DEPARTMENT OF
NATURAL RESOURCES

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April 17, 2019

TO: Forest Practices Board

FROM: Marc Engel, Assistant Division Manager, Policy and Services Forest Practices

SUBJECT: Water Typing System Rule and Board Manual Development Update

Water Typing Rule

Since the Board approval of the potential habitat break (PHB) and anadromous fish floor options for inclusion in the draft water typing system rule in February 2018, staff has convened a series of stakeholder meetings to review the draft rule. DNR convened these meetings from April 2018 through January 2019 with TFW Policy Committee (Policy) representatives. The attached draft rule incorporates the Board approved Policy recommendations and elements for the water typing system rule. DNR is also preparing Board Manual Section 23, *Guidelines for Field Protocol to Locate Mapped Divisions between Stream Types and Perennial Stream Identification*, to provide the guidance for implementing the new rule.

As this may be the first time you have seen the draft rule in its entirety, we have provided context describing the new rule structure. The rule is based on the permanent water typing system rule (WAC 222-16-030) with underline strikeout indicating proposed changes. The five anadromous fish floor options and the three potential habitat break (PHB) options are incorporated for comparison. Staff will make necessary revisions based on Board requests and final decisions regarding the anadromous fish floor and PHB options.

1. **WAC 222-12-090 Forest practices board manual.**
   Language referencing Board Manual Section 13 is removed since the newly developed Board Manual Section 23 will contain the guidance for determining the water type break between Type F and N waters.

2. **WAC 222-16-031 Interim water typing system**.
   The interim rule will be repealed with the adoption of a permanent rule.

3. **WAC 222-24-040 Water crossing structures for all typed waters.**
   The language acknowledges that existing water crossing structures in Type N waters will be addressed case by case basis.

4. **WAC 222-16-030 Water typing system**.
    - The rule retains the important role interdisciplinary teams provide in determining water type decisions.
    - The incorporation of FHAM, as the field process to delineate the extent of fish habitat.
    - Revisions to the definition of Type F Water were made to incorporate concepts from WAC 222-16-031.
    - The anadromous fish floor definition will reside under the Type F water classification. The options are included together for comparison (options A and B are identical in function).
    - The default physical stream criteria will remain under the Type F water classification.
    - The off-channel habitat definition was revised to be consistent with the recommendations from Policy.

5. **WAC 222-16-0301 Verification of fish habitat and the Break between Type F and Type N Water.**
    This new section describes the two processes applicants can use to determine the water type break between Type F and N waters. The options are available where the regulatory break has not been established through previous field verification or an interdisciplinary team review.
    - Subsection (1). The default physical stream criteria currently described in the interim rule (WAC 222-16-031) can be used to determine the type break for an FPA only. The specific metrics have not changed.
    - Subsection (2). This describes the required steps to complete the FHAM. The FHAM framework was a consensus product recommended by Policy to determine fish habitat. The application of FHAM is required to propose permanent changes to the water type map (i.e., establish the regulatory break).
    - Subsection (3). This describes the specific PHB criteria and includes either a stream gradient increase, stream width decrease or the presence of a permanent natural obstacle to upstream fish movement. All three PHB options are included for comparison.
    - Subsection (4). These general terms apply to all options.

Board Manual Guidance

The guidance for conducting FHAM and the protocol for electrofishing surveys will reside in Board Manual Section 23, *Guidelines for Field Protocol to Locate Mapped Division between Stream Types and Perennial Stream Identification*. Understandably, the group developing guidance is focused on identifying the break between Type F and N waters—guidance for identifying the break between Type Np and Ns waters will occur later. We are providing a working draft for you to see how the concepts are being developed and arranged. Discussions are on-going with meetings scheduled throughout May.

In addition to describing the steps for applying the FHAM, Section 23 will include procedures for measuring the three types of PHBs. The methods were developed after the group conducted field visits to assess the feasibility of identifying PHBs on the ground. The group has been

focused on incorporating concepts that do not need further direction or clarification. However, some elements cannot be developed until the Board has chosen which anadromous fish floor or which PHB option will be included in the permanent water typing rule.

Section 23 also contains best management practices for conducting a protocol electrofishing survey in conjunction with the FHAM. Relevant guidance from existing Section 13 and recommendations from technical work groups tasked with developing electrofishing considerations provided the framework for developing these guidelines.

The Board accepted Policy's recommendations for the definition of off-channel habitat. It was agreed that DNR should develop guidance to assist applicants for identifying habitat features based on either bankfull width or ordinary high water line indicators. The language in this version may be more appropriate in another Board Manual section since off-channel habitat is part of Type F Waters.

Final approval of Section 23 will coincide with the adoption of the permanent water typing system rule. Due to the time involved to complete the water typing system rule, no other Board Manual Sections are being worked on at this time.

Should you have any questions please feel free to contact me at 360-902-1390 or marc.engel@dnr.wa.gov.

ME
Attachments

DRAFT
Rule Proposal for a Permanent Water Typing System
FOREST PRACTICES BOARD
April 2019

WAC 222-12-090 *Forest practices board manual.

. . .

(13) ~~**Guidelines** for determining fish use for the purpose of typing waters under WAC 222-16-031~~**Reserved**.

. . .

REPEAL

WAC 222-16-031 Interim water typing system.

WAC 222-24-040 *Water crossing structures for all typed waters.

(1) When the water type break between the Type F and Type N Water is adjusted upstream beyond an existing water crossing structure, the structure will not require replacement until the end of the structures functional life when:

- The water type change is from an on-site interdisciplinary team or a protocol survey in WAC 222-16-0301(2) and has been approved by the department;
- The water crossing structure has been installed under an approved forest practices hydraulic project or a hydraulic project approval by the department of fish and wildlife; and
- The structure is functioning with little risk to public resources.

(2) Bridges are required for new crossings and reconstructed crossings of any typed waters regularly used for recreational boating.

(~~2~~3) Structures containing concrete must be sufficiently cured prior to contact with water.

(~~3~~4) One end of each new or reconstructed permanent log or wood bridge shall be tied or firmly anchored if any of the bridge structure is within ten vertical feet of the 100-year flood level.

(~~4~~5) Alterations or disturbance of the stream bed, bank or bank vegetation must be limited to that necessary to construct the project. All disturbed areas must be stabilized and restored according to the recommended schedule and procedures found in board manual section 5. This requirement may be modified or waived by the department, in consultation with the department of fish and wildlife, if precluded by engineering or safety factors.

(~~5~~6) When earthen materials are used for bridge surfacing, only clean sorted gravel may be used, a geotextile lining must be installed and curbs of sufficient size shall be installed to a height above the surface material to prevent surface material from falling into the stream bed.

(~~6~~7) Wood removed from the upstream end of culverts and bridges will be placed at the downstream end of such culverts and bridges in such a way as to minimize obstruction of fish passage and to the extent practical, while avoiding significant disturbance of sediment in connection with maintenance activities.

(~~7~~8) Fords.

. . .

222-30-021 *Western Washington riparian management zones

. . .

*(1)(b)(i)(B) In addition to the conditions set forth above, permitted conversion activities in the **inner zone** of any harvest unit are limited by the following:

- Each continuous conversion area is not more than five hundred feet in length; two conversion areas will be considered "continuous" unless the no-harvest area separating the two conversion areas is at least half the length of the larger of the two conversion areas.
- Type S and F ~~(Type 1, 2, or 3)~~ Water: Up to fifty percent of the inner zone area of the harvest unit on one side of the stream may be converted provided that:
  - ♦ The landowner owns the opposite side of the stream and the landowner's riparian area on the opposite bank meets the shade requirements of WAC 222-30-040 or has a seventy-five foot buffer of trees at least forty feet tall or:

. . .

(2)(b)(v) No timber harvest is permitted within a fifty-six foot radius buffer patch centered on a headwater spring or, in the absence of a headwater spring, on a point at the upper most extent of a Type Np Water as defined in WAC 222-16-030(3)~~ and 222-16-031~~.

WAC 222-16-030 Water typing system.

The forest practices water typing system is constructed to provide a repeatable method of classifying waters within the non-federal, forested areas of the state. The goal of the water typing system is to ensure that riparian buffers are properly placed at each stream, protecting aquatic resources and their respective habitats. It is intended that across the landscape, the water typing system will equally over and under estimate the presence or absence of fish habitat across the landscape.

~~Until the fish habitat water type maps described below are adopted by the board, the Interim Water Typing System established in WAC 222-16-031 will continue to be used.~~ The department classifies streams, lakes and ponds in cooperation with the departments of fish and wildlife, and ecology, and in consultation with affected Indian tribes ~~will classify streams, lakes and ponds~~. To assist forest practices applicants in determining the water type classification, ~~The~~ the department ~~will~~ prepares and updates water type maps showing the location of Type S, F, and N (Np and Ns) Waters ~~within the forested areas of the state~~as defined in this section. ~~The maps will be based on a multiparameter, field-verified geographic information system (GIS) logistic regression model. The multiparameter model will be designed to identify fish habitat by using geomorphic parameters such as basin size, gradient, elevation and other indicators. The modeling process shall be designed to achieve a level of statistical accuracy of 95% in separating fish habitat streams and nonfish habitat streams. Furthermore, the demarcation of fish and nonfish habitat waters shall be equally likely to over and under estimate the presence of fish habitat. These maps shall be referred to as "fish habitat water typing maps" and shall, when completed, be available for public inspection at region offices of the department.~~ The location of the water type maps and instructions for use are available on the department's website.

~~Fish habitat water type maps will be updated every five years where necessary to better reflect observed, in-field conditions. Except for these periodic revisions of the maps, on-the-ground observations of fish or habitat characteristics will generally not be used to adjust mapped water types. However, if an on-site interdisciplinary team using nonlethal methods identifies fish, or finds that habitat is not accessible due to naturally occurring conditions and no fish reside above the blockage, then the water type will be immediately changed to reflect the findings of the interdisciplinary team.~~

~~The finding will be documented on a water type update form provided by the department and the fish habitat water type map will be updated as soon as practicable. If a dispute arises concerning a water type the department shall make available informal conferences, as established in WAC 222-46-020 which shall include the departments of fish and wildlife, and ecology, and affected Indian tribes and those contesting the adopted water types.~~ The department shall consider the findings of an interdisciplinary team to determine the water type classification. The department will change the water type map to reflect water type changes resulting from an on-site interdisciplinary team or a department approval of a water type update form. The findings of a protocol survey using the Fish Habitat Assessment Method in WAC 222-16-0301(2) or an on-site interdisciplinary team will be documented on a water type update form provided by the department.

The department may convene an interdisciplinary team, as defined in WAC 222-16-010, to consider proposed modifications to the water type map to better reflect observed in-field conditions, including observations of fish, or if stream conditions change making habitat inaccessible to fish due to naturally occurring conditions, or if a dispute arises concerning a water type classification.

An interdisciplinary team includes participants from the departments of fish and wildlife, and ecology, affected Indian tribes, and those proposing a water type classification change. The department shall consider the findings of the interdisciplinary team to determine the water type classification. The department shall document the findings of an interdisciplinary team and make changes to the water type map as soon as practicable. Water type classifications concurred by the department prior to January 1, 2020, are regulatory water type.

~~The w~~Waters ~~will be~~ are classified using the following criteria:

*(1) **"Type S Water"** means all waters, within their bankfull width, as inventoried as "shorelines of the state" under chapter 90.58 RCW and the rules promulgated pursuant to chapter 90.58 RCW including periodically inundated areas of their associated wetlands.

*(2) **"Type F Water"** means segments of natural waters, other than Type S Waters, ~~which are~~ within the bankfull widths of ~~defined channels~~ fish habitat streams and periodically inundated areas of ~~their~~ associated wetlands~~, or within lakes, ponds, or impoundments having a surface area of 0.5 acre or greater at seasonal low water~~ and ~~which~~ in any case contain fish habitat or are ~~described by one of the following four categories:~~ used by humans or wildlife, or diverted for fish use. Type F Waters includes:

Option A & B (a) Waters within the anadromous fish floor. These are waters connected to saltwater and extending upstream to a sustained ten-percent gradient or a permanent natural barrier, whichever comes first. These waters include main stem stream segments and associated tributaries.

Option C-1 *OR*

Waters within the anadromous fish floor. These are waters connected to saltwater that have a sustained gradient of five-percent or less, and include associated tributaries lacking a five-percent gradient increase or permanent natural obstacle at the junction with the main stem.

Option C-2 *OR*

Waters within the anadromous fish floor. These are waters connected to saltwater that have a sustained gradient of seven-percent or less, and include associated tributaries lacking a five-percent gradient increase or permanent natural obstacle at the junction with the main stem.

Option C-3 *OR*

Waters within the anadromous fish floor. These are waters connected to saltwater that have a sustained gradient of ten-percent or less, and include associated tributaries lacking a five-percent gradient increase or permanent natural obstacle at the junction with the main stem.

(b) Waters within lakes, ponds, or impoundments having a surface area of 0.5 acre or greater at seasonal low water.

(c) Waters which meet the default physical stream criteria described in WAC 222-16-0301(1).

(d) Waters used by fish for off channel habitat. These are areas important for rearing and survival of fish and include riverine ponds, wall-based channels. The area must be connected to a Type F or Type S Water and accessible to fish during some portion of the year. The extent of off channel habitat is either the bankfull width or the ordinary high water line associated with a bankfull flow.

(e) Waters~~, which are~~ diverted for domestic use by more than ~~10~~ ten residential or camping units or by a public accommodation facility licensed to serve more than ~~10~~ ten persons, where ~~such diversion is determined by~~ the department determines the diversion ~~to be~~is a valid appropriation of water. ~~and the only practical water source for such users. Such~~ These waters shall be considered ~~to be~~ Type F Water upstream from the point of ~~such~~ diversion for ~~1,500~~fifteen hundred feet or until the drainage area is reduced by ~~50~~ fifty percent, whichever is less~~;~~.

(~~b~~f) Waters~~, which are~~ diverted for use by federal, state, tribal, local governmental entity or private fish ~~hatcheries~~hatchery. ~~Such~~ These waters shall be considered Type F Water for fifteen hundred feet upstream from the point of diversion ~~for 1,500 feet~~, including tributaries if highly significant for protection of downstream water quality. The department may allow additional harvest beyond the requirements of Type F Water ~~designation provided~~classification if the department determines after a landowner-requested ~~on-site~~interdisciplinary team assessment ~~by the department of fish and wildlife, department of ecology, the affected tribes and interested parties~~ that:

(i) The management practices proposed by the landowner will adequately protect water quality for the fish hatchery; and

(ii) ~~Such additional~~The additional harvest within the riparian management zone meets the requirements of the water type ~~designation~~ classification that would apply in the absence of the hatchery;

(~~c~~g) Waters~~, which are~~ within a federal, state, local governmental entity, or private campground having more than ~~10~~ ten camping units~~:~~. ~~Provided, That the water shall not be considered to~~ These are waters that enter a campground ~~until it reaches~~at the boundary of the park lands available for public use and ~~comes~~ come within ~~100~~ one hundred feet of a camping unit, trail or other park improvement~~;~~.

~~(d) Riverine ponds, wall-based channels, and other channel features that are used by fish for off-channel habitat. These areas are critical to the maintenance of optimum survival of fish. This habitat shall be identified based on the following criteria:~~

~~(i) The site must be connected to a fish habitat stream and accessible during some period of the year; and~~

~~(ii) The off-channel water must be accessible to fish.~~

(3) **"Type Np Water"** means all segments of natural waters within the bankfull width of ~~defined channels that are~~ perennial non-fish habitat streams. Perennial streams are flowing waters that do not go dry any time of a year of normal rainfall and include the intermittent dry portions of the perennial channel below the uppermost point of perennial flow.

(4) **"Type Ns Water"** means all segments of natural waters within the bankfull width of ~~the defined channels~~streams that are not Type S, F, or Np Waters. These are seasonal, non-fish habitat streams in which surface flow is not present for at least some portion of a year of normal rainfall and are not located downstream from ~~any stream reach that is a~~ Type Np Water. Type Ns Waters must be physically connected by an above-ground channel system to Type S, F, or Np Waters.

*(5) For purposes of this section:

(a) "Residential unit" means a home, apartment, ~~residential~~ condominium unit or mobile home, serving as the principal place of residence.

(b) "Camping unit" means an area intended and used for:

(i) Overnight camping or picnicking by the public containing at least a fireplace, picnic table and access to water and sanitary facilities; or

(ii) A permanent home or condominium unit or mobile home not qualifying as a "residential unit" because of part time occupancy.

(c) "Public accommodation facility" means a business establishment ~~open to and~~ licensed to serve the public, such as a restaurant, tavern, motel or hotel.

(d) "Natural waters" only excludes water conveyance systems which are artificially constructed and actively maintained for irrigation.

(e) "Seasonal ~~low flow" and "seasonal~~ low water" means the conditions of the ~~7~~ seven-day, ~~2~~ two-year low water situation, as measured or estimated by accepted hydrologic techniques recognized by the department.

(f) "~~Channel width and gradient~~Average bankfull width" means a measurement over a representative section of at least ~~500~~ five hundred linear feet with at least ~~10~~ ten evenly spaced measurement points along the normal stream channel but excluding unusually wide areas of negligible gradient such as marshy or swampy areas, beaver ponds and impoundments. ~~Channel gradient may be determined utilizing stream profiles plotted from United States geological survey topographic maps (s~~See board manual section ~~23~~2).

(g) "Intermittent ~~streams~~" means those segments of streams that normally go dry.

(h) ~~"Fish habitat" means habitat which is used by any fish at any life stage at any time of the year, including potential habitat likely to be used by fish which could be recovered by restoration or management and includes off-channel habitat.~~

Option A & B

"Permanent natural barrier" means a barrier that would exclude most adult salmonids, including:

(i) a waterfall greater than twelve vertical feet in height, or

(ii) a stream segment having a sustained gradient exceeding twenty percent for five hundred twenty five or more feet (continuous), or,

(iii) a channel having a sustained gradient greater than sixteen percent for a distance of five hundred twenty five feet and having a width less than two feet in western Washington or less than three feet in eastern Washington as measured at the bankfull width.

OR

Option C1, C2 &C3 "Permanent natural obstacle" means a natural, non-deformable obstacle that completely blocks upstream fish movement and includes vertical drops, steep cascades, bedrock sheets and bedrock chutes. A permanent natural obstacle excludes large woody debris and sedimentary deposits.

NEW SECTION

WAC 222-16-0301 Verification of Water Classifications.

For purposes of submitting a forest practices application, verification of water classifications may occur by use of the physical stream criteria described in (1) of this section; or by use of the Fish Habitat Assessment Method (FHAM) described in (2) of this section.

(1) **Default physical stream criteria.** The default criteria are a list of stream characteristics that presume fish use. It can only be applied when submitting a forest practices application where fish use of the streams in the forest practices application have not been determined. It does not delineate the regulatory break between Type F and Type N waters. Any of the following apply:

(a) Stream segments having a bankfull width of two feet or greater in western Washington or three feet or greater in eastern Washington; and having a gradient of sixteen percent or less;

(b) Stream segments having a bankfull width of two feet or greater in western Washington or three feet or greater in eastern Washington; and having a gradient greater than sixteen percent and less than or equal to twenty percent, and having greater than fifty acres in contributing basin size in western Washington or greater than one hundred seventy five acres contributing basin size in eastern Washington, based on hydrographic boundaries;

(c) The department shall waive or modify the requirements of this subsection if:

(i) Waters have confirmed, long-term, naturally occurring water quality parameters incapable of supporting fish; or

(ii) Snowmelt streams have short flow cycles that do not support successful life history phases of fish. These streams typically have no flow in the winter months and discontinue flow by June 1; or

(iii) Sufficient information about a geomorphic region is available to support a departure from the characteristics in (i) of this subsection, as determined in consultation with the departments of fish and wildlife, ecology, affected tribes and interested parties.

*(2) **Fish Habitat Assessment Methodology (FHAM).** The FHAM is a series of steps required to delineate the extent of fish habitat coincident with the regulatory water type break between Type F and Type N Waters. Proposals to change the department water type map must include documentation of the use of the FHAM on a form designated by the department. The FHAM is applied in waters situated upstream from known fish presence or if the department authorizes conducting the FHAM after convening an interdisciplinary team. Water type classifications concurred by the department prior to January 1, 2020, are regulatory water type. Board manual section 23 provides additional technical guidance for conducting the FHAM.

The FHAM requires identification of a geomorphic feature meeting the definition of a potential habitat break (PHB) as described in (3) of this section. Practitioners conducting electro-fishing surveys must be certified. The steps to conduct FHAM are:

Step 1	Locate the point of known fish use. The process and sources used to determine known presence or fish habitat must be documented. Proponents are encouraged to contact the department of fish and wildlife and affected Indian tribes to determine areas of known fish use.

Step 2	Locate the first PHB situated upstream of known fish use. See the PHB criteria in (3) of this section to determine if the stream feature qualifies as a PHB.
Step 3	Begin the electrofishing survey directly upstream of the first PHB identified in the stream. The survey will be used to determine if fish occur in the stream segment.
3a	If fish are observed in the stream segment upstream from the first PHB, stop the electrofishing survey and proceed upstream to the next PHB. Repeat this process until no fish are observed upstream of a PHB.
	or
3b	If fish are not observed in the stream segment upstream of a PHB, stop the electrofishing survey and go to step 4.
Step 4	When fish are not observed in the stream segment directly above a PHB, document this location as the proposed habitat break. This point becomes the end of fish habitat for the stream segment and the proposed water type break between Type F and Type N Waters.

Option A

*(3) **Potential Habitat Breaks (PHB).** PHBs include increase in gradient, reduction in bankfull width or a permanent natural obstacle. For purposes of the FHAM, the criteria for a PHB include any of the following:

(a) Western Washington

(i) Stream segments having a sustained gradient increase equal to or greater than five-percent. The minimum distance for determining a sustained gradient is measured over twenty-times the average bankfull width; or

(ii) Stream segments having a bankfull width equal to or less than two feet. The minimum distance for determining a decrease in bankfull width is measured over twenty-times the average bankfull width; or

(iii) A permanent natural obstacle having:

(A) a vertical obstacle height equal to or greater than the bankfull width, but not less than three feet; or

(B) a non-vertical step equal to or greater than thirty percent gradient, if the elevation increase is equal to or greater than two times the upstream bankfull width; or

(iv) Tributary junctions encountered during the assessment will not be considered a PHB unless the junction coincides with the criteria in (i), (ii), or (iii) of this subsection. If a PHB is **not** identified at a junction, the assessment described in (2) of this section continues upstream from the tributary junction until a PHB is identified.

(b) Eastern Washington - reserved

OR

Option B

*(3) **Potential Habitat Breaks (PHB).** PHBs include increase in gradient, reduction in bankfull width or a permanent natural obstacle. For purposes of the FHAM, the criteria for a PHB include any of the following:

(a) Stream segments having a gradient equal to or greater than ten-percent. The minimum distance for determining a sustained gradient is measured over twenty-times the average bankfull width.

(b) Stream segments having a bankfull width equal to or less than two feet. The minimum distance for determining a decrease in bankfull width is measured over twenty-times the average bankfull width.

(c) A permanent natural obstacle having:

(i) a vertical obstacle height equal to or greater than the bankfull width, but not less than three feet; or

(ii) a non-vertical step equal to or greater than twenty percent gradient, if the elevation increase is equal to or greater than the upstream bankfull width.

(d) Tributary junctions encountered during the assessment will not be considered a PHB unless the junction coincides with the criteria in (a), (b), or (c) of this subsection. If a PHB is **not** identified at a junction, the assessment described in (2) of this section continues upstream from the tributary junction until a PHB is identified.

OR

Option C

*(3) **Potential Habitat Breaks (PHB).** PHBs include increase in gradient, reduction in bankfull width or a permanent natural obstacle. For purposes of the FHAM, the criteria for a PHB include any of the following:

(i) Stream segments having a sustained gradient increase equal to or greater than five-percent. The minimum distance for determining a sustained gradient is measured over twenty-times the average bankfull width.

(ii) Upstream to downstream bankfull width decrease greater than twenty percent. The minimum distance for determining a decrease in bankfull width is measured over twenty-times the average bankfull width.

(iii) Permanent Natural Obstacle having:

(A) A vertical obstacle height equal to or greater than the bankfull width, but not less than three feet; or

(B) A non-vertical step equal to or greater than twenty percent gradient, and the elevation increase is equal to or greater than the upstream bankfull width.

(iv) Tributary junctions may be considered a PHB if they coincide with the criteria in (i), (ii), or (iii) of this subsection. If a PHB is **not** identified at a junction, the assessment described in (2) of this section continues upstream from the tributary junction until a PHB is identified.

*(4) For purposes of this section:

(a) **"Permanent Natural Obstacle"** means a natural, non-deformable obstacle that completely blocks upstream fish movement. "Permanent natural obstacles" include vertical drops, steep cascades, bedrock sheets and bedrock chutes. A permanent natural obstacle excludes large woody debris and sedimentary deposits.

(b) **"Potential Habitat Break"** means a permanent, distinct and measurable change to in-stream physical characteristics. PHBs are typically associated with underlying geomorphic conditions and may consist of natural obstacles that physically prevent fish access to upstream reaches or a distinct measurable change in channel, bankfull width or a combination of the two.

Draft v. 4-12-2019

Section 23
Guidelines for Field Protocol to Locate Mapped Divisions between Stream Types and Perennial Stream Identification

INTRODUCTION

This Board Manual section contains guidelines to correctly identify the division between the forest practices water type classifications in WAC 222-16-030. Under the rules, streams containing fish habitat receive greater riparian protection than streams lacking characteristics to support fish. Therefore, correctly identifying the appropriate water type is essential for determining the appropriate riparian protection. This manual serves as the advisory technical supplement to the forest practices rules.

Part 1 provides guidance for identifying the water type break between Type F (fish habitat) and Type N (non-fish habitat) waters. Part 1 provides the guidance for conducting the fish habitat assessment for determining fish habitat and best management practices for conducting electrofishing surveys.

Part 2 (*under development*) Type N waters are further divided between Type Np (non-fish perennial) and Ns (non-fish seasonal) waters. Part 2 provides guidance for identifying the water type break between Type Ns and Type Np waters.

Water Type Maps

DNR maintains and updates a statewide water type map depicting stream layers and water type break points. Streams are shown on the map as Type S (Shorelines of the State), Type F, Type N

or Type U (unknown), with asterisks (*) indicating the point of change from one type to another. The points on the map are derived from a GIS-based model or were digitized onto the map after a DNR concurred review. The map provides as a starting point to help identify streams types and locations. The Forest Practices Activity Mapping Tool and the instructions for finding the area of interest can be accessed on the Forest Practices Application Review System website: https://www.dnr.wa.gov/programs-and-services/forest-practices/forest-practices-application-review-system-fpars

Landowners are required to verify whether the stream location and the associated water type break depicted on the water type map is correct prior to conducting forest practices activities. In most cases, no additional assessment is necessary for streams where a previous field survey or an interdisciplinary team (ID team) has determined the appropriate water type. Part 1 provides information regarding how to view which streams are 'regulatory' points, as well as access information about previously field-verified streams.

The Water Type Classification Worksheet in the FPA instructions is a useful tool for determining stream types. Proposed changes to the water type map require submitting a Water Type Modification Form and are subject to a review process involving Department of Natural Resources (DNR), Department of Fish and Wildlife (WDFW) and Ecology, as well as affected tribes and other interested parties. All applicable forms and instructions can be found at: https://www.dnr.wa.gov/programs-and-services/forest-practices/review-applications-fpars/forest-practices-forms-and

Landowners are encouraged to contact DNR regional forest practices staff, WDFW and tribal biologists who may have local knowledge and expertise before starting the assessment to determine water type breaks. DNR Small Forest Landowner Office is also available to provide technical assistance for water typing or assist with habitat evaluations.

Water Typing on Adjacent Property Ownership.
Water typing may occur when a stream flows across adjoining property lines, preventing access to evaluate the stream's full reach. However, every reasonable effort should be made to gain access to the entire stream reach. If access cannot be attained in order to perform a thorough fish habitat stream assessment, it may not be possible to establish the permanent F/N break. In these situations, the applicable water type may be determined for the purpose of FPA approval by applying the default physical stream criteria (WAC 222-16-030) or through an ID team meeting.

PART 1. IDENTIFY AND LOCATE THE DIVISION BETWEEN TYPE F AND N WATERS

Anadromous Fish Floor [RM(2] (to be developed when the Board decides on the AFF metrics)

- Describe purpose
- Describe procedure
- Provide criteria

Delineating the water type break between Type F and Type N waters (F/N break) can be accomplished in the following ways:

- Apply the default physical stream criteria (WAC 222-16-030) for the purposes of submitting an FPA. Permanent changes to the water type map will not be made using the default physical stream criteria, but can be applied for a single FPA.
- Apply the fish habitat assessment methodology (FHAM) to establish the upstream extent of fish habitat that serves as the proposed F/N break. The assessment is used for proposing permanent changes to the water type map. If the proposed water type update is concurred by DNR, these points become the 'regulatory' water type break'[RM(3]
- Interdisciplinary teams can be used to provide expertise to determine fish habitat or establish plans for conducting surveys in unique situations. The results of an ID team can be used to make permanent changes to the water type map.

Part 1.1 Default Physical Stream Criteria

The default physical stream criteria described in WAC 222-16-030 are used to identify stream width and gradient characteristics presumed to contain fish habitat. The rules differ slightly depending on which side of the Washington Cascade Mountain crest the activity is planned. Streams with the following characteristics are presumed fish habitat and are classified as Type F waters:

Western Washington

- stream segments having a bankfull width of 2 feet or greater and having a gradient of 16% of less; or
- stream segments having a bankfull width of 2 feet or greater and having a gradient greater than 16% and less than or equal to 20%, and having greater than 50 acres in contributing basin size based on hydrographic boundaries.

Eastern Washington

- stream segments having a bankfull width of 3 feet or greater and having a gradient of 16 % or less; or
- stream segments having a bankfull width of 3 feet or greater and having a gradient greater than 16% and less than or equal to 20%, and having greater than 175 acres contributing basin size based on hydrographic boundaries.

Part 1.2 Fish Habitat Assessment Methodology

The fish habitat assessment method (FHAM) is a process used to assess the stream channel to determine the upstream extent of fish habitat for a given stream segment. In rule, fish habitat means 'those areas used by fish at any life stage at any time of the year including potential habitat likely to be used by fish, which could be recovered by restoration or management and includes off-channel habitat' (WAC 222-16-010). The FHAM guides stream surveyors in using potential habitat breaks (PHBs) in conjunction with protocol electrofishing survey in areas above known fish or documented fish presence for determining the regulatory F/N break.

Potential habitat breaks (PHB) are defined as:

A permanent, distinct and measurable change to in-stream physical characteristics. PHBs are typically associated with underlying geomorphic conditions and may consist of

- *natural obstacle (i.e., steep bedrock chute, vertical waterfall) that physically prevent fish access to upstream reaches, or*

- *a distinct and measurable change in channel gradient, bankfull width, or a combination of the two.*

Step 1. Office Review portion of FHAM[RM(4]

Pre-survey planning ensures the assessment is based on the best data and information available and helps identify potential fish locations for determining the appropriate starting point for the field assessment. Surveyors may request information from DNR, WDFW, and/or tribal biologists on known fish barriers, known fish distributions, preferred survey timing or to review documentation expectations.

- WDFW and tribal fisheries databases provide information and GIS products on fish populations (see Appendix A for a list of resources)
- Fish passage barrier information (see Appendix B for a list of resources)
- Programmatic reviews with agency staff or tribal biologists prior to conducting protocol surveys are helpful to address a variety of situations encountered in the field.

Begin by determining if the stream in question is identified on the water type map. Streams and water type breaks are represented in two ways:

- Streams depicted by a GIS-based model. These modeled streams are a "best approximation" and must be field verified. In some cases, streams are shown in the wrong location or depicted in an area where streams do not exist. Some streams may not be depicted on the map at all.
- Streams digitized by DNR. These streams have been field-verified or received concurrence by a review process. These points are considered the regulatory water type break.

Once a water type modification has been concurred by DNR, the stream and water type is digitized onto the map and assigned a unique identifier (i.e., PC 27-YY-0276, NE-59-14-0074). This identifier refers to the Water Type Modification Form (WTMF) information and the data corresponding to the survey. Streams previously field-verified and represented by an identifier are the regulatory F/N break and no further assessment is necessary (see **Step**[WJ5] **4**). In situations where fish are observed upstream from a previously established F/N break, the stream type will be corrected to reflect new information. The instructions for viewing and downloading Adobe PDF versions of WTMF information can be accessed at:
[CM6]http://file.dnr.wa.gov/publications/fp_form_fpars_wt_data_dic.pdf

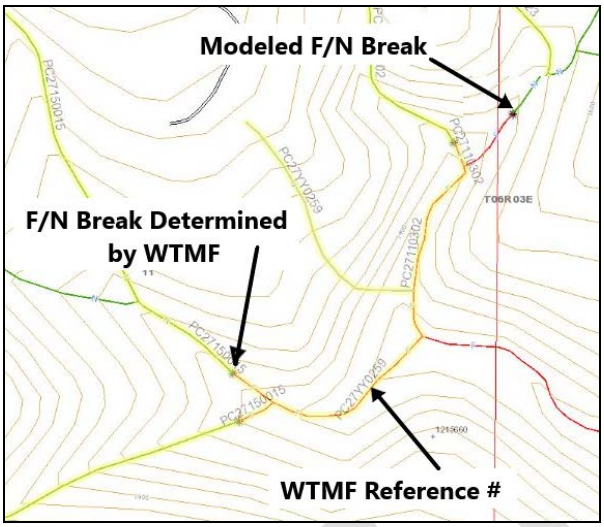

Figure X (placeholder) Water type map showing (a) modeled F/N point, (b) F/N point established through a WTMF and (c) an example of a reference ID.

Where no previous survey and/or concurrence information exists, surveyors should evaluate all available fish data and information (i.e., Salmonscape, SWIFD, SaSi, SSHIAP) for general fish distribution and/or consult with WDFW and tribal biologists. Modeled F/N breaks on the map lacking field verification or concurrence by DNR do not represent the regulatory F/N break. However, these modeled points may be a good starting point to investigate for fish presence and initiate the FHAM.

Step 2. Determine the Starting Point for conducting FHAM on the Ground
In the absence of regulatory Type F/N break, the FHAM will begin at the upstream extent of known fish presence. If fish presence or distribution information is not available, initiate sampling (electrofishing, visual observation, etc.) where you would expect fish to be present based on the modeled F/N break, agency consultation, topography (estimated stream gradient), channel access (road crossings or proximity), etc. and sample until a single fish is detected. If fish are not detected, proceed to a different starting location further downstream to a location where fish are more likely to be present. Once fish presence is verified, proceed to **Step 3**.

Step 3. Using FHAM to Identify and Measure PHBs
From the point of known fish presence determined in **Step 2**, surveyors should proceed upstream without electrofishing, looking for stream features meeting the criteria defining a PHB.

PHBs are identified at a point along a stream reach where one or more of these stream characteristics occur:

- a stream gradient increase of _____
- a bankfull width decrease of _____
- a non-deformable fish passage obstacle where an abrupt step in the stream channel with at least _____ slope and minimum elevation change greater or equal to _____ upstream channel width. [RM(7]

Deformable obstacle features (e.g. log jams, sediment or wood steps, root entanglements, beaver dams, etc.) are transient and or potentially mobile, and do not qualify as PHBs.. If a feature is determined to be deformable, proceed upstream to the next PHB before resuming electrofishing. While deformable features on their own do not qualify as PHBs, some deformable logjams may sit atop more permanent features, such as bedrock cascades. If this is the case, it may be possible to consider the underlying lithology is a PHB.

Once a likely PHB is [RM(8]encountered use the following measuring techniques:

Measuring a Permanent Natural Obstacle PHB
A permanent natural obstacle (cascade, bedrock chute, and/or vertical falls, etc.) PHB requires feature-specific gradient, length/height and width measurements. Non-deformable obstacles can be either vertical or non-vertical features. Measure the feature to see if it meets the qualifying criteria for a PHB.

Vertical Obstacles
A *vertical* obstacle must be equal to or greater than _____ feet high (or _____ minimum, scaled to BFW, but not less than___ feet), to qualify as a PHB. Measure and record the total vertical height of the feature and document its composition (e.g. bedrock or boulder) and characterization (e.g. waterfall). Measure vertical obstacle height at the respective water surface elevation at the top and base of the feature to ensure that vertical height is consistently measured at different stream flows. For dry stream channels, use bankfull width elevation.

Non-Vertical Obstacles
A non-vertical obstacle must be equal to or greater than ___ percent if the elevation increase is equal to or greater than two times the upstream bankfull width, to qualify as a PHB (see table 1). Measure non-vertical obstacle length (slope distance) and gradient at the respective water surface elevation at the top and base of the feature to ensure that elevation change is consistently measured at different stream flows. For dry stream channels, use bankfull width elevation. Gradient measurements taken too far downstream or upstream of the actual feature's inflection point will result in an inaccurate value (see figure X).

[RM(9]		Bankfull Width (ft)																
		2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Channel Gradient (%)	20	10	13	15	18	20	23	25	28	31	33	36	38	41	43	46	48	51
	21	10	12	15	17	19	22	24	27	29	32	34	36	39	41	44	46	49
	22	9	12	14	16	19	21	23	26	28	30	33	35	37	40	42	44	47
	23	9	11	13	16	18	20	22	25	27	29	31	33	36	38	40	42	45
	24	9	11	13	15	17	19	21	24	26	28	30	32	34	36	39	41	43
	25	8	10	12	14	16	19	21	23	25	27	29	31	33	35	37	39	41
	26	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
	27	8	10	12	13	15	17	19	21	23	25	27	29	31	33	35	36	38
	28	7	9	11	13	15	17	19	20	22	24	26	28	30	32	33	35	37
	29	7	9	11	13	14	16	18	20	22	23	25	27	29	31	32	34	36

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	30	7	9	10	12	14	16	17	19	21	23	24	26	28	30	31	33	35
	31	7	8	10	12	14	15	17	19	20	22	24	25	27	29	30	32	34
	32	7	8	10	11	13	15	16	18	20	21	23	25	26	28	30	31	33
	33	6	8	10	11	13	14	16	18	19	21	22	24	26	27	29	30	32
	34	6	8	9	11	12	14	16	17	19	20	22	23	25	26	28	30	31
	35	6	8	9	11	12	14	15	17	18	20	21	23	24	26	27	29	30
	36	6	7	9	10	12	13	15	16	18	19	21	22	24	25	27	28	30
	37	6	7	9	10	12	13	14	16	17	19	20	22	23	24	26	27	29
	38	6	7	8	10	11	13	14	15	17	18	20	21	23	24	25	27	28
	39	6	7	8	10	11	12	14	15	17	18	19	21	22	23	25	26	28
	40	5	7	8	9	11	12	13	15	16	18	19	20	22	23	24	26	27
	41	5	7	8	9	11	12	13	14	16	17	18	20	21	22	24	25	26
	42	5	6	8	9	10	12	13	14	15	17	18	19	21	22	23	25	26
	43	5	6	8	9	10	11	13	14	15	16	18	19	20	22	23	24	25
	44	5	6	7	9	10	11	12	14	15	16	17	19	20	21	22	24	25
	45	5	6	7	9	10	11	12	13	15	16	17	18	19	21	22	23	24
	46	5	6	7	8	10	11	12	13	14	16	17	18	19	20	22	23	24
	47	5	6	7	8	9	11	12	13	14	15	16	18	19	20	21	22	24
	48	5	6	7	8	9	10	12	13	14	15	16	17	18	20	21	22	23
	49	5	6	7	8	9	10	11	12	14	15	16	17	18	19	20	22	23
	50	4	6	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22
	51	4	6	7	8	9	10	11	12	13	14	15	17	18	19	20	21	22
	52	4	5	7	8	9	10	11	12	13	14	15	16	17	18	20	21	22
	53	4	5	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21
	54	4	5	6	7	8	9	11	12	13	14	15	16	17	18	19	20	21
	55	4	5	6	7	8	9	10	11	12	13	15	16	17	18	19	20	21
	56	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	57	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	58	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	59	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	60	4	5	6	7	8	9	10	11	12	13	14	15	16	17	17	18	19

Table 1. Table represents the minimum slope (channel) distance (in feet) required for a non-vertical barrier feature to qualify as a PHB. This table assumes a minimum barrier gradient of 20% and an overall vertical change in channel bed elevation associated with the feature of at least one BFW (barrier option 1).

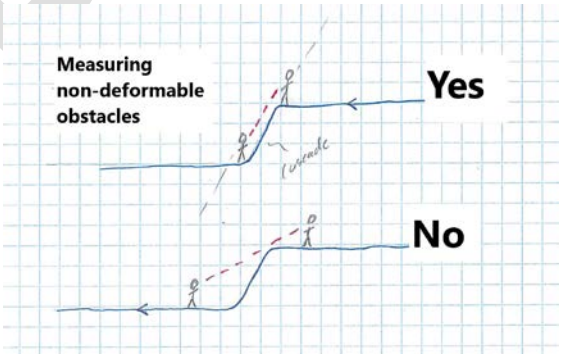

Figure X. (placeholder) Measuring non-vertical obstacles

Look for potential side channels or alternate flow routes around a vertical or non-vertical feature that might allow temporary upstream fish access at higher flows and render the feature passable and therefore, not meeting the obstacle PHB criteria.

Measuring Stream Gradient PHBs

Find the inflection point in the stream and "back-shoot" the profile to obtain the downstream reach gradient. From that same location, shoot the upstream gradient to obtain the effective gradient change (does it meet the PHB metric of [5]% difference for gradient change?). Changes in stream gradient need to be sustained and measured over a distance of 20 times the average bankfull width in both upstream and downstream directions (example 4 feet BFW x 20 = 80-feet of measured distance) to qualify as a gradient based PHB. These distances and gradients are typically measured with a laser level/ rangefinder, clinometer and string box, or other device(s) that can accurately measure gradient and/or distance.

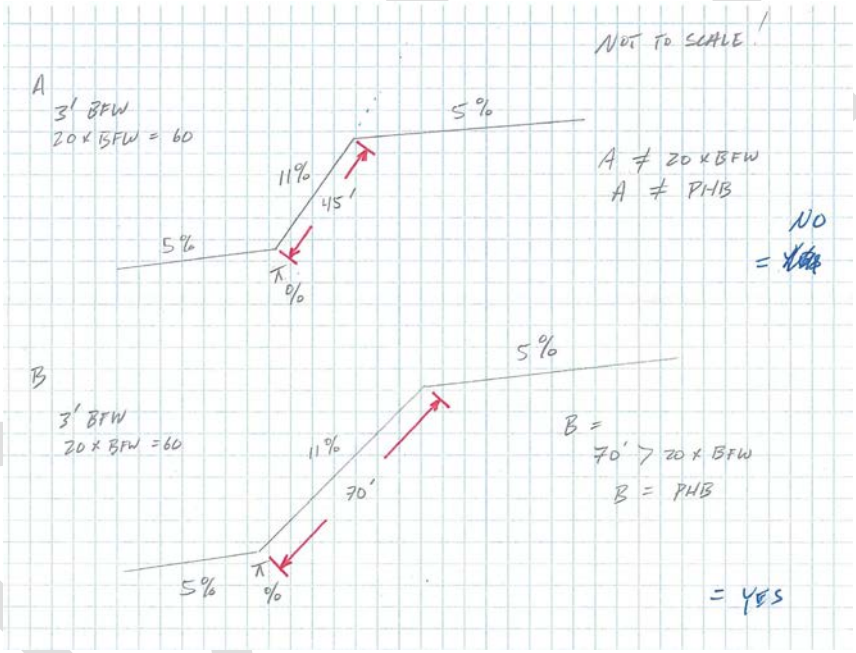

Figure X (placeholder) measuring gradient, 20X BFW

The method for measuring underlying channel gradient through a **deformable** feature uses a different approach than previously discussed for measuring obstacle PHBs. In this case, one should take measurements standing far enough back (i.e., away from) the feature to capture the average underlying channel gradient that would exist in the absence of the deformable portion of the feature. Gradient measurements should be taken from the water surface or BFW elevation above and below the deformable feature at a distance where the underlying gradient is not influenced by the deformable feature.

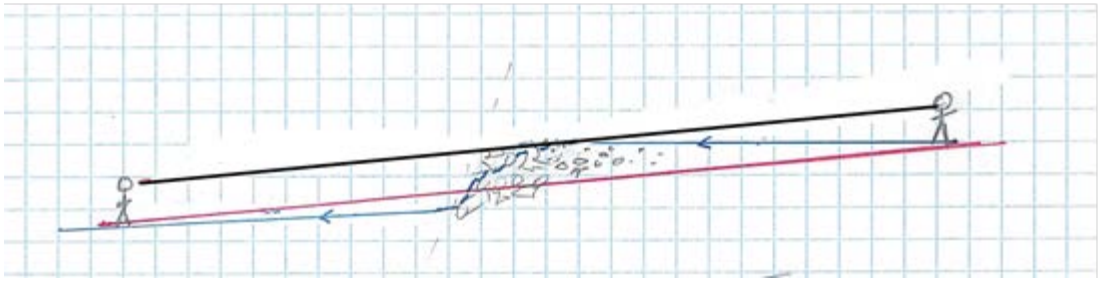

Figure X. (placeholder) Measuring through deformable features

Measuring a Bankfull Width PHB[RM(10)]
Measure bankfull width (BFW) (if tributary junction is encountered) both upstream and downstream in sufficient number of locations (rule-referenced at least 10 evenly spaced?) that best characterize the average reach BFW values with a tape measure or fixed measuring rod Here you must determine over what distance the BFW reduction consistently persists in order to meet the BFW scale reach length requirement. As with gradient segments, changes in BFW should be measured over a distance of 20 times the average bankfull width.

The ability to measure the segment's length and gradient can be affected by channel sinuosity and vegetation. If the channel is not straight or visibility is limited, you will need to take incremental channel measurements of both gradient and distance, and average the gradient change over the total distance to obtain an "accurate" reach gradient that meets the 20XBFW reach distance (example: Ave. BFW of 6 ft. X 20 BFW = 120 ft.).

NEEDS ILLUSTRATION[RM(11)]

Step 4. Using the Fish Habitat Assessment Methodology to Identify the F/N break
Once the first qualifying g, s, o PHB is encountered upstream from known fish presence identified in **Step 2**, apply the protocol electrofishing survey directly upstream from that PHB. The first PHB encountered is not necessarily the F/N break, but rather the starting point for conducting a protocol electrofishing survey. Part 1.3 provides best management practices for conducting electrofishing surveys.

If a fish is detected upstream from the qualifying PHB, discontinue electrofishing and proceed upstream to the next qualifying PHB. The stream reach between the location of that detected fish and the next qualifying PHB encountered upstream is presumed fish habitat. Repeat this process until fish are no longer detected upstream of a PHB.

If fish are not detected upstream from a qualifying PHB when conducting a protocol electrofishing survey, the first PHB upstream of the last detected fish is the F/N break. However, the protocol electrofishing survey must continue:

- for a minimum of a 1/4 mile beyond this PHB or to the next upstream PHB whichever distance is greater, or
- to the point where the stream no longer meets default physical stream criteria (WAC 222-16-030), and those channel characteristic are sustained.

Alternatively, if fish are detected in a stream reach that exceeds default physical stream criteria are sustained, electrofishing efforts are complete.

[RM(12]

The F/N break will be located at the PHB directly downstream of the reach where no fish were detected. Additional surveying may be necessary to determine fish absence depending on unique stream habitat conditions, larger stream sizes or substantial stream reaches above natural barriers. Establish the F/N break per the process outlined in **Step 4**

In order to maximize the potential for detecting fish, protocol electrofishing surveying efforts should include sampling all habitat types including glides, riffles, runs, undercut banks, and pools or anywhere fish can hold or hide. Documentation of stream characteristics is important to demonstrate the survey efforts attempted to capture all potential habitat within the stream segment.

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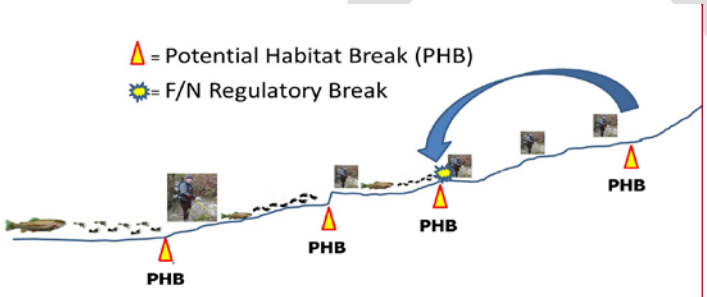

[RM(13]

Figure X (placeholder) Establishing the F/N Break

Step 5: Documenting the F/N Break in the Field[RM(14]

Monument the location where the Type F/N break is proposed and ensure the location is recorded. Accurate data collection and stream condition descriptions on the WTMF will describe whether the FHAM is conducted and will assist reviewers when evaluating the proposed break.

The documentation of the proposed F/N break should include a description of the identified PHB feature, GPS reference points and pertinent photographs to scale where possible. Photographs can aid reviewers in locating the proposed F/N break. The description of the F/N break location must be sufficient to ensure the point can be re-established on the ground in the event that the monument is lost. Weather resistant material (e.g. plastic or aluminum placards, etc.) is sufficient to remain through multiple years.

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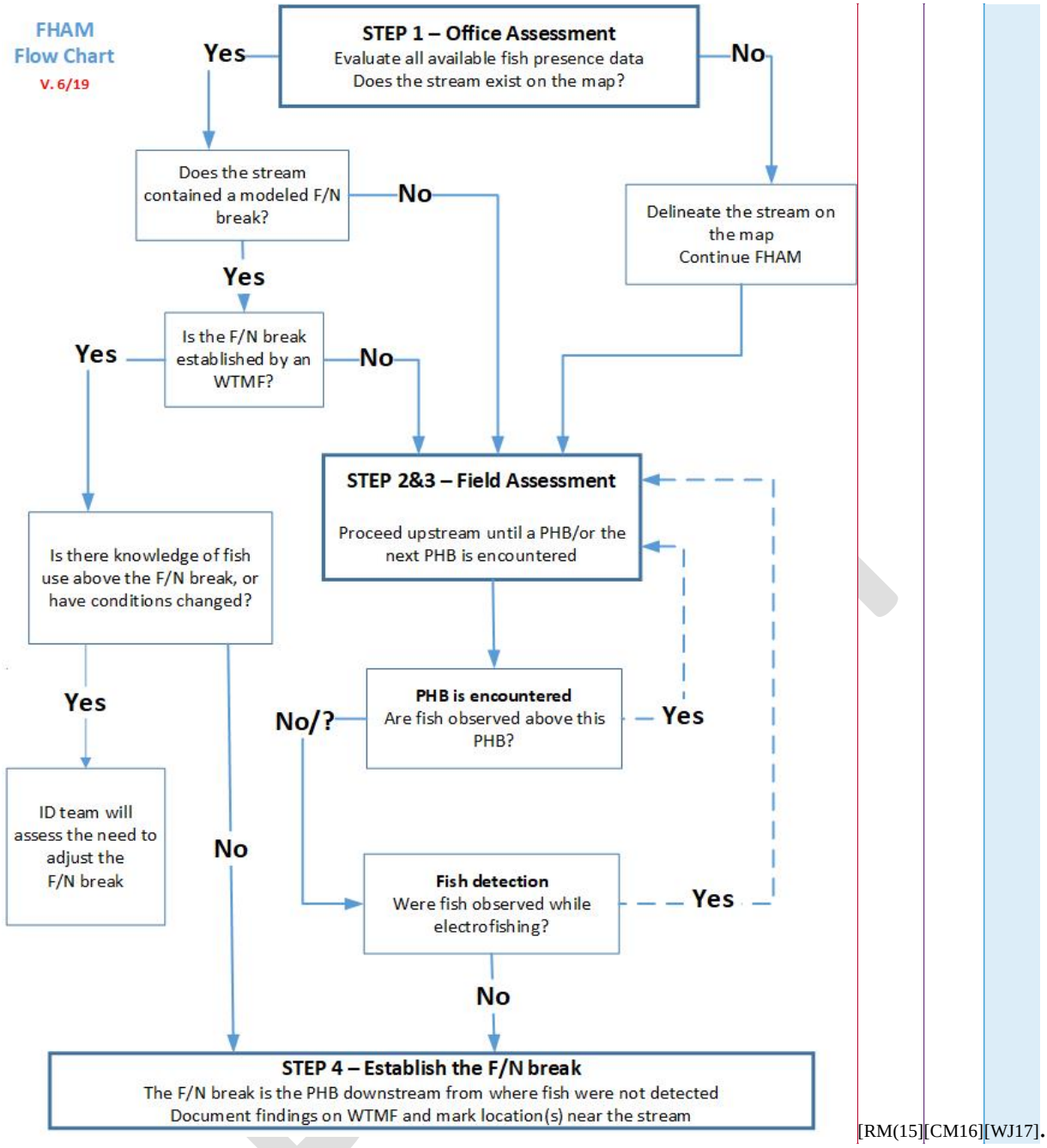


[RM(15)][CM16][WJ17].

Best management practices[RM(18]

~~1.4 Conducting Protocol Electrofishing Surveys~~

~~This guidance is provided for conducting protocol electrofishing surveying using backpack electrofishing equipment upstream of a potential habitat break (PHB) in conjunction with the fish habitat assessment methodology once fish presence has been confirmed.. The survey will determine whether fish are present in the stream segment upstream from the closest PHB from where fish are known to reside.. Careful attention to electrofishing techniques minimizes the risks to individual fish and increases the probability of fish detection in streams being sampled. Accurately documenting the stream's physical and habitat characteristics and ensuring the information on the WTMF is complete will aid the water type team's review and increase the likelihood of concurrence with survey result~~s.

State and Federal Permits

Washington Department of Fish and Wildlife (WDFW) regulations require surveyors obtain a current Scientific Collection Permit (WAC 220-200-150). To ensure the safe capture and handling of fish and wildlife, WDFW requires permit applicants and anyone conducting activities under the permit (sub-permittees) provide a statement of their qualifications and experience with conducting surveys. It is the responsibility of surveyors and trained staff to follow the requirements contained in the permit. Information on WDFW Scientific Collection Permit program can be found at http://wdfw.wa.gov/licensing/scp/.

~~An appropriate federal permit may be necessary for electrofishing in waters containing or may have historically contained ESA-listed species.~~ For proposed surveys and studies that have the potential to affect ESA-listed species, contact the National Marine Fisheries Service at: https://apps.nmfs.noaa.gov/index.cfm.

Surveyor Qualifications[RM(19] ***(***to be developed when standards are established and implementable***)***

Consultation[RM(20]

Resource professionals from DNR, WDFW or tribal biologists may have local knowledge regarding fish presence and potential habitat. Consultation can help determine appropriate survey efforts or survey timing and maximize efficiency in the review and approval process. Consultation is needed under the following situations:

- Where streams show recent channel disturbances (debris flows, fire events)
- When unfamiliar with the stream system or the life history of targeted fish species
- Prior to conducting a protocol electrofishing survey above a artifical barrier or where an artificial barrier has been replaced with fish passage structures and recolonization [RM(21]of fish is unknown.
- To determine appropriate survey timing for anticipating when fish will be seasonally active/present ~~or where man-made barriers have been replaced with fish passage structures and recolonization of fish is unknown~~
- Prior to conducting a survey during a DNR declared drought.

Part 1.3 Electrofishing Survey Best Management Practices

This guidance is provided for conducting protocol electrofishing surveying using backpack electrofishing equipment in conjunction with the fish habitat assessment methodology (FHAM). The survey will determine whether fish are present in the stream segment upstream from the closest potential habitat break (PHB) from where fish are known to reside. Careful attention to electrofishing techniques minimizes the risks to individual fish and increases the probability of fish detection in streams being sampled. Accurately documenting the stream's physical and habitat characteristics and ensuring the information on the water type modification form (WTMF) is complete will aid the water type team's review and increase the likelihood of concurrence with survey result

Stream Reconnaissance Prior to Electrofishing

Visual methods such as walking the stream bank, snorkeling, or using power bait may help determine fish presence and reduce the need for some electrofishing. Initial reconnaissance will detect if ponds or off-channel habitats exist within the targeted stream reach.

Under the right conditions, direct observation can be achieved with practice and improved using polarized glasses. Visual detection in small streams can be especially difficult when fish populations are small, the water is turbulent or turbid or vegetation cover is thick. For bottom-dwelling species such as sculpins or lampreys typically found in upper reaches in western Washington, visual observations may be virtually impossible.

While visual observation is an acceptable method to document fish presence, it is not acceptable for documenting fish absence (i.e., concluding that fish are not present when in fact they are). Providing evidence that supports the absence of fish upstream from a PHB must be supported by a protocol electrofishing survey.

Surveying in [RM(22)]***l***[RM(23]***arger streams***[JG24][CM25]

The electrofishing protocol in this manual was developed primarily for small size streams. Larger streams may have a higher expectation or presumption of fish use. Larger streams [CM26]have a larger cross-sectional area and typically deeper water column that may require more electrofishing effort in order to increase the probability of detection[WJ27].

Surveyors who wish to survey for fish in larger streams should consult with WDFW area habitat biologists and affected tribes prior to conducting the survey. The purpose of this consultation is to preview survey plans with water type review team members and cooperatively determine if there are parts of the plans that should be modified to improve both the survey quality and likelihood of concurrence.

Electrofishing Survey Timing

Survey information to determine fish occupancy must be collected during the time when the fish species in question are likely to be present. The spring period through early summer when (trout?) fry are most likely to have emerged from the gravels and moved to rearing areas is typically the most appropriate time. Surveys performed too early will miss post-emergence distribution; those performed too late may underestimate distribution as wetted headwaters

recede in late spring and early summer. Abnormally dry periods, or conversely, flood events may also alter the extent fish occupy their habitat or access adjacent habitat and low and high flow conditions can alter fish distribution.

- *Low flow considerations*: Periods of low flow can be an effective time to conduct an electrofishing surveys due to there being more fish per unit channel area and clear water conditions. However, in cases of extreme low flow conditions, survey efforts may be compromised when stream depth is too shallow for full electrode submersion, water temperatures are too high or when seasonally occupied reaches are dry. In these cases, the loss or lack of flow can reduce or eliminate the opportunity to detect fish and thereby impair survey effectiveness.
- *High flow considerations*: High flow conditions are generally not an optimal time to conduct surveys. Furthermore, there is a high flow threshold where surveys should not be conducted due to potentially difficult (and unsafe) sampling conditions resulting from increased water volume and depth, higher stream velocity, higher stream turbidity and/or reduced fish response to the electrical field. These conditions may result in reduced likelihood of detecting fish, which could result in "false negatives" (e.g., the inability to detect fish when in fact they are present).

In most cases and under normal weather patterns, survey periods extend from March 1 to July 15 when water is most likely to be present in the channel. However, depending upon the stream's late winter and spring water temperatures and species present, fry may not be out of the gravel in March [NDC(28)or April. To account for the complexities in anticipating when fish are most likely to be seasonally active, deviations from the March 1 to July 15 should occur with consultation with DNR, WDFW and local tribal biologists.

Dry Stream Reaches

Seasonal weather patterns can create situations where normal flow patterns are disrupted and subsurface flow can be affected by different lithology or local hydrology. Additionally, some stream reaches that are dry during the survey provide important habitat during fall and winter and spring seasons. In these cases late June and July may be too late to conduct a protocol survey due to lack of flowing water[NDC(29)].

Assessing fish habitat is necessary regardless of the persistence of flowing water. The absence of flowing water alone is not an indicator of a habitat break and will not solely be used to justify the F/N break. Stream reaches upstream from intermittent flow that meet the default physical stream criteria of presumed fish habitat should be assessed for isolated fish populations and fish habitat[RM(30)]. Dry reaches and associated laterals tributaries will be assumed habitat upstream until the channel no longer meets the default physical criteria for presumed fish habitat or dry segments can be resurveyed during sufficient flow[WJ31][NDC(32)][r33]

Declared Drought Conditions

At the beginning of each calendar year, DNR, in consultation with the WDFW, provides information forecasting statewide water abundance for the coming survey season. This information is provided to focus appropriate attention during potential drought conditions.

If drought conditions exist within the state or portions thereof during the fish survey season, proponents of a water type change are required to provide information explaining how stream flows and fish use determinations were unaffected by drought conditions. The proponent should supply the rationale on why the proposed F/N break is appropriate given stream flow conditions at time of survey. If such information is not provided, or not deemed adequate during the review process, then the proposed water type change may not receive concurrence. The following will help ensure survey results are accepted during declared drought seasons:

- Before conducting a survey in low-flow affected areas, it is important to check the status of the specific basins using the links in Appendix C.
- Electrofishing survey results are less likely to receive concurrence unless the WTMF documents how the distribution of fish or the ability for the survey to detect fish was not affected by drought. Drought-influenced surveys may not represent the upstream extent of fish use as fish distribution retracts lower in the stream system than under normal flows, potentially resulting in under-representation of Type F waters.

The default physical stream criteria for Type F (see WAC 222-16-030) can be applied to stream segments during declared drought conditions.

Electrofishing Surveys above Artificial Barriers

Artificial fish passage barriers[1], such as impassable culverts, can preclude fish access to upstream reaches and limit the distribution of fish. In situations where the presence of an artificial barrier influences fish abundance and/or species composition above the barrier, and where this influence could potentially influence the upstream distribution of fish, electrofishing surveys are[WJ34] not appropriate. The presence of an artificial barrier alone is not sufficient to establish the F/N break.

Where habitat conditions and fish composition and abundance are similar between stream reaches upstream and downstream from a barrier, electrofishing surveys may be useful upstream of an artificial barriers. The applicability of electrofishing surveys upstream of barriers determined by the status of the fish populations in the reach upstream from the barrier relative to the population downstream[CM35]. Examples include when barriers are located several miles downstream from the survey reach fish population(s) or when permanent natural barriers exist ~~above a man-made barrier and~~ below the proposed survey reach.

Above artificial barriers, default physical stream characteristics (WAC 222-16-030) are used to determine the presumption of fish use unless otherwise approved by DNR in consultation with the WDFW and affected tribes. Consultation will address necessary information and review expectations prior to the survey. The WTMF must provide habitat and fish population conditions above and below the barrier for concurrence consideration.

Electrofishing Survey Effort upstream from a Potential Habitat Break

Protocol electrofishing efforts must include sampling all accessible habitat up stream of a PHB including glides, riffles, runs, and pools in order to capture where fish can hold or hide.

[1] A fish passage barrier means any artificial in-stream structure that impedes the free passage of fish, WAC 222-16-010.

Documentation of stream characteristics is important to demonstrate the survey efforts attempted to investigate all habitat within the stream segment.

The electrofishing survey must continue for a minimum of a 1/4 mile, or to the next PHB whichever is greater. If fish are not detected within 1/4 mile or by the next upstream PHB, the F/N break will be located at the PHB directly downstream of the reach where the electrofishing survey was conducted. Alternatively, if the stream no longer meets the default physical stream criteria (see WAC 222-16-030) and the channel conditions are sustained, and if fish have not been detected since the last PHB, electrofishing efforts are complete[NDC(36]. The F/N break will be located at the PHB directly downstream of the reach where no fish were detected. Additional surveying may be necessary to determine fish absence depending on unique stream habitat conditions, larger stream sizes or substantial stream reaches above natural barriers[WJ37][r38].[RM(39]

Surveying in Streams with Recent Disturbances

Fish presence and distribution can be affected by stream disturbances such as mass wasting events, channel scouring by debris flows, or fire. Fish populations may be locally or temporarily extirpated from stream channels after an event and it may take years before recovery from disturbances begins.

Where recent disturbances have the potential to affect the ability to detect fish or determine the appropriate F/N break, default physical stream criteria (222-16-030) can be used for determining the upper extent of fish habitat. Water type proponents may also request an interdisciplinary team review for determining the appropriate survey protocol. In some cases, stream channel disturbances will not be known until ~~a stream assessment~~the FHAM has begun. If a proponent chooses to conduct FHAM for such streams, ~~D~~documentation on the WTMF should include:

- A description of the disturbance, including length of stream affected, how the potential habitat has been modified (aggradation, subsurface flows, isolated pools, loss of gravel, increased sediment, scouring to bedrock, etc.)
- How the disturbance factors might affect survey results (utility)
- How the disturbance factors might affect the upstream extent of fish distribution or habitat in the stream reach. Describe the density and/or condition of fish populations downstream of the disturbance, temporary barriers present (exposed bedrock features, temporary wood jams or subsurface flows, etc.), loss of spawning gravels or buried pools
- Documentation on how the proposed F/N break encompasses the full extent of potential or recoverable fish habitat[WJ40][NDC(41].

Surveying in Lentic Habitat[RM(42]

Lentic habitat including ponds, lakes, and wetlands can exist in the upper reaches of streams that provide refuge and rearing areas for fish populations. Surveyors should attempt to locate such features and other potential habitats during field reconnaissance[WJ43]. The presence of fish at these locations, or in other upstream reaches indicates downstream fish use. Additionally, electrofishing surveys are not applicable [r44]in off-channel habitats[WJ45] and[NDC(46] under the current rule, ponds larger than a half-acre are considered Type F water.

Determining fish use in water bodies such as ponds and wetlands can be difficult. While electrofishing surveys can be effective under some circumstances (small, shallow ponds or larger

pools with good water clarity) electrofishing surveys in larger water bodies is not an acceptable method for documenting fish absence. Pre-consultation can increase confidence that the survey results will be accepted.

Other sampling methods such as minnow trapping, seining, snorkeling, gillnetting, hook and line sampling, environmental DNA, or a combination of sampling techniques are likely to be more appropriate for fish detection in ponds and wetlands. However, there is no single sampling methodology that is appropriate for all lentic environments and survey techniques must be determined on a case-by-case basis in consultation with WDFW area habitat biologists or local tribal staff for proper survey techniques.

Additional Best Management Practices

Careful attention to electrofishing survey techniques minimizes risks to individual fish and increases the effectiveness of the survey. Carrying out effective surveys using techniques that result in low risk to fish populations and high probability of detection requires careful adherence to the protocols listed in Board Manual guidance. In addition, specific elements of NOAA electrofishing guidelines for ESA-listed fish and WDFW Scientific Collection Permit conditions should be followed. The following surveying techniques will help improve the effectiveness of the survey effort:[RM(47]

- Work in an upstream direction from the initial PHB while minimizing walking in the stream channel[NDC(48][WJ49].[r50]
- If fish are detected upstream of a PHB, caution should be exercised to avoid potential impacts to small isolated populations[NDC(51].
- Sample all accessible habitat (riffles, pools, banks with draped vegetation or undercut, etc.) wherever fish (not just salmonids) can hold or hide.
- In debris jams, undercut banks or around instream structures, insert the uncharged anode into the debris or undercut bank, depress the electrofisher switch and slowly move the anode into open water. Fish will often be pulled from the cover for observation.
- In deep water pools, fish can be difficult to detect. Chase fish into shallow water by sweeping the charged anode across the channel while moving it up and down in the water column in a downstream direction. Fast water can be best sampled by moving the anode downstream at approximately the same velocity the water is flowing.
- Position netters appropriately downstream (usually within about three feet below the anode) for observing fish and minimizing fish egress.
- Except for deep water pools and runs, the anode should be submerged at all times and held just below the water surface to help draw the attracted fish to the anode.
- Surveyors should be cognizant of the cathode at all times to ensure it is submerged and in the proper location relative to the anode to create an effective electrical field.
- If the stream splits into separate channels, each channel needs be individually surveyed.
- Include at least one person operating the electrofisher and at least one downstream netter. Larger streams may require more than one netter.

PART 2. IDENTIFY AND LOCATE THE DIVISION BETWEEN TYPE NP AND NS WATERS (*under development*)

PART 3. IDENTIFYING OFF-CHANNEL HABITAT[RM(52]

Off-channel habitats are side channels, wall-based channels, riverine and floodplain ponds, swales, and other aquatic features that are used by fish, and include periodically inundated areas of associated wetlands of Type S (Shorelines of the State) and F (fish habitat) waters. Off-channel habitat must be connected to a Type S or Type F water and accessible to fish at some time of the year. OCH provides areas of productivity, refuge from predators and peak flows and rearing areas to fish in streams of all sizes.

Riparian management zones for Type S and F waters begins at the outer edge of the bankfull width, the outer edge of a channel migration zone, or the external extent of off-channel habitat. The edge of the off-channel habitat is determined by the following:[RM(53]

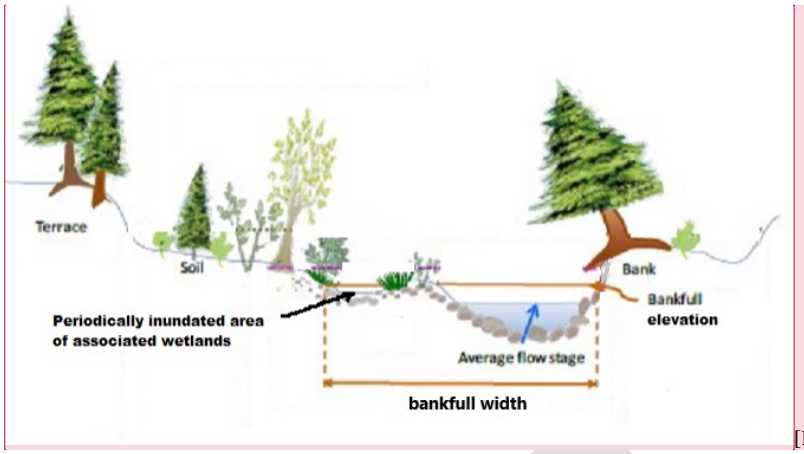
- For waters where bankfull width can be identified: the edge of off-channel habitat is established by the bankfull elevation and includes those aquatic features on the floodplain that are below bankfull elevation that are accessible to fish[NDC(54];

- For waters where bankfull width cannot be identified: The edge of off-channel habitat is established by the ordinary high water elevation, which includes those portions of wetlands and other aquatic features periodically inundated at the ordinary high water line.

Prior to identifying off-channel habitat for Type S or F waters, determine whether channel migration is present. Use Board Manual Section *2 Standard Methods for Identifying Bankfull Channel Features and Channel Migration Zones*, Part 2 Channel Migration Zones to make this determination. If channel migration is present, follow guidance under Part 2.3 to delineate the channel migration zone. However, off-channel habitat can extend beyond the edge of a channel migration zone and side tributaries or wetlands must be investigated to verify the connectivity to the main channel If channel migration is not present, follow the guidance below to identify the edge of off-channel habitat:

Identifying Off-Channel Habitat where Bankfull Width can be Identified[RM(55]

Board Manual Section 2, Part 1.2 provides guidance on how to identify bankfull width and bankfull depth. The bankfull width of a stream at various points along its course must be determined in order to establish the bankfull elevation for a particular stream reach.



[RM(56]

Figure X. Waters where bankfull width can be identified

Once bankfull elevation has been established, a determination of whether or not off-channel habitat is present can be made. Where bankfull width is identified, off-channel habitat equates to those areas outside the bankfull channel at or below the bankfull elevation. Off-channel habitat is accessible to fish at bankfull flow.

Using this standard, measuring the full extent of off-channel habitat begins by establishing the correct bankfull elevation of the associated stream. Streams that are confined or channelized will contain a bank or edge which typically corresponds to a flow that fills the natural channel to the top of its banks and at a point where the water begins to overflow onto the active floodplain (3). Under normal conditions, this consistent morphological indicator is the appropriate point to use for determining bankfull elevations and for determining if an area is accessible during bankfull flows. Therefore, any feature at or below bankfull elevation is assumed to be accessible to fish.

Bankfull elevation can be projected laterally (perpendicular to the stream) using a simple forestry tool (such as a clinometer, compass with clinometer, relaskop) set at the 0 degree or percent (flat) scale, utilizing a range pole or temporary target, for foresight or backsight to the initial bankfull elevation point. Regardless the tool, begin by establishing the bankfull elevation from the bank with the known edge. The goal is to project the water elevation at bankfull flow to an opposite bank or feature at the same elevation.

Multiple bankfull elevations may need to be taken along a pertinent stream reach within a harvest unit in order ascertain the presence or absence of off-channel habitat along channelized streams.

Identifying Off-Channel Habitat where Bankfull Width cannot be Identified

Under the Forest Practices rules, ordinary high water line (OHWL) means the mark on the shores of all waters, which will be found by examining the beds and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation.[RM(57]

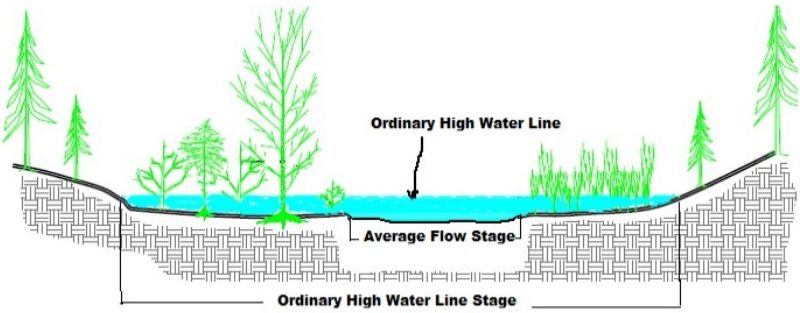


Figure X. Waters where bankfull width cannot be identified

For waters where bankfull width cannot be identified, off-channel habitat equates to those areas that are at or below the elevation of the ordinary high water line. This includes the portions of stream associated wetlands periodically inundated at the ordinary high water level. Although OHWL is generally used to define regulatory shoreline boundaries, the same indicators for identifying high water levels can be used to establish the boundary of fish habitat in smaller drainage systems and wetland areas.

The identification of OHWL should correspond with physical features that occur with regularity of the high water mark. The OHWL can be identified by physical scarring along the bank or shore and the action of water so common that it leaves a natural line impressed on the bank. OHWL and wetland delineation are similar in that both rely on the presence of water for determining the characteristics of the upland vegetation (4).

Where a 'line' is not visible on solid objects, soil characteristics or seasonal vegetation may make identifying the precise high water level difficult. Several locations and indicators should be observed to ascertain the approximate location. In some places the OHWL can be observed as a narrow zone and it other places it can be a gradual change from season to season. This line may be indicated by erosion, benching, change in soil characteristics, lack of terrestrial vegetation (or many cases bare areas with evidence of ponding and no vegetation), or the presence of flow-soured vegetation litter or woody debris.[RM(58] The assessment should rely on current observations, past physical characteristics and professional judgement.

Physical indicators for interpreting the OHWL may include:

- Areas on the floodplain devoid of vegetation indicating frequent ponding
- Deposited litter and debris accumulated after recent flow events may indicate the spatial extent of high water.
- Water staining or discoloration on solid objects such as rocks indicate recent or prolonged water levels
- Leaf litter or pine needles removed or disturbed can show where recent flows have transported material
- Abandoned pollen rings or algae staining can provide indicators where high water levels occurred particularly after spring runoff

- Change in plant community transitioning from hydrophytic vegetation (reed grasses, sedges, rushes) to terrestrial vegetation (sword fern, salal)

No single indicator necessarily proves an exact elevation, but a combination of several indicators can help locate where high water levels typically reside[NDC(59)][r60].

References

1 - Lichvar, R.W., S McColley. 2008. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual. ERDC/CRREL TR-08-12. Hanover, NH: U.S. Army Engineer

2 - Lichvar, R.W., and J.S. Wakeley, ed. 2004. Review of Ordinary High Water Mark indicators for delineating arid streams in the southwestern United States. ERDC/CRREL TR-04-1. Hanover, NH: U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.

3 - Rosgen, D. 1996. Applied river morphology. Pagosa Springs, CO: Wildland Hydrology.

4 - Olson, P. and E. Stockdale. 2010. Determining the Ordinary High Water Mark on Streams in Washington State. Second Review Draft. Washington State Department of Ecology, Shorelands & Environmental Assistance Program, Lacey, WA. Ecology Publication # 08-06-001.

Cole 2006 was referenced in the e-fish report – which one used for single visit???
Cole, M.B. and J.L. Lempke. 2006. Annual and seasonal variability in the upper limit of fish distribution in Eastern Washington streams. Final report. Prepared for Washington DNR.

Cole, M.B., D.M. Price, and B.R. Fransen. 2006. Change in the upper extent of fish distribution in Eastern Washington streams between 2001 and 2002. Transactions of the American Fisheries Society. 135:634-642.

Appendix A - Fish Data Information

Provide short intro…..

- Kalispel Tribe's Geo-Spatial Database Management System. A comprehensive database for Kalispel Tribal natural resources data (wildlife, fisheries, habitat, forestry). Contains additional data from WDFW, Colville Tribes, and Spokane Tribe on fish and water quality for tributaries and lakes in the upper Columbia River blocked area in Washington (area above Chief Joseph Dam). http://gis.knrd.org/knrdgisviewer/

- Pacific States Marine Fisheries Commission provides coastal cutthroat trout interactive maps as a range-wide assessment on coastal cutthroat trout observations, data and distribution compiled to date. http://www.coastalcutthroattrout.org/sample-page/cct-interactive-map

- Salmon and Steelhead Habitat Inventory and Assessment Program (SSHIAP): Another joint western Washington Treaty Tribes and WDFW effort that complements both SaSI and SWIFD to provide regional, watershed and stock-level habitat information for comparisons of habitat conditions that is especially useful for prioritizing salmon recovery activities. https://nwifc.org/about-us/habitat/sshiap/

- Salmonscape: A WDFW interactive map providing statewide distribution, stock status, habitats and recovery evaluations for steelhead, bull trout and all individual salmon species. http://apps.wdfw.wa.gov/salmonscape/

- Salmonid Stock Inventory (SaSI) A joint tribal and WDFW collection of documents that include the original 1992 stock inventory for salmon and steelhead along with updated descriptions of life history, stock identification and stock status (by WRIA) for bull trout/Dolly Varden, coastal cutthroat trout and all salmon species. https://wdfw.wa.gov/conservation/fisheries/sasi/

- Statewide Integrated Fish Distribution (SWIFD) is a Northwest Indian Fishery Commission web map that provides a general fish distribution layer for western Washington that is associated with the DNR Water Typing Hydro layer. https://geo.nwifc.org/SWIFD/

- Washington State Department of Fish and Wildlife fish passage barrier maps: A centralized WDFW map application that identifies artifical barriers where a fish passage inventory has been conducted. https://wdfw.wa.gov/conservation/habitat/fish_passage/data_maps.html

- Washington State Department of Fish and Wildlife contact information: Web site providing contact information for WDFW district and area biologists. https://wdfw.wa.gov/about/contact/district_biologists.html

- Wild Fish Conservancy state-funded water type assessment results including georeferenced photos, habitat, and fish data. http://wildfishconservancy.org/resources/publications/wild-fish-runs/introducing-wfcs-barrier-prioritization-mapping-system[JG61]

Appendix B – Road Crossing Information

- Washington State Department of Fish and Wildlife Fish Passage Map – a centralized database of fish passage and habitat information statewide. https://wdfw.wa.gov/conservation/habitat/fish_passage/data_maps.html

- Washington State Department of Transportation fish passage inventory – an interactive map provides data for corrected and uncorrected barriers statewide. http://www.wsdot.wa.gov/Projects/FishPassage/default.htm

- Department of Natural Resources Forest Practices Activity Mapping Tool – an interactive map showing fish barrier status based on Road Maintenance and Abandonment Plans. https://www.dnr.wa.gov/programs-and-services/forest-practices/forest-practices-application-review-system-fpars

Appendix C – Drought and Stream Flow Information

Interested parties can find details regarding drought effects in specific basins by reviewing the following water supply forecast and stream flow resources:

- The Natural Resource Conservation Service, current Water Supply Outlook Report. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/wa/snow/waterproducts/

- The United States Geologic Survey (USGS) provides water data and streamflow information on Washington's rivers. While most stream gauges are located on major rivers, the information for the appropriate basin could provide insight into the status of tributary streams. https://www.usgs.gov/centers/wa-water

- For current drought status as well as information about the state drought declaration process, review Ecology's 2016 drought web site at: http://www.ecy.wa.gov/drought/index.html

- National Oceanic and Atmospheric Administration (NOAA) Northwest River Forecast provides flood forecasting and stream flow information for selected basins. The Northwest River Forecast Center "Ensemble Streamflow Prediction (ESP) Water Supply Forecast as Percent of Average". http://www.nwrfc.noaa.gov/ws/