

TECHNICAL MEMORANDUM



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Project Name: Klickitat County Critical Areas Ordinance Update

Project Number: 121201.1

Subject: Klickitat County Critical Areas Ordinance (CAO) – Application of Best Available Science to Code Update

Introduction

Klickitat County is conducting a substantive review and revision of its Critical Areas Ordinance, last updated and adopted in 2013 (Ordinance #O080613). The Growth Management Act (GMA) under RCW 36.70A.172 requires all counties and cities in Washington State to “include the best available science in developing policies and development regulation to protect the functions and values of critical areas.” The information contained in this memorandum is a summary of the best available science (BAS) source documents that are referenced to inform the County’s Critical Areas Ordinance (CAO) update approach related to wetlands and fish and wildlife habitat conservation areas. This is not an exhaustive summation of all scientific research related to critical areas, rather a summary of those resources applied to the CAO update as applicable to Klickitat County. This memo focuses on updates proposed for Chapter III. Wetlands and Chapter IV. Fish and Wildlife Habitat Conservation Areas of Klickitat County’s Critical Areas Ordinance.

1. Wetlands

1.1 Mapping

Chapter III of the Klickitat CAO specifies the use of the National Wetlands Inventory to identify approximate wetland locations. The National Wetlands Inventory (NWI) is produced and managed by the U.S. Fish and Wildlife Service and is readily available. Additional information may be produced by applicants, qualified professionals, or other agencies.

1.2 Classification and Rating

The classification and rating of wetlands is the first step in their protection and provides guidance in wetland management. The Growth Management Act (GMA) states that wetlands managed under development regulations shall be designated in accordance with the “*approved federal wetland delineation manual and applicable regional supplements.*” For Klickitat County, the current methodology is found in the US Army Corps of Engineers (Corps) Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (2008). The Corps manual and regional supplement provide specific methods for determining the presence or absence of jurisdictional wetlands in the landscape. The methodology does not simply delineate the boundaries of a wetland but is based on an examination of a site’s hydrology, vegetation, and soils. Chapter 3.2 of the 2013 Klickitat CAO as well as the proposed 2021 update reference use of the approved federal manual in the code.

Wetland ecological functions and resource values vary between wetland types, so identifying a wetland’s type, ecological functions in the landscape, and response to disturbance aids land managers and property owners in wetland protection. To support natural resource managers, planners, and citizens, The Washington State Department of Ecology (DOE) published the Washington State Wetland Rating System for Eastern Washington in 2004 and updated in 2014 (DOE 2014) which categorizes, or rates wetlands based on specific attributes such as rarity, sensitivity to disturbance, the ability to replace them, and the functions they provide in the landscape. The DOE rating methodology integrates the Cowardin (Cowardin et al. 1979) and hydrogeomorphic (Brinson 1993) classification methods into a four-tiered rating system that assigns wetlands a rating based on its functions and values.

Chapter 3.3.A. and B. of the 2013 Klickitat Critical Areas Ordinance references the 2004 version of the Wetland Rating System. The 2021 CAO update revises this to reference the 2014 update to the DOE Eastern Washington rating system which meets the standards of “best available science” under the Growth Management Act (DOE 2016).

1.3 Wetland Buffers

To protect wetlands from adjacent development and other permitted uses, the 2014 update to Ecology’s rating system includes guidance on establishing wetland buffer requirements to protect wetland functions based on the category (I through IV), habitat scores, and level of adjacent land use impacts (e.g., low, medium, and high). The 2021 CAO update includes amendments to Chapter 3.3.A. Performance Standards to incorporate the buffer guidance established in Ecology’s 2014 update to the wetland rating system. The buffer guidance is outlined in *Appendix 8-D Guidance on Widths of Buffers and Ratios for Compensatory Mitigation for*

Use with the Eastern Washington Wetland Rating System (DOE 2014). The 2021 CAO update specifically utilizes Buffer Alternative 2: *Width Based on Wetland Category and Modified by the Intensity of the Impacts from Proposed Land Use.* This approach allows for more regulatory flexibility as it recognizes that not all land uses have the same level of impact on a given wetland system. The standard buffer widths recommended by DOE have been developed based on DOE's review of the BAS for wetlands throughout the state. These buffer recommendations assume the buffer is densely vegetated with native plants adapted to that jurisdiction's ecoregion. Buffers not meeting these criteria should be enhanced with native plants or require a buffer width increase.

2 Fish and Wildlife Habitat Conservation Areas

Fish and Wildlife Habitat Conservation Areas (FWHCA) as defined under WAC 365-190-030 are those areas *"that serve a critical role in sustaining needed habitats and species for the functional integrity of the ecosystem, and which, if altered, may reduce the likelihood that the species will persist over the long term. These areas may include, but are not limited to, rare or vulnerable ecological systems, communities, and habitat or habitat elements including seasonal ranges, breeding habitat, winter range, and movement corridors; and areas with high relative population density or species richness..."* GMA guidelines specify that the functions and values of FWHCAs should be protected and that jurisdictions must prioritize those conservation and protection measures necessary to preserve and enhance anadromous fisheries (WAC 365-190-080). The proposed 2021 CAO update integrates regulatory language to clarify and strengthen the protections of FWHCAs in Klickitat County.

2.1 Mapping

Chapter IV of the Klickitat CAO specifies the use of the Priority Habitats and Species (PHS) database to identify those sensitive species and habitats considered priorities for conservation and is considered the best available science on the presence and location of habitats in Washington with priority wildlife species. PHS is updated regularly by WDFW habitat biologists and scientists. In addition, the United States Fish and Wildlife Service, and the NOAA Fisheries critical habitat maps are referenced as resources to identify those areas where state and federally listed species (sensitive, candidate, threatened, or endangered) that have a "primary association" as defined in WAC 365-190-130. The County may refer to the Washington State Department of Natural Resources Forest Practices Water Typing maps for stream location and State water typing classifications.

2.2 Riparian Buffers

Klickitat County habitat types vary widely across the landscape. The western edge of the county is characterized by coniferous forests and the foothills of the eastern Cascade Mountains whereas the central and east side of the County generally fall within the Columbia Plateau Ecoregion characterized by semi-arid shrub-steppe. Riparian areas within this latter ecoregion are either not forested or very sparsely forested with such species as Black Cottonwood (*Populus trichocarpa*) and White Alder (*Alnus rhombifolia*), Douglas-fir (*Pseudotsuga menziesii*), and Ponderosa Pine (*Pinus ponderosa*). Quinn et al (WDFW 2020) state that “*Vegetation within riparian ecosystems of the Columbia Plateau often exhibits an abrupt demarcation between the riparian zone and the zone of influence. Phreatophytic trees and shrubs and hydrophytic herbaceous plants are confined to moist streamside areas, but the upland zone of influence may consist of sagebrush or bunchgrass communities*”. The plant community and ecology of this region has important implications for how riparian buffers are established and regulated in critical areas.

For the purpose of this discussion, clarification needs to be made between the terms “stream buffers” and “riparian management zones”. WDFW current guidance (Windrope et al 2020) for protection of riparian areas heavily emphasizes a shift in terminology from the concept of “stream buffers” to “riparian management zones” (RMZs). An RMZ is defined as “...a scientifically based description of the area adjacent to rivers and streams that has the potential to provide full function based on the SPTH [site potential tree height] conceptual framework.” This differs from the use of “buffer(s),” as an RMZ is by definition wide enough to potentially provide full riparian function. Stream buffers are established through policy decisions and are clearly intended to protect streams, but may or may not be intended to provide full riparian function or a close approximation of it. However, the proposed riparian buffer widths in the draft Klickitat County CAO update were set in an effort to approximate RMZ dimensions and functions as described in the WDFW recommendations, through the application of fixed, but adequate, buffer widths. The County’s basis for proposed buffer widths is modified from the existing critical areas ordinance with adjustments based upon best available science as referenced in this memorandum.

It is noted that in areas that are not forested or sparsely forested, using SPTH to determine RMZ widths is not considered the best approach based on the plant communities present in more arid regions of the state. Instead, the WDFW’s guidance suggests that RMZ widths in non-forested landscapes like the Columbia Plateau be defined by the widest area necessary to provide small and large wood recruitment, streambank integrity, shade, wildlife habitat, or polluted runoff infiltration (Watershed 2020; Windrope et al. 2020).

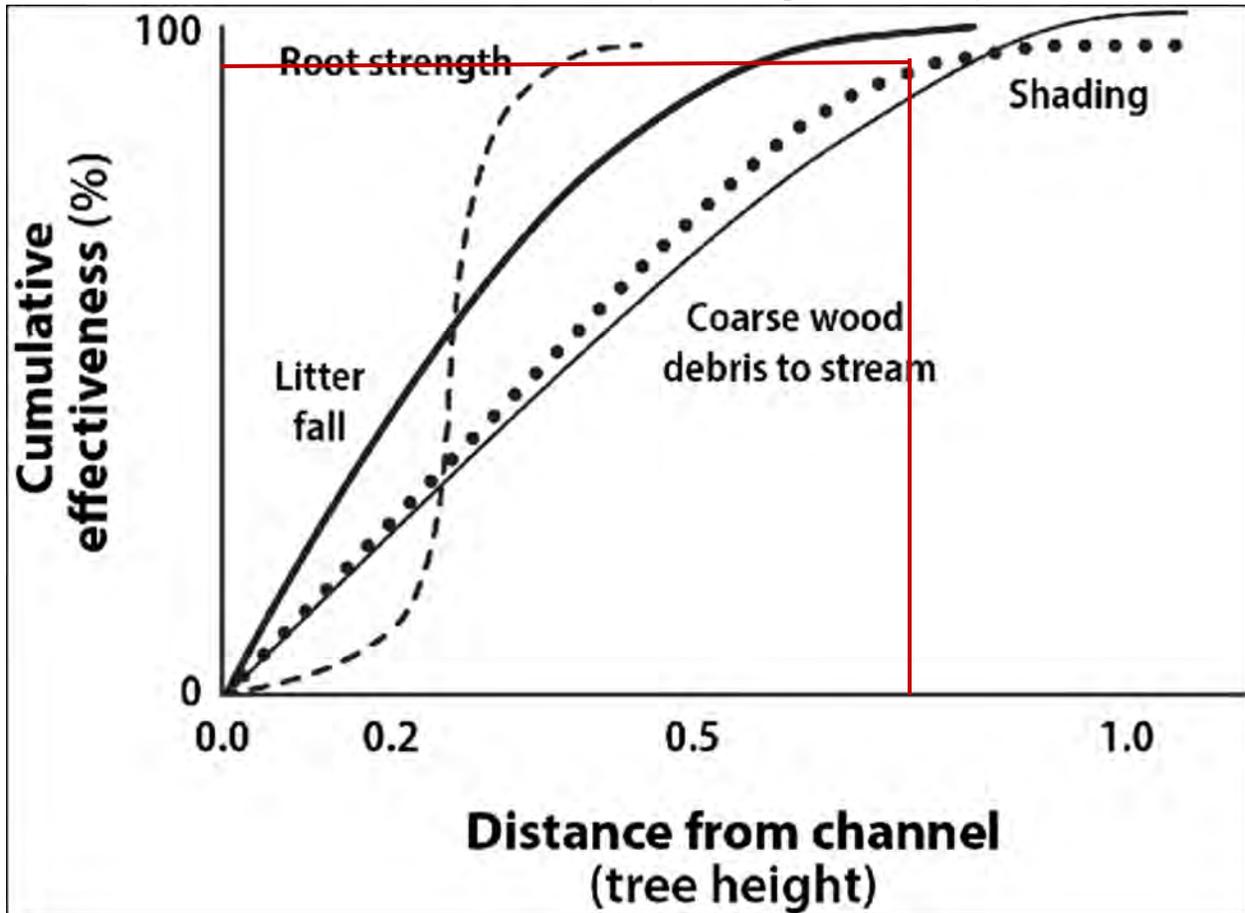
In their best available science reviews for the Kittitas County CAO update, Environmental Science Associates (ESA) (2014) and The Watershed Company (2020) reported that although there is a wide range of effective buffer widths reported in the literature, widths of 100 feet are generally sufficient for removing pollutants in Type F streams, such as nutrients and bacterial pollution, from runoff. This is an important consideration since Klickitat County is not currently participating in the Voluntary Stewardship Program (VSP) and all agricultural activity in county jurisdiction are subject to the County's critical area regulations. ESA reports further that buffers between 30 and 100 feet would provide adequate protections for Type N streams (non-fish bearing) for such functions as sediment filtration and pollutant removal (ESA 2014).

Areas in Klickitat County outside of the Columbia Plateau ecoregion tend to be forested except in areas cleared for agriculture and development. WDFW's current recommendations for establishing RMZ widths are based primarily on a Site Potential Tree Height (SPTH) framework. The SPTH of an area is defined as "...the average maximum height of the tallest dominant trees (200 years or more) for a given site class." Exceptions may occur where SPTH is less than 100 feet, in which case WDFW recommends assigning an RMZ width of 100 feet at a minimum based primarily on what is needed to provide adequate biofiltration and infiltration of runoff for water quality protection, but also in consideration of other habitat-related factors including shade and wood recruitment (Watershed 2020; Windrope et al. 2020). SPTH in Klickitat County's forested ecoregions is typically over 100 feet (see species listing below).

To apply their methodology, WDFW has developed a web-based mapping tool for use in determining SPTH in forested ecoregions of the state, such as occur in Klickitat County. Where SPTH is 100 feet or more, WDFW recommends full protection within one SPTH, driven by the largest dominant tree species at any location.

Below is a graphical representation of the Forest Ecosystem Management Assessment Team (FEMAT) curves, the same as or similar to that included in WDFW's recommendations for establishing the bounds of RMZs (Windrope et al 2020). The curves show percentage of full function for various riparian habitat attributes with increasing distance from a stream. The WDFW recommendations show this graphic and these curves to justify recommending one full SPTH for RMZ width to attain "full" riparian function. However, an examination of the graphed habitat functions reveals that most of them top out somewhat or well before reaching a distance from the channel of one full SPTH. This is clearly true for root strength, shading, and litter fall as graphed. The possible exception is coarse wood recruitment, but even there only the final few percentage points are added for roughly the last 25% of the distance, beyond approximately 0.75 SPTH. And where old-growth conditions do not already exist within a

buffer or RMZ, up to 200 years would be needed for this added small percentage of large wood to actually accrue. The curves indicate that nearly all of the benefits of RMZ function are realized at a distance of 70-80% of SPTH, with very small improvements beyond that. In fact, a



very high level of performance can be achieved with a width somewhat less than a full SPTH, as is demonstrated by the FEMAT curves. Arguably, some additional small gains would be realized even beyond a distance of 100% SPTH. The SPTH is really just one point along a continuum of diminishing returns. This point is made because the following comparison shows that the proposed fixed buffer width for Type F stream of 150 feet will fall slightly below one full SPTH in some cases. However, it is also slightly over in some cases and, where under, the habitat diminishment will be minimal.

The "FEMAT Curves" (FEMAT 1993): a generalized conceptual model describing contributions of key riparian ecosystem functions to aquatic ecosystems as the distance from a stream channel increases. "Tree height" refers to average height of the tallest dominant tree (200 years old or greater); referred to as site-potential tree height (SPTH).

The list below is not an exhaustive evaluation of the relevant data, but we used WDFW’s on-line mapping tool and found the following ranges of values for SPTH in feet for various forest types throughout Klickitat County:

Douglas-fir	119-185 feet
Grand Fir	160-198 feet
Poderosa Pine	85-195 feet
Western Larch	117-165 feet
Western Hemlock	206-219 feet

This informal sampling indicates that the riparian buffer widths proposed in the draft CAO for Type F streams tend to be in the range for most species and a good compromise or approximation for assigning a fixed width rather than a custom delineation for buffer or RMZ widths. We feel that these values support a conclusion that the 150-foot Type F riparian buffer proposed in the CAO update is a good approximation for the widths that would be determined by the recommended SPTH mapping process for determining RMZ widths. Some widths determined using the SPTH mapping process are above and some below the proposed riparian buffer width. Both methods result in a high level of riparian habitat protection and in fact the proposed buffer widths have taken typical SPTH values for the County into consideration. As can be seen from the FEMAT curves exhibit, above, a buffer width slightly below a full SPTH results in only a small, near-undetectable reduction in habitat function.

Considering the WDFW guidance and BAS reviews, which also include riparian buffer recommendations for the Columbia Plateau ecotype, The Watershed Company recommends establishing riparian buffer widths for streams in Klickitat County jurisdiction as outlined in Table 1.

Table 1. Proposed Standard Riparian Buffers (Measured horizontally from OHWM)

Water Type	Standard Buffer
Type F Waters	150 feet

Type Np Waters	75 feet
Type Ns Waters	50 feet

2.3 Special provisions for fish-bearing streams

In keeping with GMA requirements, the proposed update to the Klickitat County CAO specifies regulations to preserve and enhance streams and anadromous fisheries throughout the ordinance. The 2021 CAO update has been amended to include Chapter 4.3.C. *Special provisions – Streams* to include best management practices to minimize the impacts to salmonid bearing streams during development or other land management activities.

2.3.1 Stream Crossings in Type F Streams

The 2021 CAO update specifies that stream crossings in Type F streams such as bridges and culverts must be designed to minimize ecological impacts, not obstruct fish passage, include fish enhancement measures, and be designed in accordance with WDFW fish passage design requirements and the National Marine Fisheries Service Guidelines for Salmonid Passage at Stream Crossings (Barnard et al 2013; NMFS 2013).

2.3.2 In-Water Work Windows

Timing restrictions for in-water work to protect fish during different life-stage requirements is widely supported in best available science. Restricting construction and soil disturbing activities to summer low-flow periods and times of low precipitation protect salmon spawning habitat by decreasing the potential of soil erosion, fine sediment inputs, and increased turbidity (ESA 2014). State and federal resource agencies such as the Department of Fish and Wildlife and the Army Corps of Engineers publish work windows for streams, rivers, and lakes across the state, including Klickitat County. The 2021 CAO update includes the addition of “allowable work windows” (July 1st to August 15th) as designated by WDFW.

2.3.3 Stream bank stabilization

The 2021 CAO update integrates the best available science outlined in WDFW's Aquatic Habitat Guidelines Program per the Integrated Streambank Protection Guidelines (ISPG) (Cramer et al 2002). The ISPG is a best practices guidance manual developed by scientists, professional natural resource practitioners, and engineers with the WDFW, Washington State Department of Transportation, the Washington State Department of Ecology, and the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service. Each best practice recommendation is based on current best science and technical white papers. The guiding principles that inform the standards for streambank stabilization in the ISPG include: *(1) natural erosion processes and rates are essential for ecological health of the aquatic system; (2) human-caused erosion that exceeds natural rates and amounts is usually detrimental to ecological functions; (3) natural processes of erosion are expected to occur through the channel-migration zone. Project considerations should include the channel-migration zone and potential upstream and downstream effects; and (4) preservation of natural channel processes will sustain opportunities for continued habitat formation and maintenance.*

In line with these principles, the 2021 CAO update specifies that soft armoring techniques will be prioritized unless more hardened streambank stabilization is required for public safety. The code update also specifies that stabilization measures must maintain natural shoreline processes, that these measures will not degrade FWHCAs or associated wetlands, and that mitigation measures will be employed to ensure no net loss of ecological functions within the riparian zone.

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