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May 18, 2016

MEMORANDUM

TO: Hans Berge, Adaptive Management Program Administrator

FROM: Karen Terwilleger, TFW Policy Lead
Industrial Landowner Caucus

SUBJECT: Proposal Initiation: Evaluating Physical Default Characteristics

The Industrial Landowner Caucus requests that the following tasks be evaluated by the Adaptive Management Program Administrator to develop a proposal review packet for Policy's review and approval. The packet shall include a summary of the proposal, recommendations of proposed tracks for adaptive management program development and proposed timeline for completion.

- **Phase #1. Review the history of the default physicals including the original designed use(s). Determine how the default physicals may be used in the application of a new permanent water typing rule.**
 - Review and summarize original data used to develop the 1996 Emergency Rule default physical characteristics.
 - Clarify what the default physicals were developed to predict (fish presence, fish use, fish habitat).
 - Document the history of the 1996 defaults.
 - How are the default physicals being used in the current process? Are all criteria being used, including default basin size?

- **Phase #2. Identify and summarize additional data that can be used to assess the accuracy of the current physical defaults for determining presumed fish use.**
 - What degree of uncertainty exists about whether the current default physical criteria accurately reflect presumed fish use for all regions? For all stream morphologies?
 - Can the overall precision and accuracy of current default physical criteria be determined? If so, what resources and funding would be needed?
 - Can currently available data be used for assessing accuracy and precision such as:
 - WTMF channel width, gradient, and default basin size data to determine proportion of Type F/N breaks accurately estimated by current defaults.
 - Data collected by stakeholders specifically to evaluate the current default criteria.

- **Data collected by other scientists or investigators relevant to evaluating the current default criteria.**
 - **ISAG data used for habitat model development and validation.**
 - **Other data characterizing habitats used by fish and not used by fish.**
- **Phase #3. Determine if default physical criteria can be refined to minimize error.**
 - **Can additional criteria be added to channel width, gradient and basin size to minimize error (e.g., stream morphology type, region-specific geomorphology, etc.?) Or can the existing criteria be adjusted to improve accuracy?**
 - **Review results of Pilot Water Typing Model, when completed, to determine the need for physicals.**
 - **Are there other alternatives for determining a presumption of fish use, including the fish habitat model, the fish habitat model using LiDAR, modified physical defaults, snorkeling, trapping, eDNA, and lentic sampling techniques?**
 - **If so, characterize precision and accuracy of alternatives.**
 - **Is additional research and/or field monitoring needed to fill in important scientific gaps and/or areas of uncertainty, particularly those uncertainties related to regional variations?**
 - **Identify possible short-term and long-term approaches for developing physical criteria for the presumption of fish use that minimize error and are implementable and enforceable.**

1. *The affected forest practices rule, guidance, or DNR product.*

[WAC 222-16-031](#), “Interim Water Typing system”
[Forest Practices Board Manual Section 13](#), “Guidelines for Determining Fish Use for the Purpose of Typing Waters”

2. *The urgency based on scientific uncertainty and resource risk.*

Addressing Type F and the permanent water typing rule is currently the number one priority established by the Board for TFW Policy. In August 2015, the Board directed TFW Policy Committee to “accept the Type F matrix as the framework to complete the evaluation of all components needed to establish a permanent water typing rule, as well as to establish any needed guidance and training.¹ The Board directed the TFW Policy co-chairs to facilitate implementation of the matrix to get to a permanent rule, guidance and/or training.” According to the same motion, the Board “generally expects TFW Policy Committee to:

- use the existing information,
- develop a method for addressing streams not on the hydro layer,
- make methods as accurate as possible,
- balance error,
- minimize electrofishing,
- improve map over time,
- develop methods to locate the stream break points on the ground, and
- ensure the methods address small forest landowners.“

¹ Forest Practices Board Motion on TFW Policy Direction on Water Typing, Adopted August 11, 2015.

FFR performance goals for the water typing system were described in relationship to a fish habitat model as designed to achieve a level of statistical accuracy of 95% in separating fish habitat streams and non-fish habitat streams; and that the demarcation of fish and nonfish habitat waters would be equally likely to over and under estimate the presence of fish habitat.² These measures were further memorialized in the FPHCP as:

Functional objective (stream typing): Type “fish habitat” streams to include habitat which is 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 including off-channel habitat, by using a multi-parameter, field-verified, peer reviewed, GIS logistic regression model using geomorphic parameters such as basin size, gradient, elevation and other indicators.

Performance Target (stream typing): Fish habitat model: statistical accuracy of +/- 5%, with line between fish and non-fish habitat waters equally likely to be over and under inclusive.³

Three key metrics are integral to achieving this objective and target: the system must be highly accurate, minimize error and share remaining uncertainty. Significant uncertainty exists as to how the current physical defaults meet this objective and target, particularly on a regional basis.

The current water typing rule, WAC 222-16-031, allows utilization of protocol survey or default physical criteria to determine the regulatory fish/nonfish break. TFW Policy is currently reviewing science and technical questions related to protocol survey. A pilot project related to revising the fish habitat model is also proceeding. A comprehensive review of the water typing system as outlined by the Board also requires review of the default physical criteria. Development of a new permanent rule necessitates an assessment of the role of alternative methods for delineating the fish/non fish regulatory break and comparison of how these alternatives meet the water typing functional objectives and performance targets (highly accurate, minimize error, share remaining uncertainty). This comparison will also inform the required economic analysis for a proposed new permanent water typing rule and the subsequent comparison with previously determined economic impact.

RCW 76.09.370(6) requires that forest practices rule changes may only be adopted “if the changes or new rules are consistent with recommendations resulting from the scientifically based adaptive management process established by a rule of the board. Any new rules or changes under this subsection need not be based upon the recommendations of the adaptive management process if: (a) The board is required to adopt or modify rules by the final order of any court having jurisdiction thereof; or (b) future state legislation directs the board to adopt or modify the rules.”

² Forests and Fish Report, February 22, 1999, p. 18-19.

³ Final Forests and Fish Habitat Conservation Plan Appendix N: Schedule L-1 – Key questions, resource objectives, and priority topics for adaptive management, p. 6.

Brief Background of Physical Defaults

In 1996, after reviewing data primarily collected by the Point-No-Point Tribal Council, the Quinault Indian Nation, Washington Trout and the Department Fish & Wildlife, the Forest Practices Board (Board) adopted a consensus package of actions including emergency water typing rule with defaults for presumed fish use and a fish survey protocol to determine fish use.⁴ Given the uncertainty of the proposed defaults in meeting these objectives, Board members recognized that the defaults would be modified as necessary to more correctly reflect fish use as more and better data became available.⁵ The Board also approved guidance for the Department of Natural Resources (Department) and others to use when implementing the rule and manual, and a long-term plan for riparian management that would address Clean Water Act and Endangered Species concerns. This long-term riparian management plan ultimately resulted in the Forests & Fish Report (FFR) and the Forest Practices Habitat Conservation Plan (FPHCP). Water typing was a critical component of these efforts. As negotiations for FFR continued, the Board adopted a series of emergency rules based on the 1996 emergency rule.⁶

The FFR envisioned that the water typing system was to utilize a multi-parameter, field-verified geographic information system (GIS) logistic regression model to determine water type. Water typing maps would then be created from the model results. The model would determine the extent of fish habitat using geomorphic parameters such as basin size, gradient, elevation and other indicators. As stated in the FFR, “the risks between resource protection and timber harvest as determined by a model with a statistical accuracy of +/- 5% will be revised so that the line demarcating fish and non-fish habitat waters will be drawn so as to be equally likely to be over and under inclusive.”⁷ Thus, several key principles were critical in the development of a water typing rule for FFR: high degree of accuracy, minimized risk, and balance of the remaining uncertainty. Both the FFR and FPHCP included this concept of equity in the allocation of error, which is also consistent with the earlier Timber-Fish-Wildlife (TFW) agreement. As stated in the National Marine Fisheries Service Biological Opinion:

“Failure to correctly identify fish-bearing waters will occur and is assumed to lessen over time. It is assumed that any methods used to map or delineate such waters will have an approximately equal probability of identifying waters as fish-bearing where fish do not actually occur or the reverse, identifying waters as non-fish-bearing where fish actually do occur. It is further assumed that such errors will be relatively small and largely offset at the landscape scale. This assumption is based upon the fact that this concept of equal error probabilities was inherent to the FPHCP.”⁸

In 2001, when the Board adopted permanent rules for implementing the FFR, the model was not complete. The Board took an unusual action – it adopted two permanent administrative rules: one deemed the “permanent” rule, which described the model; and a second “interim” rule,

4 Forest Practices Board Rule Motion for Water Type Emergency Rule, Adopted November 14, 1996.

5 Minutes from November 12, 1996 Forest Practices Board meeting, p. 10.

6 Emergency Rules were adopted in February 12, 1997; July 10, 1997; November 12, 1997; February 11, 1998; May 13, 1998; September 22, 1998; November 10, 1998; February 10, 1999; March 31, 1999; July 21, 1999; November 16, 1999; October 27, 1999 (full FFR emergency rule).

7 Forests and Fish Report, February 22, 1999, p. 18-19.

8 National Marine Fisheries Service Biological Opinion, June 5, 2006, p. 180.

which continued the provisions of the emergency rules first adopted in 1996 which continued the use of protocol surveys and the physical defaults.⁹

Preliminary Review of Physical Default Characteristics

Both the default criteria and protocol surveys were temporary solutions within the 1996 emergency rule and never intended as permanent solutions. While attention to date has focused on the potential uncertainties related to protocol surveys and a reassessment of the fish habitat model, a systematic review of the rule also necessitates a review of the uncertainties related to the default physical criteria. Since 1996, landowner field-verified data indicate that the current default criteria often do not accurately reflect the extent of fish use. Based on Fransen 1999 assessment, the default criteria were demonstrated to over estimate fish use (attached as Appendix 1). Other data should also be evaluated.

3. *Any outstanding TFW, FFR, or Policy agreements supporting the proposal.*

FFR Forests and Fish Report Goals:

The Forests and Fish Report (FFR) served as the basis for development of the Forests and Fish forest practices rules, and thus, the Forest Practices Habitat Conservation Plan. The goal of the authors of the Forests and Fish Report was to compile biologically sound and economically practical solutions that would improve and protect riparian habitat on non-Federal forestlands in Washington. FFR recommended the development and implementation of rules, statutes and programs on non-Federal forestlands to:

- achieve compliance with the Endangered Species Act for aquatic and riparian dependent species on non-Federal forestlands;
- restore and maintain riparian habitat to support a harvestable supply of fish on non-Federal forestlands;
- meet the requirements of the Clean Water Act for water quality on non-Federal forestlands; and
- keep the timber industry economically viable in Washington.¹⁰

Forests & Fish Report and Statute

In the 1999 Salmon Recovery Act and the resulting Forests and Fish Rules, the Washington State Legislature required the development of an adaptive management program to: . . . *make adjustments as quickly as possible to forest practices that are not achieving the resources objectives . . . (and) shall incorporate the best available science and information, include protocols and standards, regular monitoring, a scientific and peer review process, and provide recommendations to the board on proposed changes to forest practices rules to meet timber industry viability and salmon recovery. (RCW 76.09.370(7)).*

⁹ WSR 01-12-042, § 222-16-031, filed 5/30/01, effective 7/1/01.

¹⁰ Final Forests and Fish Habitat Conservation Plan, Appendix B – Forests and Fish Report, December, 2005, p. B-1.

Forests & Fish Report Riparian Strategy for Stream Typing

B.1 Stream-typing¹¹

(a) The rule to be adopted by the Forest Practices Board will include a statewide map delineating the waters of the state into three categories: Type S waters, Type F Waters and Type N waters. The map is to be developed using a multi-parameter, field-verified GIS logistic regression model pursuant to the adaptive management procedures described in Appendix L. The multi-parameter model will be "habitat driven" and will use geomorphic parameters such as basin- size, gradient, elevation and other indicators. Electro fishing and day or night snorkeling and other non-lethal methods may be used with appropriate state and federal permits to do research and effectiveness monitoring for the purpose of developing and testing a habitat-based model or improving the model at five year intervals.

(b) The map, as applied by use of the field protocol described below, will be the standard used in making determinations of water typing. However, if on-site I.D. team reviews, using non-lethal methods, find fish or find that habitat clearly is not accessible due to naturally occurring conditions, stream typing will be adjusted immediately. Water type maps will be updated every five years to better reflect observed, in-field conditions.

(c) In connection with the adoption of a stream-typing rule, a field protocol to be used in locating the mapped divisions between stream types on the ground will be developed pursuant to the adaptive management procedures described in Appendix L. Once developed, the field protocol will be added to the Forest Practices Board Manual.

(d) If prior to rule adoption, statewide water type maps cannot be completed, the rule will provide for the completion of such maps as soon as reasonably possible after rule adoption. If statewide water type maps are not available by the time of rule adoption, water typing will proceed under an interim rule modeled after the emergency rule but modified in the following respects: (A) stream types will be described in terms of Types S, F and N waters instead of Types 1, 2, 3, 4 and 5 waters; (B) the risks between resource protection and timber harvest as determined by a model with a statistical accuracy of +/- 5% will be revised so that the line demarcating fish and non-fish habitat waters will be drawn so as to be equally likely to be over and under inclusive; and (C) electro-fishing to prove the presence or absence of fish will no longer affect stream type determination from an operational standpoint. Stream reaches previously field-verified, as fish-bearing will not be recategorized as non-fish-bearing.

(e) Streams are to be divided by map (or if maps are not available by the time of rule adoption, by rule) into one of the following three categories:

- (i). "Type S waters" include all waters within their ordinary highwater marks, inventoried as "shorelines of the state" under chapter 90.58 RCW and the related rules promulgated thereunder (currently Type 1 waters) but do not include such waters associated wetlands

¹¹ Footnote 1 from the Riparian Strategies Section of FFR B-1: The water type committee will continue to work on this project. The authors are aware that changing the water type system will require updating the current hydro GIS layer for the state (making it easier to update), in addition to obtaining and processing the 10 meter DEM data and doing the modeling work. Without funding this particular item cannot be implemented. Also the authors are aware and support DOE's need for funding to finish the redefinition of type 1 jurisdictional points so that there is a consistent application of the type S waters statewide. The system will be revisited to determine whether these broader water types will need additional subdividing, perhaps using a parameter such as gradient or stream width." Forests and Fish Report, February 22, 1999, p. 18-21.

as defined in chapter 90.58 RCW.

(ii) "Type F waters" include all segments of natural waters (other than Type S waters) (A) within the bankfull widths of defined channels or (B) within lakes, ponds, or impoundments having a surface area of 0.5 acre or greater at seasonal low water which, in either case, contain fish habitat or are described by one of the following three categories:

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

(2) Waters which are within a federal, state, local, or private campground having more than 10 camping units provided that the water shall not be considered to enter a campground until it reaches the boundary of the park lands available for public use and comes within 100 feet of a camping unit, trail or other park improvement.

(3) Waters which are diverted for use by federal, state, tribal, or private fish hatcheries; such waters shall be considered to be Type F waters upstream from the point of diversion for 1,500 feet and tributaries if highly significant for protection of downstream water quality. DNR may allow additional harvest beyond the limitations set forth below with respect to Type F waters provided the department determines after a landowner-requested on-site assessment by WDFW, DOE, 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 harvest meets the requirements of harvest adjacent to Type N waters.

As used herein "fish habitat" means habitat which is 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. Fish habitat will be established based upon a multi-parameter, field-verified, peer-reviewed GIS logistic regression model using geomorphic parameters such as basin size, gradient, elevation and other indicators.

(iii) "Type N waters" include all segments of natural waters within the bankfull widths of defined channels that are not Type S or F waters and which are either perennial streams (as defined below) or are physically connected by an above-ground channel system to downstream waters such that water or sediment initially delivered to such waters will eventually be delivered to a Type S or F water. Type N waters include two subcategories of waters: seasonal and perennial streams. As used in this Report, "perennial streams" include all Type N waters which do not go dry at any time during a year of normal rainfall. In many cases, field practitioners and scientists do not have the experience necessary to make a field determination of the initiation point perennial Type N waters. Making the determination will require a better understanding of the natural variability of the spatially intermittent

more

component of perennial streams. Factors such as stream associated amphibian habitat, sediment deposition patterns, channel morphology, water flow, non-migrating seeps or springs, and position in the basin will be observed in preparing a protocol for perennial stream identification. In those cases where non-migrating seeps or springs as the point of initiation of perennial flow cannot be firmly identified with simple, non-technical observations: (A) on the Westside, Type N waters will be "perennial streams" if they have a basin size in excess of the; following minimums: 13 acres in the coastal zone (which corresponds to the sitka spruce zone defined in Franklin and Dyrness 1973) and 52 acres on the rest of the Westside; and (B) on the Eastside, Type N waters will be "perennial streams" if they have a basin size in excess of 300 acres. The basin size thresholds identified in the preceding sentence may, at the request of any author and subject to adequate funding and prioritization, be subject to review through adaptive management. Type N waters which are not perennial streams will be categorized as "seasonal streams".

4. *How the results of the proposal could address Adaptive Management Program key questions and resource objectives or other rule, guidance, or DNR product.*

The key issue facing the Forest Practices Board is the development of a permanent water typing system that meets FFR objectives for the water typing system (high degree of accuracy, minimization of risk, balance of remaining uncertainty) and the criteria determined by the Forest Practices Board.

This proposal follows the AMP goals expressed in RCW 76.09.370, FFR Appendix L and HCP Appendix N, *Adaptive Management*, and embraces the Policy and science based process to develop recommendations for rule change to present to the Board. FFR called for the establishment of:

- A science-based adaptive management program to monitor the relationships and evaluate the effectiveness of rules and guidance toward achieving the target forest conditions and processes;
- Forest Practices Board adopted rules and guidance designating the required elements of an adaptive management process;
- Forest Practices Board set priorities for action as guided by information developed through the adaptive management process; and
- TFW (Policy) recommendations to the (Board) are to be accompanied by formal petitions for rulemaking and guidance.

Board Manual Section 22, *Guidelines for Adaptive Management Program* provides a technical advisory supplement to the Forest Practices rules and provides guidance to the AMP. The process to request an AMP review and subsequent preparation of recommendations to present to the Board for potential rules changes is found in Part 3.1 Stage 1: Initiation and Screening of Proposals.

Forest Practices Rules, WAC 222-16-010 *Definition of Fish Habitat

"Fish habitat" means habitat, which is 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.

Forest Practices Rules, WAC 222-30-031 *Interim Water Typing System.

Until the fish habitat water type maps mentioned above are available, waters will be classified according to the interim water typing system described below. If a dispute arises concerning a water type, the department shall make available informal conferences, which shall include the departments of fish and wildlife, ecology, and affected Indian tribes and those contesting the adopted water types. These conferences shall be established under procedures established in WAC [222-46-020](#).

For the purposes of this interim water typing system see the following table:

Water Type Conversion Table

Permanent Water Typing	Interim Water Typing
Type "S"	Type 1 Water
Type "F"	Type 2 and 3 Water
Type "Np"	Type 4 Water
Type "Ns"	Type 5 Water

***(1) "Type 1 Water"** means all waters, within their ordinary high-water mark, as inventoried as "shorelines of the state" under chapter [90.58](#) RCW and the rules promulgated pursuant to chapter [90.58](#) RCW, but not including those waters' associated wetlands as defined in chapter [90.58](#) RCW.

***(2) "Type 2 Water"** means segments of natural waters which are not classified as Type 1 Water and have a high fish, wildlife, or human use. These are segments of natural waters and periodically inundated areas of their associated wetlands, which:

(a) Are diverted for domestic use by more than 100 residential or camping units or by a public accommodation facility licensed to serve more than 10 persons, where such diversion is determined by the department to be a valid appropriation of water and only considered Type 2 Water upstream from the point of such diversion for 1,500 feet or until the drainage area is reduced by 50 percent, whichever is less;

(b) Are diverted for use by federal, state, tribal or private fish hatcheries. Such waters shall be considered Type 2 Water 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 2 Water designation provided 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 harvest meets the requirements of the water type designation that would apply in the absence of the hatchery;

(c) Are within a federal, state, local or private campground having more than 30 camping units: Provided, That the water shall not be considered to enter a campground until it reaches the boundary of the park lands available for public use and comes within 100 feet of a camping unit.

(d) Are used by fish for spawning, rearing or migration. Waters having the following characteristics are presumed to have highly significant fish populations:

(i) Stream segments having a defined channel 20 feet or greater within the bankfull width and having a gradient of less than 4 percent.

(ii) Lakes, ponds, or impoundments having a surface area of 1 acre or greater at seasonal low water; or

(e) 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 bearing stream and be accessible during some period of the year; and

(ii) The off-channel water must be accessible to fish through a drainage with less than a 5% gradient.

***(3) "Type 3 Water"** means segments of natural waters which are not classified as Type 1 or 2 Waters and have a moderate to slight fish, wildlife, or human use. These are segments of natural waters and periodically inundated areas of their associated wetlands which:

(a) Are diverted for domestic use by more than 10 residential or camping units or by a public accommodation facility licensed to serve more than 10 persons, where such diversion is determined by the department to be a valid appropriation of water and the only practical water source for such users. Such waters shall be considered to be Type 3 Water upstream from the point of such diversion for 1,500 feet or until the drainage area is reduced by 50 percent, whichever is less;

(b) Are used by fish for spawning, rearing or migration. The requirements for determining fish use are described in the board manual section 13. If fish use has not been determined:

(i) Waters having any of the following characteristics are presumed to have fish use:

(A) Stream segments having a defined channel of 2 feet or greater within the bankfull width in Western Washington; or 3 feet or greater in width in Eastern Washington; and having a gradient of 16 percent or less;

(B) Stream segments having a defined channel of 2 feet or greater within the bankfull width in Western Washington; or 3 feet or greater within the bankfull width in Eastern Washington, and having a gradient greater than 16 percent and less than or equal to 20 percent, and having greater than 50 acres in contributing basin size in Western Washington or greater than 175 acres contributing basin size in Eastern Washington, based on hydrographic boundaries;

(C) Ponds or impoundments having a surface area of less than 1 acre at seasonal low water and having an outlet to a fish stream;

(D) Ponds or impoundments having a surface area greater than 0.5 acre at seasonal low water.

(ii) The department shall waive or modify the characteristics in (i) of this subsection where:

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

(B) 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

(C) 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 department of fish and wildlife, department of ecology, affected tribes and interested parties.

***(4) "Type 4 Water"** means all segments of natural waters within the bankfull width of defined channels that are perennial nonfish 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.

***(5) "Type 5 Waters"** means all segments of natural waters within the bankfull width of the defined channels that are not Type 1, 2, 3, or 4 Waters. These are seasonal, nonfish habitat streams in which surface flow is not present for at least some portion of the year and are not located downstream from any stream reach that is a Type 4 Water. Type 5 Waters must be physically connected by an above-ground channel system to Type 1, 2, 3, or 4 Waters.

***(6)** 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" mean the conditions of the 7-day, 2-year low water situation, as measured or estimated by accepted hydrologic techniques recognized by the department.

(f) "Channel width and gradient" means a measurement over a representative section of at least 500 linear feet with at least 10 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. (See board manual section 23.)

5. *Available literature, data and other information supporting the proposal.*

Potential Data Sets:

- 1996 Data to develop the physicals
- 1999 review (end-of-habitat; end-of-fish) compared to physicals
- 2005 Model development dataset
- Other data sets, including those provided by industry, agencies, stakeholders or Tribes.

Assessment of Emergency Rule Precision and Balance of Error

Brian Fransen, Weyerhaeuser Company
October, 1999

In this assessment, we evaluated the relative precision of the Emergency Rule default habitat suitability criteria against independently collected “End of Fish” and “End of Habitat” data. By comparing the results of these intensive field survey efforts and the current Emergency Rule criteria, the precision and balance of error of the current rule was assessed.

The “Emergency Rule” default habitat criteria is intended to identify habitat suitable for fish use. In Western Washington, a 2-ft channel and/or a 20% gradient break are presumed to coincide with the upper limit of suitable fish habitat. In basins less than 50 acres, a 2-ft channel and a 16% stream gradient are presumed to represent the upper limit of suitable habitat.

Channel Width and Stream Gradient at the Upper Limit of Fish Distribution:

Data for this assessment was collected during “End of Fish” field surveys in 1997. Surveys were conducted in more than 30 basins, representing a broad range of environmental conditions. Data was collected using the field survey protocol specified within the Emergency Rule electro-fishing guidelines for locating the upper extent of fish distribution in each stream surveyed. These surveys characterized channel width and gradient at the upper limit of fish distribution. Additional data on physical habitat was collected at the location of the upper-most fish to help identify physical features and conditions associated with the upper limits of fish habitat.

Results:

Channel width at the extreme upper limit of fish distribution ranged from 1.3 ft to 25 ft (fig. 1). The 2-ft channel break specified in the Emergency Rule habitat criteria over-predicted the actual upper limit of fish distribution on 94% of the sites. Most fish distributions ended where channels were 4-10 ft wide. Occasionally, much wider channels were associated with the upper extent of fish distribution. These were usually sites where impassable barriers or high stream gradient conditions restricted fish use.

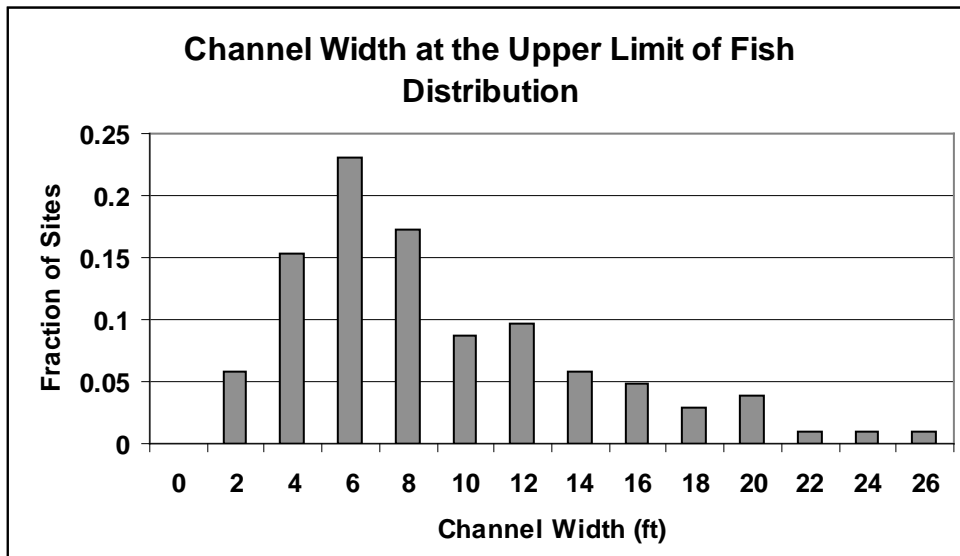


Figure 1. Channel width immediately below the upper limit of fish distribution. N=104 sites.

Stream gradient immediately below the upper limit of fish distribution ranged from 1.4 to 19.2% (Fig. 2). The 20% gradient specified within the Emergency Rule never under-predicted the upper extent of occupied fish habitat. In about a quarter of the sites (26%), fish distributions ended at a break in gradient where gradient upstream from the uppermost fish was greater than 20% (Fig 3). In those sites, the Emergency Rule would have accurately predicted the upper limit of occupied habitat assuming that channel width remained above 2 ft. However, most fish distributions ended where both upstream and downstream gradients were less than 20%.

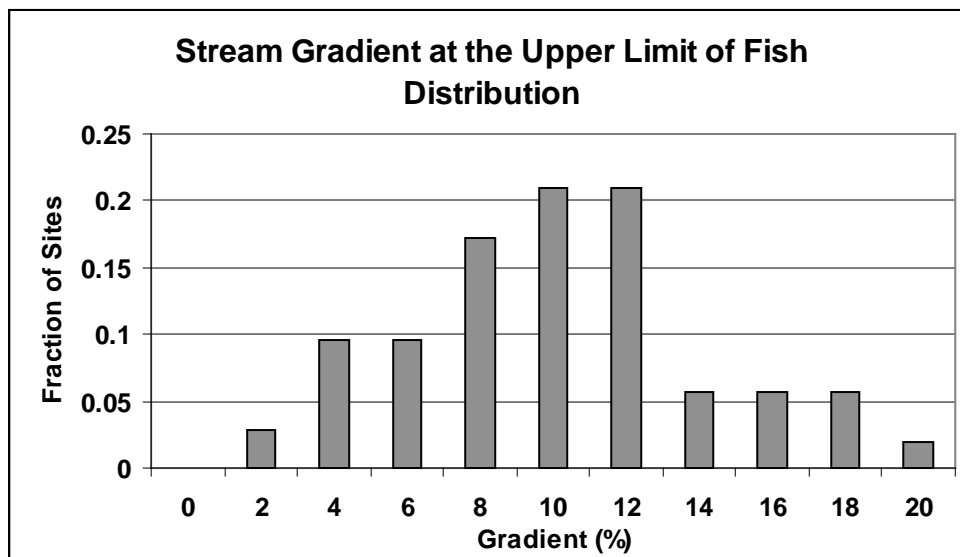


Figure 2. Stream gradient at the upper limit of fish distribution. N=105 sites.

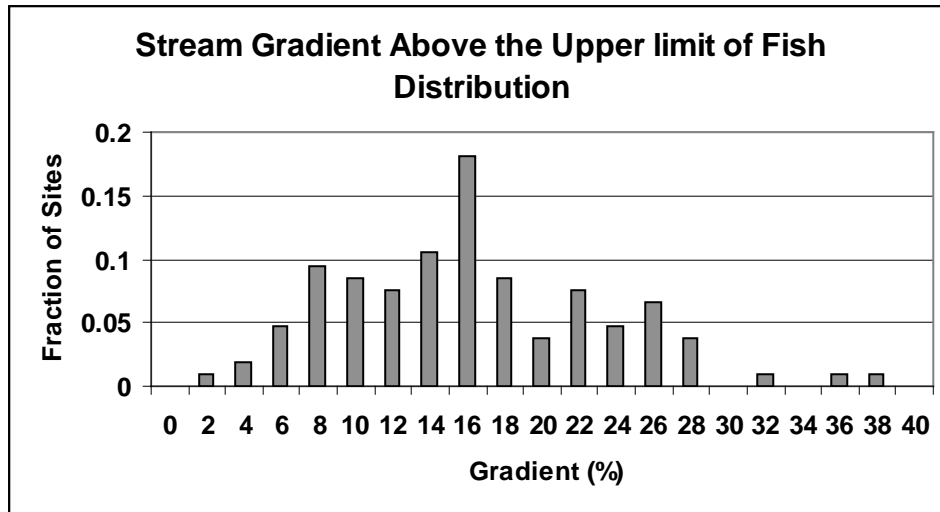


Figure 3. Stream gradient above the upper limit of fish distribution. N=105 sites

“End of Fish” vs “End of Habitat”:

“End of Habitat” surveys conducted by the Quinault Tribe and WDFW in Stillman creek were compared to “End of Fish” surveys conducted by Weyerhaeuser biologists. The “End of Habitat” surveys were conducted over the entire stream network within the basin. “End of Fish” surveys were conducted in selected areas representing the majority of the stream network. Streams not surveyed for fish presence were assumed to be correctly classified by the “End of Habitat” surveys. The “End of Habitat” surveys identified approximately 5% more fish habitat than the “Last Fish Surveys” did. Using the location of the upper-most fish, 21.5% of the total length stream network in Stillman Creek was identified as fish-bearing, compared to 22.7% of the total length being classified as fish habitat.

Assessing the Emergency Rule Criteria vs “End of Habitat” and “End of Fish” Surveys at the Basin Scale:

Using a Geographic Information System (GIS), Habitat presumed to be suitable for fish using the Emergency Rule “2-ft channel and 20% gradient” criteria was compared to the “End of Habitat” surveys conducted by the Quinault Tribe and WDFW in Stillman Creek. The GIS allows for an assessment of the precision and balance of error of the Emergency Rule criteria across the entire basin. Field data describing channel width and stream gradient conditions was not available for all sites within this basin. GIS-derived stream gradients were calculated from 10 meter a digital elevation modeling obtained from the USGS.

Actual channel width cannot be measured within the GIS. An approximation of the location of the 2 ft channel break was made using a relationship between channel width and basin area developed in western Washington (fig 4).

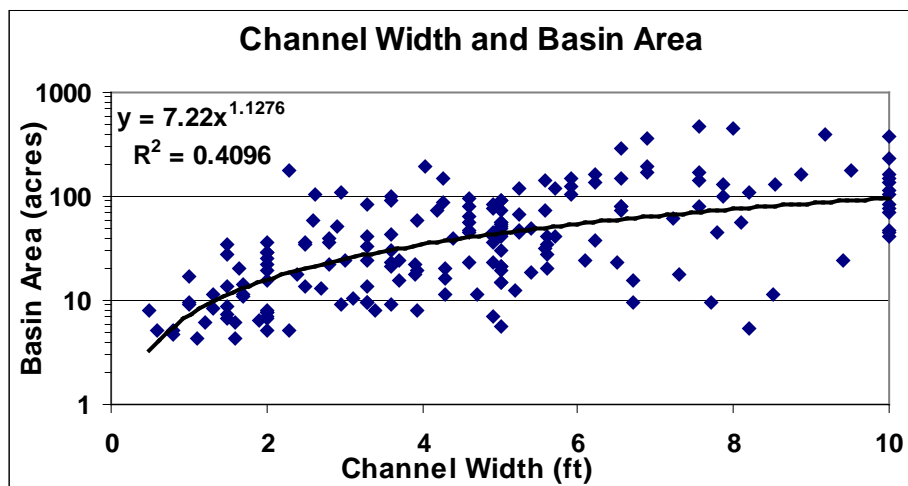


Figure 4. Relationship between channel width and basin area in western Washington streams. N= 183 streams.

Using the equation derived from the channel width/basin area relationship, a channel width of 2 ft is predicted to require an upstream basin area of 15 acres. However, the observed range of basin areas coinciding with a 2 ft channel in this dataset is 5 to 29 acres. For the purposes of this assessment, we used a range of basin areas to represent a 2 ft channel thus providing a range of possible outcomes.

Stream gradient was assessed consistent with the Emergency Rule criteria. An upper limit of 16% gradient was applied to basins less than 50 acres in area. An upper limit of 20% was applied to basins greater than 50 acres in area for the Emergency Rule presumption of fish habitat.

Results:

Basin Area Used to Estimate 2 ft Channel	Percent of Fish Habitat not Captured by the Emergency Rule (under prediction)	Over prediction of Fish Habitat by the Emergency Rule
15 acres	- 4.4 %	+ 102.6 %
20 acres	- 4.5 %	+ 88.3 %
30 acres	- 4.7 %	+ 71.1 %
50 acres	- 5.1 %	+ 50.8 %

Table 1. Percent change in the length of fish habitat from Quinault and WDFW “End of Habitat” surveys using the Emergency Rule habitat criteria in Stillman Creek.

Assuming that a 15 acre basin area represents a 2 ft channel, the Emergency Rule would more than double the total length of habitat presumed to be suitable for fish compared to the Quinault Tribe and WDFW “End of Habitat” surveys. The most conservative channel width estimate (using a 50 acre basin to represent a 2 ft channel) suggests that the current Emergency Rule criteria would add 50% to stream length classified as “suitable for fish” when compared to on-the-ground “End of Habitat” surveys.

Emergency Rule Criteria vs “End of Fish” Surveys:

A similar assessment was conducted to compare the Emergency Rule habitat criteria against the “End of Fish” survey information in Stillman Creek (Table 2.).

Results:

Basin Area Used to Estimate 2 ft Channel	Percent of Occupied Habitat not Captured by the Emergency Rule (under prediction)	Over prediction of Fish Presence by the Emergency Rule
15 acres	- 2 %	110.8 %
20 acres	- 2 %	105.4 %
30 acres	- 2 %	77.3 %
50 acres	- 2%	55.5 %

Table 2. Percent change in the length of fish habitat from Weyerhaeuser “End of Fish” surveys using the Emergency Rule habitat criteria in Stillman Creek.

The results of the “End of Fish” assessment are very similar to the “End of Habitat” assessment. The under-prediction of 2% is the result of high gradient stream reaches within fish-bearing stream lengths that are excluded by the 20% limitation. It is commonly accepted that these reaches would not be classified as non-fish habitat on the ground because gradient does not consistently remain above 20% in upstream habitat. Therefore, the Emergency Rule habitat criteria do not under-predict the extent of occupied fish habitat.

During the Forest and Fish negotiations, an 11.6% Emergency Rule over-prediction error estimate was circulated. Consistent with the above example, a 50 acre basin was used to approximate the location of the 2 ft channel break and a 20% gradient break was used to identify the upper limit of suitable habitat. The 11.6% value represented the over-classification error relative to the total stream network in Stillman Creek. Fish-bearing streams within the Stillman Creek drainage constitute 21.5% of the total stream length. Therefore, an over-prediction error of 11.6% relative to the total stream network is equivalent to an over-prediction error of approximately 55% relative to the length of streams found to contain fish.

Summary:

- The Emergency Rule habitat criteria significantly over-estimate the extent of habitat suitable for fish use.
- This result is clearly and consistently demonstrated with both “End of Fish” and “End of Habitat” field survey data.
- The GIS basin-wide assessment in Stillman Creek agrees with the field survey assessments, and provides an approximation of the magnitude of error resulting from the Emergency Rule default habitat criteria.

- Over estimation of the extent of habitat suitable for fish use likely ranges from 50% to more than 100% of the habitat identified as “suitable” in the field by a variety of qualified biologists.
- The precision performance criteria and the balance of error provision of the Forest and Fish Agreement are not being met with the existing Emergency Rule habitat suitability criteria.

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