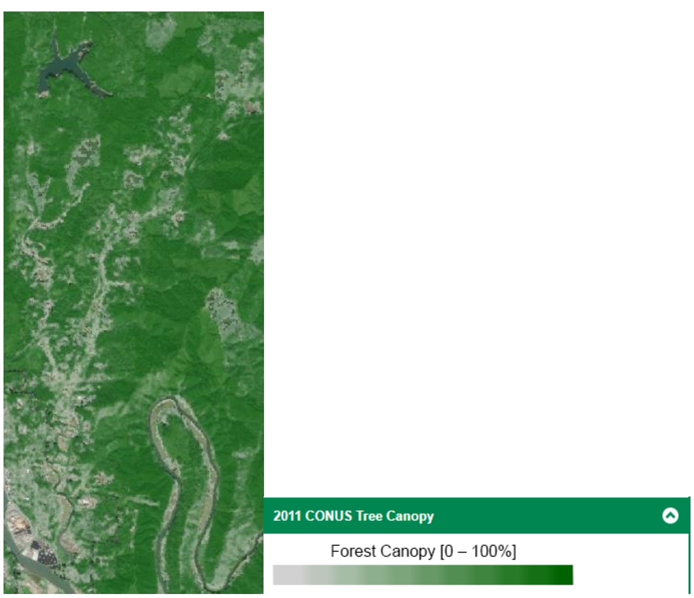

Figure 5-3. 2011 Tree Canopy, Olalla Creek and West Olalla Creek. Data from National Land Cover Database. Accessed November 14, 2023.

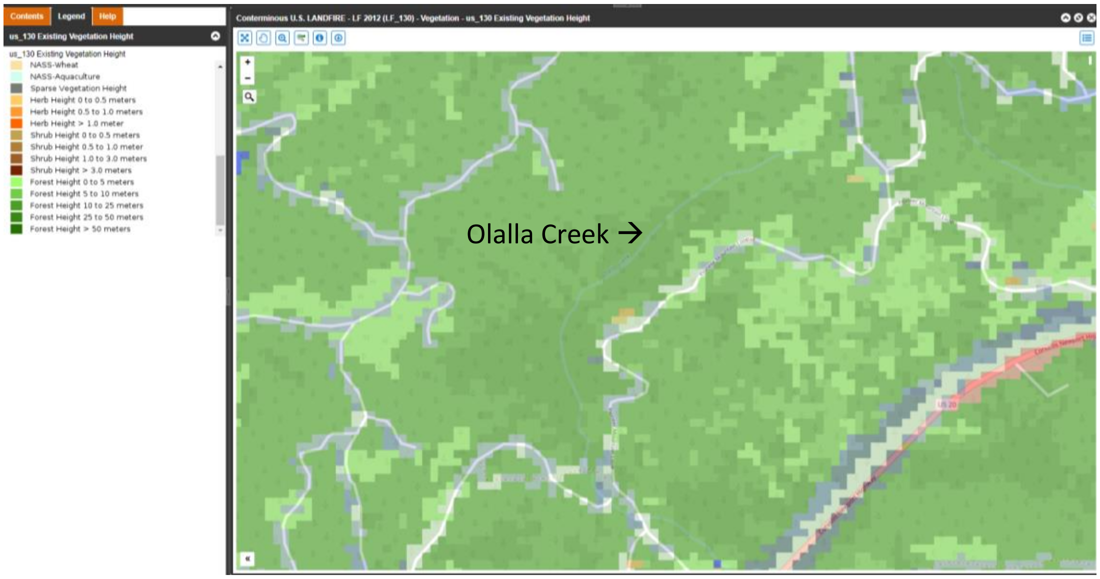

Figure 5-4. Tree height, Olalla Creek headwaters, 2012. Data from Landscape Fire and Resource Management Planning Tools (Landfire) Database. Accessed November 14, 2023.

South Coast Basin (Figure C-3)

North Fork Smith River Watershed

Protection of Existing Uses

Factors supporting use unattainability
Temperature: Waters cannot attain 16 ℃ under natural conditions.

The updates to Core Cold Water Use described in this section do not remove existing uses. In the waters of the North Fork Smith River, Core Cold Water use is not attainable and was never attainable as a result of naturally occurring temperatures, which have occurred since before 1975 based on the best available information.

Demonstration that the use is unattainable

Waters of the North Fork Smith River Watershed cannot attain Core Cold Water Habitat Use (Figure C-3). These revisions are justified under 40 CFR 131.10(g), Factor 1: "Naturally occurring pollutant concentrations prevent attaining the use." Temperatures throughout the North Fork Smith River watershed cannot attain the Core Cold Water Criterion of 16 °C, despite the watershed being in an undisturbed, reference condition. The Forest Service notes that high riparian temperatures are a natural condition resulting from a lack of shading vegetation and landslides on ultramafic soils.[137]

The North Fork Smith River, located in the dry warm southwest corner of Oregon, was named as a Wild and Scenic River in 1988. Approximately one-third of the NF Smith River Basin watershed lies within the Kalmiopsis Wilderness Area. The Forest Service has designated the rest of the watershed as a Late-Successional Reserve, to protect and enhance conditions of late-successional and old-growth forest ecosystems. About 80% of the Late-Successional Reserve area is classified as a roadless area where timber harvest is prohibited with very limited exceptions. Forest Service management goals prohibit mineral extraction and tree harvest in the watershed except for train maintenance and public safety, and road development for maintenance. In addition, there are no active grazing allotments. As a result of these protections, the watershed is a wilderness or roadless area with almost no anthropogenic influence beyond limited, low-impact recreational use. The Forest Service noted that all harvest since 1975 included riparian buffers to protect temperature.[138] DEQ designated all waters of the watershed as the state's first Outstanding Resource Water in 2017.[139]

In a 1995 watershed analysis, the Siskiyou National Forest stated the following:

> "During low flow years, stream temperatures in North Fork of the Smith River and the downstream reaches of Baldface and Chrome Creeks are warm, approaching the tolerance limit for salmonids. The 7-day average maximum temperature in 1994, a low-flow year, was 78.0 °F (25.6 °C) at the mouth of Baldface Creek and 72.0 °F (22.2 °C) in North Fork Smith above Baldface. This is a natural condition that has not been affected by human activities. The lower two-thirds of Baldface Creek, nearly all of Chrome Creek, and a small amount of the lower North Fork Smith subwatershed are in ultramafic soils which support sparse vegetation for shading. Multiple landslides in the ultramafics also remove vegetation and widen the channel downstream, exposing the water to solar radiation. Although banks of the mainstem of the North Fork of the Smith are well-vegetated with a closed canopy of large conifers, the stream has a north-south orientation and a broad enough channel to be exposed to the sun during midday regardless of vegetation.

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[137] Siskiyou National Forest. 1995. North Fork of the Smith River Watershed Analysis. Chetco Ranger District. Brookings, OR. 40 pp.

[138] Siskiyou National Forest. 1995. North Fork of the Smith River Watershed Analysis. Chetco Ranger District. Brookings, OR. 40 pp.

[139] Oregon DEQ, 2017. EQC Staff Report: North Fork Smith River Outstanding Resource Water Rulemaking. 153 pp.

Timber harvest on small tributaries west of the North Fork of the Smith River removed stream shade from 10% of the perennial stream length in Upper and Lower North Fork Smith subwatersheds prior to 1975. Temperatures may have increased on some of these tributaries immediately following harvest. It is unlikely that this possible warming had any effect on temperatures in the North Fork of the Smith River due to the small summer flow they contribute. Tributary riparian areas have since grown in with hardwoods and are well shaded. Harvest since 1975 left riparian buffers. Measured spot temperatures in these tributaries in the 1990's are less than 58°."

DEQ analyzed available summer temperature data taken at various locations within the North Fork Smith River watershed (Table 5-2 and Figure 5-5), as well as NorWeST modeled 7-DADM temperatures. Unlike Factor 1 analyses provided in Chapter 3, DEQ did not adjust modeled temperatures, because measured temperatures were available throughout the watershed and weekly maximum temperatures throughout the watershed exceed the Core Cold Water Habitat criterion of 16.0 ℃ in almost all locations and years where field temperature data was available. Modeled data, which account for forest canopy, indicate that current temperatures are well above 16.0 ℃ throughout the watershed.[140] This conclusion is supported by the report cited above.

Based on the available information, stream temperatures are indicative of reference conditions and the 16.0 ℃ Core Cold Water criterion is not attainable in most of the watershed. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated Core Cold Water Use and for the proposed use revision. Therefore, DEQ is proposing to remove Core Cold Water Use from the entire watershed as a unit.

Table 5-2. Maximum Weekly Maximum Temperature, North Fork Smith River and Tributaries. The modeled temperatures are from NorWest statistical model.

Station ID	Station Name	Years sampled	Weekly Maximum T (℃)	Modeled 1993-2011 7-DADM Temperature (℃)
1767	Chrome Creek	1999	Data unavailable	21.4
2966	Baldface Creek	1994, 1996-1998	24.1-26.3	23.0
5327	NF Smith River at Baldface Creek	2014	21.3	22.0

[140] Isaak, D., S. Wenger, E. Peterson, J. Ver Hoef, D. Nagel, C. Luce, S. Hostetler, J. Dunham, B. Roper, S. Wollrab, G. Chandler, D. Horan, S. Parkes-Payne. 2017. The NorWeST summer stream temperature model and scenarios for the western U.S.: A crowd-sourced database and new geospatial tools foster a user community and predict broad climate warming of rivers and streams. Water Resources Research, 53: 9181-9205.

5331	Baldface Creek (upper)	2014	21.6	20.9
5332	NF Smith River below Hardtack Creek	2014	20.3	22.0
5344	NF Smith River above Acorn Creek	2014	18.6	19.6
5361	Horse Creek	2014	16.7	17.2
5362	Cedar Creek	1999	14.1	17.0
5374	NF Smith River at California Border	2015	24.3	23.9
5390	Cedar Creek	2015	18.8	18.9
5392	Acorn Creek	2015	17.7	17.6
5396	Cedar Creek	2000	12.3	17.2

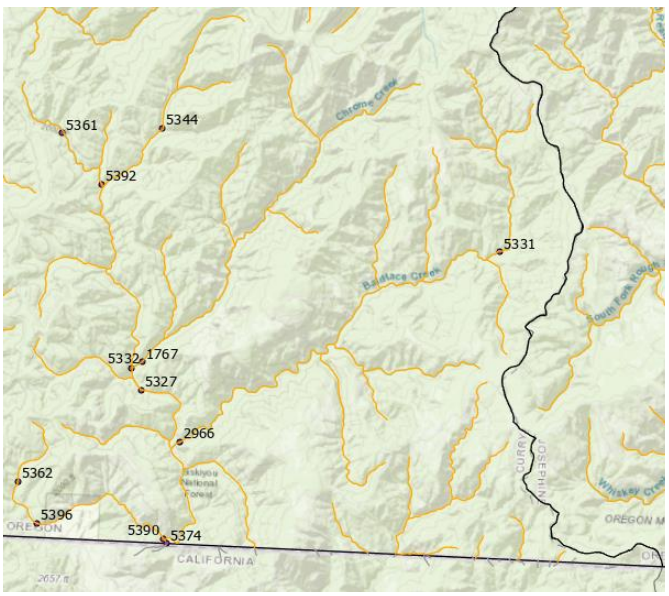

Figure 5-5. North Fork Smith River Temperature Data Stations.

Highest Attainable Use

The highest attainable year-round use in the waters described here is Salmon and Trout Rearing and Migration, which is protected by a criterion of 18℃ and is the next most stringent use after Core Cold Water Use. Factor 131.10(g)(1) precludes attainment of Core Cold Water Use in these waters but does not preclude attainment of Salmon and Trout Rearing and Migration Use. Criteria associated with Salmon and Trout Rearing and Migration Use protect waters that provide suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead. This use designation also protects other cold-water biota that co-occur with salmonids.

Umatilla Basin (Figure C-4)

Protection of Existing Uses

> **Factors supporting use unattainability**
>
> **Temperature:** Waters cannot attain 16 ℃ under natural conditions, so they cannot support Bull Trout FMO use during the summer.

The updates to Core Cold Water Use described in this section do not remove an existing use. Based on TMDL modeling DEQ has conducted for the waterbodies described below, these waters have naturally-occurring temperatures exceeding the 16°C criterion and therefore do not support Core Cold Water Habitat Use. The modeled natural condition temperatures account for system potential shade, natural or augmented flow, and changes in stream morphology. DEQ did not update the use if temperature data or modelling evaluated as part of this project indicated that the Core Cold Water Use criterion of 16℃ has been or can be attained (i.e., is an existing use).

Demonstration that the use is unattainable

DEQ is updating Core Cold Water Use in the Umatilla River near Pendleton, Oregon (Figure C-4) from RM 50.0 (mouth of McKay Creek) to RM 54.2 (mouth of Wildhorse Creek). These updates are justified based on 40 CFR 131.10(g), Factor 1: "Naturally occurring pollutant concentrations prevent attainment of the use."

These waters were designated for Core Cold Water Use in 2003, although they are isolated from other Core Cold Water streams. Natural condition temperature modeling that DEQ has conducted for the Umatilla River TMDL indicates that the Umatilla River in this section of river cannot attain the Core Cold Water criterion of 16 ℃ (Figure 5-6).[141] System thermal potential parameters include tributary temperatures that are less than 64 ℉, site potential vegetation and near-stream disturbance zone widths, and targeted channel width-to depth ratios. DEQ calculated three different flow scenarios based on current flow, natural flow and augmented flow. Even under the augmented flow condition, which imports water from the Columbia River or from groundwater wells into the Umatilla, no portion of the Umatilla River attains a temperature of 16 ℃ (60.8 ℉) during the warmest part of the year, indicating that the Core Cold Water Use is unattainable under natural conditions. System potential temperatures in the reach where DEQ is revising the use is approximately 69-70 ℉, approximately 21 ℃.

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[141] Oregon DEQ, Umatilla Basin Watershed Council and Confederated Tribes of the Umatilla Indian Reservation, 2001. Umatilla River Total Maximum Daily Load and Water Quality Management Plan. 420 pp.

The Umatilla River TMDL modeled temperatures based on an annual maximum daily temperature rather than 7-DADM due to the expression of temperature criteria when the TMDL was developed. The difference between maximum daily temperature and 7-DADM temperatures in the interior Columbia averages less than 1℃ and at most measured 2.1 °C.[142] Assuming the worst case scenario, 7-DADM temperatures under system potential conditions in this reach would be approximately 19 °C, meaning that the Core Cold Water criterion of 16 °C isn't attainable.

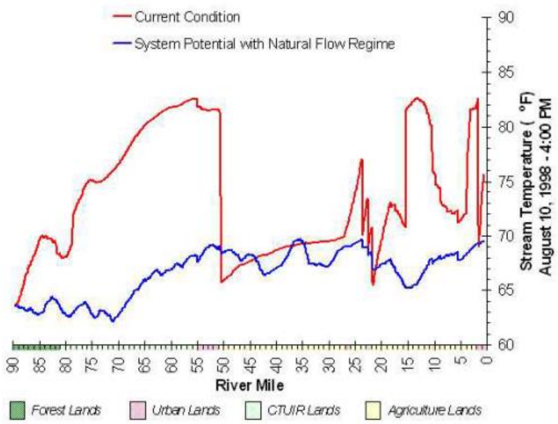

Figure 5-6. System Potential with Natural Flow Regime, Umatilla River. Source: Figure A-57 in ODEQ. 2001. Appendix A-4: Temperature Technical Analysis, Umatilla River TMDL.

DEQ is also revising the Core Cold Water Habitat Use designation to tributaries to these waters. Consistent with the decision rules used in 2003, these tributaries were designated for Core Cold Water Use only to provide cold water to the downstream habitat. The tributaries were never identified as supporting Bull Trout FMO Use or early Spring Chinook spawning use. EPA notes in its UAA guidance that States may treat several water bodies as a single unit, which is how DEQ treated these waterbodies in 2003 when it initially designated the Core Cold Water Use and is how we are treating them for the proposed use correction. If the mainstem of a catchment is not suitable habitat, as indicated for this portion of the Umatilla River, the occurrence of the use in singular tributary reaches of the catchment would also be precluded. Therefore, DEQ is proposing to remove the Core Cold Water Use from each of these reaches together with its tributaries as a unit.

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[142] Dunham, J. B.; B. Rieman, and G. Chandler. 2001. Development of field-based models of suitable thermal regimes for interior Columbia Basin salmonids. Boise, ID: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Final Report RMRS-00-IA-11222014-521. 79 p

Highest Attainable Use

Based on the best available data and the decision rules used for this rulemaking, the highest attainable use in the waters described here is Salmon and Trout Rearing and Migration, which is protected by a criterion of 18℃ and is the next most stringent use after Core Cold Water habitat. Factor 131.10(g)(5) precludes attainment of Core Cold Water Use but does not preclude attainment of Salmon and Trout Rearing and Migration Use as discussed in this section. Criteria associated with Salmon and Trout Rearing and Migration Use protect waters that provide suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead. This use designation also protects other cold-water biota that co-occur with salmonids.

5.2 Use Revisions based on UAA Factor 5

5.2.1 Updates to Core Cold Water Use in "Anchor Habitat"

Reason for the Use Change

Factors supporting use unattainability

Habitat: Waters do not support early Spring Chinook spawning due to natural or physical conditions.
Temperature: Modeled and measured temperatures cannot attain 16 ℃ in near reference conditions.

DEQ is updating Core Cold Water Habitat Use to Salmon and trout rearing and migration in several waters in the North Coast and Mid Coast Basins (Figures C-5 and C-6). DEQ designated these waters for Core Cold Water Use in 2003.[143]

One of the triggers for the year-round Core Cold Water Habitat Use designation is early (pre-September 15) Spring Chinook spawning, which indicates the presence of colder water. In these waters, Core Cold Water Habitat is the year-round designated aquatic life use subcategory. For streams where spring Chinook spawning occurs later than September 15, Salmon and Trout Rearing and Migration is the year-round designated use. In both cases, salmon and steelhead spawning, which is a seasonal use, applies at the times specified on the spawning maps.

In 2003, when DEQ was developing the fish use maps, DEQ used information from an EcoTrust and Wild Salmon Center study, "A salmon conservation strategy for the Tillamook and Clatsop State Forest."[76] (Referred to as the "Anchor Habitat Study.") The Anchor Habitat Study identified waters as core juvenile

[143] Ecotrust, Oregon Trout, and The Wild Salmon Center. 2000. A salmon conservation strategy for the Tillamook and Clatsop State Forest.

rearing habitat for Coho Salmon, steelhead and Chinook Salmon in the Tillamook and Clatsop State Forests. The purpose behind the Anchor Habitat Study was to protect the most critical areas for production of salmon in the Clatsop and Tillamook State Forests, while allowing for some timber harvest. EcoTrust provided DEQ with GIS files showing anchor habitat in these areas and the Siuslaw River basin in the Midcoast Basin.[144] Anchor habitat in the Ecotrust study is not defined the same as DEQ's Core Cold Water Habitat Use subcategory and did not use the same trigger or identifier, i.e., early Spring Chinook spawning. Some waters were considered anchor habitat because they had high productivity values supporting salmonid rearing, with temperatures higher than 16°C as a 7dAM (the Core Cold Water criterion). Neither thermal condition nor thermal potential were part of EcoTrust's habitat evaluation. These waters with higher productivity are more appropriately classified as the Salmonid Rearing and Migration criterion of 18℃ 7dAM. The colder waters protected by the Core Cold Water criterion (16°C 7dAM) have lower productivity and lower juvenile salmon growth rates.

Protection of Existing Uses

The updates to Core Cold Water Use described in this section do not remove an existing use. The use is being updated because the original designations did not consider whether there was early spring Chinook timing in these waters. ODFW has concluded that these waters are not habitat for early spring Chinook spawning and there is no information indicating that these waters have supported early Spring Chinook spawning since 1975. The technical workgroup convened for the Aquatic Life Use Updates project supported these changes. As noted in Chapter 4, information indicates that the timing of Chinook spawning has been stable since before 1975.

Demonstration that the use is unattainable

These updates to Core Cold Water Use are based on 40 CFR 131.10(g), Factor 5: "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses." Specifically, the natural features of the waterbody do not support early spring Chinook spawning, which is one of the triggers for Core Cold Water Use.

The timing of upstream migration from the ocean is a hereditary trait of Pacific salmon which has developed through natural selection over generations.[145] River temperatures in mainstem streams are

[144] Steinback, Chris, Ecotrust. *Personal communication with ODEQ,* October 30, 2003.

[145] Quinn, TP. 2018. The behavior and ecology of Pacific salmon and trout. 2nd edition. Seattle, WA: University of Washington Press.

thought to be important for triggering upstream migration of Chinook salmon.[146] Conditions thought to trigger upstream migration may also include day length and flow.[147] Spring Chinook migrate in mid-to-late spring and hold throughout the summer near their spawning habitat, and so are the first anadromous species to initiate spawning when thermal conditions are right in the fall.

In the waters described here, there is no indication that Spring Chinook begin spawning prior to September 15. As a result, there is no indication that stream temperatures are likely to remain at or below 16°C throughout the summer. Because these use refinements are based on the best available information, DEQ concludes that the reasons spawning doesn't occur in these waters is because physical conditions, such as flow, do not support spawning on or prior to September 15. Another possibility is that naturally occurring temperatures are too warm in summer to classify the water as Core Cold Water Habitat or landscape scale cold water refuge.

DEQ retained Core Cold Water Use in "anchor habitat" waters if: 1.) ODFW indicated that the waters support early Spring Chinook spawning; 2.) measured temperature data indicates that 16 ℃ is attainable; or 3.) NorWeST 7-DADM temperatures indicate that 16 ℃ is attainable. In remaining waters, both measured and NoRWeST 7-DADM temperatures indicate that 16 ℃ isn't attainable. These waters occur in heavily forested public forests with high levels of tree canopy, meaning programmed harvest and opportunities for additional cooling is limited (Figures 5-7 and 5-8).

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[146] Bergendorf, D. 2002. The Influence of In-stream Habitat Characteristics on Chinook Salmon (*Oncorhynchus tshawytscha*). Report prepared for Northwest Fisheries Science Center, National Oceanic and Atmospheric Association. Seattle, WA. 46 pp.

[147] Dusek Jennings, E. and A. N. Hendrix. 2020. Spawn Timing of Winter-run Chinook in the Upper Sacramento River. San Francisco Estuary and Watershed Science. 18(2). 16 pp.

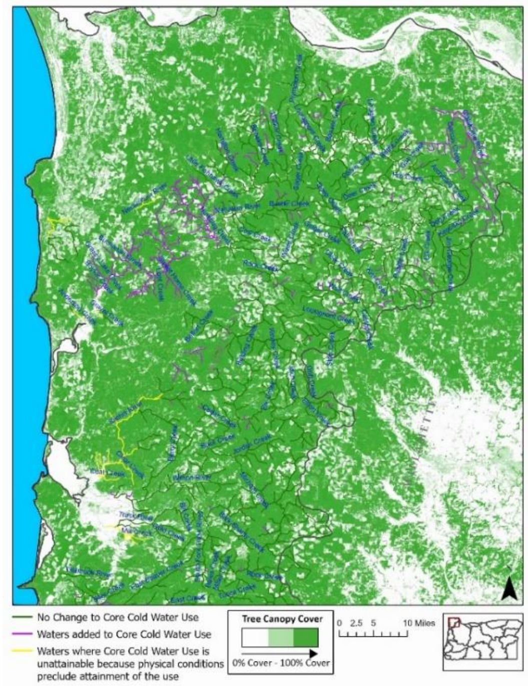

Figure 5-7. Tree Canopy, North Coast Basin. Data from National Land Cover Database, 2011 Tree Canopy dataset. 2011 data was used because it is the layer utilized for modeling temperatures in the NoRWeST stream temperature model.

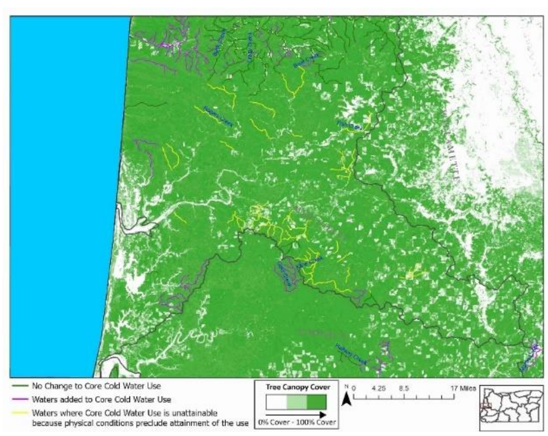

Figure 5-8. Tree Canopy, North Coast Basin. Data from National Land Cover Database, 2011 Tree Canopy dataset. 2011 data was used because it is the layer utilized for modeling temperatures in the NoRWeST stream temperature model.

The one water where tree canopy appears limited is in the lower Trask River Basin in the North Coast Basin. In this water, TMDL modeling indicates that temperatures cannot attain 16 ℃ under natural conditions, including site potential near stream vegetation and channel morphology (Figure 5-9), except in the upper headwaters of the river, indicating that the Core Cold Water criterion isn't attainable.[148]

[148] Oregon DEQ, 2001. Tillamook Bay Watershed TMDL. 252 pp.

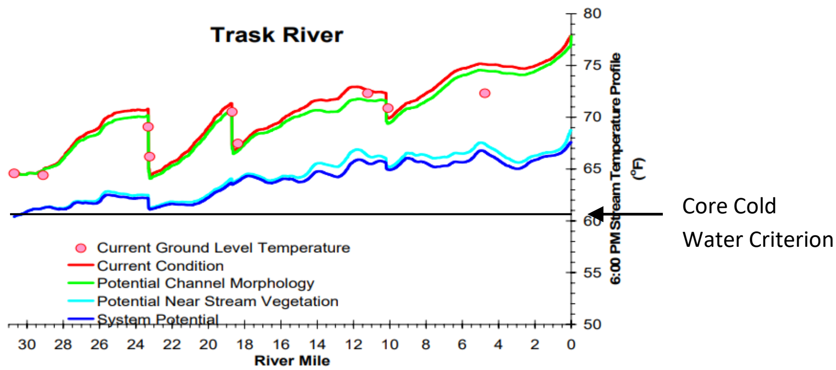

Figure 5-9. System Potential Temperature, Trask River. Source: Tillamook Bay Watershed TMDL (2001).

DEQ analyzed literature regarding historical shifts to salmonid spawning timing in relation to higher water temperatures and hydrological modifications to evaluate if there is evidence indicating timing has shifted in these waters since spawning use was designated in 2003. The studies DEQ evaluated indicate that, at most, shifts in spawning timing, if any, have been on the order of a few days to a week. This amount of change is within the two-week scale of ODFW's timing table data used for the current and proposed spawn timing designations. For example, the peak of Coho spawning in 2020 was approximately 10 days later than average, which is within interannual variability.[149] Outside of the Oregon Coast, mean timing of redd construction by Fall Chinook on the Hanford Reach was found to have shifted later by approximately 8 days since 1950.[150] Coho and Chinook salmon from hatcheries in the Lake Washington watershed have shifted earlier in the fall since the 1940s and 1950s, countering temperature trends.[151] Higher water temperatures are associated with slower migration times for

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[149] Sounhein, B., M. Lewis and M. Weeber. 2021. Western Oregon adult Coho Salmon, 2020 spawning survey data report. Monitoring Program Report Number OPSW-ODFW-2021-3, Oregon Department of Fish and Wildlife, Salem, Oregon.

[150] Hayes, D.B., B.J. Bellgraph, B.M. Roth, D.D. Dauble and R.P. Murphy. 2014. Timing of Redd Construction by Fall Chinook Salmon in the Hanford Reach of the Columbia River. River Research Applications 30:1110-1119.

[151] Quinn, T.P., J.A. Peterson, V.F. Gallucci, WK. Hershberger and E.L. Brannon. 2002. Artificial Selection and Environmental Change: Countervailing Factors Affecting the Timing of Spawning by Coho and Chinook Salmon. Transactions of the American Fisheries Society 131:591-598.

Columbia River steelhead;[152] however, there is no information suggesting that this affects timing of spawning, as summer-run steelhead mature for several months in freshwater before spawning.[153]

Highest attainable use

Based on the best available data and the decision rules used for this rulemaking, the highest attainable year-round use in the waters described here is Salmon and Trout Rearing and Migration, which is protected by a criterion of 18°C and is the next most stringent use after Core Cold Water Use. Factor 131.10(g)(5) precludes attainment of Core Cold Water Use but does not preclude attainment of Salmon and Trout Rearing and Migration Use. Criteria associated with Salmon and Trout Rearing and Migration Use protect waters that provide suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead. This use designation also protects other cold-water biota that co-occur with salmonids.

5.2.2 Updates to Core Cold Water Use related to changes to "early" Chinook spawning

Reasons for the Use Change

DEQ is updating Core Cold Water Use in waters of the North Coast, Rogue River and Willamette River basins because updated information from ODFW indicates that early Chinook spawning does not occur in these streams and has not since 1975 based upon best available information. These waters were initially classified as Core Cold Water Use in 2003 because the best available data indicated they were waters where either: 1.) Spring Chinook salmon spawning occurs early (prior to September 15), or 2.) were upstream of such waters and were not designated for the more stringent Bull Trout Spawning and Juvenile Rearing

Factors supporting use unattainability

Substrate: Waters in canals do not support spring Chinook spawning, one of the triggers to Core Cold Water Use.
Habitat: Headwaters of Marion and First Creeks begin at lower elevations than other tributaries to the North Santiam River and thus are rain-dominated, contributing to higher temperatures. The Nestucca River reach is estuarine and thus cannot support spring Chinook spawning.

[152] Keefer, M.L., C.A. Peery, T.C. Bjornn and M.A. Jepson. 2004. Hydrosystem, Dam, and Reservoir Passage Rates of Adult Chinook Salmon and Steelhead in the Columbia and Snake Rivers. Transactions of the American Fisheries Society 133:1413-1439.

[153] Oregon Department of Fish and Wildlife. 2023. Steelhead. Website visited June 27, 2023.

Use.[154] Updated data from ODFW indicate Spring Chinook spawning occurs after September 15 in Marion Creek. FHD data indicates all tributaries to Marion Creek do not support spawning and historically never supported spawning.

The timing of the spawning designation in DEQ's spawning use maps was based on the ODFW life-stage activity-timing database available at the time. The database shows salmon or steelhead spawning through egg incubation and emergence for each species and each timing unit. In some waters updates to Core Cold Water Use reflect revisions to the timing tables for Chinook Salmon spawning in ODFW's Fish Habitat database based on current information, which relies on more extensive habitat surveys than existed in 2003. In other waters, updates reflect revisions to the FHD indicating that Spring Chinook Salmon spawning does not occur at all. DEQ retained Core Cold Water Use in streams where data indicates they currently attain 16 °C.

Protection of Existing Uses

The updates to Core Cold Water Use described in this section do not remove an existing use. The changes described here rely on FHD information regarding "early" spring Chinook spawning (i.e., waters where spring Chinook Salmon spawn prior to September 15). The use is being updated in these waters because ODFW's database now has more accurate data regarding spawning location and timing. Early spawning does not occur in these waters, nor is there information that early spawning ever occurred in these waters. DEQ is revising the Core Cold Water Use in a small reach of the Nestucca River in the North Coast because the reach is estuarine. As demonstrated in Chapter 4, estuarine waters do not support spawning. In canals in Medford and Brownsville, these waters do not have habitat conditions that support spawning and are not upstream of Core Cold Water habitat. In Marion Creek headwaters in the North Santiam River valley, the waters are primarily fed by rainwater, whereas other streams in the basin are fed by snowmelt and are thus likely much cooler. This is supported by NoRWeST temperature data, as discussed in the following section.

Demonstration that the use is unattainable

DEQ is proposing these revisions based on 40 CFR 131.10(g), Factor 5: "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses." The waters where Core Cold Water Use is being updated include Marion Creek and tributaries to Marion

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[154] There are two tributaries to the North Santiam River named "Marion Creek." The Marion Creek referred to in this discussion is in the lower portion of the basin, near the town of Marion. It does not refer to the Marion Creek upstream of Detroit Reservoir, where the Marion Forks Fish Hatchery operates.

Creek (Figure C-8). The FHD indicates that neither Marion Creek nor its tributaries support early Spring Chinook spawning.

The timing and location of upstream migration from the ocean is a hereditary trait of Pacific salmon that has developed through natural selection over generations.[155] Conditions thought to trigger upstream migration may include day length, river temperature, and flow.[156] Migration into low-order channels typically occurs during periods of higher flow, often correlated with the first fall rains.[157] River temperatures in mainstem streams are thought to be important for triggering upstream migration of Chinook salmon.[158] This is particularly true for Spring Chinook salmon, which typically spawn in late summer and early fall. Spring Chinook hold throughout the summer near their spawning habitat, and so are the first anadromous species to initiate spawning when thermal conditions are right in the fall.

DEQ analyzed available literature regarding historical shifts to salmonid spawning timing in relation to higher water temperatures and hydrological modifications to evaluate if there is evidence indicating that timing has shifted in these waters. The studies DEQ evaluated indicate that, at most, shifts in spawning timing, if any, have been on the order of a few days to a week. This amount of change is within the two-week scale of ODFW's timing table data used for the current and proposed spawn timing designations. For example, higher numbers of Fall Chinook migrating to spawning grounds upstream of Bonneville Dam on the Columbia River sought thermal refugia during periods of warmer water temperatures; however, most fish continued migration in spite of these warmer temperatures.[159] Mean timing of redd construction by Fall Chinook on the Hanford Reach was found to have shifted later by approximately 8

[155] Quinn, TP. 2018. The behavior and ecology of Pacific salmon and trout. 2nd edition. Seattle, WA: University of Washington Press.

[156] Dusek Jennings, E. and A. N. Hendrix. 2020. Spawn Timing of Winter-run Chinook in the Upper Sacramento River. San Francisco Estuary and Watershed Science. 18(2). 16 pp.

[157] Beechie T, Moir H, Pess GR. 2008. Hierarchical physical controls on salmonid spawning location and timing. American Fisheries Society Symposium 65:83–101.

[158] Bergendorf, D. 2002. The Influence of In-stream Habitat Characteristics on Chinook Salmon (*Oncorhynchus tshawytscha*). Report prepared for Northwest Fisheries Science Center, National Oceanic and Atmospheric Association. Seattle, WA. 46 pp.

[159] Goniea, T.M., M.L. Keefer, T.C. Bjornn, C.A. Peery, D.H. Bennett and L.C. Stuehrenberg. 2006. Behavioral Thermoregulation and Slowed Migration by Adult Fall Chinook Salmon in Response to High Columbia River Water Temperatures. Transactions of the American Fisheries Society 135(2): 408-419.

days since 1950.[160] Coho and Chinook salmon from hatcheries in the Lake Washington watershed have shifted earlier in the fall since the 1940s and 1950s, countering temperature trends.[161] Higher water temperatures are associated with slower migration times for Columbia River steelhead;[162] however, there is no information suggesting that this affects timing of spawning, as summer-run steelhead mature for several months in freshwater before spawning.[163]

North Coast Basin (Figure C-6)

DEQ is proposing to revise Core Cold Water Use in the Nestucca River between Clear Creek and Roy Creek. The FHD shows these waters as primarily rearing with some migration. CMECS data indicate that this portion of the Nestucca River is estuarine. As such, it does not support early spring Chinook spawning (or any spawning), which is one of the decision rules used to designate Core Cold Water Use.

Salmon and steelhead spawning is not attainable in estuarine and tidally influenced freshwaters for several reasons. Stream reaches influenced by tides have slowed flow velocities, or even no or reserved flow, during a significant portion of each day, and they tend to be depositional reaches. Therefore, the substrate is generally sand, fines or soft mud, rather than the gravel substrate needed for redd construction. Moreover, sand and sediment deposition can clog redds, decreasing the dissolved oxygen needed for embryo survival.[164] The riffle habitats needed for spawning are not present and flow velocities in tidal waters are not sufficient to aerate redds. Salmonid redds are typically bowl-shaped depressions with a deeper, more abrupt depth gradients at the leading edge (upstream), gradually tapering to shallower depths on the tail end (downstream). This redd geometry facilitates intrusion of oxygenated water from the overlying flow into the redd and its gravels. The slack water or flow reversal that occurs in a tidally influenced river or stream, does not achieve the flow conditions necessary to

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[160] Hayes, D.B., B.J. Bellgraph, B.M. Roth, D.D. Dauble and R.P. Murphy. 2014. Timing of Redd Construction by Fall Chinook Salmon in the Hanford Reach of the Columbia River. River Research Applications 30:1110-1119.

[161] Quinn, T.P., J.A. Peterson, V.F. Gallucci, WK. Hershberger and E.L. Brannon. 2002. Artificial Selection and Environmental Change: Countervailing Factors Affecting the Timing of Spawning by Coho and Chinook Salmon. Transactions of the American Fisheries Society 131:591-598.

[162] Keefer, M.L., C.A. Peery, T.C. Bjornn and M.A. Jepson. 2004. Hydrosystem, Dam, and Reservoir Passage Rates of Adult Chinook Salmon and Steelhead in the Columbia and Snake Rivers. Transactions of the American Fisheries Society 133:1413-1439.

[163] Oregon Department of Fish and Wildlife. 2023. Steelhead. Website visited June 27, 2023.

[164] Burril, S.E., Zimmerman, C.E., and Finn, J.E., 2010, Characteristics of fall chum salmon spawning habitat on a mainstem river in Interior Alaska: U.S. Geological Survey Open-File Report 2010-1164, 20 p.

adequately circulate the intergravel water. In addition, estuarine waters and marine waters are generally lower in dissolved oxygen than free flowing upland waters.

Rogue Basin

DEQ is proposing to revise Core Cold Water Use in the Hopkins and Medford Canals in the Medford area (Figure C-7). The Hopkins Canal was primarily constructed between 1911 and 1929 for irrigation.[165] The Medford Canal was constructed sometime between 1917 and 1929.[166]

These waters were inadvertently classified as Core Cold Water Habitat in 2003 because GIS hydrography indicated they were upstream of Dry Creek, which is classified as Core Cold Water Habitat because it supports early Spring Chinook spawning. As a result of the upstream waters rule, these waters also were designated for Core Cold Water Habitat. In fact, these waters are not upstream of Dry Creek, but pass over Dry Creek in an aqueduct. These waters do not support salmon or steelhead spawning, as they do not have appropriate substrate to support spawning. As a result, the Core Cold Water Use is not attainable, nor is it needed for downstream protection.

Willamette Basin (Figure C-8)

Brownsville Ditch

DEQ is revising Core Cold Water Use to Salmon and Trout Rearing and Migration in Brownsville Ditch, a water conveyance leading from the Calapooia River to the town of Brownsville, Oregon. The Brownsville Canal was built in the late 1800's and was fed by the construction of the Brownsville Canal providing water for a variety of mills. The dam was rebuilt in the late 1960's to divert flow into the canal for aesthetic purposes. The dam was removed in the summer of 2007.[167] A condition of dam removal was to maintain flows in the canal of 2.5 cfs.[168] Brownsville Ditch does not support Chinook spawning because of a lack of gravel substrate. As a result, the ditch does not have the physical conditions to trigger Core Cold Water Use.

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[165] https://www.oregonencyclopedia.org/articles/fish-lake-canal-company/. Visited June 29, 2023.

[166] Linenberger, T.R. 199. Rogue River Basin Project. U.S. Bureau of Reclamation. 32 pp.

[167] https://blogs.oregonstate.edu/rivers/research/oregon-dam-removal/brownsville-dam-removal-effectiveness-monitoring/. Visited June 14, 2023.

[168] https://www.calapooia.org/what-we-do/dam-removals/. Visited June 14, 2023.

Marion Creek and tributaries

DEQ is revising Core Cold Water Use to Salmon and Trout Rearing and Migration in Marion Creek, a tributary to the North Santiam River, and tributaries to Marion Creek. Marion Creek has headwaters in lower portions of the lower Santiam Basin. A short downstream portion of Marion Creek supports Spring Chinook spawning according to the FHD, but does not support early (i.e., before September 15) Spring Chinook Spawning. Because Marion Creek begins at a lower elevation (approximately 300 feet) than other tributaries to the North Santiam, which begin in the Cascade Mountains, its flow is driven by rainfall rather than snowmelt. Average precipitation in nearby Jefferson, Oregon averaged 41 inches per year from 1907-1954 (when data was available) including 5 inches of snowmelt.[169] As a result, Marion Creek is not expected to provide cold temperatures that would support early Spring Chinook spawning, as compared to other tributaries higher in the Cascades (Figure 5-10).

Figure 5-10. Current 7-DADM temperatures from NoRWeST 1993-2011 scenario, Marion Creek and North Santiam River.

First Creek

DEQ is revising Core Cold Water Use to Salmon and Trout Rearing and Migration in First Creek, a tributary to Hamilton Creek in the South Santiam River watershed. In 2003, DEQ designated First Creek for Core Cold Water because the GIS hydrography available at the time showed that First Creek was a tributary to the South Santiam River, which is designated Core Cold Water. In fact, First Creek empties into Hamilton Creek very close to Hamilton Creek's mouth to the South Santiam River. Hamilton Creek is

[169] Western Region Climate Center. https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?or4238. Visited 7/5/2023.

designated as Salmon and Trout Rearing and Migration Use. DEQ is proposing to revise the use for First Creek so that it protects the correct downstream use in Hamilton Creek.

Highest attainable use

Based on the best available data and the decision rules used for this rulemaking, the highest attainable year-round use in the waters described here is Salmon and Trout Rearing and Migration, which is protected by a criterion of 18℃ and is the next most stringent use after Core Cold Water Use. Factor 131.10(g)(5) precludes attainment of Core Cold Water Use but does not preclude attainment of Salmon and Trout Rearing and Migration Use. Criteria associated with Salmon and Trout Rearing and Migration Use protect waters that provide suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead. This use designation also protects other cold-water biota that co-occur with salmonids.

5.2.3 Updates to Core Cold Water Use in waters that do not support Bull Trout Foraging, Migration, and Overwintering or Subadult Rearing in the summer.

Reason for the Use Update

DEQ is proposing to update Core Cold Water Use designation for two tributaries to the Hood River: Cedar Creek, and an unnamed tributary (NHD Reach Code 17070105000864) (Figure C-9). These tributaries enter Hood River within four miles of its mouth on the Columbia River.

Factors supporting use unattainability

Flow: One tributary is intermittent; one tributary may be a drainage with no flow.
Geographic Location of Habitat: Habitat is much lower in watershed than those typically supporting Bull Trout FMO Use.

In 2003, DEQ mistakenly designated these tributaries for Core Cold Water Use because they are upstream of Hood River, which USFWS considers FMO habitat to its mouth. Upstream tributaries support Bull Trout FMO use in the Hood River by providing cold water fed by glacial melt from Mt. Hood. The physical conditions of these low basin tributaries do not support Bull Trout FMO use. The tributaries have headwaters in agricultural or urban areas in the lower Hood River Valley. Their relative flow volume (both streams are intermittent or ephemeral) and warmer temperature regime means they do not provide cold water to the mainstem Hood River. These tributaries are not Bull Trout FMO habitat and cannot attain 16 °C throughout the summer, as they have no flow during that time.

Protection of existing uses

The updates to Core Cold Water Use described in this section do not remove an existing use. Evidence supporting that these tributaries do not support Bull Trout FMO Use, one of the triggers for Core Cold Water Habitat Use are the following:

- Neither ODFW nor the Bull Trout Working Groups identify these waters as Bull Trout habitat.

- Buchanan, et al. (1997) also does not identify these waters as Bull Trout habitat.
- The Cold Water Climate Shield model developed by USFS did not calculate any probability of Bull Trout occurrence in these streams in based on 1970-1999 conditions.
- There is insufficient flow in these waters to support Bull Trout FMO use, as demonstrated below.

Demonstration that the use is unattainable

These updates are justified based on 40 CFR 131.10(g), Factor 5: “Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses.”

Cedar Creek and the unnamed tributary do not have any flow to support Bull Trout FMO Use in the summer, which is one of the triggers that Core Cold Water Use is designed to protect. DEQ analyzed the intermittent and ephemeral stream layer that is included in the National Hydrography Database. Both of these tributaries are considered intermittent (Figure 5-11). Due to the climatic conditions in Oregon, stream flow does not occur during the dry summer period; as such, these waters cannot support Core Cold Water Use during the summer.

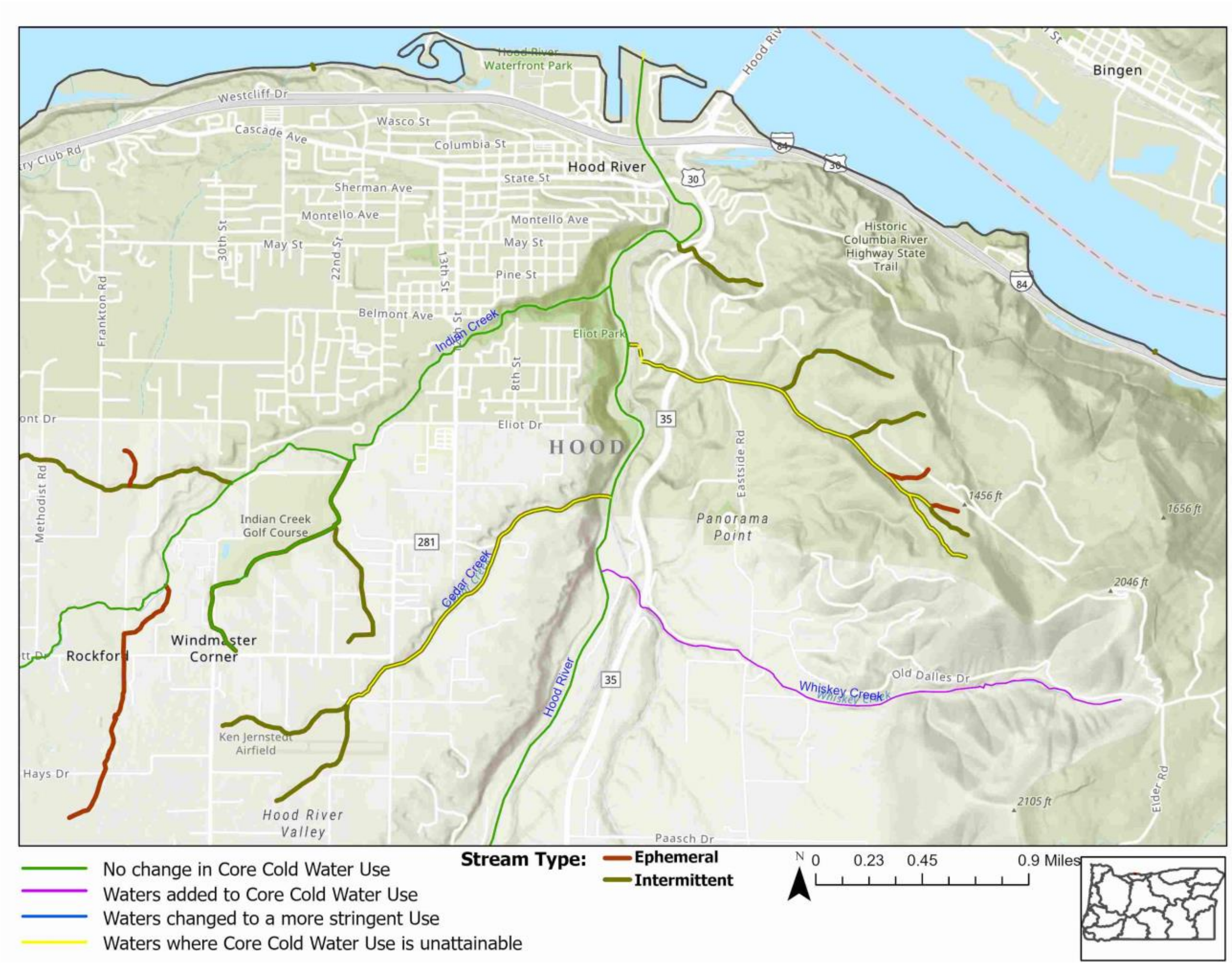

Figure 5-11. Intermittency analysis for Hood River tributaries. Yellow lines with olive outline indicates waters where DEQ is proposing to revise Core Cold Water Use in intermittent streams.

Highest attainable use

Based on the best available data and the decision rules used for this rulemaking, the highest attainable year-round use for the waters described here is salmon and trout rearing and migration, which is the next most stringent use after Core Cold Water Use. Factor 131.10(g)(5) precludes attainment of Core Cold Water Use but does not preclude attainment of Salmon and Trout Rearing and Migration Use. Criteria associated with this use designation protect waters that provide suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead. This use designation also protects other cold-water biota that co-occur with salmonid fishes.

6. Revisions to 'Salmon and Trout Rearing and Migration use'

Characteristics Supporting Salmon and Trout Rearing and Migration Use

Temperature: Waters with maximum summer temperature less than 18 ℃.
Habitat: Supports rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout.

DEQ is proposing to revise a few waters from Salmon and Trout Rearing and Migration Use to either Migration Corridor Use or Redband Trout Use. Salmon and Trout Rearing and Migration Use is defined as waters providing "thermally suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout" as designated in the use maps.[170] The Salmon and Trout Rearing and Migration Use is associated with a temperature criterion of 18 ℃, which must be met throughout the summer.

Evaluation of existing use and use attainability. In order to evaluate whether Salmon and Trout Rearing and Migration Use is an existing use (i.e., may have occurred since October 28, 1975) in these waters, as well as to evaluate attainability of uses DEQ relied primarily on the following sources of data:

- *Oregon Fish Habitat Database.* Evidence indicating the lack of existing use includes: 1.) waters that do not currently, nor ever have supported rearing salmon, steelhead, rainbow trout and cutthroat trout during the summer.
- *Intermittent stream dataset.* DEQ utilized the layer available on the National Hydrography Dataset Plus database regarding intermittent streams for certain streams. [171]
- *Temperature.* Oregon's water quality criterion is 18°C, which must be attained as a 7-day average maximum during the maximum temperature period in the summer. For some streams, DEQ has information that 18°C as a 7-day average maximum is unattainable. To evaluate attainability of 18℃ as a naturally occurring temperature (UAA Factor 1), DEQ utilized TMDL modeling DEQ has conducted, particularly in the Willamette River TMDL (2006), and site-specific data for D River, a tributary of Devil's Lake in the Mid-Coast Basin.

Maps and Inventory Table. Maps and a table showing revisions to Salmon and Trout Rearing and Migration are included in Appendix D.

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[170] OAR 340-041-0002(53).

[171] https://www.usgs.gov/national-hydrography/nhdplus-high-resolution

6.1 Use Revisions Based on UAA Factor 1

Reason for this Use Change

DEQ is updating Salmon and Trout Rearing and Migration Use in the lower approximately 9.8 miles of the Santiam River, Multnomah Channel and Scappoose Bay, and the D River to Migration Corridor Use (Figures D-1 – D-3). Modeling conducted for TMDLs and site-specific data indicate these waters cannot attain the Salmon and Trout Rearing and Migration Use criterion of 18℃ under natural thermal conditions throughout the summer. This is consistent with FHD data, indicating these waters do not support peak salmon rearing use during the summer. The presence of cool water species in the Santiam River, Multnomah Channel and Scappoose Bay also indicates these waters do not fully support Salmon and Trout Rearing and Migration Use. Migration corridors may have incidental salmon and trout rearing, particularly as juveniles are moving downstream through the system. However, they do not provide prime rearing conditions, and they are not the habitats where juveniles would rear and grow throughout the summer prior to smolting and beginning their downstream migration to the ocean. The primary use for these waters is migration.

Mid Coast Basin (Figure D-3)

D River

DEQ is revising the aquatic life use subcategory in D River in the Mid Coast Basin. The revision is based on data indicating that temperatures in D River, a short outlet to Devil's Lake, cannot attain 18 ℃ as a 7-DADM temperature during the hottest part of the summer under natural conditions.

Protection of Existing Uses

The updates to Salmon and Trout Rearing and Migration Use described in this section protect existing uses. Criteria associated with the Salmon and Trout Rearing and Migration Use protect waters that provide suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead during the summer months. According to the FHD, these waters do not currently or historically support such uses during the summer, nor do natural occurring temperatures support such uses.

Factors supporting use unattainability

Temperature: Measured temperatures cannot attain 18 ℃ in Devil's Lake, which feeds D River.
Habitat: Does not provide suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead during the summer months.

Demonstration that the use is unattainable

This update is justified based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use." D River is a 440-foot-long river draining Devil's Lake, which was formed when sand dunes and beach deposits blocked the valley formed by D River. The river is the only outflow from Devil's Lake, a natural lake near Lincoln City. After it flows under Highway 101, D River discharges to a beach and enters the Pacific Ocean. Devil's Lake has a retention time of 2 months, indicating that solar radiation during the summer has sufficient time to significantly warm the lake. Information from the Oregon Lakes Atlas indicates summer temperatures exceed 20℃ at the surface and 18 ℃ at its depth.[172] Because these warm lake waters feed D River, stream temperatures naturally exceed the Salmon and Trout Rearing and Migration Use criterion of 18 ℃. NorWeST temperature modeling indicates current temperatures are 19.5 ℃. Given the short length of D River, there is no possibility of cooling the water during the short residence time in the river (no more than a few minutes) sufficiently to meet the Rearing and Migration Use criterion before the water discharges to the Pacific Ocean.

Highest attainable use

Based on the best available data and the decision rules used for this rulemaking, the highest attainable year-round use for these waters is Migration Corridor Use which is the next most stringent use after Salmon and Trout Rearing and Migration. Factor 131.10(g)(1) precludes attainment of Salmon and Trout Rearing and Migration Use but does not preclude attainment of Migration Corridor Use based on existing information. The Migration Corridor Use is a seasonal cold-water use, meaning it is not optimal salmonid rearing or holding habitat during the warm summer months. Anadromous or adfluvial species migrate through and may rear in these reaches, primarily during other times of the year. There may be some cold-water fish use during the summer, such as juvenile rearing or out migration, but these are not spawning streams and do not provide optimal juvenile rearing conditions during the summer.

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[172] Atlas of Oregon Lakes: Devil's Lake. 1985. https://aol-backend.wdt.pdx.edu/api/document/380/ includes a copy of the print version of the Atlas that includes water quality data for the lake.

Willamette Basin (Figure D-1)

Santiam River

DEQ is revising the aquatic life use subcategory in the lower 9.8 miles of the mainstem Santiam River from Salmon and Trout Rearing and Migration to Migration Corridor. The revision is based on modeling indicating temperatures in the 9.8 miles cannot attain 18 ℃ as a 7-DADM temperature during the hottest part of the summer under natural conditions.

Factors supporting use unattainability
Temperature: Measured temperatures cannot attain 18 ℃ in the Santiam River during the summer. **Habitat:** Reach is not prime or optimal rearing habitat during the summer; the proportion of the population that uses the reach for rearing in the summer is low.

Protection of existing uses

Evidence supporting protection of existing uses in these waters includes:

- The reach is not prime or optimal rearing habitat during the summer.
- These waters cannot achieve the Salmon and Trout Rearing and Migration Use criterion of 18℃ under DEQ's best estimate of natural conditions. The technical workgroup convened for the Aquatic Life Use Updates project supported these changes.

Demonstration that the use is unattainable

This update is justified based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use."

Natural thermal potential for this reach of the Santiam River was modelled for the Willamette Basin TMDL. Modeling indicates that the reach naturally exceeds 18°C in July and August up to river mile 9.8 (Figure 6-1). The modeling scenario calculated system potential conditions without changing upper boundary flow rates or temperatures. These compare model calculated temperatures for 2002 system potential conditions to model calculated temperatures for 2002 current conditions. Figure 6.1 shows system potential assuming no point sources and system potential near stream land cover and effective shade.[173] The modeling does not account for the impacts of dams many miles upstream of this reach of the Santiam River. However, USGS has modeled the impact of dam removal, which indicates peak summer water temperatures without the dam may be warmer than temperatures with the dam, likely

[173] Oregon DEQ, 2006. Willamette Basin Total Maximum Daily Load, Chapter 4: Willamette Basin Temperature TMDL. See discussion in Willamette Temperature TMDL, page 4-158 and forward.

due to decreased flow (Figure 6-2).[174] The likely outcome is that dam removal may increase stream temperatures further downstream, indicating temperatures under natural conditions may be even higher than what is shown in Figure 6-1 and further indicating that natural thermal conditions prevent use attainment.

Habitat use suggests the Salmon and Trout Rearing and Migration Use is unattainable. This reach is identified as providing primarily migration habitat for Coho salmon and summer steelhead; and primarily rearing habitat for Spring Chinook salmon and Winter Steelhead in ODFW's FHD database. However, the timing table shows there is no peak or lesser rearing or migration for any species in July or August. Spring Chinook and Winter Steelhead are present, and their rearing use is evenly distributed throughout the year. This means the proportion of the population that may use this reach in July and August is expected to be low. The "Migration Corridor" use subcategory may support some rearing, but the reach is not prime rearing habitat during the summer.

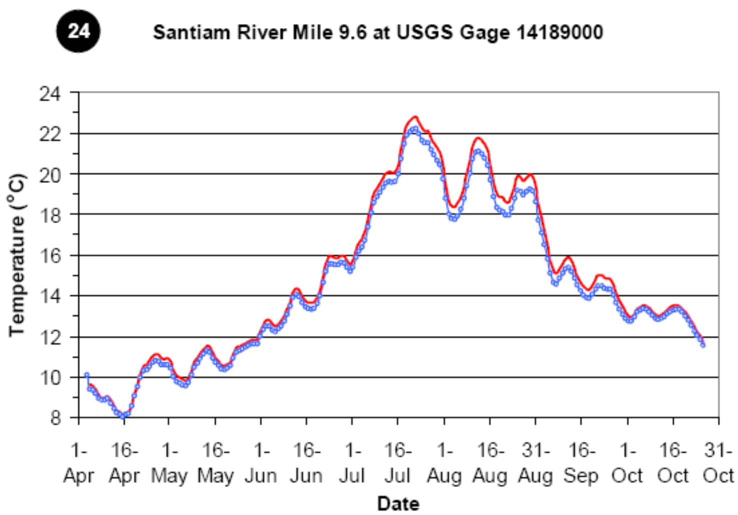

Figure 6-1. 2003 temperatures (Red) and System Potential Temperatures (Blue), Santiam River Mile 9.6. Sources: Willamette Basin Temperature TMDL (2006).

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[174] Rounds, S.A., 2010, Thermal effects of dams in the Willamette River basin, Oregon: U.S. Geological Survey Scientific Investigations Report 2010-5153, 64 p. This study does not model the temperatures in the reach of the Santiam River where DEQ is revising the use, but further upstream. Figure 6-2 indicates that water releases from the dams likely decrease river temperatures downstream during the summer, indicating that system potential temperatures downstream may be higher than actual measured temperatures.

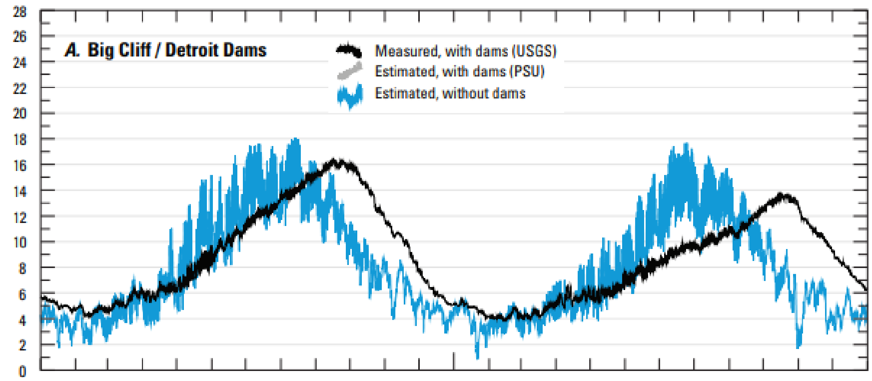

Figure 6-2. Measured and estimated water temperatures for conditions with and without upstream dams at the Big Cliff dam sites in the Willamette River basin, Oregon, 2001–02. (Note: x-axis is time in months, beginning in January 2001). Source: Rounds (2010).

Highest attainable use

Based on the best available data and the decision rules used for this rulemaking, the highest attainable year-round use for these waters is Migration Corridor, which is the next most stringent use after Salmon and Trout Rearing and Migration. The Migration Corridor use is a seasonal cold-water use, meaning it is not optimal salmonid rearing or holding habitat during the warm summer months. Anadromous or adfluvial species migrate through and may rear in these reaches, primarily during other times of the year or in microhabitats. There may be some cold-water fish use during the summer, such as juvenile rearing or out migration, but these are not spawning streams and do not provide optimal juvenile rearing conditions during the summer. The presence of native cool water species, such as speckled dace, redside shiner, largescale sucker, and mountain sucker, also supports a migration corridor designation. Factor 131.10(g)(1) precludes attainment of Salmon and Trout Rearing and Migration Use but does not preclude attainment of Migration Corridor Use based on existing information.

Multnomah Channel (Figure D-2)

Protection of existing uses

Evidence supporting protection of existing uses in these waters includes:

- The reach is not prime or optimal rearing habitat during the summer.
- These waters cannot achieve the Salmon and Trout Rearing and Migration Use criterion of 18°C under DEQ's best estimate of natural conditions.

Factors supporting use unattainability

Temperature: Measured temperatures cannot attain 18 ℃ in Multnomah Channel and Scappoose Bay.

Habitat: Does not provide suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead during the summer months.

Demonstration that the use is unattainable

This revision is justified based on 40 CFR 131.10(g), Factor 1: "Natural occurring pollutant concentrations prevent attaining the use." Naturally occurring temperatures in Multnomah Channel and Scappoose Bay are naturally higher than 18 °C during the summer, according to DEQ temperature modeling.

Current temperatures in Multnomah Channel and Scappoose Bay waters exceed 18-20°C as a mean August maximum temperature.[175] The current water temperatures of these reaches are similar to the nearby Willamette River and Columbia River, which are designated for migration corridor use. These reaches were not modeled in the 2006 Lower Willamette basin TMDL. However, these reaches receive water from both the Willamette River and Columbia River, where TMDL modeling indicates natural thermal potential exceeds 18°C in July and August (Figures 6-3 to 6-6) and the designated aquatic life use is Salmon and Steelhead Migration Corridor. The NTP model assumes no point source loads, potential near stream land cover and effective shade. The lower Willamette model also removed the diversion to the McKenzie River from the Eugene Water and Electric Board and the concrete cap and flashboards from the Willamette Falls Hydroelectric Project. The model reflects the current channel and boundary condition temperatures and flows from U.S. Army Corps of Engineers reservoirs on the Willamette and the Clackamas River Hydroelectric Project and tributary inflow temperatures from 2001 and 2002. Flow augmentation from the USACE results in cooler water temperatures than would be experienced naturally, although the river may not cool as quickly in the fall.[176] The TMDL did not model impacts of channel modification that has occurred over the last 150 years; however, the TMDL noted that the greatest loss of channel complexity is upstream of Albany and thus not in the area where DEQ is proposing the use change. The lower Willamette River and Multnomah Channel area has a confining bedrock channel and lacks off-channel features such as alcoves and side channels that are likely to support colder temperatures, further supporting the notion that natural thermal conditions do not support Salmon and Trout Rearing and Migration Use in Multnomah Channel and Scappoose Bay.[177]

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[175] U.S. EPA, 2017. Memorandum: *Evaluation of the potential cold water refugia created by tributaries within the Lower/Middle Columbia River based on "NorWeST" temperature modeling project*, *February 21, 2017*.

[176] ODEQ. 2006. Willamette River Mainstem TMDL. See page 4-27.

[177] See discussion on page 24 in Mangano, J.F., Piatt, D.R., Jones, K.L, and Rounds, S.A., 2018, Water temperature in tributaries, off-channel features, and main channel of the lower Willamette River, northwestern Oregon, summers 2016 and 2017: U.S. Geological Survey Open-File Report 2018-1184, and page 43 in Oregon DEQ, 2020. Lower Willamette River Cold-Water Refuge Narrative Criterion Interpretation Study.

Highest attainable use

Based on the best available data and the decision rules used for this rulemaking, the highest attainable year-round use for Multnomah Channel and Scappoose Bay is “Migration Corridor,” which is the next most stringent use after Salmon and Trout Rearing and Migration. The “Migration Corridor” is defined as “waters that are predominantly used for salmon and steelhead migration during the summer and have little or no anadromous salmonid rearing in the months of July and August.” [178] Anadromous or adfluvial species migrate through and may rear in these reaches, primarily during other times of the year. There may be limited cold-water fish use during the summer, such as juvenile rearing or out migration, but these waters do not provide optimal juvenile rearing conditions during the summer. The presence of native cool water species, such as speckled dace, redside shiner, largescale sucker and mountain sucker, also supports a migration corridor designation. Factor 131.10(g)(1) precludes attainment of Salmon and Trout Rearing and Migration Use but does not preclude attainment of Migration Corridor Use based on existing information.

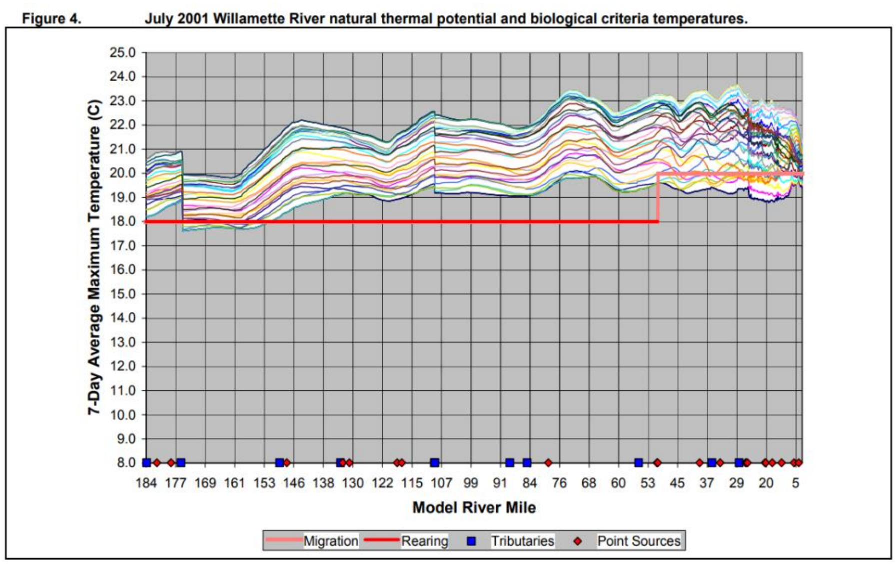

Figure 6-3. Natural thermal potential scenarios, Willamette River, July 2001. Source: Oregon DEQ. 2006. Willamette River Temperature TMDL.

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[178] OAR 340-041-0002(37)

Figure 5. August 2001 Willamette River natural thermal potential and biological criteria temperatures.

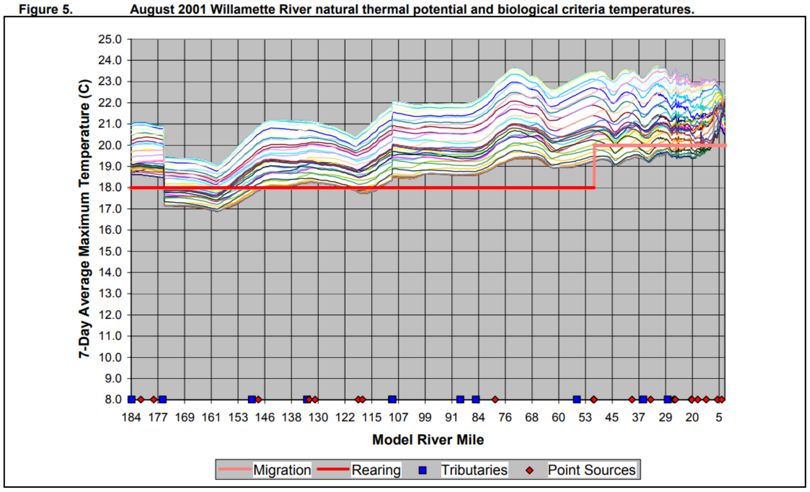

Figure 6-4. Natural thermal potential scenarios, Willamette River, August 2001. Source: Oregon DEQ. 2006. Willamette River Temperature TMDL.

Figure 11. July 2002 Willamette River natural thermal potential and biological criteria temperatures.

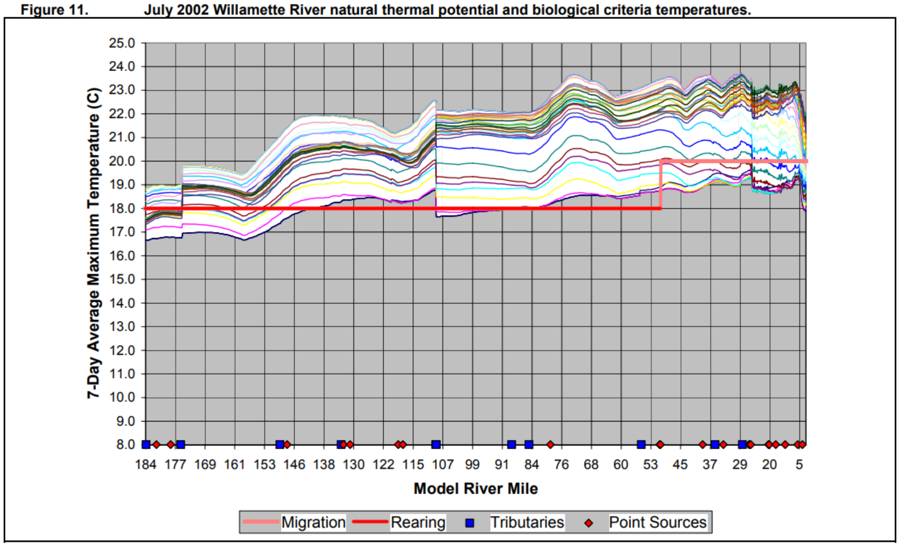

Figure 6-5. Natural thermal potential scenarios, Willamette River, July 2002. Source: Oregon DEQ. 2006. Willamette River Temperature TMDL.

Figure 12. August 2002 Willamette River natural thermal potential and biological criteria temperatures.

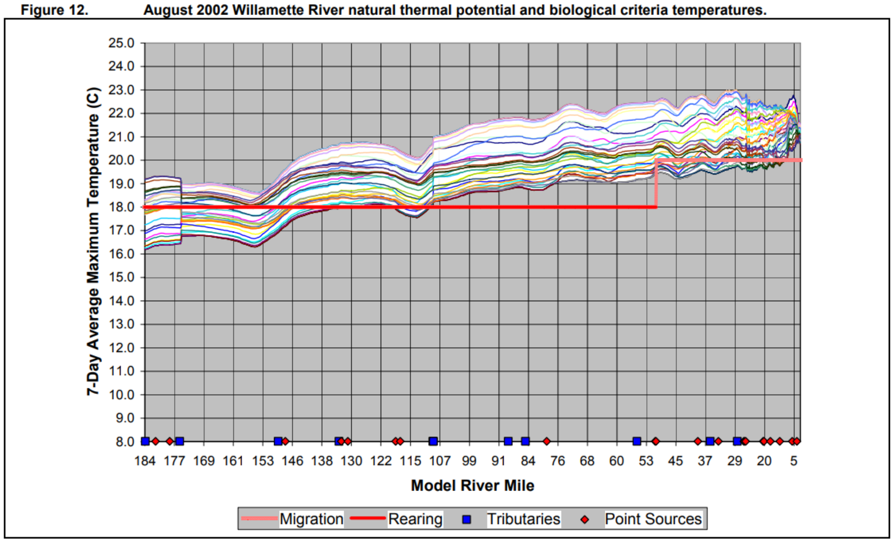

Figure 6-6. Natural thermal potential scenarios, Willamette River, August 2002. Source: Oregon DEQ. 2006. Willamette River Temperature TMDL.

6.2 Use Revisions Based on UAA Factor 5

Reason for the Use Update

DEQ is updating salmon and trout rearing and migration use in several lower tributaries of the Walla Walla River located in Oregon (Figure D-4).[179] Information collected since these waters were designated for Salmon and Trout Rearing and Migration Use in 2003 indicate that these waters are not suitable habitat to support salmonid rearing, as described below.

Factors supporting use unattainability

Flow: Waters here have intermittent or very low flow, which are not sufficient to support suitable rearing habitat for salmon, steelhead, rainbow trout and cutthroat trout during the summer.

Protection of existing uses

Evidence supporting protection of existing uses in these waters includes:

- The waters described here have not historically provided suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, and upstream adult pre-spawn migration for salmon and steelhead during the summer based on the FHD.

[179] Administratively, these waters are included as part of the Umatilla Basin (OAR 340-041-0310).

- The waters here have intermittent or low flow, which do not provide rearing habitat for salmon, steelhead, rainbow trout and cutthroat trout. These physical conditions unrelated to water quality that have existed since before 1975 because these waters are in an arid area with little precipitation.

Demonstration that the use is unattainable

This update is based on 40 CFR 131.10(g), Factor 5: “Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses.”

In 2003, DEQ designated these waters for salmon and trout rearing and migration because the mainstem Walla Walla River, downstream of these waters, is considered habitat for steelhead. However, these lower tributaries are not suitable habitat for steelhead spawning, rearing, or migration according to FHD and have never historically supported such use. Like other anadromous salmonids, steelhead require cold, free-flowing water, and clean gravel for spawning. The area where DEQ is updating the use, located primarily west and south of Milton-Freewater, is arid and warm with average maximum stream temperatures since 1928 of 89.3 °F in July and 87.5 °F in August. Average annual precipitation in the area since 1928 is 14.5 inches with averages of less than ½ inch of precipitation per year in July and August.[180] Almost all of the waters described here are intermittent (Figure 6-7). Pine Creek, which flows from the border south through Weston is perennial, but only due to the presence of the Poplar Springs Reservoir near Weston, which regulates the flow of the river. Without the presence of the dam, Pine Creek downstream of the reservoir would be intermittent, similar to those reaches upstream of the reservoir, and thus has not historically provided suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout, nor does it currently according to ODFW. The only other perennial waters in the area are irrigation ditches or canals, which do not have appropriate substrate or cover to support habitat for salmon, steelhead, rainbow trout, and cutthroat trout, which generally require large substrate or other large cover (steelhead, rainbow trout and cutthroat trout) or require larger tributaries and pools (salmon).[181]

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[180] Western Region Climate Center. https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?or5593. Visited March 22, 2023.

[181] For information on rainbow trout rearing requirements: U.S. Fish and Wildlife Service. 1984. Habitat suitability information: Rainbow trout. 74 pp. For information on salmon and steelhead requirements: https://www.fs.usda.gov/detail/r6/workingtogether/contracting?cid=fsbdev2_027105. For information on cutthroat trout requirements: Soil Conservation Service. 1986. Cutthroat Trout. USDA Soil Conservation Service Technical Notes, Biology No. 305.

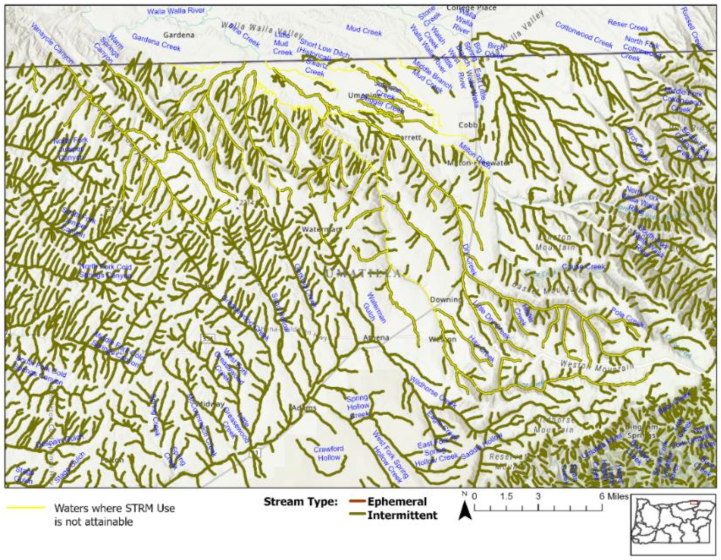

Figure 6-7. Stream intermittency, Walla Walla Basin.

Highest attainable use

Based on the best available data and the decision rules used for this rulemaking, the highest attainable year-round use for these waters is Redband Trout Use, which is, along with Migration Corridor Use, the next most stringent use after Salmon and Trout Rearing and Migration Use. Factor 131.10(g)(5) precludes attainment of Salmon and Trout Rearing and Migration Use but does not preclude attainment of Redband Trout Use. These waters have appropriate physical conditions to support Redband Trout when there is sufficient precipitation to do so, as opposed to Rainbow or Coastal Cutthroat Trout. ODFW FHD data categorizes Dry Creek and Pine Creek, two of the major tributaries in this area, as foraging, migration and overwintering habitat for Redband Trout.

7. Revisions to 'Lahontan Cutthroat Trout or Redband Trout' use

Factors Supporting Lahontan Cutthroat Trout or Redband Trout Use

Temperature: Waters with maximum summer temperature less than 20 ℃.
Flow: Sufficient flow must be available during the summer.
Substrate: Cobble/boulder for rearing; silt-free gravel for spawning.
Geographic Location: Not geographically isolated from other waters supporting the use; not in irrigation canals.

DEQ is proposing to revise the aquatic life use subcategory from Lahontan Cutthroat Trout or Redband Trout Use to Cool Water Species Use in numerous waters. This includes many waters in southern and southeastern Oregon, as well as in the overflow channel to the West Division Main Canal in the Umatilla Basin.

Redband Trout include several subspecies of *Oncorhynchus mykiss*, or Rainbow Trout, that live in the interior of many western states. Interior Redband Trout live above anthropogenic or natural barriers where anadromous migration is not possible. In high elevation waters of the interior Columbia River Basin, Redband Trout prefer pools, rather than flowing waters. In lowland desert waters, Redband Trout prefer shaded and cooler reaches of stream.[182] Redband trout habitat is associated with cobble/boulder substrate in both desert and montane ecosystems and decreased amounts of silt substrate in desert streams.[183] Silt-free gravel and pebbles is required for spawning, which typically occurs from November to May.[184] Redband can have adfluvial, fluvial or resident life histories depending on their location.

Redband Trout distribution varies according to water year and fluctuation of instream flow. Redband Trout distribution constricts during drought years as streams dry and expands during wet cycles. The

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[182] U.S. Forest Service. 2016. Conservation Strategy for Interior Redband (*Oncorhynchus mykiss subsp.*) in the States of California, Idaho, Montana, Nevada, Oregon and Washington.

[183] Meyer, K.A., J.A. Lamansky, Jr., and D.J. Schill. 2010. Biotic and Abiotic Factors Related to Redband Trout Occurrence and Abundance in Desert and Montane Streams. Western North American Naturalist 70(1), pp.77-91.

[184] Muhlfeld, C. C. 2002. Spawning Characteristics of Redband Trout in a Headwater Stream in Montana. North American Journal of Fisheries Management 22:1314–1320; WDFW. 2004. Instream Flow Study Guidelines: Technical and Habitat Suitability Issues including Fish Preference Curves.

Redband Trout occur in very dry areas of the state, with annual average rainfall (based on 1961-1990 data) less than 15" and often less than 10", with little precipitation during the summer (Figures 7-1 and 7-2). ODFW notes that, "where suitable habitat and water flow are available, Redband Trout are likely to be present." Most of the waters where DEQ is updating the use are ephemeral or intermittent drainages that are dry except during precipitation events or snowmelt, typically occurring during the winter and early spring. Many Redband Trout populations are naturally isolated from other populations or from large water bodies due to the drying of the pluvial lakes thousands of years ago. [185]

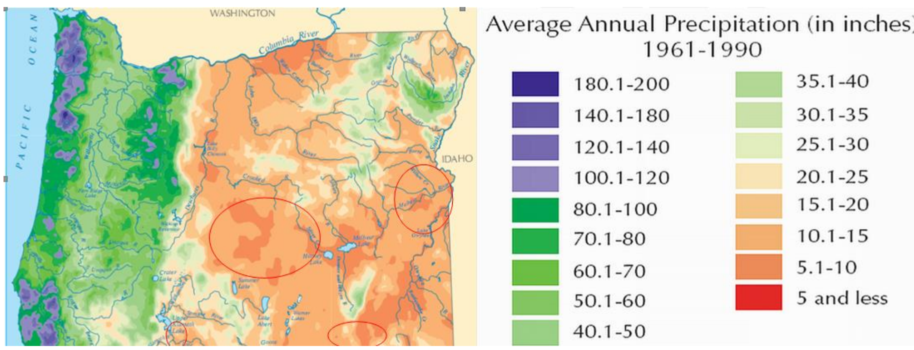

Figure 7-1. Annual precipitation, Oregon. Red circles roughly correspond to areas where DEQ is revising Redband Trout Use.

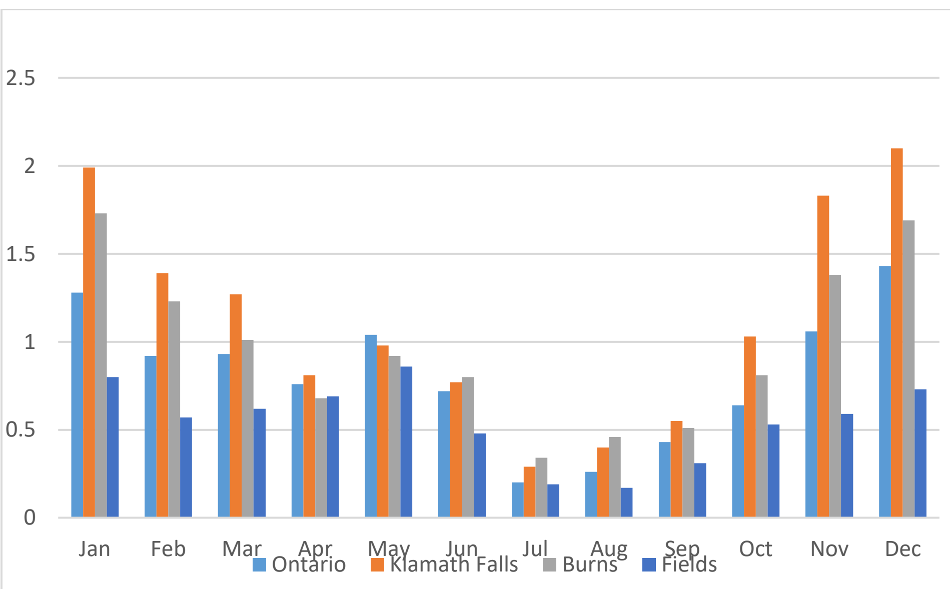

Figure 7-2. Long-term average precipitation in inches in southeastern Oregon. Data from Western Regional Climate Center. https://wrcc.dri.edu/summary/Climsmor.html.

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[185] Oregon Department of Fish and Wildlife, 2008. Oregon Native Fish Status Report – Volume II. Pp. 368-412. Available at: https://www.dfw.state.or.us/fish/onfsr/docs/final/08-redband-trout/rb-methods.pdf.

Lahontan cutthroat trout were once widespread throughout the Lahontan Basin in present-day California, Nevada and Oregon. Lahontan Cutthroat trout are tolerant of alkaline waters, high stream temperatures, and low dissolved oxygen that has allowed them to flourish in harsh, arid environments. While they can rear in lakes, they spawn in streams.[186] Current native populations in Oregon are only found in the Whitehorse and Willow creek basins in the far southeastern corner of the state.[187] ODFW stocked hatchery Lahontan Cutthroat Trout in Mann Lake for anglers, but they have not stocked the lake for 10 years due to low water conditions brought about by drought conditions and it is not a self-sustaining population, so the trout are no longer present.[188]

Evaluation of existing use and use attainability. In order to evaluate whether Lahontan Cutthroat Trout or Redband Trout Use is an existing use (i.e., may have occurred since October 28, 1975), as well as to evaluate the attainability of Redband Trout Use, DEQ relied primarily on the following sources of data:

- *Oregon Fish Habitat Database.* Waters that do not support Redband Trout during the summer.
- *Intermittent stream dataset.* The NHD Plus data on intermittent and ephemeral streams. A full description of how the NHD perennial and nonperennial stream classification was developed is included in Hafen, et al. (2020).[189] The paragraph below provides a summary.
- *Canals/ditches dataset.* The NHD Plus data on canals and ditches.
- *Site-specific data.* In a few waters that are neither intermittent, ephemeral or canals and ditches, DEQ has relied on site-specific data to determine use attainability.

Stream intermittency and ephemerality were based on field crew surveys conducted between 1881 and 2000. The majority of the surveys were conducted between 1955 and 1990. Each NHD-HR streamline was assigned a classification of perennial, intermittent, ephemeral, or designated as an artificial path. Classifications were assigned based on topographic field surveys or based on interviews with local residents. Perennial streams were defined as containing “water throughout the year, except for infrequent periods of severe drought.” Intermittent streams contain “water for only part of the year, but more than just after rainstorms and at snowmelt,” and ephemeral streams contain “water only in direct

[186] https://caltrout.org/sos/species-accounts/trout/lahontan-cutthroat-trout-2. Accessed January 24, 2024.

[187] https://myodfw.com/fishing/species/lahontan-cutthroat-trout. Accessed January 24, 2024.

[188] Plaven, George. 2023. “Likely that no Lahontans remain in Mann Lake.” East Oregonian, Updated Oct. 31, 2023 (originally published Mar 28, 2018). Available at: https://www.eastoregonian.com/outdoors/likely-that-no-lahontans-remain-in-mann-lake/article_61f2ac36-ba68-5d85-8b7b-57e5641dc170.html.

[189] Hafen, K.C., K.W. Blasch, A. Rea, R. Sando, and P.E. Gessler. 2020. "The Influence of Climate Variability on the Accuracy of NHD Perennial and Nonperennial Stream Classifications." Journal of the American Water Resources Association 56 (5): 903–916.

response to precipitation." Designations were intended to represent stream permanence conditions across a normal range of climatic conditions, not just the conditions observed during the survey year. Locations of NHD streamlines were sometimes revised where aerial imagery was available, but these updates could only be applied to streams visible from above. [190]

Highest Attainable Use. In all waters described here, the highest attainable use is Cool Water Species Use, which is the next most stringent use to Redband Trout Use.

Maps and Inventory Table. Maps and a table showing revisions to Redband Trout Use are included in Appendix E.

7.1 Revisions to Lahontan Cutthroat Trout or Redband Trout Use Based on UAA Factor 5

Factors Supporting Use Unattainability

Flow: Flow is unavailable during July and August in ephemeral and intermittent streams.
Substrate: Substrate does not support Redband Trout in canals.

Reason for the Use Update

DEQ is proposing to revise the aquatic life use subcategory from Lahontan Cutthroat Trout or Redband Trout Use to Cool Water Species Use in numerous waters in southern and southeastern Oregon (Figures E-1 to E-4). In 2003, ODFW had little information regarding the distribution of Redband Trout or cool water species in Oregon, particularly for the inland basins of southeastern Oregon. In 2003, as a precautionary approach, DEQ applied a conservative assumption where data was unavailable and broadly designated entire administrative basins for Redband Trout with the intention of updating these uses when ODFW had better information about their distribution. Since 2003, ODFW has significantly improved its understanding of the distribution of Redband Trout through increased surveys in southeastern and southcentral Oregon streams. ODFW also has improved its understanding of the timing of when Redband Trout occurs in various waters. Specifically, DEQ is updating the Redband Trout designations based on new and improved data because Redband Trout do not reside in many of the waters previously designated and ODFW biologists have concluded that the habitat is not suitable or is not accessible. This includes numerous waters that are intermittent or ephemeral and thus do not have flow during the summer. It also includes irrigation canals where the substrate does not support Redband Trout use, which requires large cobble and boulder for rearing and small gravel and pebbles for

[190] https://www.usgs.gov/national-hydrography/nhdplus-high-resolution

spawning. It also includes a few waters that are classified as perennial but are in isolated basins and thus physically separated from other Redband and Lahontan Cutthroat Trout habitat.

DEQ retained Lahontan Cutthroat Trout or Redband Trout Use in perennial streams even though the FHD indicates they do not support these species. These waters include Trout Creek, Little Trout Creek, and Cottonwood Creek in the southern Malheur Lake basin, because data indicated these waters are perennial and may have sufficient flow to support Redband Trout. DEQ also is retaining the use in a drainage of Tencent Lake east of the Steens Mountains in the Malheur Lake Basin, because NHDPlus indicates it's perennial, and the lake is stocked with Lahontan Cutthroat Trout during wet years as part of ODFW's Lahontan Trout Fish Management Plan.[191]

Protection of existing uses

The updates to Lahontan Cutthroat Trout or Redband Trout Use described in this section protect existing uses. Criteria associated with the use protect waters that provide suitable habitat for Lahontan Cutthroat Trout or Redband Trout during the summer months. The waters described here either do not support these fish at all or do not support them in the summer. The waters described here are primarily either: 1.) irrigation canals or ditches, which do not have substrate to support these fish or have fish passage barriers, or 2.) intermittent or ephemeral streams which typically only have flowing water during early spring snowmelt and thus do not have any flow to support these fish during the summer. These conditions are naturally occurring or, for canals and ditches, have occurred since before 1975. A few waters are perennial but are in isolated basins where Lahontan Cutthroat or Redband Trout use does not occur based on many years of surveying by ODFW biologists; these isolated basins were created by drying of pluvial lakes thousands of years ago and have no connectivity to other waters inhabited by Lahontan Cutthroat or Redband Trout.

Demonstration that the use is unattainable

These revisions are based on 40 CFR 131.10(g), Factor 5: "Physical conditions related to the natural features of the waterbody, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality preclude attaining aquatic life protection uses."

DEQ broadly categorizes the waters where DEQ is updating Redband Trout use. For each category, Lahontan Cutthroat or Redband Trout use is unattainable due to physical conditions in the waterbodies. These findings are consistent with the professional opinion of ODFW biologists who have been surveying these streams for twenty years or more, have evaluated the habitat conditions and have not detected Redband Trout in these waters.

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[191] OAR 635-500-1710; *Personal communication*, David Banks, District Biologist, ODFW, June 14, 2023.

Canals, ditches, and artificial paths. This category includes waters identified as canals or ditches in NHDPlus. It also includes a few reach codes that are not identified as such in NHDPlus, but have "Canal," "Ditch," or "Drain" within their GNIS name or appear as canals in satellite imagery based on a straight flow path. FHD data and professional opinion from ODFW district biologists and staff indicate that these irrigation canals and ditches do not have and never have had the physical conditions that make such habitat suitable for Redband Trout. There is no suitable substrate to support Lahontan Cutthroat Trout or Redband Trout, because many of these canals are lined. [192] In other cases, diversion screens exclude access to fish passage. For example, under the Klamath Reservoir Reach Restoration Prioritization Plan, there are current efforts to place diversion screens to exclude fish passage to these diversions to ensure successful restoration of salmon habitat to natural waterways.[193]

Intermittent and ephemeral waters. This category includes waters that are categorized as intermittent or ephemeral streams in NHDPlus, as described in the introduction to this chapter. Lack of flow prevents attainment of the use in ephemeral and intermittent waters during the summer. Ephemeral waters will have little or no flow except for during snow melt or precipitation, which generally occurs in the winter and spring in eastern Oregon. Intermittent waters may have flow for more of the year but will be dry during the summer. Because these waters are ephemeral or intermittent, there is no publicly available flow data; however, Figures 7-3 and 7-4 are indicative of flow patterns throughout eastern Oregon, with high flow during the spring and low flow conditions during the summer and into fall, indicating that periods of intermittency will also occur during the summer.

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[192] *Personal communication, Bill Tinniswood, Assistant District Fish Biologist, ODFW, January 5, 2023.*

[193] O'Keefe, C., Pagliuco, B., Scott, N., Cianciolo, T., Holycross, B. Klamath Reservoir Reach Restoration Plan: A Summary of Habitat Conditions and Restoration Actions in the Mainstem Klamath River and Tributaries Between Iron Gate Dam and Link River Dam. 2022. Prepared by NOAA Fisheries, Pacific States Marine Fisheries Commission, and Trout Unlimited.

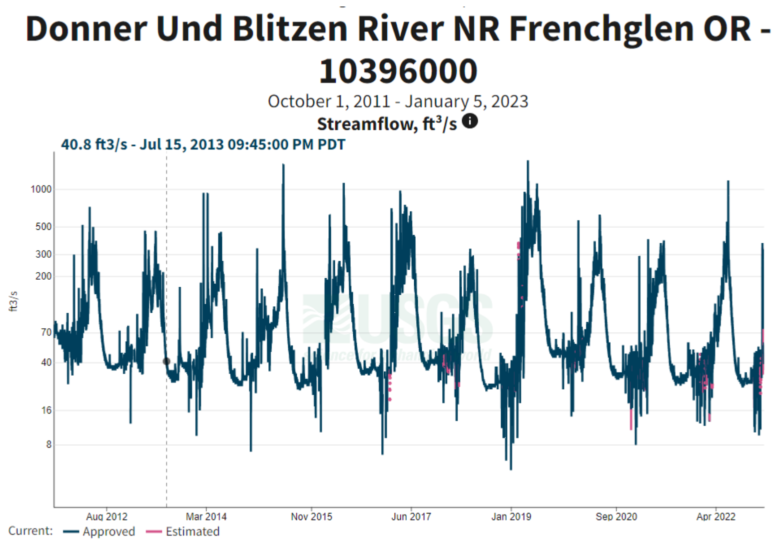

Figure 7-3. Flow (CFS), Donner and Blitzen River, Malheur Lake Basin. Data from USGS, https://waterdata.usgs.gov. Accessed August 23, 2023.

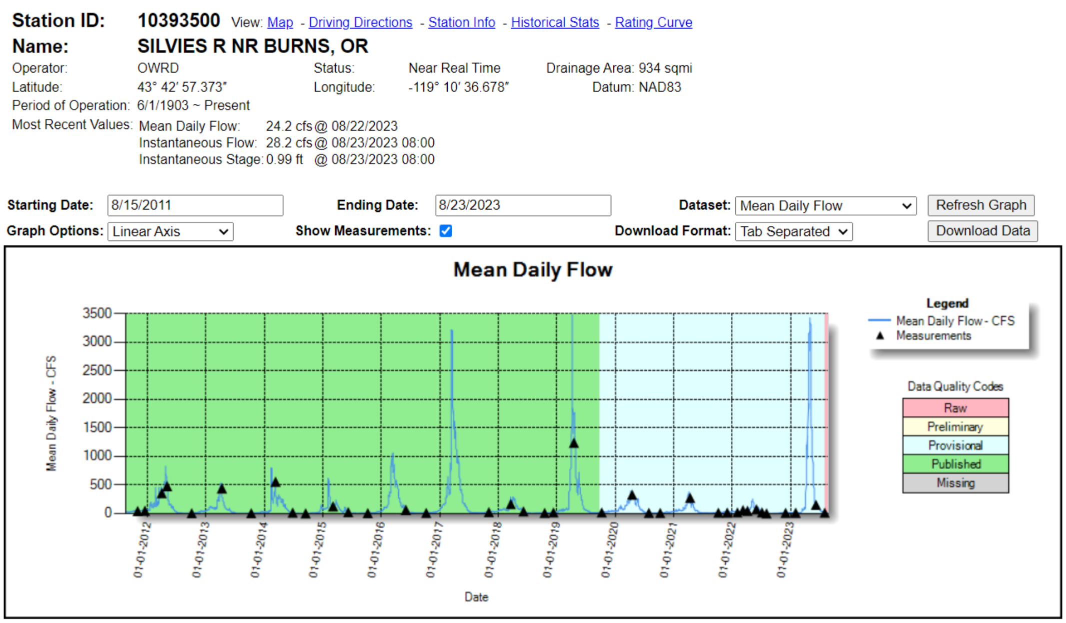

Figure 7-4. Flow (CFS), Silvies River, Malheur Lake Basin. Data from Oregon Water Resources Department. Accessed August 23, 2023.

Perennial waters in isolated basins. DEQ is revising the Lahontan Cutthroat Trout or Redband Trout use in several isolated reaches that are categorized as perennial in NHDPlus but are in isolated basins or areas with no connectivity to other waters with Lahontan Cutthroat or Redband Trout. This includes a single reach in an unnamed drainage (Reach Code 17120005001915) near the town of Christmas Valley, which drains into the dry Christmas Valley and is separated by miles from other waters that support Redband Trout. DEQ is also revising the use in several reaches that are classified as perennial in NHDPlus but are otherwise surrounded by intermittent or ephemeral reaches in waters where Lahontan and

Redband Trout do not occur and cannot be supported during the summer, as described in the previous section. Because these perennial waters (which likely occur as isolated pools during the summer) are otherwise surrounded by waters that do not support Redband Trout, there is no access to them as habitat. As a result, the use is unattainable.

DEQ is also removing Redband or Lahontan Use in Mann Creek and House Creek, in the Mann Lake area just north of the Alvord Desert. Lahontan Cutthroat Trout were native to Mann Lake but were eradicated years ago. Due to the typically dry conditions prevalent throughout eastern Oregon, there is no way for Lahontan Cutthroat that live in a few waters that drain to the Alvord Desert, to access Mann Creek or House Creek. As a result, Lahontan Cutthroat trout is not an attainable use. [194]

Perennial waters with insufficient flow. DEQ is revising the Lahontan Cutthroat Trout or Redband Trout use in several isolated reaches that are categorized as perennial in NHDPlus, but do not appear to have sufficient flow to support the use during the summer. This includes several waters east of Steens Mountain in the Alvord Desert and near Mann Lake, Silver Creek in the Harney Lake basin and North Alkali Creek, a tributary to the Snake River.

Waters east of Steens Mountain. A few waters that drain Steens Mountain into and north of the Alvord Desert are classified as perennial in NHD Plus but do not support Redband or Lahontan Cutthroat Trout according to NHD Plus. These include lower portions of Big Alvord, Cottonwood Creek and Mosquito Creek that drain to the Alvord Desert, as well as some channels in the northern portion of the desert that may have flow during snowmelt from the high peak of Steens Mountain but are likely either dry or stagnant during the summer months. During this time rainfall is nearly absent due to the rain shadow from the Coastal and Cascade Mountains. Lahontan Cutthroat Trout in this area only live in higher mountain streams where there is sufficient flow during the spring and summer to support spawning, which takes place from April to July (Figure 7-5).[195]

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[194] ODFW has stocked Mann Lake with hatchery Lahontan cutthroat trout for the purposes of fishing. However, this is not a self-sustaining population and should be associated with the fishing use, not aquatic life use. Even the hatchery fish have not been able to survive and are no longer in the lake. See https://www.eastoregonian.com/outdoors/likely-that-no-lahontans-remain-in-mann-lake/article_61f2ac36-ba68-5d85-8b7b-57e5641dc170.html.

[195] https://caltrout.org/sos/species-accounts/trout/lahontan-cutthroat-trout-2. Visited January 25, 2024.

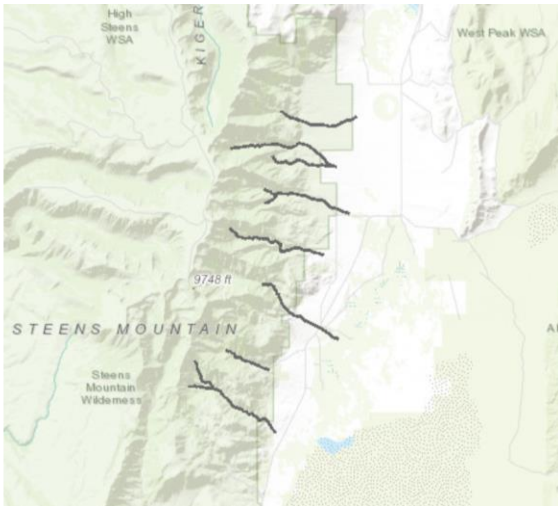

Figure 7-5. Current Lahontan Cutthroat Trout habitat, Alvord Desert area. Data from Fish Habitat Database, Oregon Department of Fish and Wildlife.

<u>North Alkali Creek.</u> North Alkali Creek, a tributary to the Snake River, is classified as a perennial stream in NHD Plus. However, summer flow is insufficient to support Redband Trout use. Mean August flow according to NHDPlus is 0.21 cfs. As there is only one water withdrawal right on North Alkali Creek of 0.0067 ft^3/s, flow is unimpacted by withdrawals. Redband Trout distribution is highly correlated with flow.[196] DEQ has not found literature connecting Redband Trout distribution with specific flow thresholds; however, one study indicates that Redband Trout migrate upstream during periods of greater flow and thus do not occupy dry drainages that occur during the summer.[197]

Figures 7-6 – 7-10 show all waters that DEQ is revising based on 40 CFR 131.10(g), Factor 5 by category: 1. canals, ditches, drains; 2. ephemeral waters; 3. intermittent waters; 4. perennial waters isolated from other Lahontan Cutthroat Trout or Redband Trout habitat; and 5. Perennial waters with insufficient flow to support the use. This information is also included in the inventory table provided with the UAA.

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[196] Oregon Department of Fish and Wildlife, 2008. Oregon Native Fish Status Report – Volume II. Pp. 368-412. Available at: https://www.dfw.state.or.us/fish/onfsr/docs/final/08-redband-trout/rb-methods.pdf.

[197] Anderson M, G. Giannico and S. Jacobs. 2011. Seasonal migrations of adult and sub-adult redband trout in a high desert basin of Eastern Oregon, USA. Ecology of Freshwater Fish 20(3): 409-420.

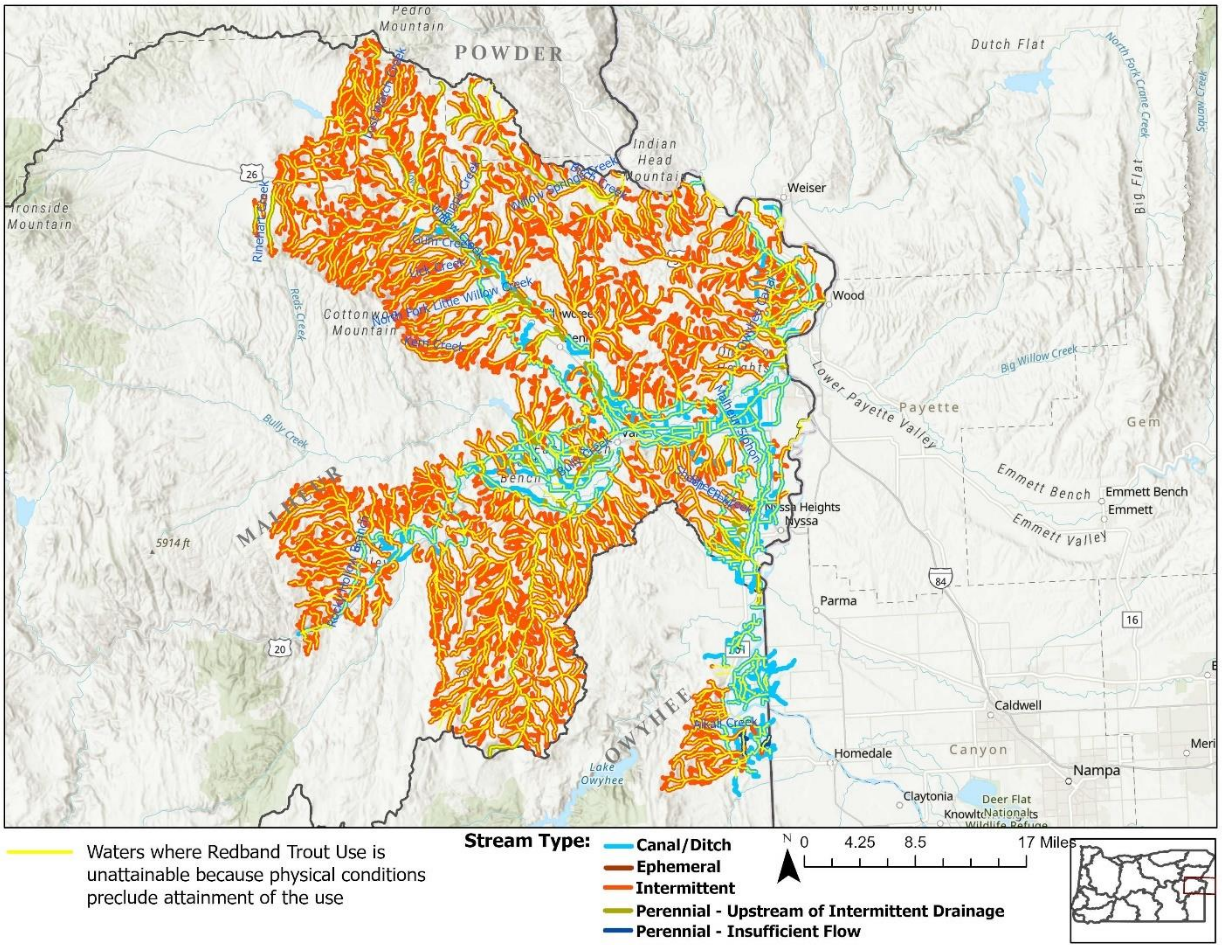

Figure 7-6. Waters where Redband Trout Use is unattainable due to physical conditions, Malheur River and Owyhee River Basins.

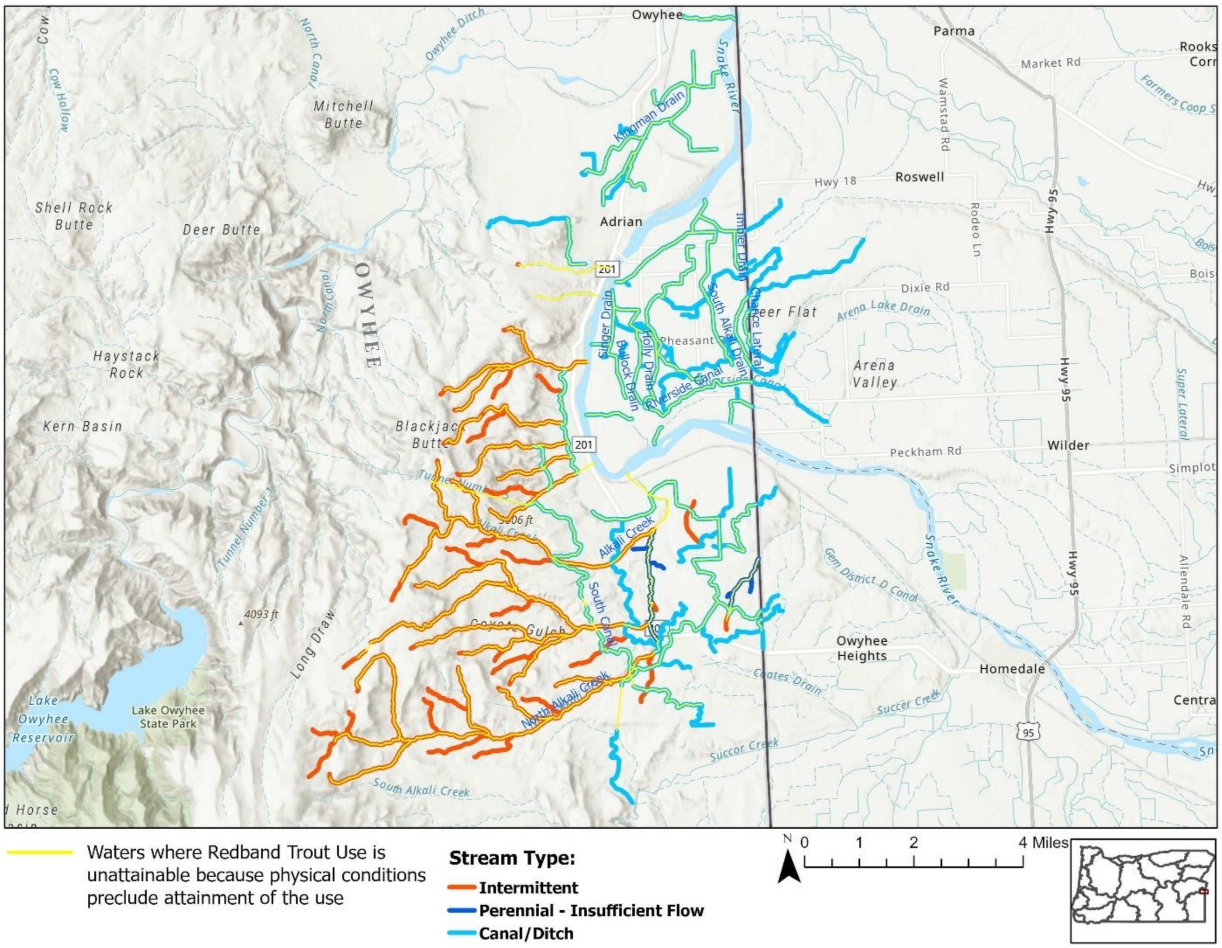

Figure 7-7. Waters where Redband Trout Use is unattainable due to physical conditions, close-up showing North Alkali Creek, Owyhee Basin.

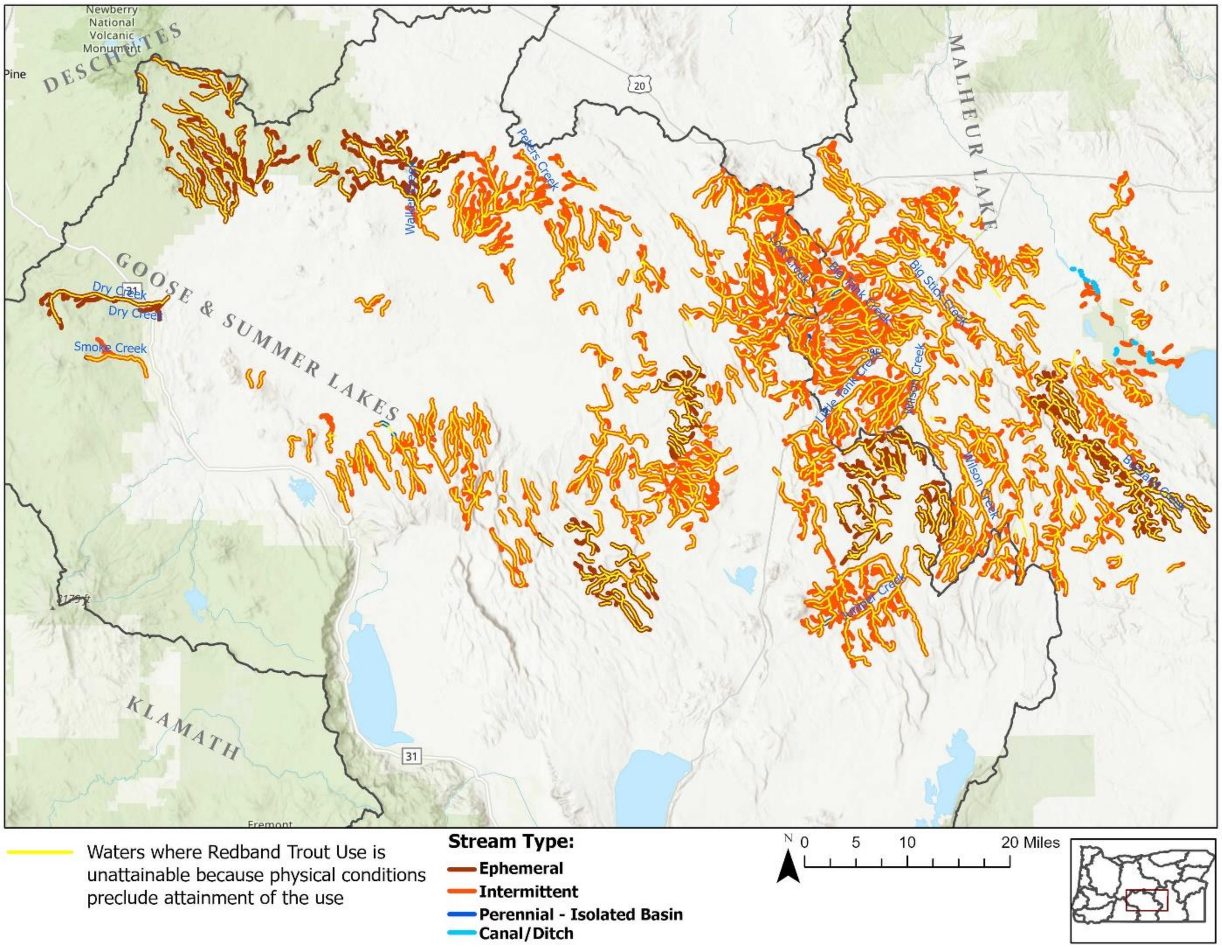

Figure 7-8. Waters where Redband Trout Use is unattainable due to physical conditions, Christmas Valley area (Goose & Summer Lakes and Malheur Lakes Basins).

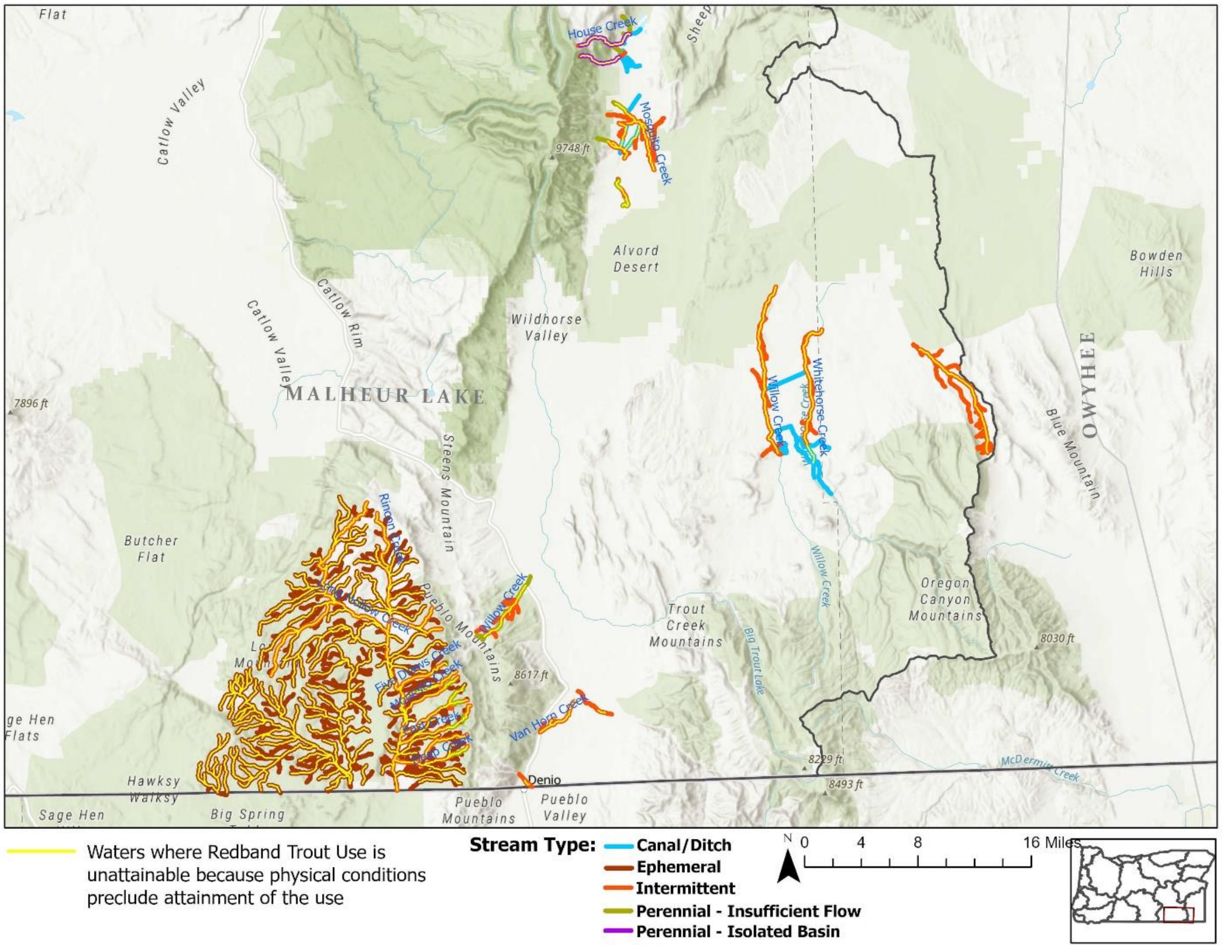

Figure 7-9. Waters where Redband Trout Use is unattainable due to physical conditions, southern Malheur Lakes Basin.

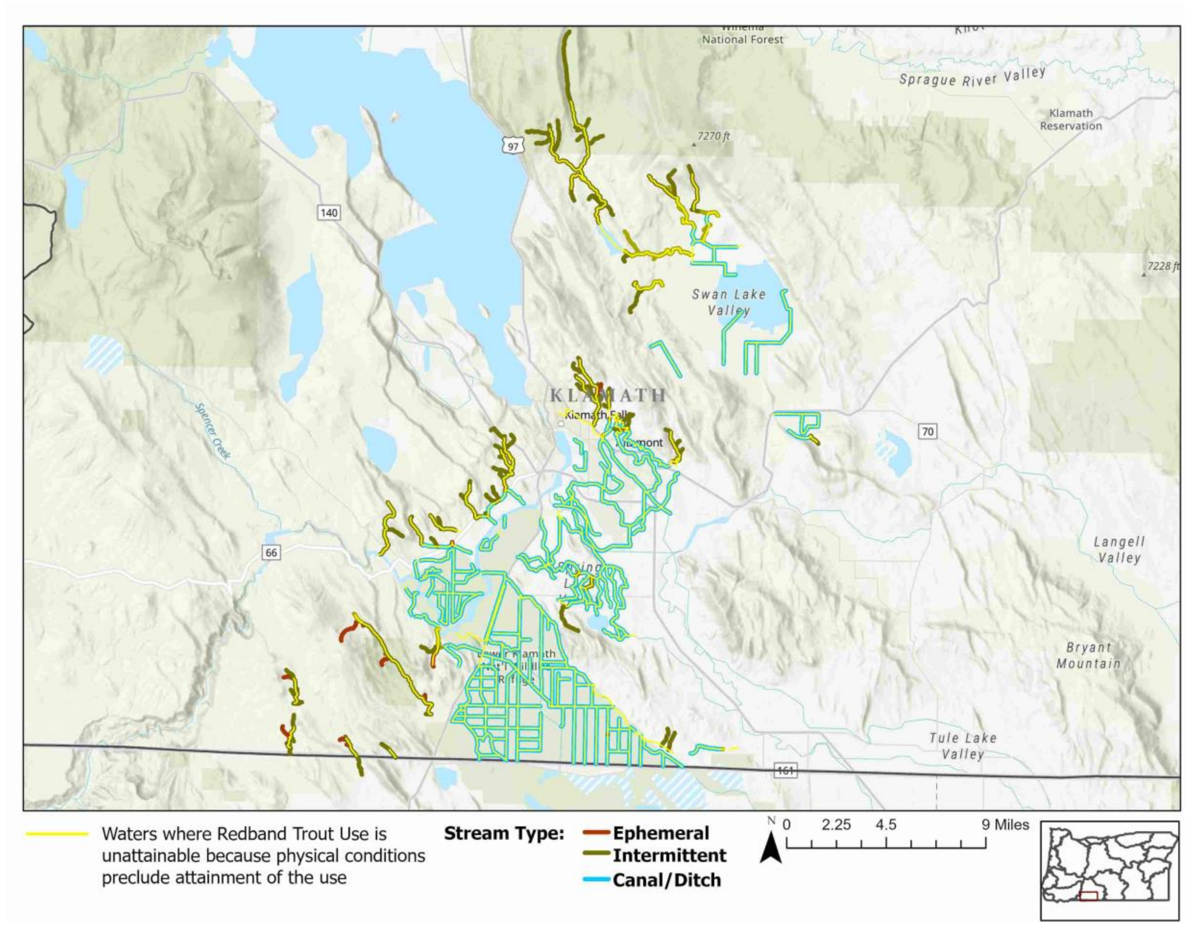

Figure 7-10. Waters where Redband Trout Use is unattainable due to physical conditions, Klamath Basin.

Highest attainable use

Based on the best available data and the decision rules used for this rulemaking, the highest attainable year-round use for these waters is Cool Water Species Use, which is the next most stringent use after Redband Trout Use. Factor 131.10(g)(5) precludes attainment of Redband Trout Use but does not preclude attainment of Cool Water Species Use. To the extent that Redband Trout may move into these waters when there is sufficient water generally during spring snowmelt, but occasionally during the summer during rare wet years, implementation of the Cool Water Species Use, which is protected by a narrative criterion, will limit anthropogenic temperature increases. Moreover, we would expect Redband Trout to avoid waters that don't support their thermal requirements.

Designation of these waters for cool water species is consistent with the decision rules for the aquatic life use update project, which is to designate cool water species use in any waters not identified as primary migration or rearing habitat for any resident or anadromous salmonid fish in July or August, unless ODFW identifies the waters as having salmon or steelhead "primary migration" use. This is the same "decision rule" that was used for the 2003 fish use designations.

7.2 Revisions to Redband Trout Use Based on UAA Factor 4

7.2.1 West Division Main Canal

Factors Supporting Use Unattainability

Diversion/hydrologic modification: Canal itself is a hydrologic modification and flow is a diversion. Fish passage is blocked by barriers created for the purpose of the modification.
Flow: Current summer flow, created by diversion, may be lethal to Redband Trout; "natural" flow, to the extent it existed, would not have supported Redband Trout use in the summer.

Reason for the Use Update

DEQ is proposing to revise the aquatic life use subcategory in the overflow channels below the West Division Main Canal (Umatilla Basin) from Redband Trout Use to Cool Water Species Use (Figure E-5). In 2011, DEQ prepared a UAA supporting the removal of all aquatic life uses from the West Division Main Canal, including a 27-mile long concrete-lined portion of the canal beginning in Hermiston, as well as overflow channels that run from the end of the concrete-lined portion of the canal to the Columbia River. EPA approved removing aquatic life uses from the lined portion of the canal, but not from the overflow channels.

Information collected during the UAA process for the WDMC indicates that Redband Trout use is unattainable in the overflow channels because of the presence of a fish screen that ODFW designed and installed to prevent fish from entering the canal system and because the naturally occurring physical conditions of the canal would not support attainment of Redband Trout Use. Information supporting this conclusion is provided in the UAA for the WDMC, which is incorporated by reference into this UAA.[198] Relevant portions of the UAA are included here.

Protection of existing uses

The revision to Redband Trout Use described in this section protects existing uses. Redband Trout have been prevented from entering the system since at least the 1960s from the upper end of the irrigation system and since at least 1916 from the downstream end. At the head of the canal where it diverts water from the Umatilla River, there is a modern fish screen and bypass facility built in 1988. Prior to

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[198] Oregon DEQ, 2011. Water Quality Standards Revision, West Division Main Canal near Hermiston, Oregon. DEQ Document 11-WQ-034. Portland, OR. 43 pp. Available at https://www.oregon.gov/deq/FilterDocs/HermCanalStdsRevRpt.pdf.

that, a screen was in place dating back to the 1960's and earlier. At the downstream end of the canal, fish were prevented from entering the drainage system by a large concrete irrigation box that blocked passage. This box was a part of the original irrigation system built in 1916. In 2002, a fish barrier was designed by ODFW and installed near the end of the final overflow channel. In the 2011 UAA for the WDMC, the manager of the West End Irrigation District described the structure:

> "This is 1.5 miles downstream of our main canal. We had ODFW design the structure. The area is limited by the two culverts - one under I-5 and one under the railroad tracks. There is a 4-foot elevation difference between the two culverts. So, our gate is set at a minimum three-foot height. The ramp (on the downstream side of the gate) falls an additional foot. Water sheets over the ramp typically, so fish are not able to swim upstream. We have never noticed fish coming up since we put this in. Landowners upstream from this area confirm."

Based on this information, Redband Trout were prevented from entering the overflow channels since the early part of the 20th century, indicating that Redband Trout are not an existing use.

Demonstration that the use is unattainable

The use revisions to the overflow channels of the WDMC are justified under 40 CFR 131.10(g), Factor 4: "Dams, diversions or other types of hydrologic modifications preclude attaining the use, and it is not feasible to restore the waterbody to its original condition or to operate such modification in a way which would result in the attainment of the use."

The WDMC is itself a hydrologic modification, the source of its water is a hydrologic diversion, and fish passage barriers have been constructed to prevent fish from entering the canal. It is infeasible to operate a modification that would result in attainment of Redband Trout when the West Division Irrigation District pumps water from the Umatilla River to the WDMC during summer months. During the irrigation season when water is pumped into the canal, large amounts of water are pumped out of the canal for use in center pivot sprinkler irrigation systems, presenting a severe hazard to any aquatic life in the canal. Consequently, the canal conditions are inhospitable and often lethal for fish.

The overflow channels may have at one time been ephemeral drainage-ways prior to canal construction in the early 1900s. However, even if the canals were restored to their previous status as drainage-ways, they could not have supported Redband Trout Use. As they were ephemeral, they only would have flow directly following rain events, which rarely occur in the dry summer climate. As a result, Redband Trout are prevented from using these drainage-ways during the summer, which is what the Redband Trout Use is designed to protect.

Highest attainable use

The highest attainable year-round use for these waters is Cool Water Species Use, which is the next most stringent use after Redband Trout Use. Factor 131.10(g)(4) precludes attainment of Redband Trout

Use but does not preclude attainment of Cool Water Species Use. Although there is no information suggesting that these waters support any fish use and notwithstanding the presence of a fish passage barrier, designation of these waters for cool water species is consistent with the decision rules for the aquatic life use update project, which is to designate cool water species use in any waters not identified as primary migration or rearing habitat for any resident or anadromous salmonid fish in July or August, unless ODFW identifies the waters as having salmon or steelhead "primary migration" use. This is the same "decision rule" that was used for the 2003 fish use designations.

7.2.2 Silver Creek, Malheur Lakes Basin

Factors Supporting Use Unattainability

Diversion/hydrologic modification: Flow in Silver Creek is insufficient to support Redband Trout use in the summer due to the influence of Moon Reservoir, which provides water to the Double O Ranch area, and numerous water right allocations.

Reason for the Use Update

DEQ is revising the aquatic life use subcategory in the lower portion of Silver Creek, a tributary to Harney Lake, from Redband Trout or Lahontan Cutthroat Trout Use to Cool Water Species Use (Figure E-6). The portion of Silver Creek where DEQ is revising the use is downstream of Moon Reservoir, which was built in the 1950s to support flood irrigation to the Double O Ranch.[199] Irrigation water from the reservoir also flows to the Malheur Lake National Wildlife Refuge, which was created in 1908 to create habitat for waterfowl. Upstream of Moon Reservoir, there are numerous legal water rights dating as far back as the 1870s, primarily for irrigation. As a result, there is insufficient flow downstream of Moon Reservoir during the summer, preventing Redband Trout Use from being attainable.

Protection of existing uses

The conditions that have prevented Redband Trout use in the lower portion of Silver Creek have existed since prior to 1975. Approximately two river miles of Silver Creek downstream of Moon Reservoir is considered historic Redband Trout habitat by ODFW. In the 1950s, Cote Dam was built to create Moon Reservoir in order to provide irrigation water to the Double O Ranch area, in what is now the Malheur Lake National Wildlife Refuge. Although Cote Dam provides fish passage based on satellite photos, because of the numerous water rights allocations upstream, Redband Trout use has not existed in the Harney Lake valley area downstream of the dam since before 1975.

[199] Brown, Lauren. "Harney County's Cote and Rose Dams Receive Much-Needed Replacements." *Burns Times Herald,* October 11, 2023. Available at: https://www.btimesherald.com/2023/10/11/harney-countys-cote-and-rose-dams-receive-much-needed-replacements/.

Demonstration that the use is unattainable

The use revision to Silver Creek is justified under 40 CFR 131.10(g), Factor 4: “Dams, diversions or other types of hydrologic modifications preclude attaining the use, and it is not feasible to restore the waterbody to its original condition or to operate such modification in a way which would result in the attainment of the use.”

Redband Trout use is not attainable in the lower portion of Silver Creek, downstream of Moon Reservoir. The reservoir appears to allow fish passage (Figure 7-10). However, there is insufficient flow to allow Redband Trout Use during the summer (see Figure 7-11). This is likely due to a combination of climatic and anthropogenic conditions.

Figure 7-11. Satellite photo of Moon Reservoir and Silver Creek. There appears to be fish passage to the north of Cote Dam (circled). Source: maps.google.com.

Figure 7-12. Moon Reservoir (April 2022). Attributed to David Goodenow. Source: maps.google.com.

Harney Lake and Malheur Lake are remnants of pluvial Lake Malheur, which existed during the last glacial maximum that existed from 24,000 to 16,000 years ago.[200] Since then, water has receded due to dry climatic conditions (see Figure 7-2 for annual precipitation). During the summer, Flow in Silver Creek many miles upstream of the reservoir frequently falls below 1 cfs during the summer (Figure 7-12), although this flow may be somewhat affected by irrigation rights higher in the watershed.

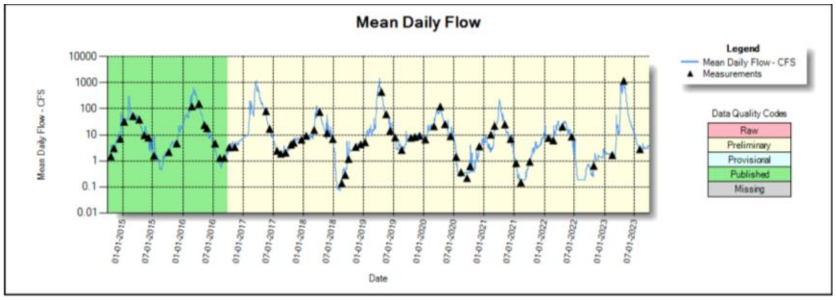

Figure 7-13. Mean Daily Flow, Silver Creek below Nicoll Creek near Riley, 10/1/2014-9/30/2023. Data from Oregon Water Resources Department, Near Real Time Hydrographics Data.

Flow in Silver Creek is highly impacted by water withdrawals. Upstream of Cote Dam, the Water Rights Information System shows 733 water rights, the vast majority of which are for irrigation or livestock, both by number and by flow (Figure 7-13).[201] Approximately 54% of the flow rights and 70% of storage rights were allocated before 1975. As a result of these allocations, there is insufficient water downstream of Moon Reservoir during summer months. As a result, consumptive uses and storage exceed natural stream flow by approximately 33 cfs in July and 14 cfs in August.[202]

It is not feasible to restore Silver Creek to its original condition or operate a modification to water withdrawals in a way which would attain the Redband Trout Use downstream of Moon Reservoir, because doing so would prevent water users from their legal rights to obtain irrigation water, as governed by the Oregon Water Rights Act (See ORS 537.010 for definition) and under the doctrine of prior appropriation.[203] Because of this doctrine, the senior water rights users (typically those that use the water from Silver Creek and its tributaries for irrigation have senior rights, which means that those

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[200] https://www.oregonencyclopedia.org/articles/pleistocene-pluvial-lakes/#:~:text=During%20the%20later%20part%20of,Lake%20Coyote%2C%20Lake%20Fort%20Rock.

[201] Oregon Water Resources Department. Water Rights Information System.

[202] Oregon Water Availability Reporting System (https://apps.wrd.state.or.us/apps/wars). Data based on water availability for the Silver Creek station above Unnamed Stream at 80% exceedance level.

[203] Oregon Water Resources Department, 2018. Water Rights in Oregon: An Introduction to Oregon's Water Laws. 52 pp.

rights are senior to rights for instream purposes. While there have been efforts to improve conditions at the dam to simultaneously support irrigation and flow to the Malheur National Wildlife Refuge downstream of the reservoir[204], these cannot result in use attainment if there is essentially no flow to the dam during the summer.

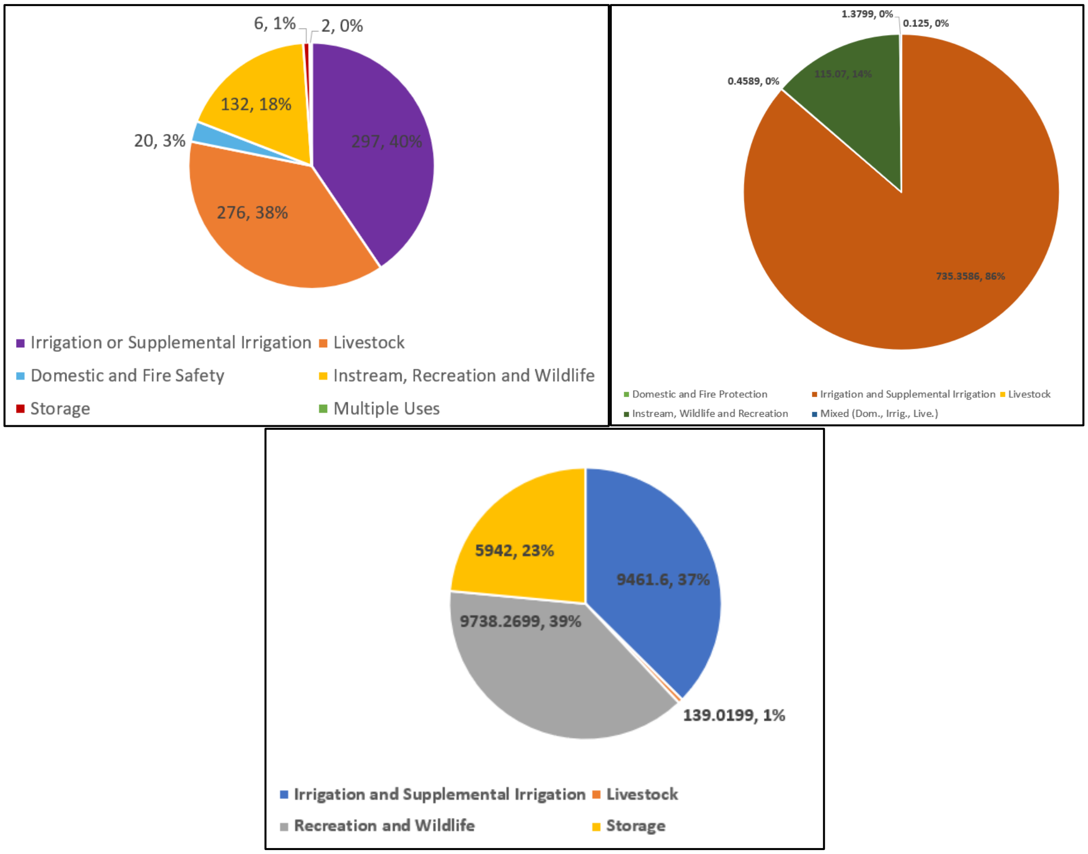

Figure 7-14. Water Rights Allocations upstream of Cote Dam by type of right: a.) by number of rights; b.) by amount and percentage of flow rights; c.) by amount and percentage of storage rights. Data from Oregon Water Rights Information System and Mapping Tool, https://apps.wrd.state.or.us/apps/gis/wr/Default.aspx.

Highest attainable use

The highest attainable year-round use for these waters is Cool Water Species Use, which is the next most stringent use after Redband Trout Use. Factor 131.10(g)(4) precludes attainment of Redband Trout Use but does not preclude attainment of Cool Water Species Use.

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[204] Brown, Lauren. "Harney County's Cote and Rose Dams Receive Much-Needed Replacements." *Burns Times Herald,* October 11, 2023. Available at: https://www.btimesherald.com/2023/10/11/harney-countys-cote-and-rose-dams-receive-much-needed-replacements/.

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