

FORESTS AND FISH REPORT

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Final Report Subject to Caucus Ratification

FORESTS AND FISH REPORT

This Forests and Fish Report ("Report") is presented to the Forest Practices Board and the Governor's Salmon Recovery Office this 22nd day of February, 1999 and represents the recommendations of the authors for the development and implementation of rules, statutes and programs designed to achieve the goals discussed below.

BACKGROUND

A. Authors. The authors of this Report include the United States Fish and Wildlife Service, an agency of the Department of the Interior of the United States of America ("USFWS"), the National Oceanic and Atmospheric Administration, through the National Marine Fisheries Service ("NMFS"), an agency of the Department of Commerce of the United States of America, the United States Environmental Protection Agency, Region 10 ("EPA"), The Office of the Governor of the State of Washington, the Washington State Department of Natural Resources ("DNR"), the Washington State Department of Fish and Wildlife ("WDFW"), the Washington State Department of Ecology ("DOE"), the Colville Confederated Tribes, the _____ and _____ Tribes (list all tribes separately), the Washington State Association of Counties, the Washington Forest Protection Association ("WFPA"), and the Washington Farm Forestry Association ("WFFA"). USFWS, NMFS and EPA are referred to collectively as the "federal agencies." DNR, WDFW and DOE are referred to collectively as the "state agencies."

B. Goals. The authors of this Report have been working together to develop biologically sound and economically practical solutions that will improve and protect riparian habitat on non-federal forest lands in the State of Washington. These discussions have been commonly referred to as the "forestry module" for the Washington's Statewide Salmon Recovery Strategy and have culminated in the recommendations outlined in this Report.

The goals of the forestry module discussions are fourfold:

- (1) to provide compliance with the Endangered Species Act for aquatic and riparian-dependent species on non-federal forest lands;
- (2) to restore and maintain riparian habitat on non-federal forest lands to support a harvestable supply of fish;
- (3) to meet the requirements of the Clean Water Act for water quality on non-federal forest lands; and
- (4) to keep the timber industry economically viable in the State of Washington.

C. Background. In 1986, as an alternative to competitive lobbying and court cases, four caucuses (the Tribes, the timber industry, the state, and the environmental community) decided

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to try to resolve contentious forest practices problems through negotiations. This resulted in the first Timber Fish Wildlife ("TFW") agreement in February 1987 (schedule N-1). Caucus members have continued to work cooperatively on policy, local and technical levels to implement the agreement, through interdisciplinary teams that evaluate individual forest practices applications, through joint review of scientific research, and through teams analyzing conditions of various forest watersheds. The authors remain committed to the original TFW Agreement which continues to be in effect, except as otherwise amended through the TFW process, including the development of this Report. The original TFW Agreement and amended ground rules are attached as Schedule N-1 and N-2

Recent events have caused the TFW caucuses to once again come together at the policy level address a new round of issues. Under the Endangered Species Act, Upper Columbia steelhead has been listed as endangered, Snake River sockeye and chinook salmon, Snake River and Lower Columbia steelhead and Columbia River bull trout have been listed as threatened. Puget Sound chinook salmon, Lake Ozette sockeye, and Hood Canal summer chum have subsequently been listed. Other salmonids are being considered for listing. In addition, over 660 Washington streams have been included on a 303(d) list identifying stream segments with water quality problems under the Clean Water Act. With the decline in fish populations, tribal and other fishers have been forced into unemployment. Constantly changing regulations or other potential restrictions have increased the cost and uncertainty attendant upon investments in timber acquisitions and harvest activities. In November 1996, the caucuses -- now expanded from the original four to six with the addition of federal and local governments -- decided to work together to develop joint solutions to these problems.

D. Process. The process of creating a solution and devising a set of recommendations was slow and deliberate, allowing time for different caucuses to better understand one another's concerns and to build relationships that will strengthen implementation of this Report. In that context, there were numerous two- and three-day sessions attended by representatives of all caucuses. Each caucus also met many times to discuss the issues internally among its members and to develop trust for caucus negotiators. Cross-caucus meetings were held to further facilitate understanding on particular issues. In addition, technical groups worked on assigned tasks so that the Report could be shaped by sound science. The issues were repeatedly revisited in a process that led to greater and greater detail and refinement.

Near the end of this process, the environmental caucus withdrew from the discussions. As a result, no TFW consensus was reached. Others continued with the discussions, however, and this Report now reflects the consensus recommendations of the five remaining caucuses.

E. Economic impacts. The following Report recommends modifications to and the adoption of certain forest practices rules and related statutes. The authors recognize that such changes in the rules and statutes will impose substantial additional financial burdens on forest landowners. The authors further acknowledge that such financial impacts may be experienced disproportionately by different landowners. The Report recommends acquisition in certain situations and allows for the development of alternate plans as means of addressing such impacts while still maintaining a level of protection for public resources at least equal in overall effectiveness to the protection provided by the basic rules. The authors also acknowledge that

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landowners may seek additional compensation to redress the financial impact of the proposed rules and statutes through a variety of mechanisms including efforts to secure additional federal and state grants. The pursuit of additional compensation by any forest landowner will not be construed as contrary to the purpose or substance of the following Report.

F. Equity. All participants recognize that the goals of Washington's Statewide Salmon Recovery Strategy cannot be met by contributions from any single sector of the economy. This Report reflects the commitment of the forestry sector to contribute to the recovery of salmon and certain other riparian and aquatic species and to the restoration of related riparian ecosystems. The authors of this Report agree to support efforts to secure comparable contributions from all sectors of Washington State and to do so in a way which equitably apportions the additional burdens and costs associated with recovering salmon, bull trout and other aquatic and riparian species among these sectors.

G. Tribal Role. The participants continue to recognize that the tribes must be involved in forest management decisions that affect the aquatic resources upon which their treaty fishing rights depend. Accordingly, this Report provides for Tribal participation in all phases of the regulation of forest practices including, without limitation, the development of forest practices rules by the Forest Practices Board; watershed analysis; restoration, compliance, effectiveness and validation monitoring; scientific research; and the implementation of rules and forestry prescriptions through such mechanisms as interdisciplinary teams.

H. Authors' Commitments. The authors agree to use all reasonable efforts to support the expeditious implementation of the recommendations contained in this Report. Many of these recommendations involve commitments from the authors themselves. The authors will also commit: to following the principles and ground rules of the original TFW Agreement and amended ground rules. Except as expressly provided herein, these commitments do not serve to waive such rights or to supersede existing contracts.. The authors' commitments, however, are subject to (i) the Legislature's adoption of a statutory package providing for implementation of the report prior to July 1, 1999; (ii) the Forest Practices Board's adoption of permanent rules implementing the recommendations of this Report within 24 months of the effective date of the legislation referred to above; (iii) the provision of adequate funding for the implementation of the recommendations contained in this Report as more fully described in Appendix N; (iv) the receipt of federal assurances relating to the Endangered Species Act and the Clean Water Act as described in the attached Appendix M by the dates identified in such Appendix; and (v) continued support from the authors for the completion of the tasks and implementation of the provisions specified in the report.

I. Appendices

The following appendices are attached and incorporated into this Report:

- Appendix A – Definitions
- Appendix B – Riparian strategies
- Appendix C – Unstable slopes
- Appendix D – Roads
- Appendix E – Pesticides

- Appendix F – Wetland protection**
- Appendix G – Watershed analysis**
- Appendix H – Alternative plans**
- Appendix I – Small landowner**
- Appendix J – Revisions to permit process**
- Appendix K – Enforcement**
- Appendix L – Adaptive management**
- Appendix M – Assurances**
- Appendix N – Funding**
- Appendix O – Miscellaneous**

Appendix A

Definitions

A.1 As used throughout this Report:

"Bankfull depth" means the elevation difference between the water surface of a stream flow having a return period of approximately 1.5 years and the thalweg. The horizontal projection of this water surface elevation to the stream bank or the top of the geomorphic flood plain indicates bankfull depth. The top of the active flood plain of a stream is often indicated by the top of the point bar, by a change in vegetation from bare surfaces or water-tolerant species to water-intolerant shrubs and trees, by a break in slope, or by a change in the size distribution of surface sediments.

"Bankfull width" means, for any stream, the average distance between the elevations indicated by bankfull depth. The top of the active flood plain of a stream is often indicated by the top of the point bar, by a change in vegetation from bare surfaces or water-tolerant species to water-intolerant shrubs and trees, by a break in slope, or by a change in the size distribution of surface sediments.

"Basal area" means the area in square feet of the cross section of a tree bole measured at 4½ feet above the ground.

"Bedrock hollows" (colluvium-filled bedrock hollows or hollows; also referred to as zero-order basins, swales, or bedrock depressions) means landforms which are commonly spoon-shaped areas of convergent topography (upward or contour concavity) within unchannelled valleys on hill slopes. Hollows are formed on slopes of varying steepness and tend to be longitudinally linear on the slope. Their upper ends can extend to the ridge, or begin as much as several hundred feet below. Most hollows are approximately 75 to 200 feet wide at the top and may narrow to 30 to 60 feet downhill. They terminate at distinct channels, either at the point of channel initiation or along a stream side. Unless they have recently experienced scouring by landslide or debris flow, bedrock hollows are partially or completely filled with colluvial soils that are typically deeper than those on the adjacent spurs and planar slopes. (Hollows that are completely filled with colluvium may show no surface continuity.) Many hollows have no surface water, but others contain seeps and springs. Hollows should not be confused with other hillslope concavities such as small valleys, the bodies of large landslides, tree-throw holes, or low-gradient grassy swales. Bedrock hollows typically experience episodic evacuation of debris by shallow-rapid mass movement, followed by slow refilling with colluvium. Debris slides that begin within bedrock hollows commonly evolve into debris torrents, which have the potential to reach great distances downhill and downstream.

"Bull trout habitat overlay" means the portions of the Eastside region identified in the WDFW's bull trout map attached hereto as Schedule A-1 as modified in accordance with the following procedures:

- (i) Prior to the development of the habitat-based predictive model described in subclause (ii) below, "bull trout habitat overlay" may be modified to allow for locally-based corrections to the maps using current data, field knowledge, and best professional judgement. A landowner can meet with a local WDFW fish or habitat biologist and, in consultation with affected Tribes and federal biologists, determine whether certain stream reaches have unsuitable habitat conditions to support bull trout. If such a determination is mutually agreed upon, documentation submitted to DNR will result in the applicable stream reaches no longer being included within the definition of bull trout habitat overlay. Conversely, if suitable bull trout habitat is discovered outside the current mapped range, those waters will be included within the definition of "bull trout habitat overlay." Interim guidelines for modifying the bull trout habitat overlay in the field will be developed by the TFW bull trout technical group within the next several months.
- (ii) "Bull trout habitat overlay" may be modified based upon the determinations reached using an agreed upon habitat-based predictive model. The authors will, working through a TFW bull trout technical group, develop a scientifically-defensible predictive model and corresponding field survey protocols to screen specific stream or river reaches to determine if suitable habitat conditions for bull trout are present. This process may take up to two years and will require scientific peer review. Participation by federal and state agencies, tribes, and forest landowners will be required in the TFW bull trout technical group. This model will be capable of predicting type I and type II error rates, leading to a TFW policy decision on the appropriate level of risk associated with the survey protocols. Any disputes in the development of the model will be resolved through the dispute resolution processes set forth in Appendix L.

As used in this agreement, "bull trout habitat overlay" refers to Eastside regions where additional specific protections for bull trout have been specified.

"Channel migration zone" means, for each of the types of streams described below, the area where the active channel of such stream is prone to move and where such movement would result in a potential near-term loss of riparian forest adjacent to the stream. For purposes of this Report, "channel migration zones" are associated with moderately confined streams, unconfined streams, unconfined meandering streams, unconfined braided streams, and unconfined avulsing streams. As used in this Report, no "channel migration zone" will be associated with any other waters of the state. A chart summarizing the following discussion is attached as Schedule A-2. The Forest Practices Board Manual will provide further guidance for the delineation of channel migration zones on the ground. Unstable slope protections for inner gorges and outer bends of meandering streams as provided in Appendix C are potential supplements to channel migration zone riparian protections.

- (i) Moderately confined streams defined. As used in this definition, "moderately confined streams" are typically 3rd or 4th order Type F or S waters with bankfull widths of less than 50 feet and with gradients between 2% and 8% that are

moderately confined by alluvial terraces, glacial terraces or valley walls that often create a well-defined break in slope.

- (ii) **Unconfined streams defined.** As used in this definition, "unconfined streams" are 2nd to 4th order Type F or S waters with bankfull widths of less than 50 feet which usually have a gradient of less than 4% (but occasionally have a gradient of up to 8%.) These streams are often located in broader headwater or tributary valleys or are flowing across the terraces of larger river valleys. They may also occur in areas where a significant change in channel slope or confinement causes high amounts of sediment deposition such as at alluvial fans or the mouth of confined tributary valleys. Channel movement typically occurs during floods when woody debris or large sediment accumulations can cause the stream or portions of the stream to jump or avulse into side channels. These side-channels are considered part of the active channel. Localized reaches of meandering or braided streams may also be present.
- (iii) **Unconfined meandering streams defined.** As used in this definition, "unconfined meandering streams" are 5th order and larger Type S waters with bankfull widths greater than 50 feet and gradients of less than 2% with the following additional characteristics: The waters are sinuous, primarily single-thread channels that have a distinct meandering pattern readily observable on aerial photographs. Remnant side-channels and oxbow lakes often create wetland complexes within the associated channel migration zone. A diverse set of vegetation can grow within the associated channel migration zone including cedar, spruce, hardwoods, and wetland vegetation on wetter sites and Douglas-fir, spruce, hemlock and true firs on drier terraces. "Unconfined meandering streams" do not include any waters that are unconfined braided streams or unconfined avulsing streams.
- (iv) **Unconfined braided streams defined.** As used in this definition, "unconfined braided streams" means 5th order or larger Type S waters with bankfull widths greater than 50 feet and gradients of less than 2% with the following additional characteristics: These waters have a high sediment supply and form numerous channels (multi-threaded) that are likely to move within the bankfull width of the stream in even small storm events. The frequent rate of channel movement means that the associated channel migration zone is typically sparsely vegetated with young hardwoods along the channel margins. Glacially-fed streams often have large sections of braided channel. "Unconfined braided streams" do not include any waters that are unconfined meandering streams or unconfined avulsing streams.
- (v) **Unconfined avulsing streams defined.** As used in this definition, "unconfined avulsing streams" means 5th order or larger Type S waters with bankfull widths greater than 50 feet and gradients of less than 2% with the following additional characteristics: These waters are usually large dynamic river systems that in some cases have had dikes and levees constructed that may restrict channel movement. Numerous side channels, wall-based channels, oxbow lakes, and wetland complexes may exist within the associated channel migration zone. Sizeable

islands with productive forest land may also exist within the zone. Woody debris jams with larger diameter pieces of large woody debris are an important element for creating pools within these waters, as well as redirecting flow to create side channels and islands. Vegetation within the associated channel migration zone can include cedar, spruce, hardwoods, and wetland vegetation on wetter sites and Douglas-fir, spruce, hemlock and true firs on drier terraces or islands.

“Unconfined avulsing streams” do not include any waters that are unconfined meandering streams or unconfined braided streams.

- (vi) CMZ for moderately confined streams. The channel migration zone for moderately confined streams is determined by reference to the surrounding topography and vegetation. The zone typically ends at a well-defined break in slope created by alluvial terraces, glacial terraces or valley walls. Vegetation within the channel migration zone is usually dominated by young hardwoods (alder and cottonwood) because of the high frequency of disturbance from channel movement, floods, or dam-break floods. Wet areas and seeps with vegetation such as devil’s club and salmonberry are frequently found, particularly at tributary junctions. Portions of the zone such as low terraces that are not disturbed as frequently can contain upland vegetation. Woody debris jams, gravel bars, and abandoned side branches are common. The ground surface within the channel migration zone usually has a layer of fine sediment, especially around vegetation, but can also have significant areas of exposed gravel and cobble. The area outside of the zone usually has deeper soils that can support conifer and other upland plant species. One rule of thumb to help locate the elevational extent of the channel migration zone is to measure the distance that is twice the reach-averaged bankfull depth. The channel migration width is usually less than four channel widths across. For example, a stream with a bankfull width of 10 feet in this situation would typically have a total channel migration zone width of less than 40 feet.
- (vii) CMZ for unconfined streams: The channel migration zone for unconfined streams is likewise determined by reference to the surrounding topography and vegetation. Delineating the boundaries of these zones can be more difficult because of the subtle changes in the surrounding topography and vegetation. A diverse set of vegetation can grow within these zones including cedar, spruce, hardwoods, and wetland vegetation on wetter sites and Douglas-fir, spruce, hemlock and true firs on drier terraces. The extent of the channel migration zones often coincide with the furthest extent of the side-channels. A side-channel may currently be considered a fish-bearing water or it may be a recently abandoned channel as evidenced by the presence of a swale with exposed gravel and cobble, woody debris jams or signs of recent disturbance. The entire channel migration zone width is typically on the order of 10’s of feet for small streams, but can be a few hundred feet on moderate-sized streams.
- (viii) CMZ for unconfined meandering streams. The channel migration zone for unconfined meandering streams can be determined using one of the two following options: Option 1 defines the channel migration zone as the area between two

generally parallel lines representing the amplitude of the meander wavelength as determined from maps or aerial photographs. An example of the application of this Option is attached as Schedule A-3. Option 2 defines the channel migration zone as the annual average rate of bank erosion at meander bends for the reach of stream that exhibits meandering behavior multiplied by the years required to grow functional size large woody debris. An example of the application of this Option is attached as Schedule A-4. As used in this definition "functional large woody debris" means woody debris with a diameter of at least 0.5 of the reach average bankfull depth. The intent of Option 2 is to allow a more accurate representation of the area subject to channel migration using site-specific characteristics. Option 2 will require more expertise to define the channel migration zone because an analysis of the long-term meander rate and reach-averaged bankfull depth needs to be conducted. Option 1 provides a more easily implemented rough approximation of the boundaries of the zone, particularly in cases with multiple ownerships. The Board Manual field guide will provide further guidance on delineating the amplitude of the meander wavelength for Option 1 and determining average meander rates for Option 2. The total channel migration zone width will typically be a few hundred feet.

- (ix) CMZ for unconfined braided streams. The channel migration zone for unconfined braided streams is the same size as the bankfull width of such streams although this often represents a large proportion of, or even the entire, valley floor. The width of the channel migration zone for these streams is usually a few hundred feet.
- (x) CMZ for unconfined avulsing streams. The channel migration zone for unconfined avulsing streams can include much of the valley bottom and is typically hundreds of feet, but can easily be a few thousand feet, in width. Delineation of the boundaries is often determined based upon a review of the associated vegetation and history of past migration.
- (xi) Levees. The channel migration zone of any stream determined pursuant to the preceding subparagraphs may be further limited to exclude the area behind a permanent dike or levee provided such permanent dike or levee was constructed pursuant to appropriate federal, state, and local requirements. As used in this subparagraph, a "permanent dike or levee" is a channel limiting structure that either (1) is a continuous structure from valley wall or other geomorphic structure that acts as an historic or ultimate limit to lateral channel movements to valley wall or other such geomorphic structure and is constructed to a continuous elevation exceeding the 100-year flood stage (1% exceedence flow); or (2) is a structure that supports a public right-of-way or conveyance route and receives regular maintenance sufficient to maintain structural integrity; provided, however, a dike or levee shall not be considered a "permanent dike or levee" if the channel limiting structure is perforated by pipes, culverts or other drainage structures that allow for the passage of any life stage of anadromous fish and the area behind the dike or levee is below the 100 year flood level.

“Convergent headwalls” (or headwalls) means landforms which are teardrop-shaped, broad at the ridgetop and terminate where headwaters converge into a single channel. They are broadly concave both longitudinally and across the slope, but may contain sharp ridges that separate the headwater channels. Convergent headwalls generally range in size from about 30 to 300 acres; slope gradients are typically steeper than 35 degrees and may exceed 45 degrees. Soils are thin because slides are frequent in these landforms. It is the arrangement of bedrock hollows and first-order channels on the landscape that causes a convergent headwall to be a unique mass-wasting feature. The highly convergent shape of the slopes, coupled with thin soils, allows rapid saturation during rainfall and/or snowmelt. The mass-wasting response of these areas to storms, to natural disturbances such as fire, and to forest practices is much greater than is observed on other steep hill slopes in the same geologic settings. Convergent headwalls are also prone to surface erosion. Landslides that evolve into debris flows in convergent headwalls typically deliver debris to larger channels downstream. Channel gradients are extremely steep within headwalls, and generally remain so for long distances downstream. Channels that exit the bottoms of headwalls have been formed by repeated debris flows and have forms and gradients that are efficient at conducting them. Convergent headwalls commonly have debris fans at the base of their slopes.

“Core zone” means (i) for the Eastside, the area between the edge of a Type S or F water and a line 30 feet from the edge of such water (measured on a horizontal distance basis) and (ii) for the Westside, the area between the edge of a Type S or F water and a line 50 feet from the edge of such water (measured on a horizontal distance basis).

“Covered resources” means water quality, native salmonids and certain other fish to be identified by the federal agencies from the attached Schedule H-1, the Columbia torrent salamander (*Rhyacotriton kezeri*), the Cascade torrent salamander (*Rhyacotriton cascadae*), the Olympic torrent salamander (*Rhyacotriton olympian*), the Dunn’s salamander (*Plethodon dunnii*), the Van Dyke’s salamander (*Plethodon vandyke*), the Tailed frog (*Ascaphus truei*) and their respective habitats.

“Deep-seated landslides” means landslides in which the zone of movement is below the maximum rooting depth of forest trees, to depths of tens to hundreds of feet. Deep-seated landslides can vary greatly in size (up to thousands of acres) and activity level and can occur almost anywhere on the hillslope. Deep-seated landslides are usually formed in incompetent materials such as glacial deposits, volcanoclastic rocks, and fault gouges. Commonly, development of a deep-seated landslide begins after a slope has been over-steepened by glacial or fluvial undertowing; however, the initiation of such slides has also been associated with changes in land use, increases in ground-water levels, and the degradation of material strength through natural processes. Movement can be translational, rotational, or complex, range from slow to rapid, and include small to large displacements. Deep-seated landslides in bedrock commonly occur in masses that are relatively weak. These can include bodies in which the rocks themselves are incompetent, such as certain types of clay-rich sediments and volcanics (e.g., some shales and tuffs), or low-grade metallic rocks (e.g., phyllite) or in highly weathered materials, such as deeply weathered rock and saprolite. In other cases, the geologic structure weakens the rock strength; bedding planes, joints, and faults commonly act as planes of

weakness that can become slide surfaces. Deep-seated landslides in glacial deposits are common in thicker glacial deposits, usually where very permeable and impermeable materials are juxtaposed. Impermeable deposits can perch ground water, causing elevated pore-water pressures in the overlying deposits which can then slide out and downward. Groundwater recharge areas for glacial deep-seated slides is the area upslope that can contribute water to the landslide. (This assumes that there is an impermeable perching layer in or under a deep-seated landslide in glacial deposits). It is assumed to be equivalent to the topographically defined sub-basin directly above the active slide. The spatial extent of the groundwater recharge area can be identified in the field using one of several accepted methods as explained in greater detail in the Forest Practices Board Manual. Many deep-seated landslides occur in the lower portions of hillslopes and extend directly into stream channels. In such situations, streams can undercut the landslide toes, promoting further movement; such over-steepened toes can also be sensitive to changes caused by harvest and road construction. On the other hand, deep-seated landslides confined to the upper slopes may not have the ability to deposit material directly into stream channels. The ability of scarps and marginal streams to deliver sediment to waters or structures varies with local topography. Steep marginal streams can be subject to debris-flow initiation.

"Eastside" means north of Mt. Adams, the area in the State of Washington east of the crest of the Cascade Mountains and south of Mt. Adams, the area in the State of Washington east of the ridge line dividing the White Salmon River drainage from the Lewis River drainage and east of the ridge line dividing the Little White Salmon River drainage from the Wind River drainage.

"Edge" of any water means the outer edge of the water's bankfull width or, where applicable, the outer edge of the associated channel migration zone.

"Equipment limitation zone" means the area between the edge of a Type N water and a line 30 feet (measured on a horizontal distance basis) from such edge.

"Fish" means for purposes of this agreement species of the vertebrate classes of Cephalospidomorphi and Osteichthyes.

"High elevation habitat type" means the habitat series on the Eastside ranging from elevations above 5000 feet to the end of the tree line.

"Inner gorges" means canyon walls created by a combination of the downcutting and undercutting action of a stream and mass movement on the slope walls. Inner gorges may show evidence of recent movement, such as obvious landslides, vertical tracks of disturbance vegetation, or areas that are concave in contour and/or profile. In competent bedrock, slope gradients of 35 degrees or steeper can be maintained, but soil mantles are increasingly sensitive to root-strength loss at these angles; slope gradients as gentle as 28 degrees can be unstable in gorges cut into incompetent bedrock. The top of the inner gorge is typically a distinct break in slope but in some places the upper boundary is a subtle zone where the slope becomes markedly steeper or convex downhill. Inner gorge walls can be continuous for great lengths, as along a highly confined stream that is

actively downcutting; or they can be discontinuous, as along a flood-plain channel that is undercutting the adjacent hillslopes in isolated places where the stream has meandered to the valley edge. Inner gorges experiencing mass wasting are likely to deliver sediment to waters or structures downhill. Exceptions can occur where benches of sufficient size to stop moving material exist along the gorge walls but these are uncommon. Inner gorges are distinguished from ordinary steep valley sides; ordinary valleys can be V-shaped with distinct slope breaks at the top, but they commonly do not show evidence of recent movement. In practice, a minimum vertical height of 10 feet should be applied to distinguish between inner gorges and slightly incised streams. The upper boundary of an inner gorge is assumed to be a line along the first break in slope of at least 10 degrees or the line above which slope gradients are typically gentler than 30 degrees.

“Inner zone” for the Westside means the area between a line 50 feet from the edge of a Type S or F water and the inner zone outer boundary. The inner zone outer boundary will be determined based on the size of the affected water and the management option, if any, elected for timber harvest within such inner zone all in accordance with the following:

(A) The outer boundary of the inner zone will be three-fourths of a site potential tree height feet from the edge of the affected water (measured on a horizontal distance basis) where the bankfull width of such water is greater than ten feet and the landowner is not conducting timber harvest within such inner zone utilizing Option 2 (as such option is described in paragraph II.B.4(a)(ii) of Appendix B).

(B) The outer boundary of the inner zone will be two-thirds of a site potential tree height feet from the edge of the affected water (measured on a horizontal distance basis) where the bankfull width of such water is ten feet or less and the landowner is not conducting timber harvest within such inner zone utilizing Option 2 (as such option is described in paragraph II.B.4(a)(ii) of Appendix B).

(C) The outer boundary of the inner zone (measured on a horizontal distance basis from the edge of the affected water) will be determined based upon the Site Class of the land within such inner zone from the following chart where the bankfull width of such water is greater than ten feet and the landowner is conducting timber harvest in such inner zone utilizing Option 2 (as such option is described in paragraph II.B.4(a)(ii) of Appendix B).

<u>Site Class</u>	<u>Outer Boundary of Inner Zone</u>
I	134 ft.
II	120 ft.
III	100 ft.
IV	80 ft.

V 80 ft.

(D) The outer boundary of the inner zone (measured on a horizontal distance basis from the edge of the affected water) will be determined based upon the Site Class of the land within such inner zone from the following chart where the bankfull width of such water is ten feet or less and the landowner is conducting timber harvest in such inner zone utilizing Option 2 (as such option is described in paragraph II.B.4.(a)(ii) of Appendix B).

<u>Site Class</u>	<u>Outer Boundary of Inner Zone</u>
I	134 ft.
II	114 ft.
III	94 ft.
IV	80 ft.
V	80 ft.

“Inner zone” for the Eastside means the area between the outer boundary of the adjacent core zone and a line 75 feet or 100 feet from the edge of the affected water (in each case measured on a horizontal distance basis) as determined in accordance with the following:

(A) The outer boundary of the inner zone will be 100 feet from the edge of the affected water (measured on a horizontal distance basis) where the bankfull width of such water is greater than fifteen feet.

(B) The outer boundary of the inner zone will be 75 feet from the edge of the affected water (measured on a horizontal distance basis) where the bankfull width of such water is fifteen feet or less.

“Mixed Conifer habitat type” means the habitat series on the Eastside ranging from elevations above 2500 feet up to and including 5000 feet.

“Outer zone” means the area, if any, between the outer boundary of the inner zone and a line one site potential tree height in length (measured on a horizontal distance basis) from the edge of the affected water.

“Perennial stream” has the meaning given to such term in paragraph B.1(e)(iii) of Appendix B.

“Placement strategy” means one or more agreed upon strategies for the placement of woody debris in streams. The strategies will consist of standards and guidelines describing types of streams, the nature of the wood, and the manner of placement. Placement strategies will be developed through a cooperative process by the authors of this Report and will be consistent with the hydraulics code so as to avoid the need for

separate permits. The strategies will provide an incentive ratio of one unit deposited to streams for every two units otherwise required to be left. As provided below, the placement strategies may substitute for prescriptions otherwise required by the recommendations set forth in this Report.

"Ponderosa Pine habitat type" means the habitat series on the Eastside ranging from the lower elevation limit of tree growth to elevations not higher than 2500 feet.

"Preferred Species" means, for each of the following habitat types, the following preferred species (in order of priority): For Ponderosa Pine habitat type: all hardwoods, Ponderosa Pine, Douglas Fir and Red Cedar; for Mixed Conifer habitat type: Douglas Fir, Western Larch, Ponderosa Pine, Lodgepole Pine, White Pine and all hardwoods; and for High Elevation habitat type, Red Cedar, Douglas Fir, Western Larch, Englemann Spruce, Lodgepole Pine, True Fir and all hardwoods.

"Priority Areas" means the areas described in paragraph B.4(d)(ii) of Appendix B.

"Public Safety" means reducing the risk to the public at large from snow avalanches, identified in consultation with the department of transportation or a local government, landslides, or debris torrents caused or triggered by forest practices.

"Qualified Expert" means a person with at least (i) either: (A) a Master's degree in geology or geomorphology or a related field or (B) a significant amount of post-graduate course or thesis work or other training in geomorphology or mass-movements; and (ii) an additional 5 years of field experience in the evaluation of relevant problems in forested lands.

"Riparian leave trees" is a term used in relation to the Westside region, and in that context means conifer trees with a diameter breast height of 12 inches or greater, or in the case of trees left to protect a sensitive feature, such trees as are representative of the overstory, canopy trees in or around such sensitive feature (including, where applicable, hardwoods) and which have a diameter breast height of eight inches or greater.

"Riparian management zone" or "RMZ" means (i) the area adjacent to any Type F or S water included within the core, inner and outer zone of such water and (ii) the area adjacent to any Type N water and included within the equipment limitation zone or any area to be left for the protection of a sensitive site or priority areas adjacent to such water.

"Seasonal stream" has the meaning given to such term in paragraph B.1(c)(iii) of Appendix B.

"Sensitive sites" means each of the sites described in paragraph B.4(d)(ii) of Appendix B.

"Site Class" means, as to any land and as to any conifer species, the site class determined based upon the following groupings of site indices:

Westside Region

Site Class	50 Yr. Site Index Range
I	137 +
II	119-136
III	97-118
IV	76-96
V	<75

Eastside Region

Site Class	100 Yr. Site Index Range
I	120 +
II	101-120
III	81-100
IV	61-80
V	<60

For purposes of this definition, the site index at any particular location will be the site index reported by USDA Natural Resource Conservation Service, Washington State soil surveys, and reported in State of Washington Department of Natural Resources Forest Soil Summary Sheets.

“Site potential tree height” means the distance represented by the approximate mid-point of one of five site classes projected to a stand age of 100 years as per the following table

Region	Site Class	Site Potential Tree Height
Westside	I	200
	II	170
	III	140
	IV	110
	V	90
Eastside	I	130
	II	110
	III	90
	IV	70
	V	60

Site potential tree height numbers in the preceding table were derived from Douglas Fir stands. At the request of any of the authors, TFW may assess whether adjustments are appropriate for stands in which other species are dominant.

“Stream-adjacent parallel roads” means roads in an RMZ on a landowner’s property (including roads used by others under easements or cooperative road agreements) that have an alignment that is parallel to the general alignment of the stream. This includes stream crossings where the alignment of the road continues to parallel the stream. It does not include segments of road near streams that are part of a road approach for a stream crossing where the approach is generally perpendicular to the alignment of the stream. It does not include roads that enter the outer portion of a riparian management zone for a short distance if the general alignment of the road is not parallel to the stream. It also does not include federal, state, county or municipal roads that are not subject to forest practices rules, or roads of another adjacent landowner.

“Type S”, “Type F”, or “Type N” waters has the meaning given in paragraph B.1(e) of Appendix B.

“Westside” means north of Mt. Adams the area in the State of Washington to the west of the crest of the Cascade Mountains and south of Mt. Adams, the area in the State of Washington west of the ridge line dividing the White Salmon River drainage from the Lewis River drainage and west of the ridge line dividing the Little White Salmon River drainage from the Wind River drainage.

“Yarding corridors” means a narrow, linear path through a riparian management zone to allow suspended cables necessary to support cable logging methods or suspended or partially suspended logs to be transported through these areas by cable logging methods.

Appendix B

Riparian Strategies

I. Introduction.

- (a) To achieve the overall objectives of this Report, significant changes in current riparian forest management policy are necessary. The goal of riparian management and conservation as recommended in this Report is to achieve restoration of high levels of riparian function and maintenance of these levels once achieved. For Westside forests, this Report specifies riparian silvicultural treatments and conservation measures that are designed to result in riparian conditions on growth and yield trajectories towards what are called "desired future conditions." As used in this report, desired future conditions are the stand conditions of a mature riparian forest, agreed to be 140 years of age (the midpoint between 80 and 200 years) and the attainment of resource objectives. For Eastside forests, riparian management is intended to provide stand conditions that vary over time within a range that meets functional conditions and maintains general forest health. These desired future conditions are a reference point on the pathway to restoration of riparian functions, not an endpoint of riparian stand development.
- (b) The riparian functions addressed by the following recommendations include bank stability, the recruitment of woody debris, leaf litter fall, nutrients, sediment filtering, shade, and other riparian features that are important to both riparian forest and aquatic system conditions. Provisions are made for the conversion and/or treatment of riparian forests which may be understocked, overstocked or uncharacteristically hardwood - dominated while maintaining minimum acceptable levels of function. The diversity of riparian forests across the landscapes is addressed by tailoring riparian prescriptions to the site productivity and tree community at any site. Accommodations are made for forest operations and roads in ways that compensate altered riparian function.

II. Prescriptions. The authors of this Report recommend the adoption of statutes, rules, and regulations as necessary to implement the following prescriptions:

B.1 Stream-typing¹

- (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

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 I 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.

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 current 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-fishbearing.
- (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 high-water 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 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 of perennial Type N waters. Making the determination will require a better understanding of the natural

variability of the spatially intermittent 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."

B.2 Yarding in riparian management zones. Yarding across Type S or F waters will be limited to cable or suspension methods. Logs will be fully suspended above the water unless otherwise provided in the applicable HPA. Variation in topography, landing locations, forest conditions and stream resources across the landscape dictate the need for flexibility in locating and designing yarding corridors. Yarding corridors should be no wider or more numerous than necessary to accommodate safe and efficient transport of logs. Total openings resulting from yarding corridors must not exceed 20% of the stream length associated with the harvest operation. (This percentage is intended to be a limitation on a per harvest unit basis. Subject to adequate funding and prioritization, an adaptive management project will study the cumulative impact of yarding corridors across the landscape.) Generally, yarding corridors are to be located no closer to each other than 150 feet (measured edge to edge) and to have a width of no greater than thirty feet. Safety is a prime consideration in the location of yarding corridors. When changing cable locations, care should be taken to move cables around or clear of the riparian vegetation to avoid damage to such vegetation. As per the current rules, the construction and use of yarding corridors crossing Type S or F waters will require a hydraulics permit. In connection with any harvest operation which include both the development of yarding corridors and other harvest activities, all calculations of basal areas (including basal area components of Stand Requirements) will be determined as if the yarding corridors were constructed prior to any other harvest activities contemplated by such operation. If trees cut or damaged by yarding are taken from excess basal area, such trees can be removed from the inner zone. If trees are cut or damaged by yarding in a unit with insufficient basal area, such trees cannot be removed from the inner zone. Any trees cut or damaged by yarding in the core zone must be left on the site.

B.3 Salvage logging in riparian management zones

- (a) For all purposes of this paragraph B.3, salvage activities will be determined based upon the zone in which the associated tree was initially located. For example, if a tree located in the inner zone is felled by a windstorm and lands in the core zone, salvage of the resulting down log would be governed by the rules applicable to salvage in the inner zone.

- (b) Salvage logging will not be permitted in any channel migration zone or core zone.
- (c) Salvage logging in any inner zone will not be permitted if the landowner (or its predecessor in interest) has conducted any harvest operations (other than prior salvage operations) in such inner zone before the date of the proposed salvage operation and after the date on which the rule package recommended in this Report becomes effective. A landowner may conduct salvage operations in an inner zone if the landowner (or its predecessors in interest) has not conducted any harvest operations (other than prior salvage operations) in such inner zone after the date the rule package recommended in this Report becomes effective provided, however, that all such salvage operations shall meet the following additional requirements: (i) no wood will be allowed to be removed if such wood is between the bankfull widths of the adjacent water; (ii) no down wood may be removed unless the unremoved balance of down wood is sufficient to meet the regional down wood guidelines attached hereto as Schedule B-4; and (iii) the removal of all down wood and the conduct of all other salvage operations shall be done with reasonable care to protect residual undamaged trees within the inner zone.
- (d) Salvage logging in any outer zone will not be permitted if the landowner (or its predecessor in interest) has conducted any harvest operations in such outer zone (other than commercial thinning or partial harvests which have left more than the minimum number of trees required to be left in such outer zone or prior salvage operations) before the date of the proposed salvage operation and after the date on which the rule package recommended in this Report became effective. A landowner may conduct salvage operations in an outer zone if the landowner (or its predecessors in interest) has not conducted any harvest operations in such outer zone (other than commercial thinning or partial harvests which have left more than the minimum number of trees required to be left in such outer zone or prior salvage operations) after the date the rule package recommended in this Report became effective, provided that at the conclusion of such salvage operation, the landowner has left (either standing or down wood) sufficient to meet the outer zone requirements for harvest operations adjacent to the stream were all such wood still standing.

B.4 Prescriptions applicable to harvest and certain other forest practices

(a) Westside Type S and F waters

Forest practices in the riparian management zone of Westside Type S and F waters will be subject to the following prescriptions:

- (i) Except as noted in subclause B.4(a)(vi), no harvest or construction² will be conducted in a core zone.
- (ii) Except as noted below, forest practices in any inner zone must be conducted so as to leave standing sufficient trees in such inner zone and in the adjacent core zone to satisfy the applicable Stand Requirement. If trees can be

² As used in this Appendix, the word "construction" is intended to have a broad meaning and to include the construction of roads, landings, rock quarries, gravel pits, barrow pits, and soil disposal areas.

harvested and removed from the inner zone consistent with the Stand Requirement, the harvest and removal of such trees, if any, must be undertaken either in a manner consistent with the thinning guidelines to be developed in accordance with the implementation process and parameters described on the attached Schedule B-2 (which shall provide for “thinning from below”) (“Option 1”) or in a manner which removes only the trees furthest from the edge of the affected water (“Option 2”). If the landowner elects to employ Option 2, the landowner will leave an additional 20 riparian leave trees per acre in all inner zone areas from which other trees are harvested and removed. Such riparian leave trees will not be counted toward the satisfaction of the Stand Requirement. The Stand Requirement for any site in an RMZ proposed for timber harvest shall be developed in accordance with the implementation process and parameters described on the attached Schedule B-2. The Stand Requirements and thinning guidelines will be developed within 45 days of the date of presentation of this Report. The determination of “Stand Requirements” will be based upon an assessment of the following criteria: site class, species, trees-per-acre; ratio of hardwoods-to-conifer, and average stand age, and basal area. The basal area component may be limited by certain extremes in derived diameters.

(iii) If the landowner elects to employ Option 2 for harvest of timber in the inner zone, in addition to the limitations set forth in B.4(a)(ii) above, the landowner may not harvest any trees which are closer than eighty feet to the edge of the applicable water where the bankfull width of such water is ten feet or less or the Site Class of the land in the inner zone is IV or V, or closer than one hundred feet to the edge of the applicable water where the bankfull width is greater than ten feet and the Site Class of the land in the inner zone is I, II or III. If the eighty-foot limitation (or where applicable, the one-hundred-foot limitation) set forth in this paragraph B.4(a)(iii) reduces the harvest of trees which the landowner would otherwise be entitled to, the landowner may compensate for such additional reduction in harvest by reducing the number of riparian leave trees otherwise required to be left in the adjacent outer zone (on a basal area by basal area basis) by the additional trees required to be left under this paragraph B.4(a)(iii). A second option for compensation involving the removal of trees between the outer edge of the core zone and eighty feet (or where applicable, one hundred feet) from the edge of the affected water in a manner consistent with the thinning guidelines to be developed by the process and parameters described in the attached Schedule B-2 remains an unresolved issue.

(iv) Where the basal area components of the Stand Requirement cannot be met within an inner and core zone due to the presence of a stream-adjacent parallel road in the inner or core zone the following will occur: a determination will be made of (A) the approximate basal area that would have been present in the inner and core zones if the road was not occupying space in the inner zone and (B) the shortfall in the basal area component of the Stand Requirement. Trees containing a basal area equal to the amount determined in subclause (A) in the preceding sentence will be left elsewhere in the inner or outer zone of the stream, or if such zones contain insufficient trees, within one site potential tree height of

other Type F or S waters in the same unit with the objective of maximizing function. The landowner's obligations under this B.4(a)(iv) may be reduced or eliminated through the implementation of an acceptable placement strategy. If the amount determined in subclause (A) of the first sentence of this paragraph exceeds the amount determined in subclause (B) of such sentence, the landowner shall receive credit for such excess to be applied on a basal area to basal area basis against the landowner's obligation to leave trees in the outer zone of such stream or other waters in the same unit.

(v) Forest practices in any outer zone must be conducted so as to leave standing 20 riparian leave trees per acre, provided, that (A) if a landowner agrees to implement a placement strategy, the landowner may reduce the number of trees required to be left in the outer zone to the extent provided in such placement strategy provided, however, that the reduction in the number of riparian leave trees pursuant to this subclause (A) may not go below ten trees per acre; (B) if trees are left in an associated channel migration zone, a landowner may reduce the number of trees required to be left in the outer zone as provided in paragraph B.4(g)(iii) below; (C) if the restrictions imposed by paragraph B.4(a)(iii) would require the landowner to leave more trees in the inner zone than would otherwise be required, the landowner may reduce the riparian leave trees required to be left in the outer zone on a 1:1 ratio (measured by basal area) to compensate for the additional trees left in the inner zone provided, however, that the reduction in the number of riparian leave trees pursuant to this subclause (C) may not go below ten trees per acre; (D) the landowner may reduce the riparian leave trees required to be left in the outer zone as, and to the extent permitted by paragraph B.4(a)(iv) above provided, however, that the reduction in the number of riparian leave trees pursuant to this subclause (D) may not go below ten trees per acre; and (E) subject to future discussions, the landowner may be allowed to reduce the number of riparian leave trees otherwise required to be left in the outer zone if the basal area of large diameter trees is not to be fully credited in the calculations of Stand Requirements. Tree counts are to be satisfied regardless of the presence of a stream-adjacent parallel road in such outer zone. Riparian leave trees to be left in the outer zone will be placed in accordance with the following: the landowner may elect to disperse or clump such trees within the outer zone. If the landowner elects a dispersal strategy, the riparian leave trees must be left disbursed approximately evenly throughout the outer zone. If the landowner elects to clump its riparian leave trees, the landowner will elect to clump such trees in around one or more of the following sensitive features (to the extent available on the landscape): seeps and springs; forested wetlands; topographic locations (and orientation) from which trees currently on the site will be delivered to the stream; areas where riparian leave trees may provide wind throw protection; shallow rotational unstable, or potentially unstable, slopes not of sufficient area to be detected by other site evaluations; archeological or historical sites registered with the Washington State Office of Archeology and Historic Preservation; or sites containing evidence of Native American cairns, graves or glyptic records. If no such sensitive features are present, then clumps should be

well distributed throughout the outer zone in order to accommodate operational and biological concerns.

(vi) Restrictions on forest practices conducted in RMZs set forth above will not preclude or limit (A) the construction and maintenance of road crossings in accordance with applicable rules; or (B) the creation and use of yarding corridors in accordance with paragraph B.2 above.

(b) **Eastside Type S and F waters.** Forest practices in the riparian management zones of Eastside Type S and F waters will be subject to the following prescriptions:

(i) Except as set forth in paragraph B.4(b)(vi) below, no harvest or construction will be conducted in a core zone.

(ii) Permitted forest practices in the inner zone will vary by habitat type.

(A) For inner zones in the Ponderosa Pine habitat type, except as noted in paragraph B.4(b)(vi) below, no timber harvest will be permitted until the basal area of the standing trees (including hardwoods) with a diameter breast height greater than 6 inches in the inner zone is greater than 110 square feet per acre. If this minimum basal area amount is met, forest practices, if any, in such inner zone must be conducted so as to leave standing trees (including, without limitation, hardwoods) sufficient to meet the following requirements: At least 50 trees per acre will be left. Of these 50 trees per acre, 21 will be the largest trees; the remaining 29 will be at least 10 inches diameter breast height (or if 10 inch trees are not available, the largest remaining trees). If, after identifying the 21 largest trees, more than 29 other trees meet the minimum size requirements, the 29 trees will be selected in accordance with the priorities identified in paragraph B.4(b)(iii) below. The minimum basal area to be left in the inner zone will be 60 square feet per acre provided, however, that if the minimum basal area cannot be met with fewer than 100 trees of at least 6 inches dbh, then no more than 100 trees per acre will be required to be left regardless of the basal area.

(B) For inner zones in the Mixed Conifer habitat type, except as noted in paragraph B.4(b)(vi) below, no timber harvest will be permitted until the basal area of the standing trees (including hardwoods) with a diameter breast height greater than 6 inches in the inner zone is greater than 110 square feet per acre, 130 square feet per acre or 150 square feet per acre for sites with a low site index, medium site index, and high site index, respectively. If this minimum basal area amount is met, forest practices, if any, in such inner zone must be conducted so as to leave standing trees (including, without limitation, hardwoods) sufficient to meet the following requirements: At least 50 trees per acre will be left. Of these 50 trees per acre, 21 will be the largest trees; the remaining 29 will be at least 10 inches diameter breast height (or if 10 inch trees are not available, the largest remaining trees). If, after identifying the 21 largest trees, more than 29 trees meet the minimum size requirements, the 29 trees will be selected in accordance with

the priorities identified in paragraph B.4(b)(iii) below. The minimum basal area to be left in the inner zone will be 70 square feet per acre, 90 square feet per acre, and 110 square feet per acre for low productivity sites, medium productivity sites, and high productivity sites, respectively, provided, however, that if the minimum basal area cannot be met with fewer than 120 trees of at least 6 inches dbh, then no more than 120 trees per acre will be required to be left regardless of the basal area. As used herein, “low site index” shall mean a site index for a 100-year tree which is less than 90; “medium site index” shall mean a site index for a 100-year tree which is between 90 and 110; and “high site index” shall mean a site index for a 100-year tree which is greater than 110.

(C) For inner zones in the High Elevation habitat type, except as noted in paragraph B.4(b)(vi) below, Except as noted below, forest practices in any inner zone must be conducted so as to leave standing sufficient trees in such inner zone and in the adjacent core zone to satisfy the applicable Stand Requirement. If trees can be harvested and removed from the inner zone consistent with the Stand Requirement, the harvest and removal of such trees, if any, must be undertaken either in a manner consistent with the thinning guidelines to be developed in accordance with the process and subject to the parameters described on the attached Schedule B-2 (which shall provide for “thinning from below”) (“Option 1”) or in a manner which removes only the trees furthest from the edge of the affected water (“Option 2”). If the landowner elects to employ Option 2, the landowner will leave an additional 20 riparian leave trees per acre in all inner zone areas from which other trees are harvested and removed. Such riparian leave trees will not be counted toward the satisfaction of the Stand Requirement. The Stand Requirement for any site in an RMZ proposed for timber harvest shall be developed in accordance with the process and subject to the parameters described on the attached Schedule B-2. The Stand Requirements and thinning guidelines will be developed within 45 days of the date of presentation of this Report. The determination of “Stand Requirements” will be based upon an assessment of the following criteria: site class, species, trees-per-acre; ratio of hardwoods-to-conifer, and average stand age, and basal area. The basal area component may be limited by certain extremes in derived diameters.

(D) Where the basal area targets (or in the case of the High Elevation habitat type, the basal area component of the applicable Stand Requirement) cannot be met within the inner zone due to the presence of a stream-adjacent parallel road the following will occur:

- Where such stream-adjacent parallel road is adjacent to a Type S or F water with a bankfull width equal to or greater than 15 feet and the edge of the road closest to the water is 75 feet or more from the water, no harvest may occur in the inner zone. All trees on the uphill side of the road out to 100 feet shall also be retained for shade, sediment filtering, and maintenance of other riparian function.

- **Where such stream-adjacent parallel road is adjacent to a Type S or F water with a bankfull width equal to or greater than 15 feet and the edge of the road closest to the water is less than 75 feet from the water, the landowner will implement site specific management activities to replace lost riparian function in consultation with the DNR. Where appropriate, DNR may consult with the other state agencies and affected Tribes. Guidelines for such site specific management activities will be developed and included within the Forest Practices Board Manual. Such management activities could include one or more of the following mitigation or restoration activities: (i) enhanced BMPs for the applicable stream-adjacent parallel road to reduce sediment and ensure stability; (ii) enhanced BMPs for landings which could include provisions for placement, size, and rehabilitation; (iii) additional RMZ prescriptions impacting the other side of the stream on a basal area for basal area basis; and (iv) mitigation in other parts of the channel or watershed on basal area for basal area basis.**
- **Where such stream-adjacent parallel road is adjacent to a Type S or F water with a bankfull width less than 15 feet and the edge of the road closest to the water is 50 feet or more from the water, no harvest may occur in the inner zone. All trees on the uphill side of the road out to 75 feet shall also be retained for shade, sediment filtering, and maintenance of other riparian function.**
- **Where such stream-adjacent parallel road is adjacent to a Type S or F water with a bankfull width less than 15 feet and the edge of the road closest to the water is less than 50 feet from the water, the landowner will implement site specific management activities to replace lost riparian function in consultation with the DNR. Where appropriate, DNR may consult with the other state agencies and affected Tribes. Guidelines for such site specific management activities will be developed and included within the Forest Practices Board Manual. Such management activities could include one or more of the following mitigation or restoration activities: (i) placement strategies based on best available information regarding functional piece size and numbers of pieces for eastern Washington streams; (ii) enhanced BMPs for the applicable stream-adjacent parallel road to reduce sediment and ensure stability; (iii) enhanced BMPs for landings which could include provisions for placement, size, and rehabilitation; (iv) additional RMZ prescriptions impacting the other side of the stream on a basal for basal area basis; and (v) mitigation in other parts of the channel or watershed on a basal area for basal area basis.**

(E) In addition to the foregoing limitations on timber harvest in inner zones, if the inner zone is located in bull trout habitat overlay, no tree located within 75 feet of the edge of the affected water (measured on a horizontal distance basis) and which provides any shade to the affected water may be harvested.

(iii) In the Ponderosa Pine and Mixed Conifer habitat types, after the 21 largest trees are selected, if a landowner has more than 29 remaining trees meeting the minimum size requirement, the landowner shall select the 29 additional trees to be left in the inner zone in accordance with the following priorities: (1) trees which provide shade to the water, (2) trees which lean towards the water, (3) trees of the preferred species, and (4) trees which are evenly distributed across the affected area.

(iv) Except as noted in paragraph B.4(b)(vi) below, forest practices in any outer zone (A) in Ponderosa Pine habitat type must be conducted so as to leave standing 10 dominant or co-dominant trees per acre; (B) in Mixed Conifer habitat type must be conducted so as to leave standing 15 dominant or co-dominant trees per acre; and (C) in High Elevation habitat type must be conducted so as to leave standing 20 dominant or co-dominant trees per acre. Tree counts are to be satisfied regardless of the presence of a stream-adjacent parallel road in such outer zone. Trees to be left in the outer zone of High Elevation habitat type will be placed in accordance with the following: the landowner may elect to disperse or clump such trees within the outer zone. If the landowner elects a dispersal strategy, the trees must be left disbursed approximately evenly throughout the outer zone. If the landowner elects to clump the trees it is leaving, the landowner will elect to clump such trees in around one or more of the following sensitive features (to the extent available on the landscape): seeps and springs; forested wetlands; topographic locations (and orientation) from which trees currently on the site will be delivered to the stream; areas where riparian leave trees may provide wind throw protection; shallow rotational unstable, or potentially unstable, slopes not of sufficient area to be detected by other site evaluations; archeological or historical sites registered with the Washington State Office of Archeology and Historic Preservation; or sites containing evidence of Native American cairns, graves or glyptic records. If no such sensitive features are present, then clumps should be well distributed throughout the outer zone in order to accommodate operational and biological concerns.

(v) Forest practices in any Eastside inner zone must, in addition to the preceding requirements, comply with the following down wood requirements: In Ponderosa Pine habitat type, forest practices, if any, must be conducted so as to leave a minimum of twelve tons of down wood per acre, a minimum of six pieces greater than 16 inches in diameter and 20 feet in length and a minimum of an additional four pieces greater than six inches in diameter and 20 feet long, in each case to the extent such down wood is available on the landscape. In Mixed Conifer habitat type, forest practices, if any, must be conducted so as to leave a minimum of 20 tons of down wood per acre, a minimum of eight pieces greater than 16 inches in diameter and 20 feet in length and a minimum of an additional

eight pieces greater than six inches in diameter and 20 feet long, in each case to the extent such down wood is available on the landscape. In the High Elevation habitat type, forest practices, if any, must be conducted so as to leave a minimum of 30 tons of down wood per acre, a minimum of eight pieces greater than 16 inches in diameter and 20 feet in length and a minimum of an additional eight pieces greater than six inches in diameter and 20 feet long, in each case to the extent such down wood is available on the landscape. Nothing in this subparagraph (v) shall require the recruitment of down wood and in no event will any landowner be required to leave more down wood following any harvest activity than was present prior to the conduct of such harvest activity.

(vi) The restrictions set forth above on forest practices conducted in the RMZ will not preclude or limit (A) the construction and maintenance of road crossings in accordance with applicable rules; or (B) the creation or use of yarding corridors in accordance with paragraph B.2 above.

(c) **Westside and Eastside Type N waters – Equipment limitation zones.** The area between the edge of a Type N water and a line 30 feet (measured on a horizontal distance basis) from such edge will be established as an equipment limitation zone. Landowners must mitigate for the disturbance of more than 10% of the soil within any equipment limitation zone as a result of the use of ground-based equipment, skid trails, stream crossings (other than road crossings) or partially-suspended cabled logs. Such mitigation will be designed for the purpose of replacing equivalent functioning conditions, particularly for the prevention of sediment delivery (e.g. grass seeding, mulching, or the installation of water bars). This prescription applies to both seasonal and perennial Type N waters.

(d) **Additional prescriptions for Westside Type N waters**

(i) Forest practices must be conducted to protect sensitive sites as set forth below:

(A) For Type N perennial streams, a 50-foot, no-harvest buffer (measured horizontally from the edge of such stream) will be established along each side of the stream in accordance with the following: For Type N perennial streams which are 1000 feet or longer, the no harvest buffer will be established along the first 500 feet upstream from the intersection of such Type N water with any Type F or Type S water. For Type N perennial streams which are more than 300 feet and less than 1000 feet in length, the no harvest buffer will be established from the intersection of such Type N water with any Type F or Type S water upstream for a distance equal to the greater of 300 feet or 50% of the total length of such Type N stream. For Type N perennial streams which are 300 feet or less in length, the no harvest buffer will be established for the entire length of such Type N water.

(B) No timber harvest is permitted in an area within 50 feet of the outer perimeter of a soil zone perennially saturated from a headwall seep. As

used herein, a "headwall seep" is a seep located at the toe of a cliff or other steep topography and at the head a Type N perennial stream, which connects to the channel network via overland flow, and is characterized by loose substrate and fractured bedrock with perennial water at or near the surface throughout the year.

(C) No timber harvest is permitted in an area within 50 feet of the outer perimeter of a soil zone perennially saturated from a side-slope seep. As used herein, a "side-slope seep" is a seep within 100 feet of a Type N perennial stream, located on side-slopes of greater than 20 percent, connected to the channel network via overland flow, and characterized by loose substrate and fractured bedrock with perennial water at or near the surface throughout the year. Water delivery to the Type N perennial channel will be visible by someone standing in or near the stream.

(D) No timber harvest is permitted in an area within 50 feet of a side-slope spring. As used herein, a "side-slope spring" is an identified spring within 100 feet of a Type N perennial stream which is the initiation point for such stream and is connected to such stream's channel network via a perennial channelized flow.

(E) No timber harvest is permitted within a 100-foot by 100-foot buffer patch centered on a permanent initiation point of perennial flow for a Type N perennial water. Habitat characteristics of such permanent initiation points include steep channel gradients, very cold water, lack of embedded sediment, and rocky stream-beds.

(F) No timber harvest is permitted within an alluvial fan. As used herein, "alluvial fan" means an erosional landform consisting of cone-shaped deposit of water-borne, often coarse-sized sediments. The upstream end of the fan (cone apex) is typically characterized by a distinct increase in channel width where a stream emerges from a narrow valley. The downstream edge of the fan is defined as the sediment confluence with a higher order channel. The lateral margins of a fan are characterized by distinct local changes in sediment elevation and often show disturbed vegetation. For the purposes of this Report, alluvial fans do not include features that otherwise meet this definition, but were formed under climatic or geologic conditions which are not currently present.

(G) No timber harvest is permitted within a 100-foot by 100-foot buffer patch centered on the point of intersection of two or more Type N perennial streams.

(ii) None of the limitations on harvest in or around sensitive sites set forth in paragraph B.4(d)(i) above will preclude or limit (A) the construction and maintenance of road crossings in accordance with applicable rules; or (B) the creation and use of yarding corridors in accordance with paragraph B.2 above in sensitive sites and the related buffers; provided, however, that to the extent

reasonably practical, the landowner will (1) avoid creating yarding corridors or road crossings through sensitive sites (and related buffers); and (2) avoid management activities which would result in soil compaction and loss of protective vegetation and sedimentation in perennially moist areas. Where yarding corridors or road crossings through sensitive sites and their buffers cannot reasonably be avoided, the landowner will mitigate by expanding the area to be protected around the sensitive site by an area equivalent to the area disturbed or by providing comparable functions through other management initiated efforts. Landowners will leave as additional buffer around any sensitive site, the number of acres (including partial acres) occupied by an existing, stream-adjacent parallel road within the sensitive site's required buffer area.

(iii) In connection with any forest practices adjacent to a Type N perennial stream, the landowner shall identify such additional priority areas having a width of 50 feet (on each side of the stream) measured on a horizontal distance basis adjacent to such stream, if any, as may be necessary so that the identified priority areas and the areas set aside as buffers for sensitive sites for such stream include at least 50% of the length of the stream. The landowner shall select the necessary priority areas, if any, in accordance with the following priorities: (1) low gradient areas, (2) perennial stream reaches of non-sedimentary rock with gradients greater than 20 percent in the tailed frog habitat range, (3) hyporheic and groundwater influence zones, and (4) areas further downstream from other areas. Except for the construction and maintenance of road crossings and the creation and use of yarding corridors, no timber harvest shall be allowed in the selected priority areas. Landowners will leave additional acres equal to the number of acres (including partial acres) occupied by an existing, stream-adjacent parallel road within a selected priority area.

(iv) Certain additional restrictions (phase II restrictions) for the protection of amphibians may be added after 10 years based upon research and monitoring. Any such changes shall be processed in accordance with the adaptive management procedures described in Appendix L.

(e) Additional prescriptions for Eastside Type N waters

(i) In connection with any application for forest practices adjacent to a Type N perennial stream, the landowner shall identify one of two different management strategies for areas within 50 feet (measured on a horizontal basis) of the edge of such stream: a partial cut or a clear cut strategy. Subject to the limitations set forth below, the landowner may elect different strategies for different areas covered by a single permit or within a single harvest unit.

(A) In areas designated as partial cut areas, the landowner may conduct forest practices as if the basal area target and, in the case of the High Elevation habitat type, the basal area component of the Stand Requirement, applicable to the inner zone of an Eastside Type F water located in the same habitat type (i.e. Ponderosa Pine, Mixed Conifer, or High Elevation) were applicable to such buffer

area. Where possible, basal area requirements must be met even if such buffer contains a stream-adjacent parallel road. In addition to satisfying such basal area requirements, a minimum of the 10 largest trees per acre will be left after harvest. (The 10 largest trees will be included in the determination of the basal area.) In selecting the trees, if any, that need to be left to satisfy the remaining basal area requirement after the 10 largest trees are left, the landowner will select trees in accordance with the following priorities: (1) trees that maintain streambank stability, (2) trees that provide shade to the stream, (3) trees that lean towards the water, (4) trees that are of the preferred species, and (5) trees that are evenly distributed over the affected area.

(B) Consistent with the restrictions relative to equipment limitation zones, in areas designated for the clearcut strategy, the landowner may elect to clearcut an area of the buffer provided that stream-side boundary of such area does not exceed 30 percent of the stream reach in the harvest unit, does not exceed 300 continuous feet in length, does not occur within 500 feet of the intersection of the Type N perennial stream and any Type F or S water and does not occur within 50 feet of a sensitive site. If the landowner elects to clearcut a portion of the buffer, an equal portion, measured by area, must be simultaneously designated as a no-cut zone along the edge of the Type N stream. No timber harvest will be permitted in the designated no-cut zone.

(C) Any selection of a partial cut or clearcut strategy for a particular area will remain in place until July 1, 2051. If the landowner elects a clearcut strategy, any selection of clearcut and no-cut zones will likewise remain in place until July 1, 2051. If after selecting a partial cut or clear cut strategy a landowner transfers title to the harvest unit, the landowner will be required to notify the new owner of the prior election and of the resulting continuing restrictions on the harvest unit. A copy of such notice will be delivered to, and maintained by, the DNR.

(ii) Riparian prescriptions for Type N waters on the Eastside will be adjusted as follows when stream-adjacent parallel roads are located within the fifty foot zone described in subclause B.3(e)(i) above and the required basal area target (or, in the case of the High Elevation habitat type, the basal area component of the Stand Requirement) cannot be met due to the presence of such road. When the road is 30-49 feet (measured on a horizontal distance) from the edge of the stream, the landowner will retain a total of one hundred total feet of riparian zone (total width measured on a horizontal basis and taking into account both sides of the affected stream), located in such a manner as to provide maximum functions for non-fish bearing streams. Location of such riparian zone will be based upon a consideration of the following factors: the area between the streamside-edge of the road and the stream channel is, absent other considerations, to be preferred. Other relevant factors include the area that provides the most shade to the channel is desired and the area where trees are most likely to deliver to stream channel. For example, if the road is 35 feet from the stream channel and the road is

occupying 15 feet of the riparian zone, the 15 feet of road could be mitigated by leaving an additional 15 feet on the other side of the stream or outside the road, whichever provides shade or large woody debris depending on the needed function of the stream. When the road is less than 30 feet from the edge of the stream, the prescriptions set forth above will apply but will be adjusted so as to ensure that basal area targets and components will be met by retaining all trees between the streamside-edge of the road and the edge of the stream.

- (f) **Shade restrictions.** The shade rule provides a methodology for determining the amount of shade that must be provided to a segment of stream within a proposed harvest unit in order to avoid non-compliance with temperature standards for that stream. The methodology is sensitive to changes in the temperature standards so that if the standards change, the output of the methodology will change. Current rules limit the application of the methodology by limiting the distance from the stream within which restrictions on tree removal can be enforced. This limitation will be removed. No tree may be harvested from the inner zone of any Type S or F water if according to the methodology, it is providing shade to the stream necessary to maintain compliance with temperature standards. If a landowner elects to remove any tree within 75 feet of any Type S or F water, the landowner must demonstrate in accordance with the methodology set forth in the Forests Practices Board Manual that the removal of such tree would not be contrary to the restrictions of this paragraph B.4(f). This shade rule must be satisfied in addition to satisfying the other various restrictions set forth above for management in the riparian management zones. The shade rule must be satisfied whether or not the inner zone includes a stream-adjacent parallel road. Nothing herein shall preclude or limit the harvest of shade trees in connection with the construction and maintenance of road crossings or the creation and use of yarding corridors.

(g) **Channel Migration Zones**

(i) No harvest, construction or salvage will be permitted within the boundaries of a channel migration zone except for the construction and maintenance of road crossings in accordance with applicable rules and the creation and use of yarding corridors in accordance with paragraph B.2 above.

(ii) At the request of a landowner, the State of Washington will acquire fee title (or at the landowner's option, a conservation easement) to any productive forest land capable of growing a merchantable stand of timber within the channel migration zone of an unconfined avulsing stream (as such term is defined in the definition of "channel migration zone" in Appendix A) (including, in each case, the land and the associated timber) provided, however, that the State may decline to purchase any such interest if it is subject to any unacceptable liabilities (e.g. liability for the clean-up of hazardous substances). Payment for the fee title (or, where applicable, a conservation easement) shall be based on a presumed value equal to: (a) the median value of commercial forestlands under the land value tables used for property tax purposes under RCW 84.33.120, plus (b) the cruised volume of any timber located within the channel migration zone that is 12 inches or larger in diameter at breast height times the median value of timber of the same

species under the tables used for timber harvest excise purposes under RCW 84.33.091. Funding for the acquisition or easements must be identified and the transaction must be completed within a reasonable time. Subject to the restrictions contained in subclause B.4(g)(i) above, agencies, tribes, and private landowners may elect to work together to develop management options within these CMZ's in lieu of public acquisition. The State's obligations under this subparagraph are subject to the availability of funding. The authors agree to support approval of all necessary funding for this program.

(iii) The basal area of all timber, including hardwood, within any CMZ can offset riparian leave tree requirements in the outer zone according to the following principles:

(A) Offsets will be measured on a basal area for basal area basis.

(B) Conifer in a CMZ equal to or greater than 6" dbh will offset conifer in the Outer Zone at a 1:1 ratio.

(C) Hardwood in a CMZ equal to or greater than 10" dbh will offset hardwood in the Outer Zone at a 1:1 ratio.

(D) Hardwood in a CMZ equal to or greater than 10" dbh will offset conifer in the Outer Zone at a 3:1 ratio.

(h) Notwithstanding any of the foregoing, riparian management prescriptions, including riparian buffers, shall be subject to review and adjustment, including on a regional basis, based on the best available science under the Adaptive Management Process provided herein. Regional adjustments may include information developed through watershed analysis within the region.

III. Voluntary commitments. The authors recommend further review of, and where necessary would support revisions to, guidelines distinguishing between Eastside "safe" and "unsafe" snags.

Appendix C

Unstable Slopes

I. Introduction. The goal of management on unstable slopes as described in this Appendix will be to prevent or avoid an increase or acceleration of the naturally occurring rate of landslides due to forest practices.

II. Prescriptions. The authors of this Report recommend the adoption of statutes, rules, and regulations as necessary to implement the following prescriptions:

C.1 Overview of revised process

- (a) DNR will screen each forest practice application for risks associated with unstable slopes. In connection with the exercise of their current rights to evaluate and comment on such applications, affected Tribes may also screen forest practices applications for risks associated with unstable slopes.
- (b) Applications identified as including forest practices on potential unstable slopes will be subject to field verification by a DNR forester under the supervision of a qualified expert. Affected Tribes will be notified in advance of field verification and invited to participate in the field review. The DNR forester will be asked to field verify the proposed forest practices to determine (i) if the proposed application covers any areas including the following landforms: (A) inner gorges, convergent headwalls and bedrock hollows steeper than 35° (70%); (B) toes of deep-seated landslides with slopes steeper than 33° (65%); (C) groundwater recharge areas for glacial deep-seated landslides; or (D) the outer edge of a meander bend along a valley wall or high terrace of an unconfined meandering stream (as such term is defined in the definition of “channel migration zone” in Appendix A); (ii) if the proposed application covers any areas (other than the areas described in C.1(b)(i) above) containing indicators or other features suggesting the presence of unstable slopes, which cumulatively evidence the presence of unstable slopes and which are identified on the list to be prepared by the authors as described in paragraph III(b) of this Appendix C; and (iii) if any areas are identified in subclauses (i) or (ii) above, whether such areas have a potential to deliver sediment and water to a public resource or to threaten public safety. The evaluation can include but need not be limited to professional knowledge of the area, reports or other information provided by the applicant or other resources such as soils, geologic or hazard zonation maps.
- (c) Potential unstable slope areas described in C.1(b)(i) and (ii) above must be shown on forest practices application maps if such areas are known to the applicant.
- (d) Where the applicant proposes forest practices in any area described in C.1(b)(i), the applicant may elect to provide DNR with a geotechnical report which will describe the area’s potential for failure and potential to deliver to a public resource or to threaten public safety. If the applicant elects not to provide a geotechnical report and the DNR

field review identifies the affected landform as one of the landforms described in C.1(b)(i) above and concludes that such landform has a potential to deliver to a public resource or to threaten public safety, the application will be processed as a Class-IV Special application.

- (e) Unless withdrawn by the landowner, applications which are determined (based upon the screening process, in-field review and any geotechnical report submitted) to involve forest practices on landforms (i) which are likely to be unstable; (ii) which have a potential for failure, and (iii) which, if such failure occurred, would have the potential to deliver sediment and water to a public resource or threaten public safety will be processed as Class IV-Special applications. Otherwise, the application will be processed as a Class III forest practice.
- (f) If the application is to be processed as a Class IV-Special application, the applicant will be required to provide a checklist, and additional information in accordance with the SEPA guidance described below.
- (g) SEPA guidance will be set forth in the rules and will require that the applicant provide the DNR with an analysis by a qualified expert that identifies:
 - (i) the likelihood that the proposed forest practices would result in the failure of the identified potential unstable slopes,
 - (ii) the likelihood of delivery to public resources (or in a manner which would threaten public safety) were such slopes to fail, and
 - (iii) any mitigation for the identified risks.

The SEPA guidance will also provide assistance to DNR on how to review the completed proposal with its qualified expert with a goal of keeping mass-wasting that delivers to public resources (or in a manner which would threaten public safety) at near natural rates and how to make the required threshold determination. DNR will review the application with its qualified expert and make a threshold determination as to whether the proposed forest practices (i) are likely to increase the probability of a failure that would deliver sediment and debris to public resources (or in a manner which would threaten public safety) and (ii) are likely to cause significant adverse impacts. If so, the proposed forest practice is likely to have a probable significant adverse impact on the environment and will require a revised application with technical analysis and solutions sufficient for DNR to issue a determination of non-significance or the preparation of an EIS. When an EIS has been triggered, in addition to assessing the risk of mass-wasting that results in the delivery of sediment to public resources, the EIS process will be used to develop and implement measures that are likely to prevent a significant increase in the risk of mass-wasting that results in delivery of sediment to public resources. The Tribes will be afforded the opportunity to participate in the development of such measures.

- (h) As per current rules, DNR's threshold determination will be subject to a 15-day public comment period.

- (i) As per current rules, after completion of all required compliance with SEPA, DNR will approve, approve with conditions (i.e. specific prescriptions for activities on unstable slopes) or disapprove the proposed application.
- (j) Notwithstanding the preceding description, a proposed forest practices application will not be processed as a Class IV-Special permit as a result of unstable slopes if (i) an application is filed seeking a permit for forest practices to be conducted in a Watershed Administrative Unit which is subject to an approved watershed analysis, (ii) the application seeks a permit to conduct forest practices in accordance with an approved prescription from such watershed analysis (as the same may have been modified through the 5-year review process), and (iii) the applicable watershed prescription is a specific prescription, such as a “no-harvest” prescription or a prescription which requires the retention of certain numbers of trees (in contrast to a prescription which requires additional analysis³). Conversely, if the applicable watershed prescription included in any application is a prescription that requires additional analysis, the preceding procedures governing unstable slopes will apply to such application.

III. Voluntary commitments. The authors will commit to undertake the following additional actions:

- (a) During the six months after delivery of this Report, the authors will work through their regional TFW groups to identify other landforms in specific areas that are known (based on field verified data and best available science) to contain high hazard slopes and that are not included in the landforms described in C.1(b)(i) above. Once identified these landforms will be treated the same as the landforms identified in subclause C.1(b)(i). These landforms will be specifically described in the implementing rules or statutes. These regional groups will also look at soil covered planar slopes to determine gradient breaks, if any, above which such slopes become high hazard slopes.
- (b) During the six months after delivery of this Report, the authors will work through their TFW regional groups to identify indicators and features (based on field verified data and best available science) that will aid in the determination of the presence of unstable slopes. These indicators and features will be specifically described in the implementing rules or statutes. (c) In addition to adaptive management projects described on Schedule L-1 attached to Appendix L, and subject to adequate funding and prioritization, the authors will support the development of improved screening methods for potential unstable slopes. These screening efforts will include:

- (i) A project to identify the best available topo/geographic model to flag landforms that have significant potential to initiate shallow rapid landslides (CMER Project 10 products are anticipated to be completed by June 1999)

- (ii) A project to develop a deep-seated slide screen for use in identifying and assessing sensitive geologies around the state that require special considerations for mass wasting potential.

³ “Additional analysis” does not include the need for an expert to determine the presence of particular landforms if once identified there are specific prescriptions already established.

- (iii) A project to develop a 10 meter digital elevation model (DEM) data statewide. (This data will improve the accuracy of results from slope stability predictive models and facilitate on-the-ground applications. The data will also be used for water typing accuracy.)
- (d) The authors will provide training for their respective field resource managers to improve their ability to identify potentially unstable slopes in the field and to clarify the important features and indicators to be considered during in-field verification of potentially unstable slopes.
- (e) The authors will develop a method and guidance document similar to the mass-wasting module found in the Forest Practices Board Manual for use by qualified experts in making SEPA assessments with respect to potentially unstable slopes.
- (f) The authors will support the efforts of a team of geologists to map the potentially unstable slopes of the state. The maps would be used to assist in refining the initial screening for potential high-hazard areas. Once mapped, these areas would be substituted for the landforms described in C.1(b)(i).

Appendix D

Roads

I. Introduction.

- (a) The policy objectives for the management of roads will be to maintain or provide passage for fish in all life stages, to provide for the passage of some woody debris, to meet water quality standards, to control sediment delivery, to protect streambank stability, and to divert most road run-off to the forest floor.
- (b) To achieve these policy objectives, the rules and related Forest Practices Board Manual will be amended to provide for the following elements: inventorying and assessing the condition of existing roads⁴ and orphan roads;⁵ planning and implementing the proper maintenance or abandonment of existing roads; repairing existing roads; minimizing construction of new roads; building new roads to higher standards; and removing artificial barriers to passage of fish at all life stages.

II. Prescriptions. The authors of this Report recommend the adoption of statutes, rules, and regulations as necessary to implement the following prescriptions:

D.1 Road maintenance and abandonment plans

- (a) Road maintenance and abandonment plans will be mandatory for all private and state forest lands. These road plans will inventory and assess the condition of all roads (including orphan roads) and provide for (i) the routine, on-going maintenance of existing roads (which term does not include orphan roads) including maintenance plans to address storm events; (ii) the repair of roads (other than orphan roads) and related fish passages in substandard condition; and (iii) the abandonment of certain roads (other than orphan roads).
- (b) Each year during the first five years after the adoption of the rule package recommended in this Report, landowners will submit road maintenance and abandonment plans covering approximately 20 percent of their property base (or more) to DNR for approval. Landowners will prioritize their preparation of road plans as set forth below. In all events, landowners will have submitted road maintenance and abandonment plans covering all existing roads on their property to DNR for approval within five years of the adoption of the rule package recommended in this Report.
- (c) Road maintenance and abandonment plans will be made available for review by Tribes, other state agencies and TFW regional groups in accordance with existing rules. Based upon its review of each proposed road plan and the comments provided by other persons, DNR will approve or reject the plan within 45 days.⁶ WDFW will approve or reject any

⁴ References to "existing roads" in this Appendix are not intended to include orphan roads.

⁵ Orphan roads are roads constructed before 1974 and not used since 1974 for forest practices.

⁶ Approval of a landowner's road maintenance and abandonment plan may lead to separate five-year HPA and FPA permits for implementing the plan if state agencies have adequate funding to oversee.

related HPAs at the same time. Specifically, WDFW will use its current authority to issue 5-year HPA's. Road maintenance and abandonment plans will be submitted in the form of a Forest Practice Application to meet the requirements of a Hydraulics Project Application and DNR and WDFW's review periods will run concurrently. To assist in meeting this time frame, landowners will cooperate where appropriate and practical to pre-submit large and complex road and maintenance plans. As with many recommendations set forth in this Report, WDFW's ability to perform in accordance with the commitments under this subclause (c) will depend on adequate agency funding. The authors agree to support proposed statutory changes if necessary to permit the issuance of 5-year HPAs.

(d) Road maintenance and abandonment plans to be submitted by landowners will be prepared in accordance with the following standards:

(i) Complete implementation of the road maintenance and abandonment plans will be accomplished within 15 years after the adoption of the rule package recommended in this Report. Plans should provide that implementation efforts will proceed approximately evenly (taking into account costs, habitat, road miles and risks) over such 15 year-period or will be weighted more heavily toward the earlier years.

(ii) Road maintenance and abandonment plans will generally be developed for entire road systems or basins within an individual ownership at one time. Landowners will use the following priorities for determining which road systems or basins within its ownership will be implemented first:

- Basins containing, or road systems potentially affecting, waters which either contain a fish which is listed as threatened or endangered under federal or state laws⁷ or a water body listed on the then current 303(d) water quality impaired list.
- Basins containing, or road systems potentially affecting, sensitive geology/soils and/or areas with a history of slope failures.
- Road systems or basins where other restoration projects are in progress or may be planned coincident with the implementation of the proposed road maintenance and abandonment plan.
- Road systems or basins likely to have the highest use in connection with future forest practices.

(iii) Within any selected basin or road system, landowners will use the following priorities for determining which road repair and maintenance activities will be implemented first:

- Repair or maintenance work to improve fish passage (beginning on roads affecting the most habitat first, generally starting at the bottom of the basin and working upstream).
- Repair or maintenance work to limit sediment delivery/mass wasting in identified areas. Guidance developed from experience obtained from previous application of the watershed analysis surface erosion module for roads should be considered. (Areas where sediment delivery or mass wasting will most likely affect salmon habitat or bull trout habitat overlay will be given highest priority.)
- Repair or maintenance work to disconnect road drainage from streams.
- Repair or maintenance work on stream-adjacent parallel roads with a particular emphasis on eliminating water and sediment delivery from the road to the stream.
- Repair or maintenance work to improve hydrologic connectivity (i.e. to minimize interruption of surface water drainage, the interception of subsurface water and the pirating of water from one basin to another).
- Repair or maintenance work which can be undertaken with the maximum operational efficiency.

(iv) Each road maintenance and abandonment plan will provide for repairs and maintenance work to be performed in accordance with the road maintenance and abandonment section of the Forest Practice Board Manual. Road plans need not provide for the replacement of culverts functioning with little risk to public resources even if such culverts are not consistent with the requirements for the installation of new culverts (i.e. the requirement for a 100-year flood standard). Culverts which were legally installed, properly maintained, and which are capable of passing fish will not be required to be replaced and brought up to new standards until the end of such culvert's functional life unless otherwise recommended by WDFW. If WDFW recommends removal of such culverts, the cost of such removals will be paid through a public-private cost-sharing program. Any new culverts being installed and any culverts being replaced must be installed to the standards outlined in the Forest Practices Board Manual.

(v) Road maintenance and abandonment plans will address sediment delivery from roads and stream bank stability in connection with stream-adjacent parallel roads. Stream-adjacent parallel roads are among the highest priorities to be addressed in road maintenance and abandonment plans, particularly in

connection with the elimination of water and sediment delivery from the road to the stream.⁸

(vi) Road maintenance and abandonment plans will require landowners who in the regular course of road maintenance encounter down wood that has fallen on and is blocking vehicle passage on stream-adjacent parallel roads to remove that portion of the wood located in the roadway and place such wood on the side of the road closest to the adjacent water.

(vii) To the extent practical while avoiding significant disturbance of sediment, in connection with maintenance activities, 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.

- (e) Landowners will submit annual progress reports on planning and implementation to DNR and TFW. Along with the annual update to each plan, "as-builts" will be forwarded to DNR (preferably in digital form) so that the GIS transportation layer can be updated. The following data will be kept by DNR from data submitted by landowners and summarized on an annual basis: miles of road under plans; miles of abandonment, miles of active and orphan roads; miles of fish passage opened; and number of fish-bearing stream crossings replaced. The current annual review of road maintenance and abandonment plans by DNR and others will be continued.
- (f) Once approved, road maintenance and abandonment plans will be the obligation of the existing landowner and any person acquiring the affected lands from such landowner. If a new landowner chooses to revise the previous landowner's plan, the revised plan must be consistent with the requirements of Paragraph D.1(d) above, reviewed by TFW and approved by DNR. If a landowner with an approved road maintenance and abandonment plan transfers lands covered by such plan prior to completing the implementation thereof, the land owner must provide the acquirer of such lands with notice of the road maintenance and abandonment plan applicable to the lands being transferred and with a notice identifying the continuing obligations in respect of such transferred land. A copy of such notice will be delivered to, and maintained by DNR. Thereafter all obligations to implement the road maintenance and abandonment plan on the transferred lands will be the obligation of the transferee and will cease to be an obligation of the transferor.

⁸ When evaluating these roads the following will be considered: Is the road needed any longer for management or access? Does the cost of maintaining the road exceed the cost of relocating it away from the stream? What means are available to minimize the impact of the road? What opportunities are available to replace the functions impaired by the presence of the road? Possible means include the reduction of sediment production from the surface, ditching, cutting slope, preventing sediment delivery by improving cross drainage or other means and sidecast pull back or fill-slope revegetation. [This statement will be included the road maintenance and abandonment section of the Forest Practices Board Manual.]

D.2 New road construction.

- (a) New road construction will be performed in accordance with road construction prescriptions which will be developed and which will be substantially similar to those described on the attached Schedule D-1 and the Forest Practices Board Manual and HPA requirements for crossings of Type F and S waters.⁹
- (b) If new road construction within 200 feet of a Type S water requires preparation of a checklist in compliance with SEPA, specific SEPA guidance to the DNR, landowner and local government will apply. Such road construction will not constitute a Class IV-Special forest practice unless required to be so classified for some other reason.¹⁰
- (c) New stream-adjacent parallel roads cannot be built in RMZ's unless the landowner adequately demonstrates to the DNR that alternative options for road construction would likely cause greater damage to public resources, as appropriately documented. New Type F stream-adjacent parallel roads will be constructed under Class III-30 status, and will require on-site review by an I.D. team. The I.D. team will include appropriate federal representatives to determine compliance with the Endangered Species Act. If such roads or road segments are constructed, or subjected to major reconstruction, in such riparian management zones, the landowner will be obligated to mitigate for the affected road or road segment in accordance with a mitigation sequence guidance to be developed and to be substantially similar to the guidance attached hereto as Schedule D-2 or in accordance with an approved maintenance and abandonment plan, where applicable. As used in this subsection, "major reconstruction" means any road reconstruction involving the widening or realignment of the road.
- (d) Roads will not be constructed in bogs or low-nutrient fens.

D.3 Orphan roads. An inventory and assessment of orphan roads will be required to be completed in the first five years after the adoption of the rule package recommended in this Report. Five years after the adoption of the rule package recommended in this Report, when the extent of any problems associated with orphan roads is known, the authors of this Report will evaluate if the hazard-reduction statutes (RCW 76.09.300 through .320) are still needed and if funds for cost-sharing are needed to effect repair or abandonment of orphan roads.

III. Voluntary commitments. The authors will commit to undertake the following additional actions:

- (a) An annual TFW regional meeting will be held to exchange information on the nature and timing of road and stream restoration anticipated to occur within the next year by WRIA.

⁹ Construction standards related to sediment and water delivery to stream network need improvement. New culverts will meet a 100-year flood standard, allowing all fish and some woody debris to pass through. The authors agree that the goal is to eventually build an outcome based system. The authors also agree that this should be tabled until at least one year from now to before beginning to write outcome based rules.

¹⁰ SEPA guidance to be developed regarding new road construction within 200 feet of Type S water and other circumstances in which forest practices may be required to comply with SEPA other than as a result of being classified as a Class-IV forest practice.

This will facilitate finding out what is going on both above (USFS) and below (counties) private landowners to maximize restoration efforts and minimize duplication of roads.

- (b) The authors of this Report will use an adaptation of WDFW/DOT training to determine what constitutes a fish blockage.
- (c) A recognition program for landowners with exceptionally well-maintained roads will be instituted.
- (d) Road density is an indicator of potential sediment and water delivery. The number of new roads built needs to be minimized through cooperative efforts including, but not limited to, current efforts to look at alternative harvest systems which could reduce dependence on high road densities. DNR and the landowners have committed to looking at cost-effective alternative harvest systems. The authors recommend that landowners consider abandonment as one option for roads no longer needed or too expensive to maintain. The authors of this Report also support better funding for the green dot program, which designates which roads are to be closed or open. It is recommended that the green dot program consider not only closure for wildlife purposes but also closures to protect against sediment delivery to streams based on the ability of a road to withstand public use at the time of year most likely to be impacted.
- (e) Training programs will be established to train operators on proper road maintenance and construction standards.

Appendix E

Pesticides

I. Introduction.

- (a) Use of pesticides (as currently defined) will be managed to meet water quality standards and label requirements and to avoid harm to riparian vegetation.
- (b) The authors recognize that zero drift and zero entry of aerially applied forest pesticides into water is a goal toward which forest operators should continue to strive. However, with current technology and operational needs, it is not practical to achieve zero drift. Recognizing this, the rules and forest practices board manual will be amended to implement best management practices designed to eliminate the direct entry of pesticides to water (defined as the entry of medium to large droplets), while minimizing off-target drift. In addition, they will be revised to minimize entry into riparian zones at levels that would cause significant damage to riparian vegetation.

II. Prescriptions. The authors of this Report recommend the adoption of statutes, rules, and regulations as necessary to implement the following prescriptions:

E.1 Aerial application of pesticides

- (a) To keep pesticides out of water and wetlands, a buffer will be left on all typed waters and Type A and B wetlands, as set forth on the following table. Dry stream segments (i.e., with no surface water) do not require a buffer. To protect riparian vegetation, pesticides will not be applied to the core zone or inner zone of any Type S or F water or to wetland management zones. In addition, operators will maintain an offset from the outer edge of the inner zone and wetland management zones as set forth on the following table. (The buffer and offset widths may or may not overlap, and the distance of application must be whichever is the greater distance from the water or Type A or B wetland, for the applicable conditions.) Aerial application of pesticides in and around Type N waters and Type B wetlands will also be limited as provided in the following table. These application requirements do not apply to Bt. When applying Bt, the operator will be required to meet all label requirements.

Buffers on Type N Streams with flowing waters and Type B Wetlands <5 acres

	Wind	
	Favorable	Calm or Unfavorable
Nozzle Type	Buffer on water or wetland	Buffer on water or wetland
Regular Nozzle	50 feet	100 feet
Raindrop Nozzle	50 feet	70 feet

Buffers on Type “S” and “F” Streams

Nozzle Type	Application Height	Wind			
		Favorable		Calm or Unfavorable	
		Buffer on water	Offset from IZ	Buffer on water	Offset from IZ
Regular Nozzle	Low ($\leq 16'$)	Width of the inner zone	As needed for safety	100' or the inner zone, which is greater	50 feet
	Medium (17-50')	Width of the inner zone	As needed for safety	250'	N/A
	High (51-65')	Width of the inner zone	As needed for safety	325'	N/A
Raindrop Nozzle	Low ($\leq 16'$)	Width of the inner zone	As needed for safety	Width of the inner zone	20 feet
	Medium (17-50')	Width of the inner zone	As needed for safety	Width of the inner zone	20 feet
	High (51-65')	Width of the inner zone	As needed for safety	125' or the inner zone, whichever is greater	20 feet

Buffers on Type A and B Wetlands

Nozzle Type	Application Height	Wind			
		Favorable		Calm or Unfavorable	
		Buffer wetland	Offset from WMZ	Buffer wetland	Offset from WMZ
Regular Nozzle	Low ($\leq 16'$)	Width of the WMZ	As needed for safety	150'	N/A
	Medium (17-50')	Width of the WMZ	As needed for safety	250'	N/A
	High (51-65')	Width of the WMZ	As needed for safety	325'	N/A
Raindrop Nozzle	Low ($\leq 16'$)	Width of the WMZ	As needed for safety	Width of the WMZ	20'
	Medium (17-50')	Width of the WMZ	As needed for safety	Width of the WMZ	20'
	High (51-65')	Width of the WMZ	As needed for safety	125' or width of the WMZ, whichever is greater	20'

- (b) Operators applying aerial pesticides will apply the initial swath parallel to the buffer strip identified in the preceding table unless a deviation is approved in advance by the DNR. Drift control agents shall be required adjacent to buffer strips.
- (c) Operators applying aerial pesticides will use a bucket or spray device capable of immediate shutoff.
- (d) Operators applying aerial pesticides will shut off spray equipment during turns and over open water.
- (e) Operators applying aerial pesticides will apply the pesticides so as to leave the greater of the distances provided in the table set forth in paragraph E.1(a) under the column labeled "Buffer on Water or Wetland" or a 200 foot buffer strip around residences and 100 foot buffer strip adjacent to lands used for agriculture unless such residence or farmland is owned by the forest landowner or the aerial application is acceptable to the resident or landowner.

E.2 Ground application of pesticides with power equipment. Ground application of pesticides with power equipment will not be permitted within the core zone of Type S and F waters, unless prescribed for hardwood conversion or as necessary to meet requirements for noxious weed control. In any event, operators are to leave a 25-foot buffer strip on each side of Type A or B wetlands and all other surface waters; provided, however, that dry stream segments (i.e. with no surface water at the time of application) do not require a buffer.

E.3 Hand application of pesticides. Pesticides being applied by hand will only be applied to specific targets, such as vegetation, trees, stumps, and burrows, or as bait or in traps. No pesticides will be applied by hand within the core zone of Type S and F waters, unless prescribed for hardwood conversion or as necessary to meet requirements for noxious weed control.

E.4 Operator education. The authors of this Report support a change in the current Department of Agriculture licensing and recertification requirements to provide for a “Forest Environment” license endorsement requiring training in forestry related issues and focusing on water quality. The relicense and/or recertification requirements should be changed to include a minimum of ten hours of training on forest BMPs and water quality issues every five years, with no more than three and one-half hours in any one year. Training similar to that required for the applicators and operators should also be required for the operations managers and field supervisors, and such managers and supervisors may also be required to be licensed or certified.

E.5 New section for Forest Practices Board Manual. A new section on “Application of Forest Pesticides” will be added to the Forest Practices Board Manual reflecting the consensus recommendations set forth on Schedule E-1 attached hereto.

Appendix F

Wetland Protection

I. Introduction. The goal of this Appendix is to clarify the mapping of wetlands and provide for an assessment of the functions of associated wetlands. This is intended to include an assessment of the functions served by forested wetlands and the potential impacts of harvest activities in forested wetlands. The assessment may include the determination of harvest impacts that cannot be adequately mitigated or recovered. Where such assessments suggest that changes in forest practices are required, this Appendix is intended to provide the mechanism for the consideration of additional rules for the protection of such wetlands. The authors of this Report acknowledge that forest practices are exempted from permitting requirements under Section 404 of the Clean Water Act.

II. Prescriptions. The authors of this Report recommend the adoption of statutes, rules, and regulations as necessary to implement the following prescriptions:

F.1 Protection of forested wetlands

- (a) As described more fully in Appendix B, where riparian associated wetlands are present in an outer zone, trees which the landowner is required to leave in the outer zone will be left in such wetlands (or in other priority areas described in such Appendix) as appropriate to maximize function.
- (b) As described more fully in Appendix B, landowners will be required to buffer certain seeps and springs with an obvious connection to Type N perennial streams.

F.2 Wetland mitigation. Current regulations for all road and landing constructions within wetlands require the use of a mitigation sequence. WAC 222-24-010(a-e). This regulation will be clarified to provide that mitigation will be determined on the basis of "no-net loss" of wetland functions. If road or landing constructions would impact more than one-tenth of an acre of wetlands, such activity will be undertaken so as to avoid such impacts, minimize such impacts or restore affected wetlands, to reduce or eliminate impacts. Replacement of affected wetlands may be considered as a mitigation technique if one-half acre or more is impacted by such activities. Required mitigation will be determined using adequate wetlands expertise and a site management plan.

F.3 Adaptive management to determine wetland functions

- (a) A Wetlands Working Group comprised of members with appropriate scientific expertise will be convened for the purpose of determining what is currently known about forested wetlands and what, if any, are the current scientific recommendations for the protection of forested wetlands.

- (b) In accordance with the procedures and other provisions of the Adaptive Management Appendix (Appendix L), and subject to funding and priorities, the Wetlands Working Group will develop and carry out research to address the following:
- Further define the functions of forested wetlands.
 - Revise the classification system based on wetland functions.
 - Evaluate the regeneration and recovery capacity of forested wetlands.
 - Evaluate the effectiveness of current WMZs.
 - Determine the relationship between shading of wetlands, surface and sub-surface water, temperatures in wetlands, and temperatures of associated streams. This will also include research related to wetland hydrology that results in the development of guidance for determining sub-surface water connections between wetlands and streams.
 - Recommend what functions of forested wetlands need to be provided.
 - Determine wetland size and functions that trigger any needed mitigation sequence.
- (c) Based on the results of these efforts, the Wetlands Working Group will be asked to make recommendations through the agreed upon adaptive management process as outlined in the Adaptive Management Appendix (Appendix L) for the protection of forested wetlands and for research and implementation workshops.
- (d) The Wetlands Working Group will conduct its activities in accordance with the Adaptive Management Appendix (Appendix L). Any disputes with respect to the findings and recommendations of the Wetlands Working Group will be resolved in accordance with the dispute resolution mechanisms set forth in such Appendix.

F.4 Mapping of Wetlands

- (a) In connection with any forest practice application for timber harvest or road construction:
- (i) Landowners will be required to map all forested wetlands and type A and B wetlands where more than one-tenth acres of such wetlands will be impacted by filling and where mitigation for such filling is required.
 - (ii) Landowners will also be required to map all forested wetlands (regardless of size) that are associated with an affected riparian management zone (including those parts of the forested wetlands that lie within the harvest unit but outside of the riparian management zone).

(iii) Landowners will be required to map all forested wetlands within the boundaries of the land to be covered by the application that are 3 acres or more in size.

(iv) All such mapping will be performed to the current delineation and mapping standards outlined in the Forest Practices Board Manual (and not to the DOE delineation standards).

(b) DNR will incorporate wetlands into a GIS layer. The wetlands GIS layer may be updated based on new data from time to time. The same concurrence process used for water type changes will be followed to effect any changes in the wetlands GIS layer. In addition the proponent of any wetlands mapping change will be required to notify all affected landowners.

III. Voluntary commitments. The authors will commit to undertake the following additional actions:

(a) A group will be established to review the adequacy of the procedures outlined in the current Forest Practices Board Manual to identify wetlands in the dry seasons of the year, particularly in Eastern Washington.

(b) Training programs will be established to train foresters in the best ways to utilize leave trees to maximize functions.

Appendix G

Watershed Analysis

I. Introduction. The purpose of watershed analysis is to provide a tool to address cumulative effects; provide examples of watershed and cumulative effects perspectives for adaptive management for baseline rules; provide sites for adaptive management projects to address effectiveness of practices; set restoration priorities (which may be required to be eligible for federal or state funding); refine unstable slope mapping and prescriptions; provide a tool for mixed land use evaluations; provide additional (longer term) assurances for landowners under the 303(d) provisions of the Clean Water Act; provide a tool for cultural resource assessments; and provide guidance in designing monitoring programs. Watershed analysis will be a voluntary process and should continue to be a valuable tool to accomplish its stated purposes.

II. Prescriptions. The authors of this Report recommend the adoption of statutes, rules, and regulations as necessary to implement the following prescriptions:

G.1 Creation of new modules, modification of certain modules and process improvements.

- (a) The modules for riparian and roads will be modified to maintain the assessment phase but to eliminate the need for prescriptions related to these modules. The necessity for hazard mapping in the mass wasting module will be eliminated or phased out contingent on providing adequate funding and completing geologic hazard zonation mapping to the same assessment standards as exist under the current module. The baseline rules addressing mass wasting, riparian management zones, and road construction and maintenance are proposed for significant upgrade through this Report and would be used in the synthesis process. The rule upgrades are largely dependent on technical information that has been obtained through past watershed analyses, which have been consistent on prescriptive remedies to address issues of mass wasting, riparian zone management, road construction and road maintenance. The modification of these modules is consistent with the goal of streamlining and reducing the cost of watershed analysis.
- (b) Watershed analysis modules for restoration, monitoring, and cultural resources will be cooperatively developed through a process which includes policy direction, project proposal, committee assignment, peer review and policy action. The authors are committed to completion of the cultural resources module within two years from the date this Report is completed. In connection with any new watershed analysis, the assessment phase of these modules, once developed and approved, will be required to be completed but implementation of these modules would be voluntary unless otherwise required by existing laws and regulations, or required by an HCP implementation Agreement. Implementation of the monitoring module will be encouraged when needed as part of the statewide effectiveness monitoring program. Where present, agreements between a

landowner and an affected tribe will supercede any contrary assessment or implementation requirements of a cultural resources module.

- (c) In connection with the renewal of any watershed analysis which was initially completed prior to the date of this Report, the landowner will only be required to complete the updated versions of the modules included in its original watershed analysis. With the exception of the water quality model now under development, the new modules will be included only at the option of the landowner, unless it is determined by the parties to this agreement that such modules should be added to meet the requirements of the ESA or the CWA assurances.
- (d) The water quality module will be revised in a cooperative process necessary to address process improvements and technical upgrades to meet the needs of Clean Water Act compliance.
- (e) Other modules of Watershed Analysis, including the hydrology and fish module, will be revised and updated to address process improvements, technical upgrades, and bull trout through a cooperative process.
- (f) The authors are committed to developing and implementing process improvements such as are indicated in the watershed analysis review document, including, without limitation, improvements in the process for five-year reviews.

G.2 Other changes

- (a) The new regulations for riparian management zones supersede existing watershed analysis prescriptions. Existing road plans created under the guidance of watershed analysis will be upgraded as necessary and incorporated into road maintenance and abandonment plans required under Appendix D. A proposed forest practices application will not be processed as a Class IV-Special permit as a result of unstable slopes if (i) an application is filed seeking a permit for forest practices to be conducted in a Watershed Administrative Unit which is subject to an approved watershed analysis, (ii) the application seeks a permit to conduct forest practices in accordance with an approved prescription from such watershed analysis (as the same may be modified through the 5-year review process), and (iii) the applicable watershed prescription is a specific prescription (in contrast to a prescription which requires additional analysis¹¹). Conversely, if the applicable watershed prescription included in any application is a prescription that requires additional analysis, the procedures governing unstable slopes set forth in Appendix C will apply to such application.
- (b) DNR may issue five-year forest practices permits covering a landowner's ownership in a watershed subject to a completed watershed analysis. No additional five-year permits will be issued for such ownership within the WAU where a five year review is deemed necessary but has not been completed.

¹¹ "Additional analysis" does not include the need for an expert to determine the presence of particular landforms if once identified there are specific prescriptions already established.

- (c) For the purpose of DNR's threshold determination (in implementing SEPA) on a watershed analysis, DNR shall not make a determination of significance unless the prescriptions themselves, compared to rules or prescriptions in place prior to the analysis, will cause probable significant adverse impacts on the elements of the environment other than those addressed in the watershed analysis.

Appendix H

Alternative Plans

I. Prescriptions. The authors of this Report recommend the adoption of statutes, rules, and regulations as necessary to implement the following prescriptions:

H.1 Federally approved conservation plans.

(a) Notwithstanding any provision to the contrary, forest practices shall not be subject to forest practices rules pertaining to any species included within covered resources, including rules defining Class IV practices and rules modified or adopted pursuant to this Report, if the forest practices are consistent with one of the following: (a) a habitat conservation plan and incidental take permit or an incidental take statement covering such species approved by the Secretary of the Interior or Commerce pursuant to 16 U.S.C. section 1536(b) or 1539(a); (b) an "unlisted species agreement" covering such species approved by the U.S. Fish and Wildlife Service or National Marine Fisheries Service; (c) a "take-avoidance concurrence letter" or other cooperative or conservation agreement entered into with a federal or state fish and wildlife agency pursuant to its statutory authority for fish and wildlife protection that addresses the needs of the affected species and that is subject to review under the National Environmental Protection Act, 42 U.S.C. section 4321 et seq., or the State Environmental Policy Act, chapter 43.21C RCW, as applicable; or (d) a rule adopted by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service for the conservation of a particular threatened species pursuant to 16 U.S.C. section 1533(d). Such forest practices will be deemed not to have the potential for a substantial impact on the environment by reason of their impacts on covered resources but may be found to have the potential for a substantial impact on the environment due to other reasons under RCW 76.09.050. The protection to be provided under this Section H.1 will be implemented by a rule adopted by the forest practices board.

(b) Notwithstanding the foregoing, if a landowner does not have an incidental take permit or comparable federal assurances or has not made formal application therefor on or before July 1, 2001, the assurances provided in the preceding paragraph (a) shall not be available unless the landowner has attempted in good faith to involve the WDFW and affected tribes in the development of the related federal plan or management strategy.

(c) Landowners with individual Habitat Conservation Plans wishing CWA assurances comparable to those described in Schedule M-2 may petition EPA and Ecology for such assurances. Landowners should expect to demonstrate in writing to the agencies and the tribes that the HCP, on balance, meets or exceeds the functions provided by the prescriptions contained in the Report and will result in meeting water quality standards in a reasonable time frame. Landowners providing such a demonstration would receive the same assurances as are contained in Schedule M-2.

(d) As required by RCW 76.09.350(7), DNR will report to the legislature by December 31, 2000 as to the desirability of providing for a permanent landscape planning

process to replace the pilot projects authorized by other sections of that statute. The authors of this Report anticipate that coverage for upland species comparable to the coverage provided in subclause H.1(a) may be available in the future to landowners through TFW's landscape planning process.

H.2 State alternate plans

(a) Policy intent and overview

(i) A landowner may propose, through an alternate plan, a site-scale¹² management strategy different from the basic rules that implement this Report, provided that when judged in its totality, the alternate plan must provide protection for public resources at least equal in overall effectiveness to the protection provided by the basic rules. If approved, the prescriptions set forth in the alternate plan would be substituted for the prescriptions in the corresponding basic rules. Alternate plans may address different resources including the resource objectives of fish and water quality. The alternate plan must address how proposed management activities will affect public resources over time and/or location as the strategy of the alternate plan addresses the resource objectives.

(ii) The alternate plan process can be used as a tool to deal with a variety of situations. In some instances an alternate plan may be used to make minor on-the-ground modifications which result in significant operation efficiencies while at the same time providing equally effective protection to public resources. The alternate plan process can also be used as a tool to deal with situations where the cumulative impact of regulations (including those adopted consistent with this Report) disproportionately impacts a landowner (e.g. more than 15 percent of the land covered by an application is constrained by regulation). The alternate plan process may also be used to address circumstances where a landowner has an economically inaccessible unit (i.e. a unit surrounded by buffers). In all cases, the alternate planning process will develop a management plan that provides the needed protection to public resources while seeking to minimize constraints to the management of the affected lands.

(iii) As described further below, interdisciplinary teams will be used to review and determine the efficacy of landowner proposed plans. Reviews will include field visits and problem-solving with the landowner. If the landowner's proposed plan is not acceptable to the DNR, the DNR will provide feedback to the landowner with detail on each reason why the plan is inadequate. DNR will provide an opportunity to comment to DOE, WDFW, affected Indian tribes and the Services.

(b) Developing the alternate plan process. The details of the process to develop and secure approval of alternate plans will be developed within six months of the date of

¹² Site-scale is defined as an individual forest practices application; however, the application may address activities at multiple geographic locations that have sufficient common elements to justify a collective approach. The landowner must provide such justification.

presentation of this Report. A technical task force, appointed by the authors of this Report will be created for this purpose. (An Eastside representative will serve on the task force to assure that the alternate plan process adequately addresses the Eastside forest health strategies contained in this Report.) The authors will oversee the work of the task force. The product of this work will be adopted as a new section to the Forest Practices Board Manual. Subsections (c) through (j) below outline the process and the minimum components of alternate plans that will be described in greater detail in the procedure manual.

(c) Overview of principle steps in the alternate plan process

(i) Landowner prepares draft alternate plan as part of the forest practices application. Landowners are encouraged to communicate in advance with DNR and other agencies or Tribes with expertise. At any time prior to operation under an approved alternate plan, a landowner may elect to abandon its efforts to operate under the alternate plan and may elect instead to submit a revised forest practice application.

(ii) DNR assistant regional manager with forest practices responsibility (or his or her designee) appoints an ID Team.

(iii) ID Team conducts site visit(s) with landowner.

(iv) ID Team develops recommendation.

(v) DNR assistant regional manager (or his or her designee) makes a decision on the forest practices application: approve, approve with conditions or disapprove.

(vi) Landowner implements plan.

(vii) Landowner, in consultation with DNR and other interested parties, conducts annual performance reviews and reports results to DNR (i.e. as-builts and any adjustments in timing for planned activities for the following year).

(viii) DNR conducts compliance audits.

(d) Composition of the review team. DNR will select the members of the ID Team with qualifications needed to address the issues in the alternate plan. Every ID Team shall contain a DNR forester and the chair of each team shall be a DNR employee. Affected tribes will have the opportunity to participate as a member of the I.D. team. The quality of the decision process will be checked at the plan approval step by DNR management and in succeeding performance reviews and audits. DNR shall provide a reasonable opportunity for comment to WDFW, DOE, other state agencies, the federal agencies and affected Tribes prior to approval of an alternate plan.

(e) **Contents of the alternate plan.** The procedure manual will provide detailed guidance regarding the contents of alternate plans. Items to be covered will be based upon the nature of the plan and may include where appropriate:

- descriptions of lands, streams and roads;
- descriptions of slope stability issues and other issues affecting public resources;
- descriptions of how implementation of the proposed alternate plan will provide protection for public resources at least equal in overall effectiveness to the protection provided by the basic rules;
- descriptions of the alternate management strategy;
- descriptions of the time period requested for the permit;
- descriptions of restoration or other enhancement activities, including a description of where these activities would occur, and
- descriptions of monitoring and adaptive management strategies, including landowner plans for annual performance reviews; and
- descriptions of an implementation schedule.

(f) **Plan approval process.** After review, alternate plans will be approved if they provide protection for public resources at least equal in overall effectiveness to the protection provided by the basic rules.¹³ The ID Team is intended to work with the landowner in an attempt to reach a consensus on the efficacy of the alternate plan. In the absence of consensus, the ID Team will forward reports reflecting majority and minority opinions, or the landowner may elect to withdraw or revise the proposal. The DNR shall give substantial weight to adopting the recommendations of the ID Team in cases where a consensus recommendation is forwarded.

The procedure manual will expand upon the following principles to direct the review and approval process:

- the effectiveness of strategies for meeting resource objectives and protecting public resources;
- appropriate recognition or credit for improving the condition of public resources;
- the quality of analysis and presentation;

¹³ If the forest practices are expected to be concluded within two years, normal permit time frames apply; if a five-year plan is sought requesting a five-year permit a 45-day review period would apply.

- the quality of monitoring and adaptive management programs; and
 - the landowner's performance on prior forest practices and commitment to stewardship principles.
- (g) **Audits by DNR.** The DNR will conduct audits of the landowner's compliance with the terms of the alternate plan. DNR will specifically review and approve each of the landowner's scheduled performance review reports by checking the reports themselves or through a more extensive audit involving field verification. The DNR audit program for alternate plans will be designed to be consistent with the terms of any agreements with the federal government regarding fish and water quality.
- (h) **Cooperation for alternate plan management efficiency.** The DNR, WFFA and WFFPA will work cooperatively to develop efficient management approaches for reviewing and approving alternate plans, including:
- capturing successful alternate plan experiences that can be shared as examples;
 - developing generic templates for planning situations of differing levels of complexity;
 - compiling lists of technical experts (e.g. watershed analysis specialists);
 - establishing a point of contact for small landowner planning in local offices of the DNR; and,
 - working together to promote excellence in land stewardship and forestry.

The new small landowner assistance office in the DNR described in Appendix I will participate in these efforts.

- (i) **Relationship to other plans.** The state alternate plan provisions are not intended to supersede other plans or planning processes allowed under the rules or other authority. For example, landowners could conduct forest practices under Habitat Conservation Plans without needing to secure the state's approval of a corresponding alternate plan. Federal agencies will exercise oversight over the alternate plans at a programmatic level through periodic audits and by ensuring that the state standards are consistent with the requirements of the Endangered Species Act and the Clean Water Act.

Appendix I

Small Landowners

I. Introduction.

- (a) This is a program for small forest landowners. It is designed to achieve both full riparian resource protection and to provide financial incentives to those small landowners who volunteer to participate in the Forestry Riparian Easement Program to be established by statute and administered by a "Small Forest Landowner Office" within the DNR.
- (b) This is not a small landowner "exemption" that sets lower standards of resource protection for small landowners. Instead, it applies the same riparian and related buffers to small landowners as is applied to all other forest landowners, and provides partial compensation to those small landowners who volunteer to enter into easements covering riparian areas. This program is intended to help maintain the viability of non-industrial forest landowners and to provide an incentive to keep the small landowners' forest land base in forestry. That viability is being further eroded by the increased costs of compliance and disproportionate impact of the new riparian rules on this class of landowners. The disparate impacts will exist because: (a) in general, there are more buffer requirements on the lower elevation lands owned in greater proportion by small landowners; (b) small landowners will incur much higher costs retaining outside professional consultants to comply with the new, complex rules; and (c) the diseconomies of scale faced by small landowners are magnified by further harvest reductions under the new rules. As noted above, the regulatory aspects of this program is mandatory; the incentive portion is voluntary.
- (c) DNR's obligations under the Forest Riparian Easement program are subject to the availability of funding. The authors agree to support approval of all necessary funding for this program.

II. Prescriptions. The authors of this Report recommend the adoption of statutes, rules, and regulations as necessary to implement the following provisions:

I.1 Small Forest Landowner Office Established

- (a) A Small Forest Landowner Office ("SFLO") will be created within DNR. The SFLO will be created by statute. The office will be funded by separate legislative appropriation. The statute creating the SFLO and the Forest Riparian Easement program, outlined below, will include a provision expressly allowing for administrative review of SFLO decisions within DNR.

- (b) The SFLO will be directed (1) to serve as a resource and focal point for small landowner concerns and policies; (2) to administer the Forest Riparian Easement ("FRE") program for small landowners that is specified below; (3) to recommend to the Forest Practices Board the standard (template) versions of the Forestry Riparian Easement (FRE) documents needed to implement the program; (4) to recommend to the Forest Practices Board any procedural rules or instructions needed for small landowners regarding the FRE program; (5) to recommend to the Forest Practices Board rules pertaining to valuation of FREs for small landowner compensation purposes; (6) to contract with qualified consultants to cruise and appraise the timber as needed to implement the FREs; and (7) to make technical guidance available to requesting small landowners as otherwise provided in other statutory programs.
- (c) The SFLO will be assisted by a seven member advisory committee made up of one representative each from DOE, WDFW and the Tribes and 4 members recommended by WFFA and appointed by the Commissioner of Public Lands. The committee shall pre-review rules proposed by the SFLO and advise the SFLO on administration of the FRE/SFLO program. Committee members shall be reimbursed expenses only for attending committee meetings.
- (d) The SFLO will have significant expertise in managing small forest holdings, governmental programs applicable to such holdings and the forestry riparian easement program. The SFLO will maintain a list of pre-approved FRE consultants used by the SFLO for FRE timber cruises (so that small landowners may choose to hire such consultants to assist the small landowner with aspects of the riparian harvest layout).

I.2 Forestry Riparian Easements Authorized

- (a) **FRE eligibility.** FREs are limited to small landowners.¹⁴ Eligibility for an FRE is determined at the time of submission of the forest practices application covering an eligible area. A small landowner is a private owner of forest land in this state from which the owner harvests or causes to be harvested during the three years prior to the year in which the small landowner submits the FRE application an average timber volume that would qualify that owner as a small timber harvester under RCW 84.33.073.¹⁵ The small landowner must certify to the SFLO that he or she meets the requirements of the small landowner definition, and that the small landowner does not expect to exceed the harvest volume limits of RCW 84.33.073 during the current year (i.e., the year of the application for the FRE). Only harvests from the land owned by the small landowner are counted toward the threshold. (In other words, if the small landowner is a timber harvester that also harvests timber from other persons' land, the volume harvested from those other persons' lands does not count towards the total harvest volume for this purpose).
Exception on harvest limit: If a person can establish to the satisfaction of the SFLO that the limits of RCW 84.33.073 were exceeded during the prior three-year period (or will be exceeded in the current year) to raise funds to pay estate taxes or equally compelling and

¹⁴ A small landowner can be an individual, partnership, or any non-governmental corporate or other legal entity.

¹⁵ RCW 84.33.073 currently sets an annual limit of 2 million board feet. Eligibility as a small landowner under this report is intended to track the limits in RCW 84.33.073 as they may be amended.

unexpected obligations such as court-ordered judgments or extraordinary medical expenses, the SFLO may deem such person to be a small landowner.

- (b) **Land eligible for an FRE.** Forest land that is subject to regulation under Chapter 76.09 RCW (Forest Practices Act) and owned by a small landowner is eligible for an FRE.¹⁶ An FRE can be set up only for riparian and related areas that are included within an otherwise commercially reasonable harvest unit, as determined by the SFLO. The advisory committee shall provide the SFLO with suggested criteria for determining a commercially reasonable harvest, following the committee's consideration of the following criteria: the inclusion of the FRE or the bordering of the FRE by an even-aged or partial-cut harvest; the taxable value of the harvest equals or exceeds the value of the leave trees in the FRE; the harvest is not a Class IV – General conversion or covered by a conversion option harvest plan; the parcel including the FRE area is or qualifies to be designated or classified forest land under Chapters 84.33 RCW; or other factors affecting a particular harvest that indicate it is a bona fide commercial harvest. Payment under an FRE is made only after the harvest is completed and verified. The riparian areas eligible for inclusion in an FRE include all riparian and other special management zones required by the forest practices rules associated with:

- all streams, including the no harvest, inner, and outer zones and leave tree requirements from the shade rules;
- forested wetlands within a site potential tree height of perennial streams;
- seeps and springs;
- steep headwalls;
- channel migration zones;
-
- buffer patches at stream junctions and initiation points of perennial flow;
- other sensitive sites protected in the new rule package; and
- areas rendered uneconomically harvestable by the adoption of rules implementing the recommendations contained in this Report.

- (c) **Duration of FRE.** FREs will run 50 years from the date the Forest Practices Application is received. Consistent with the ordinary rules governing easements of this nature, the

¹⁶ Where the timber is owned separate and apart from the land on a long-term (50 years) or on a permanent basis, the timber owner will be treated as the landowner for purposes of qualifying as a small landowner. In the case of a timber owner who holds a timber interest of less than 50 years duration, an FRE may be entered into, but only where both the timber owner and landowner enter into the FRE and each meet the definition of small landowner. Where the timber and land ownerships are separate, the applicant(s) for an FRE must provide reasonable evidence of their ownership interests to the SFLO.

holder of the FRE (DNR) could choose to relinquish its rights back to the small landowner.

(d) Establishment of an FRE

(i) A small landowner may trigger establishment of an FRE by checking a box on the Forest Practices Application (FPA) indicating its desire to enter into an FRE, or by submitting a separate request form that accompanies the FPA.¹⁷ The DNR Forest Practices Division will provide copies of FPAs containing FRE requests to the SFLO. The small landowner retains the responsibility to have the leave trees designated on the ground (ribboned out or by individual tree marking) prior to harvest.

(ii) Small landowner will advise the SFLO when the harvest is concluded and any post-harvest forest practices inspections are complete. An investigation conducted by the SFLO will verify that buffers were adhered to by landowner. A representative sample of existing small landowner FRE's will be included in the compliance survey recommended in Appendix K, Paragraph III(d). A failure to substantially comply with the buffer requirement will be grounds for the SFLO to deny an FRE.

(iii) The SFLO will arrange for a timber cruise (100% cruise) by SFLO staff or by contract with qualified consultants to determine the volume by species and grade sufficient to value the leave trees required by the rules. Additional trees left voluntarily by the small landowner are not counted in the compensation determination.¹⁸

(e) Compensation. The SFLO will compute the payments to the small landowner as follows:

(i) FRE Leave Tree Volumes will be determined based on the SFLO cruise of leave trees referenced above.

(ii) The Compensation Rate will be determined as follows: The SFLO will attempt to determine the fair market value of the leave trees based on data maintained by the Department of Revenue (i.e. the standard stumpage tables and/or the data reported to the Department of Revenue by the small landowner (or his or her agent) in connection with the harvest of the areas adjoining the FRE area). For those leave trees in FREs in Eastern Washington that are required to be left but which may be removed during the 50-year term of the FRE, the SFLO shall establish a reduced Compensation Rate based on the proportionate economic

¹⁷ DNR has authority to prescribe required elements of the application. WAC 222-20-010(2).

¹⁸ The SFLO will have authority to use DNR staff to cruise the buffers (with reimbursement from SFLO funds) or to retain qualified private forestry consultants to do the cruising, whichever is least costly and timely. This authority is designed to maximize efficiency by using DNR staff if they are available, but not to add full time staff during peak demand periods. It is expected that the SFLO will get competitive bids from qualified consultants in various locales to provide "on demand" cruises. Since these cruises are small and shouldn't take long, prompt turn-around should be possible.

value lost to the small landowner from the regulatory requirement applicable to such leave trees. Such Compensation Rate shall be based on the same DOR data, but adjusted based on lost growth and revenue (and may be based on site averages).

(iii) The Value Lost to the small landowner from the leave tree requirements shall be the Compensation Rates multiplied by the FRE Leave Tree Volumes (by species and grade, if appropriate).

(iv) The FRE Payment Amount to the small landowner shall be 50% of the Value Lost.

(v) "High Impact Override." Through the Small Business Economic Impact Statement (SBEIS) process, DNR is evaluating cases where small landowners may be disproportionately impacted by the combined net effect of the new rule package (including non-riparian areas made inaccessible by the new buffer requirements). Following completion of the SBEIS, small landowner-owned parcels that are found to be subject to a disproportionately high regulatory impact will be eligible for additional compensation (an additional 50% of value of the timber on portions of the harvest parcel that is above the impact "threshold" determined through the SBEIS).

(vi) The SFLO would provide the small landowner with the computed values, proposed payment and an FRE. If acceptable, the small landowner would execute the FRE and return it to the SFLO, which would trigger payment of compensation.

(vii) The SFLO would record the FRE and maintain the necessary records.

(viii) The FRE Payment Amount shall be paid to the small landowner upon execution of the FRE by the small landowner.

Other than real estate excise tax, there should be no adverse state tax consequences; federal income tax will probably be owed.¹⁹

(f) Nature of an FRE

(i) The FRE will be a written document in the form of a restrictive easement so that it can be recorded. That ensures that future owners will have notice of the obligation. From a legal standpoint, the FRE will create an interest in real property in favor of the state. FREs will be held in the name of the state

¹⁹ The FRE will create an interest in real property. Thus, income received from the state should not be subject to B&O tax, but only R.E.E.T. The land remains fully committed to forestry, so no roll-back of the ad valorem property tax should be triggered. Since the land is still owned by the SLO, no minimum parcel size problems with the timber tax classification should be created. These conclusions should be verified by DOR or in a AGO. The income may be ordinary income under the federal income tax provisions.

and administered by DNR. The 50-year term of the FRE will be specified in the document. Surveyed legal descriptions are not required for a valid FRE. A plat map of the areas covered by the FRE will be incorporated into the easement. In those buffers that require only some leave trees (i.e., in all areas except no-touch buffers), the leave trees subject to the FRE will be permanently tagged. For FREs in Eastern Washington, trees that may be removed within the 50-year term of the FRE shall be identified separately from the permanent leave trees.

(ii) Establishment of a valid FRE will result in a restriction against removal of tagged or marked trees in the area covered by the FRE for the life of the instrument. For all other purposes, the FRE shall explicitly state that the small landowner is free to use its property as it sees fit; provided, however that the use must be consistent with other applicable rules and statutes, including forest practices rules, the growth management act, and the shorelines management act, and must protect riparian functions over the term of the FRE. The FRE does not create a right of public access. The FRE will also recite the termination conditions and payment obligations.

(iii) Blowdown of trees covered by the FREs will be left in place, unless the SFLO believes that it should be removed to avoid public resource damage, and "releases" the small landowner from that element of the FRE. However, to the extent that blowdown falling from the FRE areas lands outside the FRE areas, the landowner may move the section outside of the FRE back into the FRE.

- (g) **Funding Sources.** The SFLO will have access to funds (capital budget and general funds) as appropriated by the legislature. In addition, the SFLO will be authorized to accept federal or other funding that may become available to it for the purposes of the SFLO, including the FRE program.
- (h) **Unacceptable liabilities.** Notwithstanding anything in this Appendix I to the contrary, in no event will the State be required to acquire an FRE if such an FRE would be subject to any unacceptable liability (e.g. liability incurred due to the presence of hazardous substances.)

Appendix J

Revisions to Permit Process

I. Prescriptions. The authors of this Report recommend the adoption of statutes, rules, and regulations as necessary to implement the following prescriptions:

J.1 Multi-year permits. Regulations will be adopted to permit DNR to issue up to five year permits for (a) forest practices conducted in accordance with an approved watershed analysis where the application identifies the specific prescriptions to be used; (b) forest practices conducted in accordance with an approved road plan; and (c) forest practices to be conducted pursuant to an approved alternate state plan. Corresponding five year HPA's may be issued coincident with the DNR's five-year permits. Applications for five-year permits will be reviewed by DNR during a 45-day review period.

J.2 HPA/FPA permit process.

- (a) No modifications to the Hydraulics Act are contemplated.
- (b) WDFW will enter into a Memorandum of Agreement with DNR pursuant to which WDFW will seek to waive the requirement to obtain an HPA for forest practices activities addressed in this Report when conducted in association with Type N waters, provided that WDFW finds that the regulations adopted by the Forest Practices Board in response to implementing this Report meets the intent of the hydraulics code for protecting fish life, and that adequate DNR training, enforcement, and monitoring programs are designed and implemented. WDFW agrees for the benefit of the other authors to this Report to fully perform its obligations under such Memorandum of Agreement.

Appendix K

Enforcement

I. **Prescriptions.** The authors of this Report recommend the adoption of statutes, rules, and regulations as necessary to implement the following prescriptions:

K.1 DNR enforcement rules and authority

- (a) DNR will retain its current enforcement authority..
- (b) DNR will designate contact personnel to promptly respond to tribal concerns regarding resource damage. DNR will provide written follow-up reports on issues raised by tribes in connection with specific forest practices.
- (c) DNR will focus increased attention on repeat violators. (Using the Department of Health model, DNR will improve its database to track repeat violators who change their name or location to avoid enforcement.) DNR's authority to deny forest practices permits will be extended to the longer of one year from the issuance of a notice of intent to disapprove or until the violator pays all outstanding civil penalties or complies with all validly issued and outstanding notices to comply or stop work orders. In addition, the authors of this Report urge that consideration be given to the role that past violations should play in securing voluntary accreditation under the existing accreditation program for operators.
- (d) If an operator (or landowner) has three significant violations within a three-year period, DNR may require that he or she provide financial assurances prior to the conduct of any further forest practices on future forest practice permits. Significant violations means operating without a forest practices permit (other than an unintentional operation in connection with an approved permit outside of the approved boundary of such permit), operations in breach of the terms of any forest practice permit where such operations cause actual and material damage to public resources and the continuation of operations in breach of the terms of an effective stop work order or notice to comply.
- (e) A system with due process protections will be developed and adopted into rules by the Forest Practices Board to determine whether financial assurance will be required, the appropriate dollar amount of such assurances, the type of financial instruments which will be acceptable, and the process to be used in requiring financial assurances as a condition of approving a forest practice application. The process to be developed will include a consideration of factors, including the size of the landowner or operator, whether the violations were self-reported, the cooperation and response of the violator when such violations were discovered and other factors which may suggest that the requirement of financial assurances is not warranted in particular cases. Assurance payments will be established in amounts which are reasonable estimates of the potential amount of all civil penalties, fees and mitigation, which might be required to be paid under current law as a result of non-compliance with forest practice rules and department

directives in connection with a typical forest practice operation and the risks to the state that the landowner or operator may be financially unable to pay the fines and fees or to complete the mitigation. Assurances may include cash deposits, bonds, letters of credit, letters of financial assurance, or other certifications to the effect that the operator has sufficient resources to cover any penalties and mitigation measures which might be assessed.

- (f) An operator's name, if known, must be included on any forest practices application when submitted. Once an operator is hired or if the operator changes, the landowner must also provide a notice of such hiring or change to DNR within 48 hours. Upon receipt of any such application or subsequent notice, DNR shall promptly advise the landowner if the operator identified in such notice is on the list of operators then being denied permits by the DNR. Upon receipt of any such information from DNR, the landowner will not permit the identified operator to conduct the forest practices specified in the application.
- (g) To improve efficiency, the opportunity to appeal a civil penalty "to a DNR region manager" will be deleted. Appeals will continue to be allowed to the DNR Supervisor or his or her designee and to the Forest Practices Appeals Board.
- (b) Current rules require landowners to maintain roads regardless of how they come into a condition of disrepair. Landowners are currently exempted from the penalties for road violations caused by public use if DNR has not required the repair first. However, when the DNR requires a road to be fixed, the landowner must comply regardless of the cause. If there is non-compliance with the order then the exemption from other penalties is no longer valid.
- (i) In any action instituted under RCW 76.09.170, in addition to other penalties imposed, DNR or the attorney general shall be able to collect interest accruing on the penalty, costs, and attorneys' fees.

II. Voluntary commitments. The authors will commit to undertake the following additional actions:

- (a) DNR will work to improve relationships with county prosecutors through agreements or other appropriate means to encourage prosecuting criminal citations given by DNR in the case of egregious forest practices violations. DNR will provide a written report regarding the number of citations prosecuted by county prosecutors and the number of occasions on which the county prosecutor refuses to prosecute such a citation.
- (b) All TFW caucuses continue to be committed to cooperative and collaborative efforts, including providing access to private land for TFW cooperators for specific forest practices activities such as I.D. teams, watershed analysis, and effectiveness monitoring per the CMER monitoring strategy. Tribes will have the opportunity to participate in identifying, planning, developing and implementing restoration projects using watershed analysis or other appropriate planning tools. In connection with any watershed analysis, any review of a pending application by an I.D. team appointed by the department, any compliance monitoring, and any effectiveness monitoring or other research which has

been agreed to by a landowner, the department will invite representatives of other agencies, tribes, and interest groups to accompany a department representative where necessary to provide specific expertise to resolve issues that have been raised and, at the landowner's election, the landowner, on any such inspections after making reasonable efforts to notify the landowner of the persons being invited onto the property and of the purposes for which they are being invited.

- (c) Operators will be encouraged to participate in the existing voluntary accreditation program, but participants will seek to secure improvements to the accreditation program sufficient to meet the goals of TFW. More emphasis will be placed on educating landowners and operators about forest practices rules and the underlying principles and biology.
- (d) The authors will cooperate with and agree to perform statistically sound, biennial compliance audits.

Appendix L

Adaptive Management

I. Introduction.

- (a) Forest practices are governed so as to meet resource objectives and sustain the economic viability of the timber industry. An Adaptive Management program is necessary to monitor and assess implementation of forest practices rules and achieve desired resource objectives. Adaptive Management is a formal process for evaluating the current resource status and, over time, for evaluating the effectiveness of rules and guidance in protection, maintenance, and enhancement of habitat necessary to meet resource goals and objectives, for making adjustments to forest practices on a regional or statewide basis, and for requiring mitigation, where necessary, to achieve resource objectives.
- (b) Within 6 months following the completion of this Report, resource objectives that will enable attainment of the goals of this Report will be defined in terms of desired forest conditions and processes, including agreed upon biological, chemical, and physical criteria which (1) meet the Endangered Species Act standard and (2) are consistent with the federal Clean Water Act. Specific attainable target forest conditions, processes, and other objectives must be defined in measurable criteria. These will involve measures of habitat productivity and may include, but are not limited to pool riffle ratios, sediment levels, temperature and other water quality standards, and indices of resource conditions as defined in watershed analysis. The definition of resource objectives may include the delineation of time frames in which particular biological, chemical and physical standards can be attained.
- (c) Forest practices will be managed to maintain and recover desired forest conditions and processes through understanding of the relationship between forest practices and forest conditions. A science-based program will be established to monitor the relationship and evaluate effectiveness toward achieving the target forest conditions and processes. Additionally, it will be necessary to ensure that desired forest practices are being implemented on the ground. An infrastructure to ensure compliance will include adequate compliance monitoring, enforcement, training, and education.
- (d) Four primary relationships will be monitored: correlation between target forest conditions and goal attainment, effect of forest practices on forest conditions, effect of forest practices on other resource objectives, and enforcement and on-the-ground implementation of forest practices. Proposed changes to target forest conditions, forest practices, or enforcement programs must be evaluated by a defined set of protocol. Monitoring project selection will be guided by policy oversight, and project definition will be scientifically rigorous and subject to peer-review by a science team. Hypothesis statement, data collection and analysis, hypothesis testing and conclusion statement will be documented using standard protocols - all open to public review.

(e) The goal of the Adaptive Management program is to “close the loop” when it is necessary or advisable to adjust rules and guidance to achieve the projected result. There are three desired outcomes:

- (i) certainty of change as needed to protect targeted resources;
- (ii) predictability and stability of the process of change so that landowners, regulators and interested members of the public can anticipate and prepare for change; and
- (iii) application of quality controls to study design and execution and to the interpret results.

FORESTS AND FISH REPORT ADAPTIVE MANAGEMENT

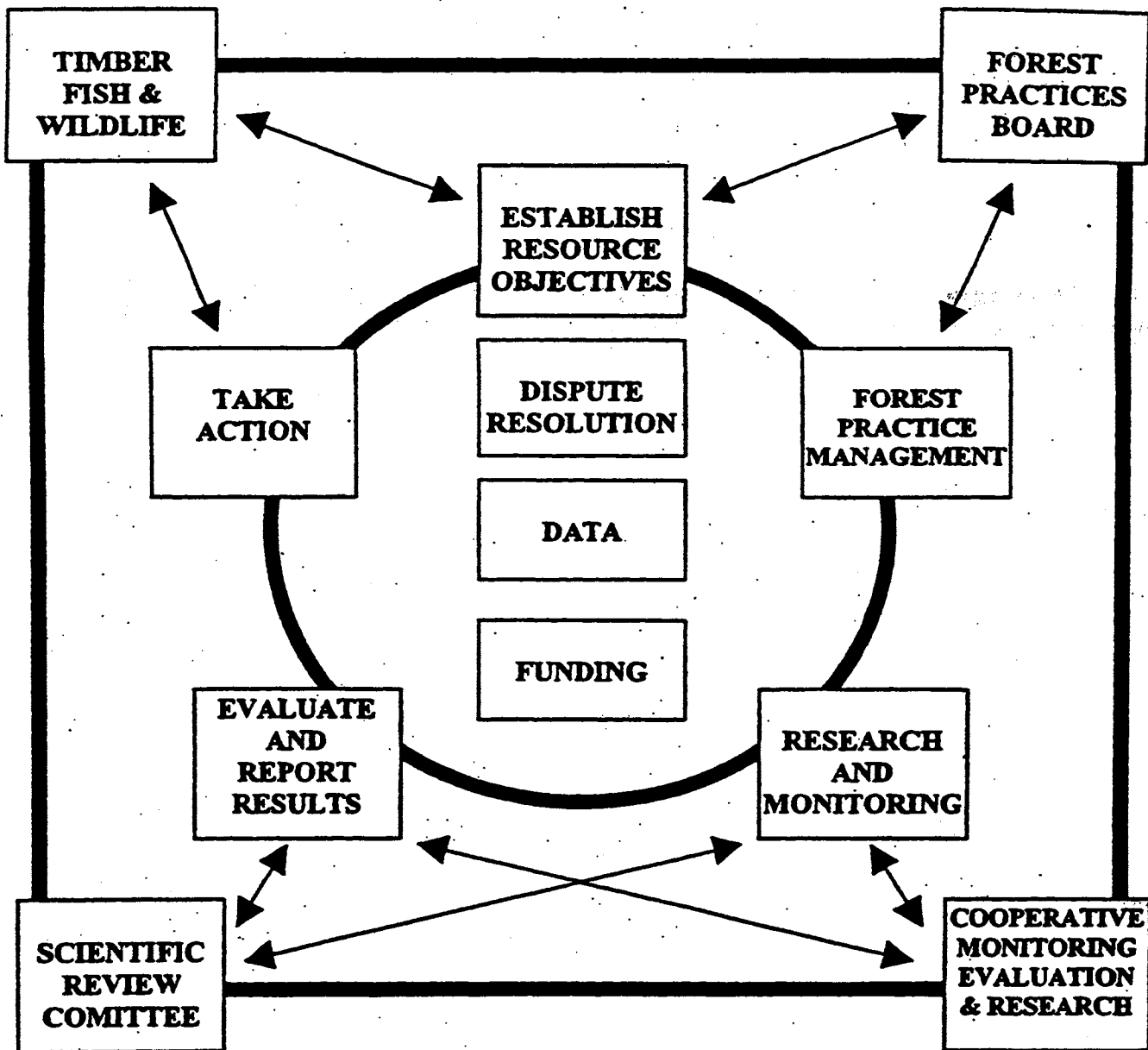


Figure 1. Adaptive Management "Closing the Loop". Four committees or boards will interact to establish goals and objectives, guide management practices, develop and implement research and monitoring projects, evaluate results of research, and take action to modify management practices or objectives as necessary to meet goals. Critical to "Closing the Loop" are independent peer review and dispute resolution mechanisms. Funding is essential to implement the Adaptive Management process, which is dependent on quality and relevant data.

- (e) Adaptive Management will be composed of the following elements:
- (i) A set of protocols and standards to define and guide execution of the process
 - (ii) A set of participants empowered to conduct the required activities
 - (iii) A baseline data set used to monitor change
 - (iv) A formalized dispute resolution process
 - (v) Adequate funding to conduct the necessary research, monitoring, and peer review

(f) The Tribes will be full and active participants in the adaptive management process and tribal representatives will be members of the TFW Policy committee and the CMER committee and any subdivisions of these committees.

II. Prescriptions. The authors of this Report recommend the adoption of statutes, rules, and regulations as necessary to implement the following prescriptions:

L.1 Protocols and Standards. The Cooperative Monitoring Evaluation and Research Committee (CMER) along with the Scientific Review Committee will establish protocols and standards governing Adaptive Management processes including but not limited to the following:

- (a) Content and presentation of hypotheses and/or data used to support requests for rule change or new rule development or initiation of research or monitoring projects. These groups will:
- (i) identify affected public resources and potential cause and effect relationships with forest practices
 - (ii) require testable hypotheses utilizing established resource objectives
 - (iii) review all pertinent external research and results and conduct literature reviews in the process of answering key questions
 - (iv) require review and approval of study designs prior to approval of projects or acceptance of data as input to the program
 - (v) require discussion of statistical sampling processes: what was the sampled population, sampling design, sample size and error and relation of the sample based estimates to the population targeted for new rules or changed rules
 - (vi) require disclosure of who, what, when, where, how and why for all data submitted for use in the adaptive management process;

- (vii) develop a process to forward independent research and monitoring as appropriate through the adaptive management process
- (b) Requests for initiation of monitoring programs as appropriate or research projects and the review and decision making process to be applied to such requests;
- (c) Format and processes for reporting results of the program to the Forest Practices Board:
 - (i) Reports should be addressed to a non-scientific audience.
 - (ii) Implications of the study should be based on the study design.
 - (iii) Reports should include analysis and evaluation of resource and operational impacts.
 - (iv) Reports should not make recommendations for specific actions;
- (d) Monitoring programs as appropriate;
- (e) Analysis and evaluation of resource and operational impacts;
- (f) Peer review processes and reviews of study designs;
- (g) Process of reporting results and initiating requests for changes in statute or regulation; and
- (h) Coordination with other statewide efforts on salmon, steelhead, bull trout, and clean water.

L.2 Participants. The following participants will be empowered to conduct the Adaptive Management process: the Forest Practices Board, the Cooperative Monitoring Evaluation Research committee (CMER), the Scientific Review Committee (SRC), the TFW Policy Committee and a full-time administrator.

- (a) **The Forest Practices Board.** The Forest Practices Board will establish the Adaptive Management Process by rule to designate the required elements as outlined in this section of the Report and appoint and empower the CMER committee. The Forest Practices Board will establish resource objectives to inform and guide the activities of the Adaptive Management program. The Forest Practices Board will set priorities for action as guided by information developed through the adaptive management process. If consensus or an otherwise acceptable conclusion is not reached during the dispute resolution process, the Forest Practices Board will make the final determination subject to all rights of appeal. The Forest Practices Board will ensure that fiscal and performance audits of the Adaptive Management program are conducted. The Forest Practices Board will submit all proposals for new regulations which require changes in this Report or implementing rules to the Adaptive Management program for review and consultation prior to initiating a rule making process. The Adaptive Management Program Administrator will present all

proposed research projects to the Board for its approval. The Board will ask DNR to submit biannual budgets to support the adaptive management priority projects.

- (b) **Cooperative Monitoring Evaluation, and Research (CMER).** A monitoring, evaluation and research program (CMER) is needed to ensure effective implementation of the recommendations contained in this Report. The intent of CMER is to advance the science needed to support adaptive management. Scientists will assist policy makers with technical questions but will not make policy. The primary attributes of the CMER as modified are:

(i) The Forest Practices Board (FPB) will establish CMER by rule to impose accountability and formality of process. The implementing rules by the FPB will include:

- Establishment of resource objectives and priorities to set program development and implementation;
- Incorporation of procedures as set out in the remainder of this proposal;
- A process for TFW approval of research, monitoring, and assessment projects and use of external information, including the questions to be answered and the timelines;
- Specific initial resource objectives, performance targets and priorities, as developed in the agreement;
- Requirement of biennial fiscal and performance audits by DNR or other appropriate and accepting independent state agency; and
- Dispute resolution procedures and timelines.

(ii) CMER will emphasize validation and effectiveness monitoring and research. CMER will develop (for TFW approval) documented, standard procedures to be followed, to include:

- Identifying testable hypotheses, utilizing established resource objectives;
- Identifying the affected public resource(s) and the cause and effect relationship(s) with forest practices;
- Data gathering and analysis;
- Analysis and evaluation of resource and operational impacts;

- Reporting results to TFW in a manner facilitating interpretation by non-scientists. The implications of the results should be clear from the questions framing the monitoring and research projects and their relationship with the resource objectives, as approved by TFW. CMER will not make recommendations on the use of its results unless asked by TFW up front. (Recommendations are not the same as implications); and
- CMER will be responsible for developing standards for technical field personnel where necessary.

(iii) The work of CMER will be done in conjunction with TFW and the scientific review committee (see below). CMER will be accountable to both TFW and the FPB as a public oversight body. TFW will recommend research priorities to the FPB and will make recommendations on use of research results. If TFW cannot reach a consensus on the uses of the monitoring and research work, the monitoring and research results will go through the dispute resolution process; if the dispute resolution mechanism is not successful in achieving consensus, the majority and minority thinking regarding the results and uses of the results can be brought forward to the FPB. CMER will be staffed by the Adaptive Management Program Coordinator.

(iv) A stable, long term funding source is needed for these activities, structured in such a way that no interest can manipulate the research or monitoring through the funding. No funding will be allowed that is earmarked for a specific project or topic unless agreed to by TFW, and no studies will be attributed to CMER unless agreed to by TFW. DNR (or other appropriate and independent state agency) will conduct an independent financial and performance audit of CMER at regular intervals (biennial).

(c) Scientific Review Committee

(i) An independent scientific peer review process will be established to oversee CMER's work. A standing committee consisting of neutral persons or an existing entity (e.g. UW Center for Streamside Studies) will be chosen with the agreement of all members (caucuses) of TFW.

(ii) The Scientific Review Committee will review and/or facilitate a peer review of all studies and data presented to CMER in support of requests for changes to existing rules or suggestions for new rules. Peer reviewers will review and comment on the quality of CMER's recommendations and the underlying study design, monitoring, and research.

(d) Adaptive Management Program Administrator

(i) The adaptive management program administrator will work full-time and will have credentials as a scientist and researcher. The adaptive management program administrator will be responsible for the following:

- Managing the Adaptive Management program to include the research projects, monitoring projects, budgets and workplans.
- Coordinating with the Forest Practices Board to ensure that the Board's guidance and priorities are honored and that the information and results produced by the Adaptive Management program are effectively communicated to the Board.
- Running a science based operation and facilitating appropriate involvement of the Scientific Review Committee.
- Bringing forward project results in a timely manner and communicating the activities of the program and the project results in an effective manner.
- Effectively supporting CMER.
- Effectively coordinating dispute resolution.

(ii) The administrator will make reports to the Forest Practices Board. The administrator's job performance will be evaluated on the following criteria:

- Managing the research and monitoring;
- Budget preparation and monitoring and developing workplans;
- Running a depoliticized operation devoted to good science;
- In accordance with timeframes established for the project, bringing forward the results of the research and monitoring in a timely fashion to TFW, the public, and the FPB; and
- Effectively managing CMER work, including resolving disputes in a timely manner or ensuring that unresolved disputes are referred to the appropriate dispute resolution process.

(e) Timber Fish Wildlife Policy Committee (TFW)

(i) TFW will remain essentially the current body, with an increase in formality and accountability. TFW will continue to be managed by a Policy Committee. TFW membership is self-selecting but the Forest Practices Board should establish the minimum participation which must include a commitment to consensus-based decision making and a willingness to support and implement the recommendation contained in this Report. TFW should include, at a minimum, representatives of the following caucuses:

- **Timber landowners (industrial and family-owned);**
- **Environmental community;**
- **Tribal governments;**
- **County governments;**
- **State caucus consisting of state departments of fish and wildlife, ecology, and natural resources (Commissioner of Public Lands or representative); and**
- **Federal caucus consisting of National Marine Fisheries Service, U.S. Fish and Wildlife Service, Environmental Protection Agency, and U.S. Forest Service.**

(ii) TFW members will participate without compensation or per diem.

(iii) TFW will:

- **Recommend resource objectives for FPB approval;**
- **Be consulted in the hiring of the Adaptive Management Program Administrator**
- **Determine CMER program priorities and specific projects and associated funding**
- **Define research objectives and questions up front before research is undertaken**
- **Recommend the membership of the scientific review committee**
- **Approve CMER final reports and make recommendations to the FPB based on results**
- **Serve as the first-stage decision maker in dispute resolution**

- Fulfill other roles as agreed upon by the FPB

(iv) If TFW fails to reach consensus on any of the above tasks any author may invoke dispute resolution beginning with stage two, L.5 (b) (ii). This specifically includes failure to reach consensus on recommendations for program priorities, specific research and associated funding.

L.3 Baseline Data Set and Data Collection Standards

- (a) A centralized, uniform system of basic data is needed to support implementation of adaptive management and will be established.
- (b) CMER will develop protocols for data used in the adaptive management process, to include information on who collected the data, when, how (i.e., instrumentation, calibration, etc.), and quality control. Subject to applicable laws, data becomes publicly available, except by special arrangement on individual projects, where proprietary data, which may be sensitive or of economic significance, has been made available to researchers.

L.4 Adaptive Management (Closing the Loop)

- (a) CMER will report its results, after review by a peer review process, to TFW. TFW will use the CMER results (and other available credible data as screened and approved by CMER) to make specific recommendations to the FPB for amending:
 - The statutory scheme of forest practices management (RCW 76.09);
 - The regulatory scheme of forest practices management (WAC 222);
 - Voluntary, incentive-based, and training programs affecting forestry;
 - The resource objectives; and
 - CMER itself, adaptive management procedures, or other mechanisms implementing the recommendations contained in this Report.
- (b) The monitoring protocols will be based on the measurable criteria stated in the performance targets. The work of CMER and TFW will be coordinated with statewide efforts on the status of salmon and bull trout for Endangered Species Act and Clean Water Act purposes beyond the commercial forestlands.
- (c) TFW recommendations to the FPB will be accompanied by formal petitions for rulemaking (RCW 34.05.330). There will be a public review process for all recommendations by CMER, including compliance with the Administrative Procedures Act and other applicable laws.

- (d) Every five years the FPB will establish a peer review process to review all work of CMER and other available, relevant data, including recommendations from the CMER staff. There will be a specified, but limited, period for public review and comment.
- (e) Failure to reach agreement at any stage of the loop will lead to dispute resolution. Examples of such failure include:
- Inability of TFW to agree on research priorities, program direction, or recommendations to the FPB for uses of monitoring and/or research after receiving a report from CMER;
 - Inability of CMER to produce a report and recommendation on schedule; and
 - Failure of the specified implementing body to act on TFW recommendations on a specified schedule.
- (f) The authors agree to develop an adaptive management process to identify regional variability that, based on sound data and information, suggests that regional amendments to forest practices rules are needed to meet the resource objectives. Where consensus is not reached in regional TFW groups, a proposal for adaptive management review and study of the issue may be made to the TFW Policy Committee. The TFW Policy Committee will recommend the priority of the proposal and define the research questions to be addressed. Within the priority sequence, data presented in support of the proposal and appropriate literature review and research will be considered in response to the proposal. The Scientific Review Committee will peer review or arrange for peer review of this work. Results will be submitted to the TFW Policy Committee, which will act through the consensus process to develop recommendations to the Forest Practices Board for rule changes. If the TFW Policy Committee fails to reach consensus on the proposal within a reasonable time, any party may elect to activate dispute resolution as provided in this Report.
- (g) Monitoring conducted under protocols that may differ from CMER approved protocols will be considered for adaptive management. For example, it is recognized that some projects may require a quality assurance/quality control program that differs from protocols developed by CMER. These protocols will be presented to CMER so that the value of monitoring conducted under these protocols can be fully understood and used appropriately.

L.5 Dispute Resolution

In the event that the “loop fails to close,” the authors will have a dispute resolution mechanism available. The key attributes of the dispute resolution process are:

- (a) Specific substantive and benchmark (schedule) triggers will be established for each monitoring and research project for invoking dispute resolution.

(b) Dispute resolution will be staged and this dispute resolution process may be applied at any level of the adaptive management process. Any author, or the FPB as appropriate, may invoke each succeeding stage, if agreement is not reached by the previous stage within the specified time (or if agreements are not substantially implemented). The FPB regulations establishing CMER will establish procedures for the commencement of time periods.

(i) Stage one will be TFW. On technical issues, CMER shall have up to six months to reach a conclusion unless otherwise agreed by TFW Policy Committee. Parties may move the process to stage two after an issue has been before TFW for six months unless otherwise agreed. The time periods commence from referral of technical issues to CMER, report by CMER to TFW, or the raising of a non-technical issue (or matter not otherwise referable to CMER) directly at TFW.

(ii) Stage two will be either informal mediation or formal arbitration. Within one month, one or the other will be picked, with the default being formal unless otherwise agreed. The relative attributes of each will be:

- Mediation will be done by mediator(s) selected in a process to be determined;
- Arbitration will be binding unless taken to stage three by an aggrieved party
- In either case, stage two will be completed within three months (including the one month to select process) unless otherwise agreed.

(iii) Stage three will be action by the FPB. Arbitration decisions will not be binding but factual findings will be rebuttable presumptions of fact. TFW and CMER reports will be automatically admissible but will carry no presumption unless unanimous (and to the extent that they do agree), in which case they will also be rebuttable presumptions of fact. FPB decisions will be appealable as per current law.

(iv) If a dispute cannot be resolved through the process, TFW caucuses may pursue other forums.

L.6 Specific adaptive management key questions.

(a) The authors of this Report expect that one of the principal benefits which will accrue to the covered resources and other fish from the adoption of the recommendations set forth in this Report will be the development of enhanced and scientifically credible information regarding the conditions and needs of such resources. The authors are committed to the implementation of an active, well-funded, and ongoing adaptive management program. As outlined in greater detail in Appendix N, substantial funding for adaptive management

is being sought coincident with the efforts to secure passage of the legislation and rules necessary to implement the terms of this Report.

- (b) The list of initial key questions to be addressed through adaptive management is attached as Schedule L-1. Projects designed to address the key questions shall be established in the order and subject to the priorities identified on such schedule. To the extent priorities are not established in the schedule, such priorities will be established by the TFW policy group referred to above.

Appendix M

Assurances

I. Prescriptions. The authors of this Report recommend the adoption of statutes, rules, and regulations necessary to implement the following and commit to take the actions set forth below:

M.1 General state assurances

- (a) The contents of this Report will be adopted and summarized in the forestry module of the state salmon recovery strategy being developed under chapter 75.46 RCW (“Salmon Recovery Strategy”).
- (b) The authors of this Report will support the adoption of legislation substantially in the form attached as Schedule M-1 and will support the adoption and modification of rules and regulations necessary to make the forest practice rules, hydraulic code regulations and regulations of the department of ecology consistent with the recommendations contained in this Report.
- (c) DNR and DOE agree to exercise their discretion to protect covered resources and other fish under all applicable laws, regulations or rules in a manner consistent with the recommendations contained in this Report. DOE and DNR agree to direct their respective personnel not to exercise any site, application or project-specific conditioning authority to impose conditions on a forest landowner or operator which are more burdensome than the recommendations in this Report except as may be necessary for the prevention of potential or actual material damage to a public resource where such material damage would be attributable to one or more unique and unusual features of the proposed site, application or project. Upon any written request by a landowner relating to a specific situation, DNR and DOE will promptly investigate any claim that one of their respective employees is disregarding such direction and will take all appropriate corrective and disciplinary action. If consistent with the terms of this paragraph, any such additional conditions are imposed, written documentation will be provided to the landowner or operator by the applicable State Agency describing the circumstances necessitating such condition.
- (d) WDFW agrees to exercise its discretion to protect covered resources through its habitat protection and permit conditioning authorities in a manner consistent with this Report for issues and activities addressed in this Report. This is not intended to limit WDFW’s hydraulics authority as established by the hydraulic code.
- (e) If WDFW deems it necessary to modify regulations adopted under the HPA after the adoption of rules that implement this Report (except as provided for in subclause M.1(b) above) which changes will affect state or private forest landowners and impose restrictions or burdens on forest practices beyond those contemplated by the recommendations of this Report for issues addressed in this Report, WDFW will invoke

the adaptive management process described in Appendix L prior to forwarding proposed changes to the Director or Commission. If TFW so elects, the proposed rule change will be processed through such adaptive management process. (If the adaptive management process is not triggered by TFW, WDFW will pursue its normal rule adoption process as directed by the APA and involve affected parties through that process.) If made applicable, the adaptive management process described in Appendix L will be used, where relevant, to review the scientific information, propose adjustments, and issue a final report to the WDFW who will then take these findings and incorporate them into the normal HPA rule adoption process. When considering and adopting final HPA rules that affect state and private forest landowners regarding activities addressed in this Report, WDFW will seek to make rule changes in a manner that maintains the integrity and furthers the purposes of the recommendations in this Report to the maximum extent practical, consistent with its statutory authority, legislative mandates, court orders, agreements, and fiscal resources.

- (f) The rule package will repeal the automatic pass-through of federal critical habitat designations that currently trigger Class-IV Special requirements.
- (g) The current forest practices regulations allow two opportunities for “safe harbor-like” certainty for landowners who are concerned about attracting marbled murrelets to older forest stands (WAC 222-16-080(1)(j)(iv)(B) and WAC 222-16-105). Landowners are concerned that these processes may be inadequate as to habitat established pursuant to this plan and thus request that the board reassess its policies providing “safe harbor” protection.

M.2 Assurances related to the ESA

- (a) Subject to compliance with all applicable federal laws including those related to environmental and public review, the Services anticipate providing relief under the Endangered Species Act to forest landowners, operators, the state and its various subdivisions from any claim that forest practices conducted in accordance with the agreed upon prescriptions in this Report would constitute an impermissible “take” of any covered resources or would otherwise violate the Endangered Species Act or the regulations promulgated thereunder with respect to covered resources.
- (b) ESA protection would be provided in two phases. First, subject to compliance with all applicable federal laws, the Services anticipate promulgating one or more 4(d) rules with respect to the covered resources which are listed as “threatened.” These 4(d) rules would (i) exempt the conduct of forest practices in accordance with the prescriptions recommended in this Report from “take” prohibitions; and (ii) would not require the performance of any additional acts or the commitment of any additional resources (as such prescriptions may be revised in accordance with adaptive management) by forest landowners, operators, the state or any of its various subdivisions in order to avoid a violation of the Endangered Species Act. It is anticipated that the applicable 4(d) rule for each covered species will be adopted within two years after the date on which any such species is first listed except that in the case of bull trout, it is anticipated that the applicable 4(d) rule will be adopted by July 1, 2001.

- (c) The Governor's office will be authorized to negotiate the precise terms of the habitat conservation plan that will form the basis of an incidental take permit under Section 10 of the ESA. Subject to implementation of all aspects of this Report and compliance with all applicable federal laws, the Services anticipate issuing a "programmatic" incidental take permit by June 30, 2003. After developing agreed upon resource objectives, such a permit would insulate individual landowners, operators, the state and its subdivisions from any "take" of covered resources which is the incidental result of the conduct of forest practices as recommended in this Report for a term of fifty years. (Many details of a "programmatic incidental take permit" need to be worked out, as this is still more of a concept than an established practice for the Services.) The issuance of such an incidental take permit will not require the commitment of additional resources beyond those required to be committed under this Report (i.e. the commitments expressly set forth in this Report and the commitments developed as a result of the application of the adaptive management provisions as outlined in Appendix L). The Services will provide "no-surprises" protection in connection with such programmatic incidental take permit.
- (d) The authors agree to work toward the development of a programmatic consultation procedure for the use of federal roads to access private lands. Such a programmatic consultation could allow landowners to avoid sending such requests through Section 7 consultation procedures on a case-by-case basis or at least streamline such case-by-case consultations.
- (e) The authors agree to seek to develop and secure federal assurances under the Endangered Species Act so that forest landowners who adopt the recommendations of this Report and thereby "grow" habitat for threatened or endangered species other than covered resources will not be subject to claims of take from the conduct of forest practices permitted under the recommendations of this Report or to other restrictions or regulations which would not otherwise apply. At this time, however, it is unclear whether such assurances will be available, what the appropriate process for securing such assurances will be and when, if at all, such assurances can be provided.

M.3 Assurances related to the Clean Water Act. EPA's and DOE's assurances are contained in the attached Schedule M-2. Each of EPA and DOE agree for the benefit of the other authors of this Report to fully perform their obligations under Schedule M-2.

M.4 Miscellaneous provisions.

- (a) "Covered resources" includes, without limitation, six specific stream-associated amphibians found in the State of Washington. These six species of amphibians were selected by the Landscape and Wildlife Advisory Group as the amphibians most dependent on riparian habitat, most susceptible to forest management impacts, and least resilient to population pressure.
- (b) Subject to compliance with all applicable federal laws, the Services believe that the implementation of the recommendations contained in this Report will comply with the requirements of the Endangered Species Act with respect to covered resources and will be sufficient (as to habitat) to meet the target of harvestable numbers of fish. The

Services agree to support these conclusions in any forum where the impact of forest practices on the habitat of covered resources in the State of Washington is under consideration.

- (c) The authors agree that, in issuing assurances dependent on commitments made in this Report, federal and state agencies have the responsibility and obligation to review the performance of each of the authors against the commitments made and to review the continuance of assurances in light of their findings.
- (d) The federal implementation agreement to be entered into in connection with the “programmatically” incidental take permit envisioned by this Report will contain provisions describing the circumstances under which such permit may be revoked. Such circumstances shall include but not be limited to the failure: to implement any of the provisions in the Forests and Fish Report in a timely manner; to provide adequate funding for relevant state agencies and Tribal governments; to provide adequate enforcement or compliance; to make progress toward resource objectives, and achieve time specific performance targets; and of the State to fully perform their obligations under this Agreement.

M.5 Treaty-Reserved Rights of Tribes. There are no implied or explicit assurances that this Report or its implementation is intended to meet the standards and legal rights of tribal treaty-reserved fishing, hunting, or gathering rights. This process will only address ESA and CWA related issues; there shall be no limitation on any treaty claims that the tribes may bring or raise as a result of this Report.

Appendix N

Funding

The Forests and Fish Report contemplates a mix of federal and state funds to implement the Report's recommendations. Certain of the dollar amounts listed below are to subject to final approval of the state's fiscal note.

N.1 Federal Funding.

Federal funding will be pursued by the authors of the Report for two specific federal purposes: U.S. Fish and Wildlife Service bull trout research requirements and Tribal technical and coordination support.

- (a) **Bull Trout Research:** The authors agree to seek up to \$2.5 million in FY 2000 for U.S. Fish and Wildlife Service bull trout research for the Northwest region and specific requirements associated with the adaptive management provisions of the Report to be carried out by the Olympia Field Office of the USFWS.
- (b) **Tribal Funding:** Federal funding for Tribes is necessary for implementation of the Forests and Fish Report. Tribes will specifically require funding to support expertise in the fields of forestry, geology and hydrology to complement their fisheries expertise. The monitoring and adaptive management provisions of the Report will require the Tribes' active participation. The authors agree to pursue up to \$4 million in FY 2000 to support Tribal participation in the Report's recommended adaptive management processes. The authors further agree to support federal Tribal funding to participate in the processes in subsequent fiscal years.

N.2 State Funding

- (a) **State Actions:** Putting the new recommended forest practices rules to work on the ground will require additional resources for state agencies, including Department of Natural Resources, Washington Department of Fish and Wildlife and Washington Department of Ecology: \$7.6 million GF-S and \$7.5 million GF-F. Specific activities that would be funded include: rule adoption; review and approval of new road maintenance and abandonment plans; field compliance, permit assistance for small landowners, mapping of unstable slopes; replacement of the Department of Natural Resource's outdated Forest Practices Application system; development of forest road and hydrology data bases; monitoring of the new rules for effectiveness and compliance; planning for cultural resources; training for rule implementation, adaptive management and purchase in fee of certain lands within channel migration zones.

- (b) Small Landowner Assistance: Because of their limited land base, small forestry landowners will likely be affected disproportionately by the new recommended rules. DNR staff will provide technical assistance to these landowners and assist them with obtaining riparian easements. A total of \$5 million will also be available to purchase streamside easements and property from small landowners that face timber harvest limitations. Total funding proposed: \$6.5 million GF-F.

Appendix O

Miscellaneous

I. Prescriptions. The authors of this Report recommend the adoption of statutes, rules, and regulations as necessary to implement the following prescriptions:

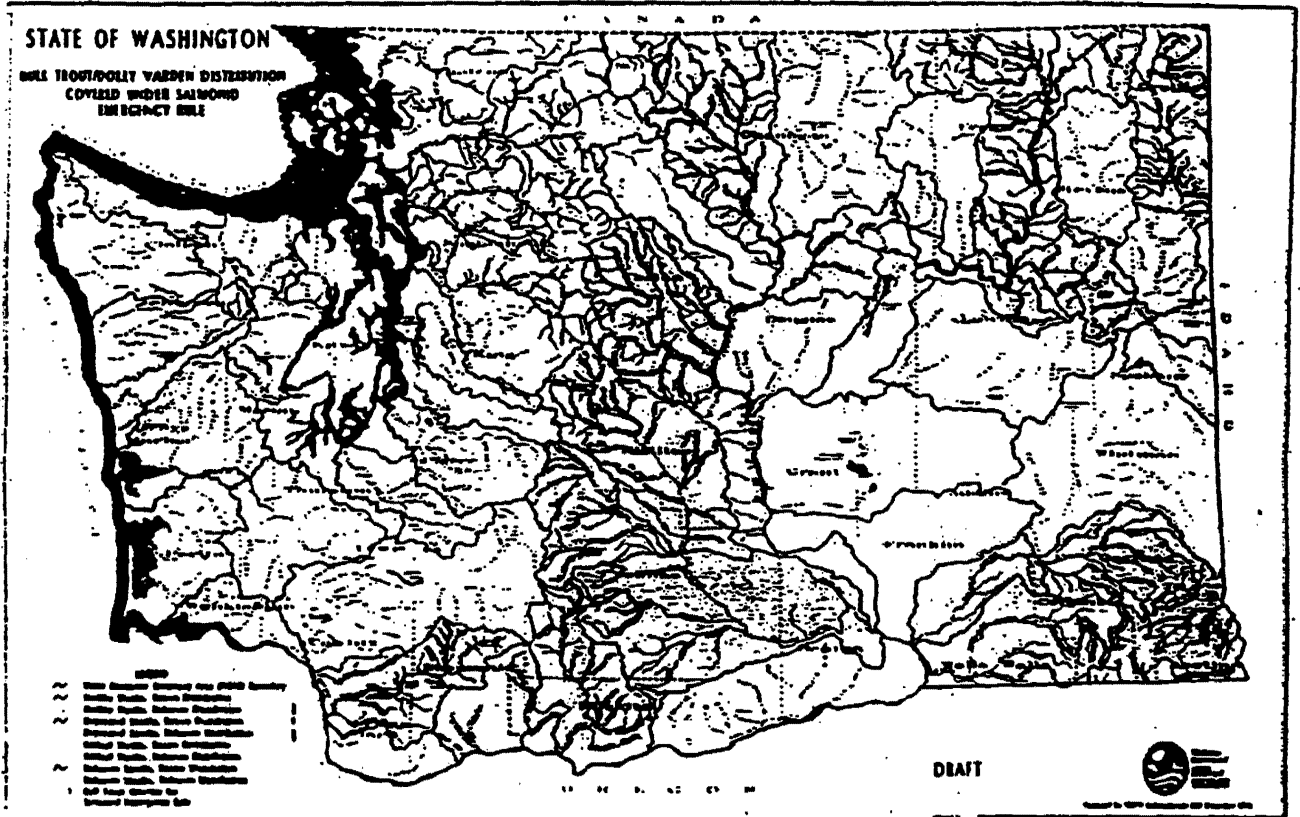
O.1 Commitment schedules. This Report contains many references to protocols and guidelines to be developed, and studies to be initiated and completed. Promptly after the submission of this Report, the authors or their designees will establish a schedule for the completion of these tasks.

O.2 Schedules. A number of the schedules contain implementation details and will be subject to further revisions and clarifications as the provisions of this Report are implemented through rule, statutes and programs.

O.3 The authors are committed to completion of a cultural resources plan to address relationships between landowners and affected Tribes and resolution of issues when cultural resource concerns arise in the course of forest practices planning or permitting. The commitments to complete the plan within two years from the date this Report is completed.

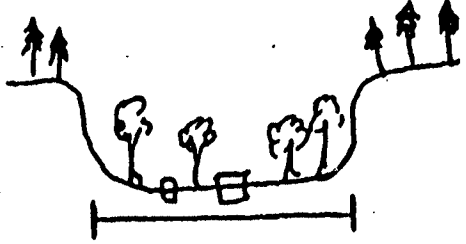
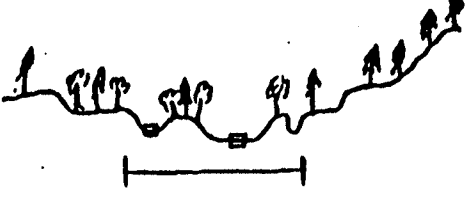
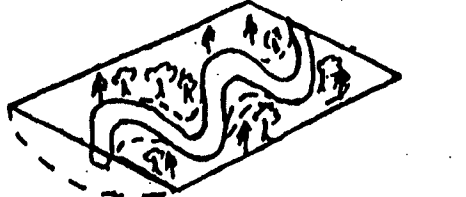
Schedule A-1

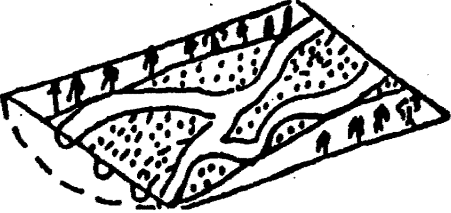

Bull Trout Habitat Overlay Map



Schedule A-2

Summary of Channel Migration Zone definition

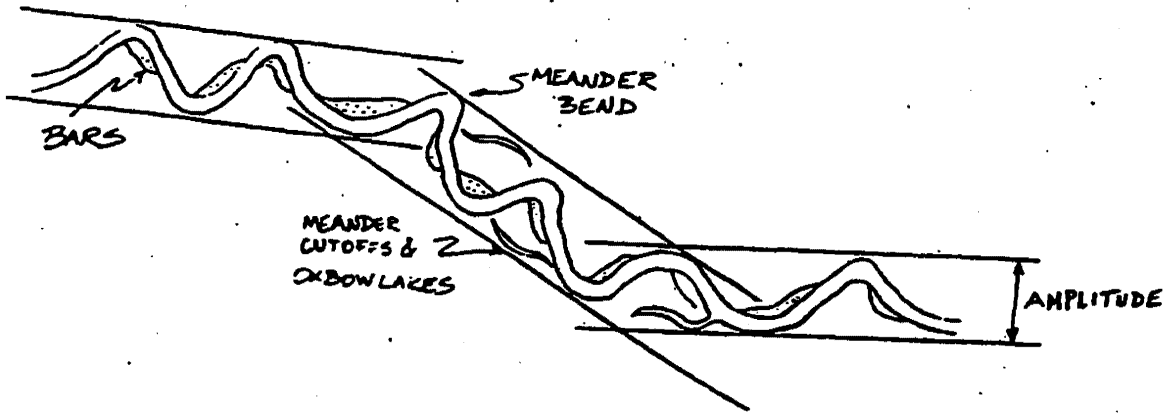
Channel Migration Situations	Stream Type	Stream Gradient	Channel Cross-Section	CMZ Characteristics
<p><i>Moderately confined streams</i> <i>< 50 ft. width</i></p>	F	< 8%		<ul style="list-style-type: none"> • CMZ = < 4 channel widths • Primarily hardwood vegetation • Well-defined break in slope at CMZ boundary
<p><i>Unconfined streams</i> <i>< 50 ft. width</i></p>	F	< 8%		<ul style="list-style-type: none"> • CMZ = mainstem + side-channels • Mixed hardwood and conifer vegetation • Numerous active and abandoned side-channels
<p><i>Unconfined meandering streams</i> <i>> 50 ft. width</i></p>	S	< 2%		<ul style="list-style-type: none"> • CMZ = amplitude of meander wave OR meander rate X years to growth of functional size LWD • Remnant side-channels and oxbow lakes

<p>Unconfined braided streams > 50 ft. width</p>	<p>S</p>	<p>< 2%</p>		<ul style="list-style-type: none"> • CMZ = bankfull width • Sparsely vegetated with hardwoods • Common in glacially-fed rivers
<p>Unconfined avulsing streams > 50 ft. width</p>	<p>S</p>	<p>< 2%</p>		<ul style="list-style-type: none"> • CMZ = valley bottom • Lowland large river systems • Dikes and levees common • Mixed land use

Schedule A-3

Channel Migration Zone for Unconfined Meandering Streams Option 1

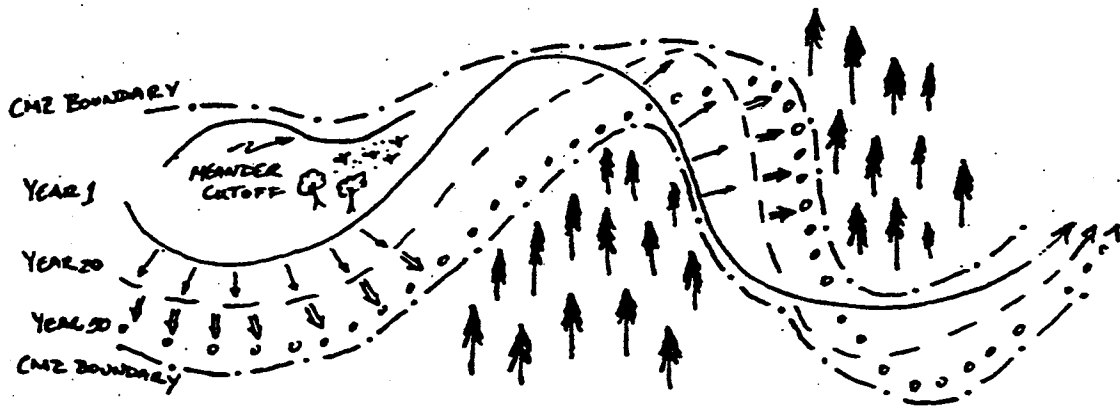
CMZ equals area within amplitude of meander bends.



Schedule A-4

Channel Migration Zone for Unconfined Meandering Streams Option 2

CMZ equals annual average rate of bank erosion at meander bend multiplied by the years required to grow functional large woody debris (LWD). Functional LWD diameter equals average bankfull depth multiplied by 0.5. Example assume functional LWD diameter achieved in 50 years.



Schedule B-2

Implementation Processes and Parameters for Completing Inner Zone Management Guidelines

Western Washington

By March 29, 1999, the authors of the Forests and Fish Report will complete guidelines for management that may occur in the inner zone of fish habitat water RMZs, as per section B.4 of the report.

The objective of the guidelines for inner zone management is to retain or improve riparian forest conditions as needed to provide for fish habitat and water quality. If management is conducted in the inner zone it must be consistent with desired future condition (DFC) targets. DFC targets will be used as the performance measure for all riparian stand manipulation. Riparian prescriptions are dependent on site productivity, community composition (percent conifer, trees per acre and basal area per acre) and age of the stand.

DFC Basal Area Targets. DFC basal area targets for mature riparian stands are set by site class. It is assumed that conifer is represented by Douglas-fir in the DFC targets.

Site Class	SPTH	DFC Target* BA/Ac (at 140 years)
I	200 feet	285
II	170 feet	275
III	140 feet	258
IV	110 feet	224
V	90 feet	190

*DFC targets are expected to be updated with additional samples provided by Byron Rot and with stand age corrections for some of the industry samples.

Stand Requirements. Growth modeling will establish the growth trajectory (pathways) of riparian stands that will likely yield DFC stand characteristics at the target age. Any point along the trajectory can be identified as the Stand Requirement for management of a stand at that age. Again, it is assumed that conifer is represented by Douglas-fir for the purposes of modeling.

- Growth will be modeled using ORGONON with the variables of:
 - Site
 - Age
 - Trees per acre
 - Basal area per acre
 - Conifer/hardwood ratio
- Forest practices (harvest) in the inner zone must be conducted in such a way as meet or exceed Stand Requirements.
- If the current stand, in the combined core zone and inner zone, does not meet Stand Requirements, the no-harvest buffer is extended out to the full inner zone width.

- If the current stand, in the combined core zone and inner zone, contains more than sufficient trees to meet Stand Requirements, two harvest options are available to landowners:

Option 1. The objective of thinning is to distribute Stand Requirement trees in such a way as to shorten the time required to meet large wood fish habitat and water quality needs. This is achieved by increasing the potential for leave trees to grow larger than they otherwise would without thinning. The strategy recognizes that the relationship between tree size and stream width must to be taken into account in the applications of thinning.

- Thinning must meet Stand Requirement (basal area) targets.
- Thinning must be from below leaving the largest trees.
- Thinning cannot decrease the proportion of conifer in the stand.
- Shade retention to meet the shade rule must be confirmed by the landowner for any harvest inside of 75 feet from the stream edge or CMZ.
- Additional thinning guidelines may be developed.

Option 2. The objective of Option 2 harvest is to maximize riparian forest function by retaining the Stand Requirement trees necessary to achieve desired future condition in a position as close to the stream as possible. The underlying assumption is that individual trees growing closer to the stream provide proportionally more functional benefit than trees farther away from the stream. This strategy recognizes that the relationship between distance from the stream and contribution to fish habitat and water quality is not linear and is not the same for all riparian needs. Therefore, some specific distance limitations are needed.

Inner Zone Widths and Minimum Distance From Stream Edge (Floor) for Option 2.

Site Class	SPTH	Small Streams 10 ft or less		Large Streams >10 ft	
		Floor	Inner Zone Width	Floor	Inner Zone Width
I	200 ft	80 ft	134 ft	100 ft	134 ft
II	170 ft	80 ft	114 ft	100 ft	120 ft
III	140 ft	80 ft	94 ft	100 ft	100 ft
IV	110 ft	80 ft	80 ft*	80 ft	80 ft**
V	90 ft	80 ft	80 ft*	80 ft	80 ft*

*2/3 or 3/4 SPTH is less than the 80 foot floor

**3/4 SPTH is 82.5 feet

- Option 2 is harvest that leaves a minimum of 20 riparian trees per acre in the harvested area.

- Option 2 harvest is limited to the outer portion of the inner zone.
- No Option 2 harvest can occur inside of the floors specified above.
- Following Option 2 harvest, the inner zone must meet the Stand Requirements.
- If the floor limitation leaves trees in excess of the Stand Requirement that would otherwise have been optional for the landowner to harvest, the basal area in excess of Stand Requirement can be used to reduce the number of riparian leave trees in the outer zone on a basal area for basal area basis. The parties continue to discuss the possibility that landowners should be permitted to allow for thinning of basal area in excess of Stand Requirement from the inner zone between 50 feet and the floor applying the thinning option guidelines.
- In the area harvested between the Option 2 harvest floor and the inner zone width, (“zone of concern”) leave a minimum of 20 riparian leave trees per acre.

Key questions to be dealt with through adaptive management. The adaptive management task group is addressing the priorities of these and other key questions:

- Are the DFC targets valid for the riparian areas covered? Two year time frame for data gathering and validation research response.
- Are forest practices rules derived from stand requirements resulting in on-the-ground riparian prescriptions that are likely to meet the riparian resource objectives? Four year time frame to collect and analyze data on rule implementation.
- Are the interactions of hardwood and conifer in mixed stands accurately modeled using the currently available tools? If not, what are the correct interactions? Three to five year time frame for gathering data, testing current tools and if necessary, constructing improved models

Schedule B-4
Down Wood Guidelines

Westside and Eastside High-Elevation Habitat Type

Structural Class I & II (Scale I-III)	< 1 foot diam	1-2 feet diam	> 2 feet diam	total
Number of Logs/ac	85	83	26	194

Eastside Mixed Conifer Habitat Type

90 Logs/ac (Class I & II) sized at least 6 inches diam at the large end. Logs with diameters greater than 12 to 15 inch are higher value and should be retained as a high proportion where available.

Eastside Ponderosa Pine Habitat Type

Guidelines similar in nature and function to those outlined above are to be developed.

Eastside requirements may need to be modified for consistency with down wood requirements contained in the body of the agreement.

Schedule D-1

Road Construction Prescriptions

(Roads Technical Committee suggested changes to comply with the Forests and Fish Report are in italics)

222-24-010. Policy.

**(1) A well designed, located, constructed, and maintained system of forest roads is essential to forest management and protection of the public resources. Riparian areas contain some of the more productive conditions for growing timber, are heavily used by wildlife and provide essential habitat for fish and wildlife and essential functions in the protection of water quality. Wetland areas serve several significant functions in addition to timber production: Providing fish and wildlife habitat, protecting water quality, moderating and preserving water quantity. Wetlands may also contain unique or rare ecological systems.*

Add a statement near the beginning of policy to the effect: As a policy objective, forest roads should be constructed and maintained so as not to result in delivery of sediment (and surface water) to any typed water in amounts, at times, or by means, that preclude achieving desired fish habitat. The target for achieving this objective is sediment delivery by WAU sub-basin that does not exceed 50% above background.

Add a Section number and bold “Wetlands” heading outside of the policy section to include paragraphs (2) and (3) below and other paragraphs later in this section pertaining to wetlands.

**(2) All road and landing construction within wetlands shall be conducted so that choices are made in the following descending order of preference:*

Reword (2) as follows: In order to assure that there is no net loss of wetland function, all road and landing construction near or within wetlands shall be conducted so that selection of choices is made in the following order with avoidance being the most preferred and replacement being the least preferred alternative:

(a) Avoid impacts by selecting the least environmentally damaging landing location, road location and road length; or

(b) Minimize impacts by such things as reducing the sub-grade width, fill acreage and spoil areas; or

(c) Restore affected areas by removing temporary fills or road sections upon the completion of the project; or

(d) Reduce or eliminate impacts over time by preserving or maintaining areas; or

(e) Replace affected areas by creating new wetlands or enhancing existing wetlands.

* (3) An accurate delineation of wetland boundaries shall not be required under this section except where necessary to determine acreage of road or landing construction which fills or drains more than 0.5 acre of a wetland. Landowners are encouraged to voluntarily increase wetland acreage and functions over the long-term.

Change "0.5" to "one tenth. Delete the last sentence above.

* (4) Extra protection is required during road construction and maintenance to protect these resources and timber growing potential. Landowners and fisheries and wildlife managers are encouraged to cooperate to develop road management and abandonment plans. Landowners are further encouraged to cooperate in sharing roads to minimize road mileage and avoid duplicative road construction.

Number (4) above remains in Policy. The language referring to road management and abandonment plans should be made consistent with the new rule for mandatory road maintenance and abandonment plans. ("cooperate in development of" rather than "cooperate to develop"). The intent here is to encourage cooperative efforts in road planning, maintenance and abandonment to meet all of the goals of the Forest Practices Act.

** (5) This section covers the location, design, construction, maintenance and abandonment of forest roads, bridges, stream crossings, quarries, borrow pits, and disposal sites used for forest road construction and is intended to assist landowners in proper road planning, construction and maintenance so as to protect public resources.*

(Note: Other laws and regulations and/or permit requirements may apply. See chapter 222-50 WAC.)

222-24-020. Road location.

This section should cover both road location and design.

(1) Fit the road to the topography so that a minimum of alterations to the natural features will occur.

* (2) Minimize roads along or within narrow canyons, riparian management zones, wetlands and wetland management zones.

(b) and (c) of this paragraph will be moved to a separate wetlands section. The wording in (a) below should replace the wording in (2) above.

(a) Except where crossings are necessary, roads shall not be located within natural drainage channels and riparian management zones when there would be substantial loss or damage to fish or wildlife habitat unless the department has determined that alternatives will cause greater damage to public resources.

(b) Roads shall not be located in wetlands when there would be substantial loss or damage to wetland functions or acreage unless the department has determined that alternatives will cause greater damage to public resources.

(c) Approximate determination of wetland boundaries, following guidelines in the Board Manual shall be required for the purpose of avoidance during design and construction of roads. Landowners should attempt to minimize road length concurrently with the attempt to avoid wetlands. Delineation, following guidelines in the Board Manual, shall be required to determine the length of road constructed within a wetland in order to determine acreage when replacement by substitution or enhancement of a wetland is required. The requirement for accurate delineation shall be limited to the area of the wetland proposed to be filled.

Delete the second sentence "Landowners should attempt to minimize road length concurrently with the attempt to avoid wetlands".

Add the following statement to the Wetland section: "Roads shall not be constructed in bogs or low nutrient fens".

*** (3) Minimize the number of stream crossings.**

Add "Stream crossings shall minimize alteration to natural features" and "culverts shall be located and designed to minimize sediment delivery".

*** (4) Whenever practical, cross streams at right angles to the main channel.**

(5) Avoid duplicative roads by keeping the total amount of construction to a minimum. Use existing roads whenever practical and avoid isolating patches of timber which, when removed, may require unnecessary road construction.

*** (6) Where feasible, do not locate roads on excessively steep or unstable slopes or known slide prone areas as determined by the department. The department shall determine whether slopes are unstable using available soils information, or from evidence of geologically recent slumps or slides, or where the natural slope exceeds the angle of repose for the particular soil types present, or where springs or seeps may indicate unstable conditions are present in or above the construction site.**

Essential road construction will be accomplished by end hauling, over hauling, or other special road construction techniques unless the department determines there is potential for damage to public resources under WAC 222-16-050 (1)(e).

Delete all of paragraph (6) since the section on Class IV Special and unstable slopes supercedes it.

Add a paragraph to say that landowners that propose road construction on unstable slopes that are not been included in site specific mass wasting prescriptions in an approved watershed

analysis will need to go through WAC 222-16-050, Class IV Special.

Add a paragraph to make the use of full bench construction mandatory where side slopes exceed 60% unless side cast construction is approved by the department based on the absence of delivery potential to a typed water or wetland.

Add a definition of "full bench" to Definitions. "Full bench means a road or trail construction technique where excavated material is removed from the site of origin and end hauled or over hauled to another location. In full bench construction, excavated material is not sidecast at the location that excavation occurs."

Add BMPs in the manual covering where to use end haul constructions or other techniques where slopes are steep, but not unstable.

222-24-025. Road design.

As previously suggested, combine road location and design under one section.

(1) Use the minimum design standard that produces a road sufficient to carry the anticipated *logging operation* traffic load and protect public resources with reasonable safety.

*(2) Subgrade width should average not more than 32 feet for double lane roads and 20 feet for single lane roads, exclusive of ditches, plus any additional width necessary for safe operations on curves and turnouts. Where road location in wetlands is unavoidable (see WAC 222-24-010(2)), minimize subgrade width.

(3) Balance excavation and embankments so that as much of the excavated material as is practical will be deposited in the roadway fill sections. Where full bench construction is necessary, design suitable embankments so that the excavated material may be end hauled to appropriate deposit areas.

(4) *Design or construct cut and fill slopes to the normal angle of repose for the materials involved, or at a lesser angle whenever practical.*

Change (4) to: "Cut and fill slopes shall be designed and constructed in such a way that have a high likelihood of remaining stable through the life of the road".

*(5) All roads should be out-sloped or ditched on the uphill side and appropriate surface drainage shall be provided by the use of adequate drainage structures such as: cross drains, ditches, drivable dips, relief culverts, water bars, diversion ditches, or other such structures demonstrated to be equally effective.

*(6) Cross drains, relief culverts, and diversion ditches shall not discharge onto erodible soils, or over fill slopes unless adequate outfall protection is provided.

*(7) Install cross drains, culverts, water bars, drivable dips, or diversion ditches on all forest roads to minimize erosion of the road bed, cut bank, and fill slope, or to reduce

sedimentation of Type 1, 2, 3 or 4 Water. Cross drains are required in wetlands to provide for continued hydrologic connectivity. These drainage structures shall be installed at all natural drainages, all low points in the road gradient and spaced no wider than as follows:

Grade	Distance Westside	Distance Eastside
0 to 7%	1,000 ft.	1,500 ft.
8% to 15%	800 ft.	1,000 ft.
over 15%	600 ft.	800 ft.

More frequent culvert spacing or other drainage improvements are required where site specific evidence of peak flows or soil instability makes additional culverts necessary to minimize erosion of the road bed, ditches, cut bank, and fill slope to reduce sedimentation of Type 1, 2, 3 or 4 Waters, or within wetlands or to avoid unreasonable risk to public resources. See "Additional culvert spacing recommendations" in the forest practices board manual. On request of the applicant, the department may approve less frequent drainage spacing where parent material (e.g. rock, gravel) or topography justify.

Delete paragraph (7) and refer to the Board manual for culvert spacing. The current manual section on culvert spacing will be revised by the time the forestry module rule package is adopted.

***(8) Relief culverts installed on forest roads shall meet the following minimum specifications (add "unless an alternative is approved by the department"):**

(a) Be at least 18 inches in diameter or equivalent in western Washington and 15 inches in diameter or equivalent in eastern Washington.

(b) Be installed sloping toward the outside edge of the road at a minimum gradient of 3 percent.

Replace (b) with the following:

Be installed in a manner that efficiently captures ditchline flow and passes it to the outside of the road.

"Drainage structures" should replace "culverts" in the context of ditch relief, cross drains or ditch water management.

Add a BMP to the manual that says drivable dips should be armored if road surface or soils at the outfall are potentially erodible and sediment delivery is likely to occur.

Add a rule that specifically states that the department may require additional information for proposed road construction as part of a completed application. This may include detailed topographic information showing the location and alignment of the road in relation to map features such as streams and wetlands; Additional information may also include the location, size and alignment of water crossing and drainage structures. Detailed plans of bridges, large

culverts or other complex elements of the proposal may be required.

***(9) Ditch diversion.** Where roadside ditches slope toward a Type 1, 2, 3 Water, or Type A or B Wetland for more than 300 feet and otherwise would discharge into the stream or wetland, divert the ditch water onto the forest floor by relief culvert or other means at the first practical point.

Reword (9) as follows: Ditch diversion. Where roadside ditches slope toward any typed water, or Type A or B wetland a ditch relief structure shall be located as close to the stream crossing or wetland as possible while still allowing the outfall to deposit onto the forest floor and not carry surface water or sediment into the stream channel or wetland.

Add the following:

Except where roads are built in rock or other materials not readily susceptible to erosion, outslope the road surface where practical. Where out-sloping is not practical, provide a ditch with cross drains on the inside of the road.

Crown or slope the road to prevent the accumulation of water on the road surface.

Rock armor the headwall of inlets on all stream-crossing culverts where the stream gradient above the crossing is greater than 6%.

Install rock armored headwalls and rock armored ditch blocks for cross drain culverts which are either located on erodible soils or where the affected road has a gradient greater than 6%.

Install drainage structures up slope of stream crossings to minimize entry of ditch water and sediment into the stream network or to any Type A or B wetland.

Install drainage structures at locations where seeps or springs are known or discovered during construction so as to pass accumulated surface water across the road prism and return it to the forest floor as close to the point of origin as reasonable practicable.

***(10) Filling or draining more than 0.5 acre of a wetland requires replacement by substitution or enhancement of the lost wetland functions and, for creation of new wetlands, area. See the Board Manual. Where creation of new wetlands is proposed, the objective of successful replacement by substitution of lost wetland area shall be on an acre for acre basis and of the same type and in the same general location. Where replacement by enhancement of wetlands is proposed, the objective shall be to provide for an equivalent amount of function to replace that which is lost.**

Change "0.5 acre" to "0.3 acre" and move (10) to the new Wetland Section.

Add a new paragraph for temporary roads. "A temporary road is a road intended for temporary use. It may be designed to a lower standard than provided in these rules and it shall be constructed in such a way as to facilitate closure and abandonment when the intended use is

completed. The design standard for a temporary road must provide the same protection for public resources that is provided by standard rules. Temporary roads must be identified on the forest practices application and a closure and abandonment date must be specified. Temporary roads must be closed and abandon to specifications approved by the department by the date specified in the forest practices application..”

222-24-030. Road construction.

(1) Right of way timber. Merchantable right of way timber shall be removed or decked in suitable locations where the decks will not be covered by fill material or act as support for the fill or embankment. *This is a BMP.*

*** (2) Debris burial.**

(a) In permanent road construction, do not bury:

(i) Loose stumps, logs or chunks containing more than 5 cubic feet in the load-bearing portion of the road, except as puncheon across wetlands or for culvert protection.

(ii) Any significant amount of organic debris within the top 2 feet of the load-bearing portion of the road, except as puncheon across wetlands or for culvert protection.

(iii) Excessive accumulation of debris or slash in any part of the load-bearing portion of the road fill, except as puncheon across wetlands or for culvert protection.

Replace “Debris burial” with “In permanent road construction, do not bury:” followed by (i), (ii) and (iii).

(b) In the cases where temporary roads are being constructed across known areas of unstable soils and where possible construction failure would directly impact waters, the requirements in (a), (i), (ii) and (iii) of this subsection shall apply. A temporary road is a roadway which has been opened for the purpose of the forest practice operation in question, and thereafter will be an inactive or abandoned road.

Delete (b).

(3) Compact fills. During road construction, fills or embankments shall be built up by layering. Each layer shall be compacted by operating the tractor or other construction equipment over the entire surface of the layer. Chemical compacting agents may be used in accordance with WAC 222-38-020.

* (4) Stabilize soils. When soil, exposed by road construction, appears to be unstable or erodible and is so located that slides, slips, slumps, or sediment may reasonably be expected to enter Type 1, 2, 3 or 4 Water and thereby cause damage to a public resource, then such exposed soil areas shall be seeded with grass, clover, or other ground cover, or be treated by erosion

control measures acceptable to the department. Avoid introduction of nonnative plant species, as listed in the board manual, to wetlands and wetland management zones.

Reword (4) as follows:

Erodible soil that is disturbed during road construction and is located where it could be reasonably be expected to enter the stream network shall be seeded with non-invasive plant species, (preferably species native to the state) adapted for rapid re-vegetation of disturbed soil, or treated with other erosion control measures acceptable to the department.

Add a BMP in the manual to encourage forest practices applicants to seek expert advice on the proper seed mix from WDFW, NRCS or DNR.

*** (5) Channel clearance.** Clear stream channel of all debris and slash generated during operations prior to the removal of equipment from the vicinity, or the winter season, whichever is first.

Add a reference to the Board Manual for debris removal guidelines. (Note: check with WDFW on the debris removal BMPs in the manual.)

*** (6) Drainage.**

(a) All required ditches, culverts, cross drains, drainage dips, water bars, and diversion ditches shall be installed concurrently with the construction of the roadway.

(b) Uncompleted road construction to be left over the winter season or other extended periods of time shall be drained by out-sloping or cross draining. Water bars and/or dispersion ditches may also be used to minimize eroding of the construction area and stream siltation. Water movement within wetlands must be maintained.

*** (7) Moisture conditions.** Construction shall be accomplished when moisture and soil conditions are not likely to result in excessive erosion and/or soil movement, so as to avoid damage to public resources.

*** (8) End haul/sidecasts.** End haul or overhaul construction is required where significant amounts of sidecast material would rest below the 50-year flood level of a Type 1, 2, 3, or 4 Water, within the boundary of a Type A or Type B Wetland or wetland management zones or where the department determines there is a potential for mass soil failure from overloading on unstable slopes or from erosion of side cast material causing damage to the public resources.

Edit for 100-year flood level and to include all Type S, F or N waters.

*** (9) Waste disposal.** When spoil, waste and/or other debris is generated during construction, this material shall be deposited or wasted in suitable areas or locations and be governed by the following:

(a) Spoil or other debris shall be deposited above the 50-year flood level of Type 1, 2, 3, or 4 Waters or in other locations so as to prevent damage to public resources. The material shall be stabilized by erosion control measures as necessary to prevent the material from entering the waters.

Edit as above.

(b) All spoils shall be located outside of Type A and Type B Wetlands and their wetland management zones. Spoils shall not be located within the boundaries of forested wetlands without written approval of the department and unless a less environmentally damaging location is unavailable. No spoil area greater than 0.5 acre in size shall be allowed within wetlands. Refer to WAC 222-24-010(2)

(10) Disturbance avoidance for northern spotted owls. Road construction, operation of heavy equipment and blasting within a SOSEA boundary shall not be allowed within 0.25 mile of a northern spotted owl site center between March 1 and August 31, provided that, this restriction shall not apply if:

(a) The landowner demonstrates that the owls are not actively nesting during the current nesting season; or

(b) The forest practice is operating in compliance with a plan or agreement developed for the protection of the northern spotted owl under WAC 222-16-080 (6)(a), (e), or (f).

(11) Disturbance avoidance for marbled murrelets.

(a) Road construction and operation of heavy equipment shall not be allowed within 0.25 mile of an occupied marbled murrelet site during the daily peak activity periods within the critical nesting season; and

(b) Blasting shall not be allowed within 0.25 mile of an occupied marbled murrelet site during the critical nesting season.

(c) Provided that, these restrictions shall not apply if the forest practice is operating in compliance with a plan or agreement developed for the protection of the marbled murrelet under WAC 222-16-080 (6)(a) or (c).

222-24-035. Landing location and construction.

*** (1) Landing location:**

Locate landings to prevent damage to public resources. Avoid excessive excavation and filling. Minimize placement and size of landings within wetlands. Landings shall not be located in Type A or B Wetlands or their wetland management zones.

Specifically reference forested wetland in the second sentence and place a reference to the wetland mitigation sequence currently WAC 222-24-010(2) in this paragraph

(2) Landing construction.

(a) Landings requiring sidecast or fill shall be no larger than reasonably necessary for safe operation of the equipment expected to be used.

(b) Where the average general slopes exceed 65 percent, fill material used in construction of landings shall be free from loose stumps and excessive accumulations of slash and shall be mechanically compacted where necessary and practical in layers by tractor to prevent soil erosion and mass soil movement. Chemical compacting agents may be used in accordance with WAC 222-38-020.

***(c) Truck roads, skid trails, and fire trails shall be outsloped or cross drained uphill of landings and the water diverted onto the forest floor away from the toe of any landing fill.**

***(d) Landings shall be sloped to minimize accumulation of water on the landing.**

***(e) Excavation material shall not be sidecast where there is high potential for material to enter Type A or B Wetlands or wetland management zones or below the ordinary high-water mark of any stream or the 50-year flood level of Type 1, 2, 3, or 4 Water.**

Edit for 100-year flood level and Type S, F and N Waters.

***(f) All spoils shall be located outside of Type A and Type B Wetlands and their wetland management zones. Spoils shall not be located within the boundaries of forested wetlands without written approval of the department and unless a less environmentally damaging location is unavailable. No spoil area greater than 0.5 acre in size shall be allowed within wetlands.**

Add a new paragraph for temporary landings. "A temporary landing is a landing intended for temporary use. It may be designed to a lower standard than provided in these rules and it shall be constructed in such a way as to facilitate closure and abandonment when the intended use is completed. The design standard for a temporary landing must provide the same protection for public resources that are provided by standard rules. Temporary landings must be identified on the forest practices application and a closure and abandonment date specified. Temporary landings must be closed and abandon to specifications approved by the department by the date specified in the forest practices application."

222-24-040. Water crossing structures.

***(1) Bridge construction.**

This first section should be changed to “All Typed Waters” and contain rules which apply to all waters. Insert a statement regarding the hydraulics project approval for crossing structures of Type S or F Waters. The following paragraph is suggested.

In addition to applicable general provisions below, installation, maintenance and removal of water crossing structures in or across the bankfull width of Type S and F Waters shall comply with hydraulic code [WAC 222-110] and require hydraulic project approval issued by the department of fish and wildlife.

(a) Bridges are required for new crossings of any Type 1 or 2 Waters regularly used for recreational boating.

Add reconstructed crossings and change “Type 1 or 2 Waters” to “any typed water”.

(b) Permanent bridges shall not constrict clearly defined channels and shall be designed to pass the 50-year flood level or the road shall be constructed to provide erosion protection from the 50-year flood waters which exceed the water-carrying capacity of the drainage structure.

Delete (b). Defer the issue to hydraulics code provisions for fish habitat waters and to the section below on bridges over Type N waters.

(c) One end of each new permanent log or wood bridge shall be tied or firmly anchored if any of the bridge structure is within 10 vertical feet of the 50-year flood level.

Add “reconstructed” to “new permanent log or wood bridge” and change 50-year flood level to 100-year flood level.

(d) Excavation for bridges, placement of sills or abutments, and the placement of stringers or girders shall be accomplished from outside the ordinary high-water mark of all waters, except when such operations are authorized by a hydraulic project approval.

(e) Earth embankments constructed for use as bridge approaches shall be protected from erosion by high water. Some examples of protection are: Planted or seeded ground cover, bulkheads, rock riprap, or retaining walls.

Delete (d) and (e). Defer the issues to hydraulics code provisions for fish habitat waters and to the section below on bridges over Type N waters.

(f). When earthen materials are used for bridge surfacing curbs of sufficient size shall be installed to be above the surface material and prevent such surface material from falling into the stream bed.

Replace (f) with: “When earthen materials are used for bridge surfacing, *only clean sorted gravel may be used, a geotextile lining shall be installed and* curbs of sufficient size shall be installed to prevent surface material from falling into the stream bed.”

Type N Waters - Bridges: In addition to applicable general provisions above, installation, maintenance, and removal of permanent bridges in or across Type N Waters are subject to the following provisions:

Permanent bridges shall not constrict clearly defined channels and shall be designed to pass the 100-year flood, or the bridge, associated embankments and fills, and all potentially inundated areas, shall be provided sufficient erosion protection to withstand the 100-year flood.

Excavation for and placement of the bridge foundation and superstructure shall be located and accomplished from outside the bankfull width. This requirement may be waived if it can be demonstrated that such activities may be conducted in such a manner as to prevent damage to public resources.

Alteration or disturbance of the stream bank or bank vegetation shall 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 the board manual. This requirement may be modified or waived by the department if precluded by engineering or safety factors.

Earthen embankments constructed for use as bridge approaches shall be provided with sufficient erosion protection to withstand the 100-year flood.

****(2) Culvert installation:***

Change "Culvert installation" to "Type N Waters-Culverts and add "In addition to applicable general provisions above, installation, maintenance, and removal of permanent culverts in or across the Type N Waters are subject to the following provisions:

All permanent culverts installed in forest roads shall be of a size that is adequate to carry the 50-year flood or the road shall be constructed to provide erosion protection from the 50-year flood waters which exceed the water-carrying capacity of the drainage structure. Refer to "Recommended culvert sizes" in the forest practices board manual for the size of permanent culverts recommended for use in forest roads. If the department determines that because of unstable slopes the culvert size shown on that table is inadequate to protect public resources, it may require culvert sizes in accordance with the nomograph (chart) contained in the forest practices board manual or with other generally accepted engineering principles.

Change "Sized to carry the 50-year flood" to "designed to pass the 100-year flood" and "protection from 50-year flood" to "protection from 100-year flood". Insert after the first sentence "Erosion protection includes armored overflows or the use of clean, coarse fill material".

(a) No permanent culverts shall be installed that are smaller than:

(i) 24 inches in diameter or the equivalent for anadromous fish streams or wetlands where anadromous fish are present.

(ii) 18 inches or the equivalent for resident game fish streams.

(iii) 18 inches or the equivalent for all other water or wetland crossings in western Washington.

(iv) 15 inches or the equivalent for all other water or wetland crossings in eastern Washington.

Replace (i) – (iv) with

(i) 24" for perennial Type N Waters

(ii) 18" for seasonal Type N Waters in western Washington

(iii) 15" for seasonal Type N Waters in eastern Washington

(b) The alignment and slope of the culvert shall parallel the natural flow of the stream whenever possible.

(c) When fish life is present, construct the bottom of the culvert at or below the natural stream bed at the inlet and outlet.

(d) Terminate culverts on materials that will not readily erode, such as riprap, the original stream bed (if stable), or other suitable materials.

(e) If water is diverted from its natural channel, return this water to its natural stream bed via culvert, flume, spillway, or the equivalent.

(f) When flumes, downspouts, downfall culverts, etc., are used to protect fill slopes or to return water to its natural courses, the discharge point shall be protected from erosion by: (i) Reducing the velocity of the water, (ii) use of rock spillways, (iii) riprap, (iv) splash plates, or (v) other methods or structures demonstrated to be equally effective.

Delete (c), (d), (e) and (f) above and add the following to the rules:

Culverts shall be designed and installed so that they will not cause scouring of the stream bed and erosion of the banks in the vicinity of the project.

When the department determines that installing a culvert in a flowing stream will result in excessive siltation and turbidity, and that siltation and turbidity would be reduced if stream flow were diverted, the department shall require that stream flow be diverted using a bypass flume or culvert, or by pumping the stream flow around the work area.

Fill associated with culvert installation shall provide sufficient erosion protection to withstand a 100-year flood.

Alteration or disturbance of the stream bank or bank vegetation shall 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 the board manual. This requirement may be modified or waived by the department if precluded by engineering or safety factors. (BMPs for stabilization and restoration have yet to be written)

(g) Stream beds shall be cleared for a distance of 50 feet upstream from the culvert inlet of such slash or debris that reasonably may be expected to plug the culvert.

(h) The entrance of all culverts should have adequate catch basins and headwalls to minimize the possibility of erosion or fill failure.

*** (3) Culverts in anadromous fish streams. In addition to the requirements of subsection (2) of this section, in streams used by anadromous fish:**

(a) Culverts shall be either open bottomed or have the bottom covered with gravel and installed at least 6 inches below the natural stream bed at the inlet and outlet.

(b) Closed bottom culverts shall not slope more than 1/2 percent; except as provided in (e) of this subsection; open bottom culverts shall not slope more than the natural slope of the stream bed.

(c) Where multiple culverts are used, one culvert shall be at least 6 inches lower than the other(s).

(d) Culverts shall be set to retain normal stream water depth throughout the culvert length. A downstream control may be required to create pooled water back into the culvert and to insure downstream stream bed stability.

(e) Closed bottom culverts, set at existing stream gradients between 1/2 percent and 3 percent slope shall be designed with baffles for water velocity control, or have an approved designed fishway.

(f) The department, after consultation with the department of fish and wildlife, shall impose any necessary limitations on the time of year in which such culverts may be installed to prevent interference with migration or spawning of anadromous fish.

(g) Any of the requirements in (a) through (f) of this subsection may be superseded by a hydraulic project approval.

Delete all of paragraph (3) and defer to HPA authority in fish streams.

***(4) Temporary water crossings**

Add "in Type N waters."

Add "A temporary water crossing is a water crossing intended for temporary use. It may be designed to a lower standard than provided permanent crossings and it shall be constructed in such a way as to facilitate closure and removal when the intended use is completed. The design standard for a temporary crossing must provide the same protection for public resources that are provided by standard rules. Temporary crossings must be identified on the forest practices application and a removal date must be specified."

(a) Temporary bridges and culverts, adequate to carry the highest anticipated flow in lieu of carrying the 50-year flood, may be used:

(i) In the westside region if installed after June 1 and removed by September 30 of the same year.

(ii) In the eastside region if installed after the spring runoff and removed prior to the snow buildup which could feed a heavy runoff.

(iii) At other times, when the department and applicant can agree to specific dates of installation and removal.

Add the following:

Temporary bridges and culverts shall be designed to pass the flood expected to occur once in 100 years during the season of installation. (This paragraph is under further review to identify the actual standard for summer roads and water crossings)

Alteration or disturbance of the stream bank or bank vegetation shall 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 the Board Manual. This requirement may be modified or waived by the department if precluded by engineering or safety factors. (BMPs for stabilization and restoration have yet to be written)

When the department determines that installing a culvert in a flowing stream will result in excessive siltation and turbidity, and that siltation and turbidity would be reduced if stream flow were diverted, the department shall require that stream flow be diverted using a bypass flume or culvert, or by pumping the stream flow around the work area.

(b) Temporary bridges and culverts shall be promptly removed upon completion of use, and the approaches to the crossing shall be water barred and stabilized at the time of the crossing removal.

Replace (b) with: "Temporary bridges or culverts must be identified in the forest practices application and they must be removed and abandon to specifications approved by the department by the date specified in the forest practices application. Approaches to the crossing shall be water barred and stabilized at the time of the crossing removal." The department may waive removal if the applicant secures an approved amended forest practices application)"

(c) Temporary wetland crossings shall be abandoned and restored based on a written plan approved by the department prior to construction.

(5) Properly prepared and maintained fords may be used in type N waters during periods of low water providing a hydraulic permit is acquired.

(a) *Entry and exit points for each ford shall be located as close along the stream as possible, but in no case shall exceed 100 feet of each other.*

(b) *Ford locations shall be shown on the forest practices application.*

(c) *Best management practices for construction, maintenance and use will be utilized as appropriate or as required by conditioning. (to be completed)*

(d) *Alteration of disturbance of the stream bank or bank vegetation shall be limited to that necessary to construct the project. All disturbed areas must be stabilized and restored according the recommended schedule and procedures found in the board manual (to be developed). This requirement may be modified or waived if precluded by engineering or safety factors.*

222-24-050. Road maintenance.

Add a policy statement: "Improving and Maintaining Forest Roads to Meet a Higher Standard. Since the inception of the forest practiced act in 1974, forest landowners, timber owners and forest operators (collectively referred to as forest landowners) have been required to maintain forest roads constructed or used for forest practices after the act went into effect. The current body of rules as amended remains in place as a minimum standard for maintaining all roads associated with forest practices. Within fifteen years of the effective date of this rule, all roads associated with forest practices will meet upgraded standards for fish passage, preventing mass wasting, limiting delivery of sediment and surface runoff water to Type S, F or N* waters and avoiding capture and redirection of surface or ground water. Upgraded standards are reflected in new road design and construction rules and Road Construction and Maintenance Best Management Practices contained in the Board Manual. For sediment delivery from roads, the Watershed Analysis Manual provides guidance for setting priorities and establishes an interim standard for compliance. Meeting the new standards will require both upgrading specific segments of existing roads and higher maintenance standards for all existing and new roads. Progress toward meeting the upgraded standards will generally be even flow. The cost to landowners will be spread more or less evenly over the fifteen- year period, although, through prioritization, most benefits to the resources are expected to occur in the early years of the

program. To insure that all forest landowners are progressing toward meeting the new standards, all roads under forest practices jurisdiction must be covered by a road maintenance and abandonment plan within five years after the adoption of this rule as described in the scheduling below.

** For the purpose of this road maintenance section, Type N waters do not include intermittent Type N waters that do not have any surface water connection to Type S or F waters*

(1) Road maintenance and abandonment plan.

Delete (a), (b), (c) and (d) below.

(a) The landowner when notified by the department shall submit a plan for road maintenance and abandonment for those drainages or road systems the department determines based on physical evidence to have a potential to damage public resources. The plan is subject to annual review and shall include:

(i) Ownership maps showing the road or road system;

(ii) Road status, whether active, inactive, abandoned or planned for abandonment;

(iii) Maintenance schedule and priorities for the year; and

(iv) Plan for further maintenance and reconstruction beyond the current year for repair of extensive damage.

(b) The plan shall be submitted to the department region office on or before June 30, 1988, and each June 30th thereafter unless the department agrees that no further plans are necessary.

(c) The department will review the plan annually with the landowner to determine whether it will be effective and is being implemented.

(d) Such plans shall also be reviewed with departments of ecology, fish and wildlife, and affected Indian tribes, any of whom may request an informal conference with the landowner.

Delete (a), (b), (c) and (d) above.

Road Maintenance and Abandonment Plans

In order to provide a verifiable, orderly and economically viable transition from maintaining roads to the previous construction and maintenance standards to upgrading roads and maintaining them to the new standard, mandatory road maintenance and abandonment planning

(road maintenance planning) is specified in the rule. Overall, upgrades and new maintenance standards must be completed for all forest roads by the end of fifteen years from the effective date of this rule. It is impractical to develop detailed road maintenance plans for a fifteen year period. Therefore, with exceptions as approved by the department, detailed road, maintenance planning will be carried out in two- to five-year increments.. All roads under forest practices jurisdiction must be covered by a road maintenance or abandonment plan within five years of adoption of this rule on a schedule as described below.

Each road maintenance plan submitted to the department must show how the forest landowner will progress toward fulfilling the requirement of generally even-flow progress toward the mandatory fifteen-year completion requirement.

Within five years after the adoption of this rule as described in the schedule below, all landowners must have submitted a road maintenance and abandonment plans to the department for all drainages or roads systems where the road were constructed or used for forest practices after 1974. (Assessment of "orphan roads" will be in a separate paragraph) Individual landowners must maintain a schedule of submitting plans to the department so as to complete plans for at least 20% of their roads each year.

Basins or road systems where approved watershed analysis prescriptions for road maintenance are in effect and followed meet the road maintenance and abandonment plan requirement for potential resource damages covered in by the prescription. Landowners may need to add components to the road maintenance plans to address issues not covered in WA prescriptions such as fish passage or potential mass wasting from roads.

(insert planning rule for small landowners)

Plans will be submitted by landowners on a priority basis. In general, drainages or road systems in which improvement, abandonment or maintenance of road swill have the highest potential benefit to public resources are the highest priority. Work on roads that effect the following are presumed to be the highest priority:

- *Basins containing, or road systems potentially affecting, waters which either contain a fish which is listed as threatened or endangered under federal or state laws or a water body listed on the then current 303(d) water quality impaired list due to road related issues.*
- *Basins containing, or road systems potentially affecting, sensitive geology/soils and/or areas with a history of slope failures.*
- *Road systems or basins where other restoration projects are in progress or may be planned coincident to the implementation of the proposed road plan.*

- *Road systems or basins likely to have the highest use in connection with future forest practices.*

The department will facilitate annual WRIA meetings inviting landowners, WDFW, DOE, affected Tribes, federal fisheries managers, affected counties, local USDA Forest Service, Watershed Councils and other interested parties (TFW). The purpose of the meetings is to suggest priorities for scheduling road maintenance and abandonment planning and to exchange other useful information on road maintenance and stream restoration projects. All parties are expected to get their issues on the table at these meetings so that it can be used in the planning process.

If notified by the department that road maintenance plans have not been submitted in a timely manner, the landowner must within 90 days submit to the department for review and approval a plan or plans for those drainage or road systems within the area identified by the department.

Plans must pay particular attention to those road segments that block fish passage or have the potential to deliver water or sediment to any typed water which delivers to the stream network and shall include:

Ownership maps showing the road or road system and typed waters;

Road status, whether active, orphan road, or planned for abandonment;

A general overview of the repair and maintenance needs of the system with sufficient information to establish the adequacy of the each plan in meeting the 15-year schedule;

Sufficient detail and scheduling on the first years of upgrading work to show that work is even-flow and will be completed in the required time period (five year interim and fifteen year total);

Standard practices for routine maintenance using enhanced BMPs;

A storm maintenance strategy covering pre-storm planning emergency maintenance and post storm recovery, (What is the storm maintenance standard for small landowner plans?)

An inventory and assessment of the risk to public resources or public safety of orphan roads. (Orphan roads are forest roads or railroad grades that the forest landowner has not used for forest practice activities since 1974. Many of these roads are overgrown or closed off, but have not satisfied the formal abandonment process.) Five years after the adoption of rule, when the extent of any problems associated with the orphan roads is known, the hazard-reduction statute (RCW _____) will be evaluated to determine if it is still needed and if funds for cost-sharing are needed to effect repair or abandonment of orphan roads. Landowners are not obligated under this rule to repair or abandon such roads before the end of the five year period.

With exception approved by the department, priorities for scheduling work within plans are:

- *Repair or maintenance work to improve fish passage (beginning on roads affecting the most habitat first, generally starting at the bottom of the basin and working upstream).*
- *Repair or maintenance work to limit sediment delivery/mass wasting in identified areas. Guidance developed from experience obtained from previous application of the watershed analysis surface erosion module for roads should be considered. (Areas where sediment delivery or mass wasting will most likely affect bull trout habitat will be given highest priority.)*
- *Repair or maintenance work to disconnect road drainage from streams.*
- *Repair or maintain stream-adjacent parallel roads with a particular emphasis on eliminating water and sediment delivery from the road to the stream.*
- *Repair or maintenance work to improve hydrologic connectivity (i.e. to minimize interruption of surface water drainage, the interception of subsurface water and the pirating of water from one basin to another).*
- *Repair or maintenance work which can be undertaken with the maximum operational efficiency.*

Initial plans must be submitted to the department according to the following schedule:

In the year that the rule becomes effective, if it becomes effective before the first of July then initial plans must be submitted to the Department before March 30 of the following year. (A minimum of 9 months to prepare the first plan)

If the rule becomes effective after the first of July, initial plans must be submitted to the Department before March 30 of the second year following the year the rule becomes effective. (A minimum of 15 months and a maximum of 20 months)

Plans due in subsequent years will follow on an annual schedule and be submitted to the department before March 30 of each year.

Complete plans submitted to the department will be considered an application for multi-year permits to accomplish those actions proposed by the plan. The department will review the plan in consultation the departments of ecology, fish and wildlife, affected Indian Tribes and interested parties. Plans will be approved, conditioned or disapproved by the department within ~~30~~ 45 days of the receiving a complete plan. The Board Manual provides tools prioritizing work to reduce

sediment delivery from roads and, the Watershed Analysis Manual establishes a subbasin standard for sediment delivery from forest roads. Approval of plans will also be based on even-flow progress toward fifteen-year completion of upgrades.

During the first quarter of the year following approval of the plan, landowners must report accomplishment of work completed the previous year and may, at the landowners option, submit modifications to the plan to the department for review and approval.

The department will review progress on the plans annually with the landowner to determine whether or not the plan is being implemented as approved. The departments of ecology and fish and wildlife, affected Indian Tribes and interested parties may consult with the department and the landowner regarding this review.

Unless the department determines that no further plans are necessary, sixty days before a plan expires a follow up plan for additional work required to remain on schedule to meet upgraded standards must be submitted to the department.

Landowners hauling timber on active haul routes not covered under a department approved road maintenance and abandonment plan, an approved watershed analysis or other agreement in which a road maintenance and abandonment plan as part of the agreement must, nevertheless, maintain the road in a condition which protects public resources. If at the time of harvest application, the department determines that log haul on such a road will cause material damage or has the potential to cause material damage to a public resource the department may require the applicant to submit a plan to address specific issues or segments on the haul route.

If a landowner is found to be out of compliance with the work schedule of an agreed to and approved road maintenance and abandonment plan, and the department determines that such work is necessary to protect public resources, the department shall exercise its authority under WAC 222-46-030 (notice to comply) and WAC 222-46-040 (stop work order) to restrict use of the affected road segment. The landowner may submit an alternative maintenance plan to the department and request permission to use the road for log haul. The department shall approve use of the road if the alternative plan provides for the protection of public resources and maintains the overall schedule of maintenance for the road system or basin.

***(2) Active roads.** An active road is a forest road being actively used for hauling of logs, pulpwood, chips, or other major forest products or rock and other road building materials. To the extent necessary to prevent damage to public resources, the following maintenance shall be conducted on such roads:

Replace the first sentence in (2) with the following "Forest roads. A forest road is a road that was built or used for forest practices after 1974 and has not been abandon in accordance with paragraph (5) of this section".

Culverts and ditches shall be kept functional.

Use the term drainage structures rather than culverts

(b) Road surface shall be maintained as necessary to minimize erosion of the surface and the subgrade *and to minimize the direct delivery of water or sediment to the stream network. Refer to the Road Maintenance Best Management Practice in the Board Manual for specific guidance in meeting this requirement.*

(d) During and on completion of operations, the road surface shall be crowned, outsloped, or water barred and berms removed from the outside edge except those intentionally constructed for protection of fills.

Specify the following operations in (d): log, pulpwood, chip, or other major forest product hauling or rock hauling or other road building

Add an item to require that if the road was designed to be outsloped or if drivable dips are part of the drainage design, that these structures be maintained as designed.

Add a road maintenance BMP to the Manual that encourages landowners to control road use through gating or other opportunities such as the Green Dot program.

***(3) Inactive roads.** An inactive road is a forest road on which commercial hauling is discontinued for 1 or more logging seasons, and the forest landowner desires continuation of access for fire control, forest management activities, Christmas tree growing operations, occasional or incidental use for minor forest products harvesting or similar activities on such inactive roads:

Delete (3) Inactive roads.

(a) Before the first winter rainy season following termination of active use, nonfunctional ditches and culverts shall be cleared and the road surface shall be crowned, outsloped, water barred or otherwise left in a condition not conducive to accelerated erosion, interruption of water movement within wetlands,

Reword (b) as follows: Before the first winter rainy season following termination of haul, drainage structures shall be cleared and the road surface shall be crowned, outsloped, water barred or otherwise left in a condition not which prevents accelerated erosion, interruption of water movement within wetlands, mass wasting or direct delivery of water or sediment to the stream network. Refer to the Road Maintenance Best Management Practice in the Board Manual for specific guidance in meeting this requirement.

(b) Thereafter, except as provided in (c) of this subsection, the landowner shall clear or repair ditches or culverts which he/she knows or should know to be nonfunctional and causing or likely to cause material damage to a public resource.

(c) The landowner shall not be liable for penalties or monetary damages, under the act, for damage occurring from a condition brought about by public use, unless he/she fails to make repairs as directed by a notice to comply.

Replace "Culverts" with "drainage structures".

Add a road maintenance BMP to the Manual that encourages landowners to control road use through gating or other opportunities such as the Green Dot program.

*** (4) Additional culverts/maintenance.** If the department determines based on physical evidence that the above maintenance has been or will be inadequate to protect public resources and that additional measures will provide adequate protection it shall require the landowner or operator to either elect to:

(a) Install additional or larger culverts or other drainage improvements as deemed necessary by the department; or

(b) Agree to an additional road maintenance program. Such improvements in drainage or maintenance may be required only after a field inspection and opportunity for an informal conference.

Replace "Additional culvert/maintenance" with "Additional drainage maintenance". Drop the option in (b) for additional road maintenance and incorporate (a) and the second sentence in (b), the requirement for field inspection, into the lead paragraph.

(4) would then read something like this: "Additional drainage maintenance. If the department determines, based on field inspection and physical evidence, that the above maintenance has been or will be inadequate to protect public resources and that additional measures will provide adequate protection it shall require the landowner or operator to install additional drainage improvements as deemed necessary by the department"

*** (5) Abandoned roads.** An abandoned road is a forest road which the forest landowner has abandoned in accordance with procedures of (a) through (e) of this subsection. Roads are exempt from maintenance only after (e) of this subsection is completed:

(a) Roads are outsloped, water barred, or otherwise left in a condition suitable to control erosion and maintain water movement within wetlands; and

(b) Ditches are left in a suitable condition to reduce erosion; and

(c) The road is blocked so that four wheel highway vehicles can not pass the point of closure at the time of abandonment; and

(d) Bridges, culverts, and fills on all waters are removed, except where the department determines other measures would provide adequate protection to public resources.

(e) The department shall determine whether the road has been abandoned according to procedures of this subsection. If the department determines the road is properly abandoned, it shall within thirty days notify the landowner in writing that the road is officially abandoned.

(6) Brush control. Chemical control of roadside brush shall not be done where chemicals will directly enter any Type 1, 2, or 3 or flowing Type 4 or 5 Water or Type A or B Wetlands. Refer to WAC 222-38-020 for additional information.

Change "Type 1, 2, or 3 or flowing Type 4 or 5" to Type S or F or flowing Type N.

***(7) Road surface treatment.**

(a) Apply oil to the road surface only when the temperature is above 55 degrees F and during the season when there is a minimal chance of rain for the next 48 hours. Use of waste oil is subject to RCW 70.95I.060(5).

(b) Water the road surface prior to application of oil to assist in penetration.

(c) Construct a temporary berm along the road shoulder wherever needed to control runoff of the applied chemical.

(d) Take extreme care to avoid excess application of road chemicals. Shut off the flow at all bridges.

(e) When cleaning out chemical storage tanks or the application equipment tanks used for storage and application of road treatment materials, dispose of the rinse water fluids on the road surface or in a place safe from potential contamination of water.

(f) The use of dry road chemicals shall be in compliance with WAC 222-38-020.

222-24-060. Rock quarries, gravel pits, borrow pits, and spoil disposal areas.

Not covered by the Surface Mine Reclamation Act of 1971 (chapter 78.44 RCW).

***(1) Location of pits.** Except as approved by the department, rock quarries and gravel pits opened after January 1, 1975 shall be located above the 50-year flood level.

***(2) Location of spoil disposal areas.** Except as approved by the department, spoil disposal areas shall be located:

(a) Above the 50-year flood level.

(b) Where the final slope after disposal will be no steeper than 1 1/2:1.

- (c) Where practical, on areas having low potential timber productivity.
- (d) Where the risk of soil erosion and mass soil movement is minimal.
- (e) All spoils shall be placed to allow drainage without additional water ponding.

(f) All spoils shall be located outside of Type A and Type B Wetlands and their wetland management zones. Spoils shall not be located within the boundaries of forested wetlands without written approval of the department and unless a less environmentally damaging location is unavailable. No spoil area greater than 0.5 acre in size shall be allowed within wetlands.

Change 50-year flood level to 100-year flood level.

***(3) Pit drainage.** During construction and use of rock quarries, gravel pits, or borrow pits, runoff water shall be either diverted onto the forest floor or be passed through one or more settling basins as approved by the department.

(4) Rehabilitation required. All rock quarries, gravel pits, spoil disposal areas and borrow pits used after January 1, 1975 shall be reclaimed within 2 years from the time the rock or gravel source is either exhausted or abandoned.

(5) Rehabilitation standards. Where rehabilitation is required:

(a) Remove all deleterious material that has potential for damaging the public resource, the soil productivity, or that would prevent reforestation of an otherwise plantable area.

(b) Grade slopes to less than the angle of repose unless otherwise approved.

(c) Reforest in accordance with chapter 222-34 WAC to the extent practical.

(d) Seed unreforested exposed erodible soils with grass, clover or other ground cover.

***(6) Major spoil disposal operations.** Where a spoil disposal operation involves more than 1,000 cubic yards of spoils:

(a) The spoils shall be placed to provide drainage onto the forest floor without water ponding within the disposal area;

(b) The site shall be reforested in accordance with chapter 222-34 WAC to the extent practical; and

(c) If significant erosion of the spoils develops, the eroding areas shall be water barred and any unreforested areas shall be matted, mulched, or seeded with grass or ground cover.

Draft Proposed Forest Practices Board Manual Sections - Road Construction and Maintenance Best Management Practices

Road Maintenance and Construction
Roads Surface Erosion Control

Guidelines Best Management Practices for road location, design, construction, use, maintenance, and abandonment of roads to minimize sediment delivered to streams

Forest roads have been identified as an important source of sediment delivered to streams and wetlands in Washington's forests.

NEW SECTION. Best management practices (BMPs) are intended to guide the forest practitioner in meeting the forest practice rules. With few exceptions, correctly applying the appropriate BMPs will result in meeting the intent of the rules. The primary focus of the BMPs is ~~These guidelines are intended to prevent excess~~ minimize sediment delivery from road to sediment and water from entering the stream network in order to protect the public resources of water quality and fish habitat.

The condition of roads is only a concern as it affects public resources. A simple formula provides a framework for consideration of road problems:

Source + Resource + Delivery = Problem *Replace the + sign with the word "and".*

Where:

Source = a source of sediment or excess water, such as the road surface or cut bank

Resource = a public resource, usually water quality and fish habitat

Delivery = connecting the sediment or excess water from its source to the public resource in sufficient quantity to be likely to have a measurable impact, ~~such as long ditches carrying water and sediment into the stream~~

Problem = ~~something of public resource concern that needs~~ caused by one or more Forest Practices that need(s) to be corrected or prevented

Roads that do not generate excess sediment (paved) do not have the "Source" part of the formula. Roads that do not drain to waters of the state the stream system network (~~Naney & Jerry, we should select a term and use it throughout the document I suggest "stream network"~~) (on flat ground far from streams) do not have the "Resource" part of the formula. Roads that are out-sloped or have adequate cross-drains to deliver the sediment and water ~~from the ditches~~ onto the forest floor where they cannot affect public resources, and thus do not have the "Delivery" part of the formula.

~~The guidelines~~ BMPs are intended to provide controls over all three components ~~of a~~ that contribute to a road "Problem". Some are aimed at controlling the sediment sources, such as vegetating cut slopes ~~so that erosion does not take place~~ to minimize surface erosion. Some

consider the resource, such as locating roads away from streams. And ~~some other~~ guidelines BMPs focus on preventing “delivery”, such as providing adequate cross drains so that any sediment and excess water carried by the ditch gets routed across the road and onto the forest floor, instead of being carried into the stream network.

Delivery

Road surfaces generate sediment in amounts dependent on the surfacing material and the amount and kind of traffic traveling over them. Gravel or dirt surfaced roads receiving log haul traffic can generate large amounts of loose, fine soil. To reduce sediment delivery from forest roads to streams and wetlands, ~~we need to disconnect the road drainage must be disconnected from the stream system network.~~ Controlling where that soil material sediment goes after it is loosened separates from the road surface is the key to preventing sedimentation of streams and wetlands. There are several effective alternatives to controlling these sediments – properly placed and spaced cross drains, sediment traps placed just up stream from ditch-stream intercepts and grass seeding the ditchline are some workable alternatives. Designing roads with an out-sloped surface or out-sloping inactive roads is an effective technique to reduce dependence on cross drain structures. Providing the road surface does not become rutted, well designed out-sloped roads will drain water and sediment away from stream with little or no periodic maintenance.

Roads that intercept large amounts of subsurface flow ~~in~~ from cut slopes can generate excess ~~surface flow from water that was flowing subsurface~~ a high volume of ditch water during wet weather. Frequent cross drains can carry that intercepted water across roads and onto the forest floor where it can be re-absorbed and return to its sub-surface flow route.

Alternative wording

Roads that intercept springs and seeps in cut slopes may interrupt subsurface flow and generate sufficient ditch water ~~that can to~~ carry sediment to streams. Rerouting subsurface flow also has the potential to change the hydrologic regime of the stream network. Cross drains placed as close as practical to the origin of intercepted water will carry it across the road and onto the forest floor where it can be re-absorbed and return to sub-surface flow.

END OF NEW SECTION

When evaluating a road maintenance plan and/or developing new road construction ~~it is important to consider how the road fits into the landscape. Consider the whole road drainage system and how it interacts with the stream system network. Where do soil and water that run off from the road surfaces and ditches go? Are they deposited on the forest floor, or do they find their way into the stream system network?~~ Each drainage structure either:

- 1) DISCONNECTS the road drainage from streams and deposits it safely where the water can be absorbed into and sediment deposited onto the forest floor ~~and the sediment is deposited~~

OR

2) CONNECTS the road drainage system to streams, allowing sediment and water to be delivered into the stream system network. This can occur either at a stream crossings, or through gullies at the below cross drain outflows, or in some instances where outsloped roads drain into nearby streams.

~~Consider how each cross drain contributes to~~ It is important to consider using all methods of separating sediments and excess ditch flows from streams when disconnecting the road/ditch drainage system from the stream network.

Road Location

~~Location~~ ing of a road away from streams and wetlands is the first opportunity in the life of when constructing a road to minimize sediment delivered to the stream system network. Roads that parallel a stream or wetland too closely (within 60-100ft) may have most or all cross-drains and surface runoff delivering sediment to the stream channel or wetland and erosion from the fill slope may enter the water directly. Erosion from the sidecast or fill slopes of roads located too close to streams can deliver sediment directly into the water unless effective locations for cross drains and outsloped road surfaces can be located.

~~Roads with many water crossings have many opportunities to deliver sediment to water. When initially considering the location of roads, look for opportunities to locate roads away from minimize the number of water crossings. Where roads crossings are necessary need to be located near streams, look for locations that offer opportunities to design the road in such a way that to limits delivery of road surface runoff to the stream system through design and construction, use, maintenance, or abandonment.~~

(Nancy and Jerry, I skipped the body of the BMPs and moved to the planning guidance at the end the Aug 10, 1998 document.)

Once a location has been selected to minimize road and water connections, the design of the road can contribute important safeguards to minimize delivery of sediment to water. Important considerations in design:

Road Design and Construction

1. Avoid redirecting streams out of natural drainages. Install culverts instead.
2. Where roads parallel stream channels within 60-100' horizontal distance (wider with steeper slopes) insure that ~~side-cast/fill~~ fill material is stabilized with herbaceous vegetation, rip-rap, slash filter windrows, or other appropriate measures.
3. Install cross drains up slope of stream crossings to minimize entry of ditch water and surface sediment into streams. Locate the cross drain as close to stream crossing as possible while still allowing the outfall to deposit on the forest floor and not run into the stream system.

4. Divert ditch water via relief culverts and ditch outs onto low angle forest floors whenever appropriate to filter out road sediments and to minimize addition of ditch water to the stream system.
5. Keep silt bearing road surface runoff from entering typed waters or wetlands. Use relief culverts located up grade from stream crossings to drain ditches contaminated with silt from road surfaces onto forest floors prior to direct entry into typed waters or wetlands.
6. Consider armoring slopes and constructing catch basins/sediment traps for silt collection.
7. On steep slopes; or where outflow drains onto fill or other unstable material, or where no vegetation or natural energy dissipation exists install and maintain flumes, down spouts, energy dissipaters. Where possible prevent delivery of outflow water to any side cast or fill material.
8. Typically, culvert grades should be at least 2% more than ditch grade and skewed 30 degrees. On roads less than 3% grade or at bottom of vertical curves no skew required.
9. When replacing permanent stream crossings, size culverts for 100-year events (Hydraulic Code uses 100 years). When future high waters are ignored, the potential for water quality damage is enormous.
10. Unimproved stream crossings that result in significant sediment, damage to stream banks, or damage to stream beds will be corrected, bridged, culverted, or abandoned.
11. Fish passage obstructions for adult and juvenile fishes shall be identified and corrected.
12. Crown or slope properly to prevent standing water that can make the surface more vulnerable to rutting and also deteriorate the road base.
13. Outsloped roads provide a means of dispersing water in a low-energy flow from the road surface. Outsloped roads are appropriate when fill slopes are stable and vegetated, drainage will not flow directly into reach stream channels and transportation safety considerations can be met.
14. Gravel roads provide better water quality protection because soils are covered with a weather resistant surface. Erosion is reduced, and the operating season may be extended.
15. Use sufficient rock depth to support haul. A smooth well-drained surface is the key to an effective road.
16. Evaluate heavily used roads in sensitive areas for alternative surfacing options, such as, clean hard rock, chip seals, asphalt, etc., to reduce the amount of surface-generated sediment.
17. Slash filter windows ~~are very effective at keeping~~ can be used to keep sediment from entering stream channels. They consist of compacted slash installed along the base of the fillslope.

Road Use

1. Road use should not exceed road design limitations.
2. Restricting the number of active haul routes used at any one time can achieve both cost effective road maintenance and desired environmental benefits including reduced sediment delivery and protection of water quality.
3. Minimize disturbance of road surfaces from tracked equipment through planning and operator education. For example: A dozer traveling on a road surface can break the seal with its grousers.
4. Using central tire inflation (CTI) equipped trucks is an option to reduce surface damage and sediment yield on sensitive roads.
5. Use turnouts and wide curves to pass. Avoid cutting corners and breaking down the shoulder or ditch line which can develop sediment.
6. Avoid over-trucking on roads with soft surface rock, during frost heaving periods and on newly-built (green) roads.
7. Keep travel speed in line with road and weather conditions to prevent excessive road surface degradation.
8. Keep equipment out of ditches and all waters except at approved established crossings.
9. Use ~~Consider~~ temporary closing or limiting traffic on active roads during periods of freeze/thaw or heavy rain when road degradation and sediment production is likely to occur. Describe in road plan how this will be accomplished.
10. Traffic control on forest roads can be an effective way to reduce road maintenance costs and provide protection for other forest resources. Traffic control can include: full road closure, temporary or seasonal closure or road open but restricted to light use. Any degree of control still requires inspection for maintenance needs as well as enforcement.
11. In many cases, physically blocking the access to roads may be necessary. Gates are used because they can provide temporary closure as well as quick access if needed.
12. Alternatives to gates include large berms or trenches, logs, stumps, or rock boulders. The method used must not create any safety hazard for the public.
13. Plan for environmental emergency response to chemical and petroleum spills. Machine operation and maintenance in the forest can result in water contamination. Dispose of used oil, hydraulic fluids, filters, and contaminated soils responsibly at designated sites.

Road Maintenance

Road maintenance is done for several reasons: to provide a smooth running surface, to minimize wear on vehicles, to protect the road surfacing material, and to limit sediment delivery to the stream system.

Active Road Maintenance

1. Maintain all cut and fill slopes at a stable angle – no steeper than the angle of repose. Remove slides from the ditches and roadway. Remove overhanging material from cut slopes and fill slopes. Do not over-steepen slopes beyond natural angle of repose.
2. To reduce the potential for sedimentation, material from slides (mass wasting events) or other sources should be transferred to a stable location to prevent entry into any typed waters or wetlands.
3. Undesirable slide, ditch, and woody debris materials should not be mixed into the road surface. Traffic and rain will produce sediment from a contaminated road surface.
4. Match equipment used to clean ditches with the type of maintenance work required. Excessive excavation will cause additional sediment.
5. Maintenance of cuts and fills should be done in suitable weather and soil conditions to prevent erosion of soils that could deliver sediments to all waters.
6. Maintain vegetated ditchline slopes that control soil erosion. Do not undercut.
7. Retain grasses and other herbaceous vegetation in ditches to reduce water velocity and to collect sediment. Only clean spots or segments necessary to restore functionality. Maintain grasses and forbes but eliminate woody plants from ditches.
8. If vegetation is removed from ditches and disturbed soil is exposed, develop sediment traps between the disturbed segment and the nearest down slope stream crossing. Example: In-stream ponds, fabric fences, or properly installed and maintained hay bales.
9. During wet weather conditions monitor and maintain functionality of all cross drains, especially those within 50-100' of down slope stream crossings. Herbaceous vegetation in ditches within 100' of stream crossing is also critical to reducing sediment delivery.
10. Where roads parallel stream channels within 60-100' horizontal distance (wider with steeper slopes) insure that ~~side-cast~~ fill material is stabilized with herbaceous vegetation, rip-rap, slash filter windrows, or other appropriate measures.

11. If wet weather traffic develops ruts on the road surface and increases sediment production in these ruts, the road, if rock surfaced, should be graded and/or rock added. Wet weather hauling should cease if sediment is delivering to stream.

12. Culverts and Drainage Structures

A. To maintain functional drainage, inspect and clean culverts routinely and immediately after any significant storm events.

B. Install cross drains up slope of stream crossings to minimize ditch water and entry of surface sediment into streams.

C. Preventative ditch maintenance can reduce the need for culvert cleaning. In recently cut or logged areas, floatable debris should be cleaned from ditches.

D. Keep ditches and drainage channels at outlets and inlets of culverts clear of obstructions. Remove brush from around inlets and outlets to aid in visual inspection for problems.

E. Maintain head walls.

F. Add additional culverts when problems are identified, such as, at springs, seeps, low spots in ditchlines, and where ditchline erosion is occurring. Where ditch waters are transporting sediment directly into typed waters or wetlands add cross drains or sediment traps – whichever is most suitable for the situation.

G. When replacing permanent stream crossings, size culverts for 100-year events (Hydraulic Code uses 100 years). When future high waters are ignored, the potential for water quality damage is enormous.

H. Unimproved stream crossings that result in significant sediment, damage to stream banks, or damage to stream beds will be corrected, bridged, culverted, or abandoned.

I. Fish passage obstructions for adult and juvenile fishes shall be identified and corrected.

J. Beaver activity at culverts may require solutions, such as, "T" pipes, perforated pipes, dams in front of culverts, or as a last resort working with DF&W to have the beaver removed.

13. Surface Maintenance

A. Grade roads to control surface runoff.

B. Avoid grading roads when surface materials are wet. When saturated, road surface material becomes rutted easily by traffic resulting in increase in fines and a potential water quality problem.

C. Avoid grading roads when surface materials are too dry. Material cannot be compacted resulting in the loss of fines as dust and segregation of large aggregates. Surface treatments (water or other products) may be required to control dust and to retain fine surface rock.

D. Avoid creating “sunken” roads which are lower than the surrounding ground level. This situation occurs on gently-sloped land where cut-and-fill is not needed to drive over the ground. It can become difficult to route surface water flow off the road when the road is below the surrounding ground level. It may be necessary to build up the road surface if ditch-outs cannot provide adequate drainage.

E. Crown or slope properly to prevent standing water that can make the surface more vulnerable to rutting and also deteriorate the road base.

F. Grade and shape the road surface, turnouts, and shoulders as needed to maintain the crown and keep the base dry. Inslope or outslope as needed to provide a suitable travel surface and control surface water runoff in an even, dispersed manner.

G. Consider compacting the surface after grading with a pneumatic or vibrating roller to seal the surface and retain fines.

H. Cut and remove chuck holes to reduce water penetration and ballast saturation. Only grade the segment of road that has chuck holes or ripples.

I. Determine the root cause of chuck holes then ~~consider~~ select appropriate alternatives to fix the problem, such as: adding rock and recrowning, adding culverts and ditching to reduce water in the road prism, etc. Standing water is usually the cause of chuck holes.

J. For insloped roads, maintain ditch gradients that will prevent ditch erosion and move sediment inputs to a non-deliverable location.

K. Suitable surface material should be maintained on the road surface. Replace surface material lost sufficiently to prevent further road deterioration and ~~minimize~~ sediment delivery.

L. Remove berms except as needed to control water flow and avoid leaving unbroken berms on outside edge of road.

M. Berms alter surface drainage. If poorly placed, berms can cause scour and fill saturation. Some intermittent berming may be necessary to protect sensitive slopes and fills and reduce sediment delivery.

N. Prevent road surface waters from flowing onto unprotected fills or into streams and wetlands using any appropriate technique necessary, such as surface slope or berm techniques.

O. Eliminate wheel rutting in sensitive areas by shaping and patching. A rut acts as a channel and can deliver silt into wetlands and typed waters. Use sufficient rock depth to support haul. A smooth well-drained surface is the key to an effective road.

P. Leave established herbaceous vegetation on outside road edges and in ditches to help filter surface sediments.

14. Roadside Vegetation Maintenance

A. Generally, remove the canopy over roads to increase drying benefits of air movement and sun exposure. Tree cover may be retained to control dust or provide habitat when roads are in riparian areas.

B. Remove brush and trees from ditches and from the roadway to a width that allows proper maintenance functions including surface grading, trimming shoulders, pulling ditches, and cleaning headwalls. Clear ditchlines of all debris generated during logging.

C. Control roadside brush vegetation by chemical application, hand brushing, mechanical brushing, or by establishing low-growing herbaceous ground covers.

D. Chemicals used on road surfaces or for brush control may not reach the stream system or a wetland.

15. General Considerations

A. Develop road maintenance plans that are measurable against current rules and standards.

B. Watershed Analysis-Surface Sediment Module provides a suitable process for determining where and what needs to be done to manage for surface sediment. The standard is to minimize sediment input or excess additional water to waters of the state or wetlands. Other best management practices should be incorporated as they are developed. Look for trends and repetitive problems and effective solutions for site specific conditions.

C. Maintain roads no wider than necessary for safety and anticipated traffic uses.

D. Consider scheduling maintenance activities in phases and during low precipitation and flow periods to minimize sediment production.

E. Reduce the need for return maintenance visits by taking permanent corrective action. Consider Use creative and appropriate alternatives to correct recurring maintenance problems.

F. Maintenance activities that expose soils need revegetation to minimize potential sediment. Seed mixtures for your site, proper timing to optimize growth, and fertilizers and mulch are important to success (consult with experts from NRCS, DF&W, etc.).

G. Inspect and repair bridges, cattle guards, fences, or other road structures periodically

H. Plan for emergency response to storm events: Use road patrols to correct immediate small problems and identify conditions needing repair by heavy equipment.

Inactive Road Maintenance

An inactive road still needs to be maintained. Refer to all the previously listed active road maintenance guidelines as the foundation in doing inactive road maintenance, Section A, Active Road Maintenance Guidelines and apply as appropriate. Make sure that road drainage (ditches, culverts, crown, dips, waterbars, insloping, outsloping) remains functional.

The following guidelines will focus on waterbars and drainage that increase the effectiveness of road drainages. Water bar construction can take several different forms depending on local conditions (rainfall pattern, soil type, road gradient and type of surface, prism geometry, existing culvert layout, etc.). The goal of water bar installation is to create a stable, dispersed, non-erosive drainage pattern which minimizes siltation and still allows access for vehicles. Consider water bars, drainage dips, and other options.

Guidelines

1. Construct water bars immediately downgrade of each ditch relief culvert. Water bars should intercept the ditch and be keyed into the road cutslope. These types of backup water bars act as "safety valves" for failed relief culverts and are most appropriate for roads that have an adequate amount of existing relief culverts.
2. Eliminate or limit public use of roads where there is potential to damage public resources such as water quality and /or wildlife.
3. ~~Where inadequate numbers of relief culverts exist~~ To insure adequate cross-drainage, construct water bars at frequent intervals ~~as needed between ditch relief culverts (in addition to immediately downgrade of relief culverts)~~. Water bars should intercept the ditch, be keyed into the road cutslope, and remove water and sediment to the forest floor. Frequent water bars provide protection if one should fail.
4. Construct road surface water bars at frequent intervals. The frequency of water bars depends on many factors, such as, percent grade, surface material, elevation, rainfall, and other site specific conditions. These types of surface water bars do not intercept the ditch and are most appropriate for steep roads that experience high runoff.
5. Typically, water bars should be skewed at least 30 degrees from perpendicular to the road centerline on roads in excess of 3 percent grade. On roads less than 3 percent grade or at the bottom of vertical curves, water bars can be perpendicular to the road centerline.
6. Water bar gradients should be steep enough to provide for a self-cleaning drainage with minimum maintenance. Outflows should be located on stable ground.

7. Use rock or other energy dissipation methods to armor the water bar at potential scour points, such as, outlets and trench bottoms.
8. Water bars should remain driveable and durable to provide access for road maintenance and land management.
9. Drain dips are especially suitable for dry sites and for native surface roads. When in erodible soils, the drain dips should be armored with rock and where feasible grass seeding of outflow near typed waters and wetlands is encouraged Drain dips should be designed so that they will not drain into typed waters or wetlands.

Road Abandonment

Abandonment (WAC 222-24-050(5)) includes all treatment necessary to secure maintenance-free drainage and promote long term stability of the road prism to protect public resources. Upon completion of abandonment, roads are exempt from future maintenance.

NEW SECTION

Prioritizing road for abandonment

When reviewing the road system, candidates for abandonment should be considered. Some criteria that would encourage abandonment include:

1. Roads running parallel to a stream and within 100' of the stream.
2. Chronic problems - roads that frequently require heavy maintenance to protect public resources
 - a. Stream crossing failures - these are likely to have public resource effects
 - b. Cut and fill slope failures that deliver to streams or wetlands
3. Older roads constructed to a lower standard

END OF NEW SECTION

Road abandonment plans may vary depending on specific characteristics (slope, lithology, road condition, etc.) of the site. For example; a short logging spur on stable ground with no typed waters or wetlands may only require verbal instructions to the equipment operator to place water bars at specific intervals. In contrast, a mid-slope road on steep ground with several typed water crossings may require an inventory and site specific activities (culvert removal, side cast pullback, water bars, end haul disposal areas, etc.) to be clearly marked on the ground. A person with the appropriate expertise should be consulted if critical road factors are encountered. Consultation with other interested parties (Department of Natural Resources Forest Practice Forester, Department of Ecology, Department of Fish and Wildlife, etc.) is advised.

Guidelines:

1. Surface Rock Recovery

When abandoning a road, consider salvaging the surface rock. The recovered rock can provide a mini stockpile for future use. Rock recovery however disturbs the running surface creating a

softer seed bed for germination of vegetation, easier root penetration, and faster growth of roots which stabilizes the soil. Grass seeding should be employed following rock salvage if sediment delivery is likely.

2. Side cast and Fill Pullback

A. Remove bridges, culverts, and other structures and leave stream channels and side slopes at a stable angle.

B. Pull back side cast on roads and landings that has potential of failing and entering any typed waters or wetlands. Usually the excavated material can be placed against the cutslope if stable.

C. When the road surface is not stable, the material should be end hauled to a stable location. Do not create water traps or ponds on the road surface when performing side cast pullback.

D. The amount of side cast retained can vary depending upon the following: deliverability to public resources, percent slope, evidence of surface cracks and slumps in the road surface or outside shoulder, size and species of vegetation on site, proximity to waters, concave or convex land form and soil type. The objective for side cast retrieval is to reduce deliverability by decreasing the weight and volume of material to a stable level.

E. Excavate overhang cutslope material that has a potential for causing sediment delivery to typed waters or wetlands. Removed material should be placed in a stable location.

3. Water bars and Surface Profiling

A. Construct non-driveable water bars at natural drainage points and at a spacing which will disperse runoff and minimize erosion and sedimentation.

B. Water bars should intercept the ditch and be keyed into the road cutslope. Outlets shall be on stable locations.

C. Water bars should be skewed at least 30 degrees from perpendicular to the road centerline on roads in excess of 3 percent grade. On roads less than 3 percent grade or at the bottom of vertical curves, water bars can be perpendicular to the road centerline.

D. Outslope the road as appropriate.

4. Culverts and Drainage

A. Remove ditch relief culverts. The resulting side slopes should be at stable angle. The removed fill material should be placed in a suitable location that will not erode into any typed waters or wetlands.

B. Remove culverts in natural drainages. Drainage structures not removed will fail eventually. They should not be relied on to direct water indefinitely. The resulting side slopes should be at a stable angle. The natural stream bed width should be re-established.

C. The removed fill material should be placed in a location that will not erode into any typed waters or wetlands.

D. The intent of culvert removal is to restore natural drainage. There may be alternatives to culvert removal provided adequate protection to public resources is maintained.

5. Erosion Control and Revegetation

A. Revegetate all exposed erodible soils resulting from abandonment to minimize potential sediment. Exact seed mixtures for your site, proper timing to optimize growth, fertilizers and mulch are important for success (consult with experts).

B. If road abandonment is to reduce sediment, the exposed soils should be promptly revegetated at the appropriate times of year to optimize growth. Sediment production is greatest during the first three years following abandonment.

C. Revegetation and erosion control can be accomplished using one or more of the following: biomatting, hay, hydromulching, seeding, planting trees and native vegetation, and by using native tree boughs and plants, etc.

D. Apply seed first when combining with other methods. Consider surface preparation before seeding and planting. Also consider wildlife forage enhancement opportunities when doing revegetation for erosion control on abandoned roads.

6. Blockage and Closure

Block the road so that four-wheeled highway vehicles cannot pass the point of closure. The preferred alternative is to obliterate the intersection and restore the entrance to the road to the pre-road condition. Also consider using tank traps, riprap, root wads, logs or slash to block access. The method used must not create any safety hazard for the public.

ROAD MAINTENANCE AND ABANDONMENT PLANS

1. Landowner Management Planning

The Forest Practices Act requires maintenance on all roads on forest land used for the transportation of forest products located on forest lands, whether the roads are in an active or

inactive status. Rules established by the Forest Practices Board require that all roads on forest lands under the jurisdiction of forest practices rules be included in a road maintenance and abandonment plan submitted to the Department of Natural Resources by December 31, _____. Further, rules specify that all upgrades must be completed and new maintenance standards be applied to all roads built after 1994 by the end of _____. Rules provide an opportunity for landowners to spread the cost of repairs over several years, enhanced maintenance and road abandonment on a more or less ~~at an~~ even flow over the period ending in _____. However, priorities established in the rules ~~favor early~~ place activities and locations with highest potential to benefit fish and water quality early in the maintenance/abandonment schedule ~~implementation of resource protection.~~

~~Routine road maintenance provides many advantages to the forest landowner. Protection of the initial road construction investment, coupled with the continual rise in maintenance costs, should provide the incentive to maintain roads. Secondly, routine road maintenance protects all the down stream resources such as water crossing structures, public and private roads, fish habitat, etc. (Move this paragraph to the beginning of the road maintenance BMP section)~~

In order to cost effectively plan for road maintenance and assure ~~that if resource damage is occurring, plans address~~ the worst problems are addressed first ~~the entire road systems should be assessed before plans are finalized accordingly.~~ Individual roads, small road systems or short segments of road on smaller ownerships can be planned for maintenance and upgrades within a period of one to five years. However, large road systems over larger areas may require the full regulatory period to complete work. In these cases, it is impractical to develop detailed plans for the entire road system in the first few years of the planning period. Rules provide for incremental planning in two to five year segments. Each incremental plan must include enough information about the road system and the work required to bring it up to current standard to assure that the longer term schedule is being met.

For these larger systems, early plans must include a general overview and schedule of the repair, maintenance and abandonment needs of the whole system with sufficient information to establish the adequacy of each plan in meeting the 15-year schedule. This will require an extensive look at the road system. Large system plans will include a listing of assessments and specific work projects that need to be done and a general basic schedule for completion ~~which fits all of the incorporates~~ repair, maintenance and abandonment projects into the regulatory time frame.

Detailed assessment, planning and scheduling of upgrading work and abandonment is required for the two to five year period of each plan. Plans must show that work is addressing resource issues as quickly as possible in a prioritized sequence with ~~an~~ a more or less even-flow of effort.

2. Assessment Tools

There are several tools available to develop a maintenance and abandonment plan. ~~and a~~ Plans should be ~~designed~~ developed to the level of detail necessary ~~for the road/road system involved to insure that the necessary maintenance activities are included.~~ The Tools and information available to assess the need and frequency of maintenance ~~could~~ start with climatic and historical knowledge of the area. ~~such as~~ Annual rainfall, rain-on-snow events, past road

failures, areas of soil instability and anecdotal information from long time managers or residents are key information. Maps and aerial photographs of the area ~~are another tools~~ provide additional information that will aid in the gathering of the information necessary for the development of a road maintenance plan.

In order to maximize the benefit to public resources in the most cost effective manor, roads or road segments which have the potential for the highest impact on public resources should be examined evaluated first and ~~included~~ prioritized in plans for early treatment. Screens have been developed to assist in locating road segments that have a high likelihood of ~~contributing to~~ degrading public resource impacts.

(Insert fish passage screens and other screens for hydrologic connectivity if available)

Sediment delivery from road related mass wasting.

Roads in the following locations have the highest likelihood of triggering landslides and should be field examined carefully to determine if remedial action should be undertaken and if so, what specific priority that action should have: (I couldn't find a copy of Julie Dieu's handout from her presentation on screens so what you have here is a place holder until we settle on screens).

- Roads crossing unchanneled, concave slopes of ~~(insert degrees)~~ >65% gradient
- Roads that are not full bench construction crossing any slope ~~(insert degrees)~~ >80 gradient. This also applies to landings with same conditions
- Roads crossing a channel with a gradient of ~~(insert degrees)~~ >15 20%

Obvious solutions for the first two locations are to pull back sidecast and cross drain away from the concave areas unless there is a natural channel. The third location requires evaluation to determine if the current drainage structure is in good condition and of sufficient size to pass the volume of water during a large storm. If not, replace with an appropriate drainage structure and follow with periodic maintenance to keep the drainage structure functional.

Sediment and water delivery from road surface erosion.

Roads in the following locations and use categories have the highest potential for delivering sediment to the stream network and if they deliver are likely to have the highest sediment delivery rates ~~of any road segments in the road system~~. These segments should be field examined carefully to determine if delivery is occurring and if so what action should be undertaken and what specific priority that action should have: (place holders until screens are agreed upon by the committee)

- All mainline haul roads

- Valley-bottom roads that parallel a stream for ¼ mile or more at a distances of <200 feet for a length of 1/4 mile or more.
- Midslope roads that meet one or more of the following criteria:

The road gradient is ~~(insert degrees?)~~ >8 12%

The road crosses more than 7 stream per mile The

~~More than 20% of the cutslope along a road segment has less than 30% vegetation or other erosion controlling attribute.~~

The road has a high (>2 yards) raveling (<30% vegetation) cutslope along >20% of the road.

~~Native surfaced, V valley-bottom or midslope roads with a drainage system that is connected to the stream network with nature surfacing (e.g., no surface rock or poor quality and inadequate rock).~~

Using the ~~large scale assessment~~ screening and assessment ~~screening~~ tools, on-the-ground reconnaissance of the roads systems must be conducted to ~~determine~~ confirm the accuracy of the other reference ~~collected data collected will~~ and enable the landowner to set maintenance priorities.

The on-the-ground assessment ~~could~~ should include but is not limited to reviewing the following elements:

- Road use status: Identify roads according to Is this road a mainline route and to be maintained in an active status or is it a or tributary to the mainline that has occasional use, to be maintained in inactive status? and level of current and projected use. Roads that are and will continue as actively used roads should be identified separate from inactive and candidate for abandonment roads.
- Public resources at risk:
 - Identify detailed specific sources and delivery of surface erosion and mass wasting that ~~could~~ impact water quality, public roads, utilities etc.
 - Identify potential specific road related fish passage issues.
 - Identify areas road segments where cut slopes intercept significant subsurface flow.
- Road surface type: Categorize roads as to surface material: native surface, ~~ballast rock, crushed or rock over ballast.~~
- Road surface condition: Categorize roads as to surface condition:
 - Surface smooth or rutted due to surface erosion or wet weather use?

- Road Drainage Condition:

Sediment being routed to forest floor or delivered directly to stream via ditch or road surface?

Surface outsloped, crowned, or not lacking shaped to allow adequate drainage, individual areas sunken or slumped?

Chuckholes or areas containing ripples?

Presence of berms along outer edge of road that route water to streams?

Water bars tied into cutslope to block ditch a divert ditch runoff?

Water bars functional from edge to edge (outlet area clean and unobstructed)?

Wheel cuts in the water bar, are water bars angled to divert surface water off road prism?

- CULVERTS

Adequate size?

Adequate location and number?

Inlet and outlet clean and functional?

Energy dissipater needed present to protect toe of the slope from erosion?

Flume needed to protect fill material from erosion, functional for fish passage?

- Road prism stabilization:

Are the ditch lines clean from of debris from cut slope?

Are there recent signs of soil movement or road cracking on outer edge?

Is ditch line deeply scoured?

(This paragraph is moved from its previous location below.) The Forest Practices Board Watershed Analysis Methods manual contains current state-of-the-art information on assessing the sediment contribution of roads. ~~that may be is useful in~~ The watershed analysis surface erosion model is the highest-level most useful assessment tool currently available and should be employed to assessing and prioritizing roads for maintenance work when other tool are not adequate.

3. Prioritizing Road Work

After completion of a maintenance needs assessment, work prioritization can take place. The priority should be placed on areas ~~that are or have a~~ with the highest potential to damage a public resource. An example of a high priority maintenance need could be excess road surface erosion flowing into ~~a fish-bearing stream~~ the stream network, or a barrier to fish passage that blocks a significant amount of habitat. The catch basin cleaning of a cross drain culvert, on relatively flat ground, with a low potential for sediment reaching a water course, is an example of low priority road maintenance.

The first round of road maintenance and abandonment plans is required for all forest roads by the end of _____. The revised rule package specifies priorities for scheduling road systems or stream basins for planning efforts. The rules further specify priorities for scheduling work within plans:

- Improve fish passage beginning with blockages affecting the most habitat first. Generally, this means starting at the bottom of the basin and working upstream.
- Repair or maintenance work to reduce sediment delivery from surface erosion and/or mass wasting. (Within bull trout range, ~~a~~Areas where sediment delivery or mass wasting will most likely affect increase stream temperature by filling pools ~~bull trout habitat~~ will be given highest priority.)
- Repair or maintenance work to disconnect road drainage from streams.
- Repair or maintain stream-adjacent parallel roads with a particular emphasis on eliminating water and sediment delivery from the road to the stream.
- Repair or maintenance work to improve hydrologic connectivity (i.e. to minimize interruption of surface water drainage, the interception of subsurface water and the pirating of water from one basin to another).
- Repair or maintenance work which can be undertaken with the maximum operational efficiency. Scheduling maintenance to fit the overall highest priority areas/basins first does not necessarily correspond to priorities above, but still provided the best results in total.

Apply these regulatory mandates in the context of addressing the worst situations first and completing the most work with the available funds in order to get the most improvement in resource protection as early as possible in the planning period.

4. Planning Format

- Ownership map with legal descriptions
- Stream type map with most recent stream types indicated
- Road network identified on map
- Active roads: used for forestry operations (logging, silviculture, and other management activities)
- Inactive roads: roads not used for forestry operations, but not abandoned and constructed after 1974
- Abandonment candidate roads: roads proposed by the landowner for abandonment
- Maintenance activity sections planned
- Fish blockages shown and schedule for fix
- Unstable areas (potential MW sites)

- Annual plan areas identified for 2-5 years out
- This year's plan for maintenance

More detail on all above

Each landowner has a unique land base, management objective and strategy, operational needs and, mapping systems. Road maintenance and abandonment plans will vary by landowner depending on these and other individual characteristics. However, forest practices rules WAC 222-24-050__ specify that all road maintenance and abandonment plan contain a minimum of the following elements.

Ownership maps showing the road or road system and typed waters. Maps shall be supplied as part of the plan and should be of sufficient scale and detail necessary to clarify and support the plan. It is suggested that a minimum map scale of 1: 24000 (1" 2000') or DNR supplied forest practices base maps be used. The map shall illustrate the status and location of existing roads, water structures, and components that will be improved or modified. In addition, the map should include section, township, range, ownership, and map symbols consistent to forest practice applications.

Road status, whether active, inactive, orphan road, or planned for abandonment.

A general overview of the repair and maintenance needs of the system with sufficient information to establish the adequacy of the each plan in meeting the 15-year schedule.

Sufficient detail and scheduling on the first years of upgrading work to show that work is even-flow and will be completed in the required time periods (five year interim and fifteen year total). Identify contributing sources of the potential or actual resource damage outlined in the request for a road maintenance and abandonment plan and provide individual, time-specific plans built to deal with them. Identify any improvements and/or modifications to road systems or components, such as stream crossing culverts, bridges, ditches, surfacing, re-construction, planned for the time period. Prioritization of maintenance is crucial for to maximizing the protection of public resources. To assist in developing the requested maintenance and abandonment plan, it would be beneficial to use the assessment tools as described earlier in this document. The plan should address how the maintenance prioritization was developed (e.g., culvert maintenance was determined to be a low priority compared with applying ballast rock to reduce sediment delivery to a type 3 water).

Standard practices for routine maintenance using enhanced BMPs. Describe the use of BMPs and identify whether maintenance will be frequency-determined (e.g., 3 times per year) or condition-determined (e.g., when sediment production exceeds a given threshold) for each of the listed components.

A storm maintenance plan if needed covering pre-storm planning, strategies for emergency maintenance and post storm recovery. Emergency plans should be included for extraordinary maintenance needed after major storm events. Implementation of any strategies developed to deal with mass-wasting or surface erosion concerns should be identified, with the specific solutions and methods for reducing impacts to public resources.

An inventory and assessment of the risk to public resources or public safety of vehicle accessible orphan roads will be done in conjunction with other road maintenance planning other orphaned roads will be assessed for hazard potential as they are located during the course of forest operations. (need to add some guidance here)

To facilitate the preparation of a road maintenance plan, a suggested field data collection form has been developed. The form has basic informational columns that will assist the land manager in addressing the minimal requirements of the Forest Practices Act regarding road maintenance. The use of this data collection form is totally up to discretionary depending upon the individual landowner or company. ~~The form may not address all the elements needed or it could be to awkward for the small landowner to use.~~ This type of format could also be used as a working document for the maintenance staff to accomplish planned ~~the season's~~ road maintenance needs.

A separate format designed for the road maintenance needs of small landowners is available.

5. Timing and Submission of Plans

The Plan shall cover the entire road systems or drainages but are specific to individual ownerships unless owners choose to participate in cooperative planning. Initial plans may be submitted to the department on or before September 30 of one of the first five years through _____. By June 30 of the year following approval of the plan, landowners must report accomplishment of work completed the previous year and may, at the landowners option, submit modifications to the longer term plan to the department for review and approval.

~~This Plans shall be submitted to the department region office. on or before June 30 of each year unless the department agrees that no further plans are necessary.~~ Unless the department determines that no further plans are necessary, sixty days before a plan expires, a follow up plan for additional work required to remain on schedule to meet upgraded standards must be submitted to the department. In addition the department will review the plan annually with the landowner to determine whether it's will be effectiveness and whether it is being implemented. All required road maintenance plans will be reviewed by the Departments of Ecology, Fisheries and Wildlife, and affected Indian tribes, any of whom may request an informal conference with the landowner.

~~Road maintenance and abandonment can be submitted on the same plan. Actual Some maintenance activities, road abandonment usually require completion of a forest practices application. Road maintenance not requiring a Hydraulic Project Approval from the Department of Fish and Wildlife is normally a Class 1 application.~~

~~Plans are written for at least a 12-month period on or before June 30 or according to operational opportunities. Plans can be amended with department approval to meet emergencies (e.g., storm events, unanticipated road failures), changes in forest practice activities, or landownership changes.~~

~~In addition to the field data collection form an accurate map indicating where the maintenance will take place is a very useful tool. The map scale used should meet the need for detail. A map scale of 1:24000 usually provides the scale needed in locating most of the maintenance activity.~~

~~3. Regulatory Planning Requirements~~

~~(These items appear elsewhere in the document) The forest practices rules WAC 222-24-050 (1) Road Maintenance and abandonment plan states the plan is subject to annual review and shall include:~~

- ~~i. Ownership maps showing the road or road system;~~
- ~~ii. Road status, active, inactive, abandoned or planned for abandonment;~~
- ~~iii. Maintenance Schedules and priorities for the year, and~~
- ~~iv. Plan for further maintenance and reconstruction beyond the current year for extensive damage.~~

~~To meet the criteria stated in the Forest Practice Act, the department will expect the following information to be included in the maintenance plan. (These items appear elsewhere in the document)~~

~~(These items appear elsewhere in the document) The contents of the plan should address the following components:~~

- ~~a) Routine maintenance by type of road for a given period of time.~~
- ~~b) Identify contributing sources of the potential or actual resource damage outlined in the request for a road maintenance and abandonment plan and provide individual, time-specific plans built to deal with them.~~
- ~~c) Identify any improvements and/or modifications to road systems or components, such as culverts, bridges, ditches, surfacing, reconstruction, planned for the time period.~~

~~This format or a similar format will assist in the development of a maintenance plan as well as provide a working document the maintenance staff can use to accomplish the needed maintenance.~~

Glossary

Stream system – a group of inter-related streams that drain surface water from a basin.

Cross drain – a culvert, water bar, driveable dip or other feature that diverts surface water from roads and drainage ditches to the downslope forest floor.

Stream crossing – road intersections with a stream that requires a culvert, bridge or ford to cross.

Road drainage – removal of surface water from the road surface and ditch using design features such as crowning the surface, outloping the surface, water barring, installing cross drain culverts, driveable dips, etc.

Proposal for Cross Drain Culvert Spacing Guidelines

A primary factor in determining proper spacing of cross drain culverts on forestland roads is the grade or slope of the road. Because water velocity and volume and therefore sediment loading increase with grade, distance between culverts must be reduced in order to deliver ditch water and sediment to the forest floor and minimize delivery to streams and wetlands. There are other factors that potentially impact sediment delivery to streams and therefore need to be considered in determining culvert spacing. They are: 1) hillslope, 2) road distance above stream, 3) road surface and condition, 4) precipitation (quantity and regime), 5) soil type and depth (erodability), and 6) upslope culvert distance to stream.

The attached graphs provide the recommended upper and lower spacing limits for cross drain culverts in three (climatically separate) regions of Washington, as a function of road grade. Within these suggested graphic limits the other factors listed above need to be considered when determining effective culvert spacing. The extent that each of the above factors influence sediment production and delivery is represented by a range in magnitude (0-20). Based upon the subjective criteria below, the numeric magnitude of each variable can be derived and used to adjust culvert spacing between the upper and lower limit lines. This approach is provided only as a guideline. The upper and lower limits may both be exceeded under some circumstances. Remember, the objective is to keep sediment delivery from roads to a minimum and cross drain culverting is one of a number of tools that can be employed to achieve this objective.

1. **Hillslope** – As hillslope increases, culvert spacing needs to be reduced to route and dissipate ditch water and sediment. On steeper slopes, cut banks are generally higher than on gentler topography therefore more bare, unprotected surface is exposed to surface erosion and small localized slumping. Sediment production following new road construction can be significant for the first several years or until vegetation is established on cut banks and in ditches and this condition can be exacerbated by steeper hillslopes.
2. **Road distance above stream** – Roads that run parallel to and above streams can deliver sediment if not properly designed and drained. The closer a road is to a stream, the more important it is to mitigate for sediment. Frequency of cross drains can be a key part of the solution if properly located to deliver surface water and sediment to the forest floor. It is important to recognize that having suitable areas for out flowing water should be considered when locating cross drains on roads near streams. Greater protection for water quality may result from extending cross drain spacing where it will access larger, stable forest floor areas for ditch water and sediment deposition. The critical distance between the road and the

stream varies with slope. On slopes over 50% the critical distance is 300 feet. On flat topography, it can be as little as 50 feet. Culvert spacing should be reduced when a road is within the critical distance. The important objective is distributing water on forest floor areas where it will be captured and dissipated.

3. **Road surface and condition** – Road surface effects the volume of sediment generated from a road. Generally, rock surfaced roads produce less sediment than native surface roads. Condition of the surface is important to sediment production and the location of the road is important to the potential for delivery. A properly designed, constructed, and maintained road should not produce and deliver significant sediment as long as the road is used the way it was designed to be used. If a road is used beyond its design limits, the surface may break down causing rutting and the potential for substantial sediment delivery. Even with rock surface that supports wet weather haul, drainage systems for roads that are active during the wet time of year must be designed to handle a predictable increase in surface sediment production.
4. **Precipitation** – Annual quantity and regimen of precipitation impacts sediment production and can transport sediment from roads to the stream system. The intensity and frequency of precipitation events that result in surface run-off need to be considered in designing road drainage and culvert spacing. Where rainfall is high or where rain-on-snow produces surface run-off, culvert spacing needs to be reduced to control ditch water and deliver it to the forest floor. In drier areas, culverts may be spaced at wider intervals unless episodic precipitation events or rain-on-snow have historically been part of the local weather pattern. For the purposes of this draft recommendation, three precipitation regions have been identified (eastern Washington, westside of Cascades, and westside coastal, which includes sedimentary soils mentioned below).
5. **Soil type and depth** – Fine textured soil like sedimentary derived types occurring along parts of the Washington coast and coast range erode much more rapidly than coarse textured soils from basalt or granitic origin. Soil depth also influences erodability of soils because it directly governs how much precipitation (water) the soil can intercept and store. Deeper, coarse textured soils have greater resistance to erosion than shallow, fine textured soils.
6. **Upslope culvert distance to stream** – The distance between a stream crossing and the first culvert upslope is one of the most important factors that influence volume of sediment delivered. It is recommended that a culvert should be installed 50'-100' above all stream crossings during new road construction if stable and adequate forest floor exists below the outflow. When culverts are located near stream crossings it is important to evaluate the outflow to determine if down stream sediment delivery will occur as a result of culvert installation. If delivery is likely, move the culvert location farther away from the stream crossing and consider additional measures. Sediment traps or ponds in the ditch line can be effective in capturing sediment near stream crossings. However, they need periodic inspection and maintenance to remain functional. Other measures include cut slope stabilization, rock armored ditches and vegetated ditches

The above recommendations for culvert spacing are workable under most circumstances, however, because of site specific conditions, there are places where the guidelines may not be applicable. Some examples include:

- Where out slope road design is used.
- Where road conditions would be better drained by a combination of features like rolling dips, water bars, or sediment ponds in concert with culverts.
- Lower or no gradient roads that do not drain into surface waters for long distances and allow adequate drainage to the forest floor via ditch outs, direct surface lateral drainage, etc.

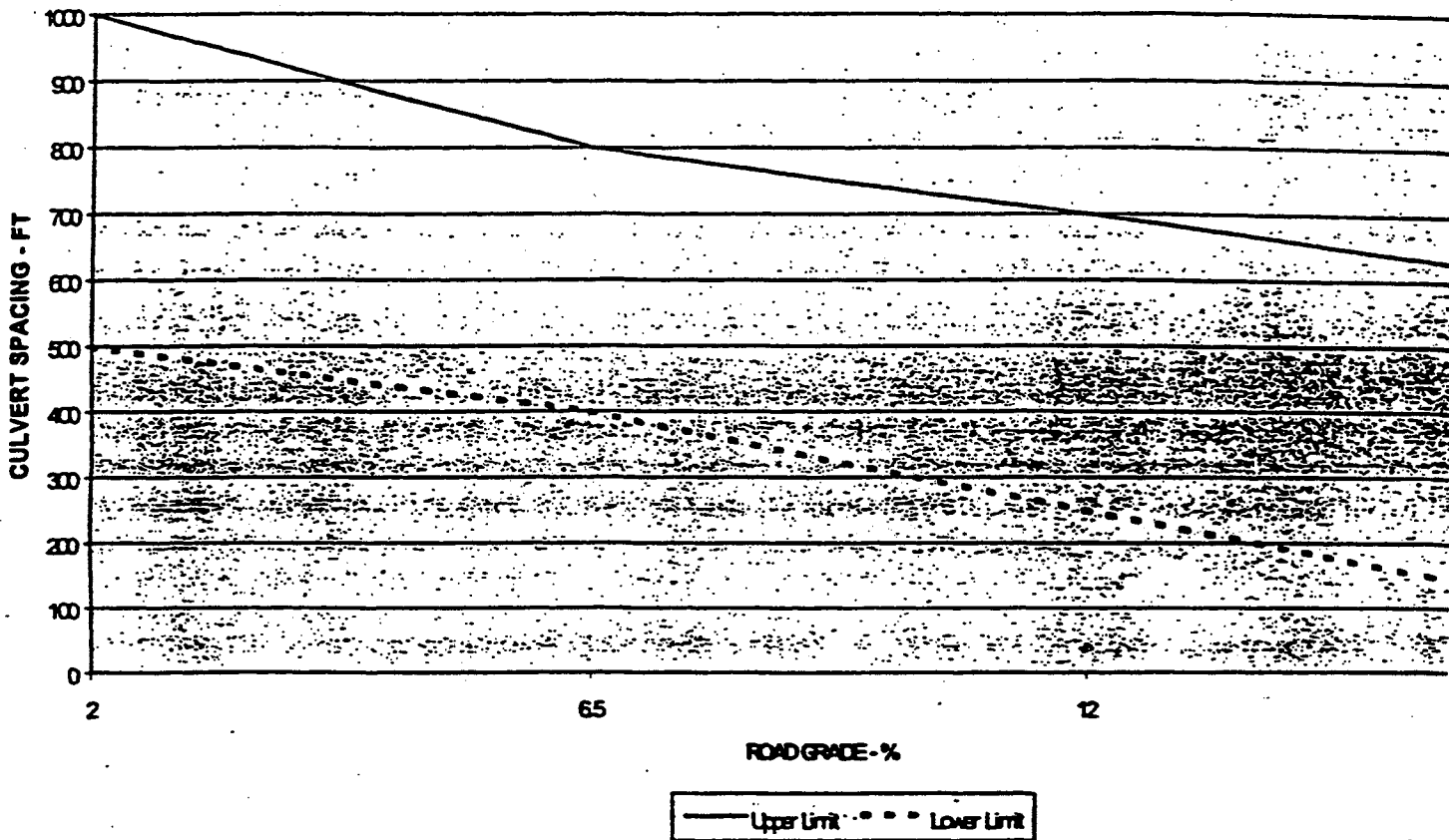
Relatively level ridge top roads and other cross drain locations that serve predictably low volume areas should allow the use of smaller culverts (15" westside). This practice is not intended for locations where culverts are vulnerable to plugging. However, where close spacing is required and plugging is low risk, this prescription can provide a very effective drainage system. Conversely, in a high peak flow area (rain-on-snow, etc.) it may be prudent to upsize culverts.

Culvert Spacing Guidelines

To determine recommended culvert spacing, select the applicable graph for the operating area. Determine the grade of the road and locate on the upper limit line. Next, evaluate factors 1-5 below that could reduce the distance between cross drains. Under severe conditions a combination of these factors, culvert spacing could be reduced to a lower limit line.

<u>Culvert Spacing Reduction Factors</u>	<u>Metric/Criteria</u>		<u>Adjustment Range</u>
1. Hillslope	0 – 80%		= 0 – 20%
2. Road distance above stream	>300' – <50		= 0 – 20%
3. Road surface, condition and use	rock surface, good condition, vegetated ditch lines	- Native surface, rutted, wet weather use	= 0 – 20%
4. Precipitation	low annual ppt and no rain-on-snow	- Coast range in rain-on-snow zone	= 0 – 20%
5. Soil type and depth	Basalt, granite, metamorphite, deep	- Sedimentary, shallow over impermeable sand/silt stone	= 0 – 20%

WESTSIDE CASCADES



- Ditch length to stream – can offset potential delivery of sediment to streams significantly if the first upstream culvert is within 50'-100' of the stream crossing and if the outflow can be placed in a manner that will not deliver sediment.

WESTSIDE CASCADES - INLAND

Culvert Spacing (ft)

Grade % Upper Limit Lower Limit

2	1000	500
6.5	800	400
12	700	250
17.5	600	100

WESTSIDE COASTAL - SEDIMENTARY SOILS - STEEP TERRAIN

(>60%)

Grade % Upper Limit Lower Limit

2	500	400
6.5	400	300
12	300	200
17.5	200	100

Upper Limit	Lower Limit
500	400
400	300
300	200
200	100

EASTSIDE

Grade % Upper Limit Lower Limit

2	1000	500
6.5	800	350
12	600	250
17.5	500	200

Schedule D-2

Mitigation Sequence Guidance for Construction of New Stream Adjacent Parallel Roads

1. Avoiding construction of stream adjacent parallel roads is the first and most preferred option.

When the department determines that alternative options for road location would likely cause greater damage to public resources than a new, stream adjacent parallel road, placement of the road shall be accomplished so that design and construction is completed to meet the first available choice from the following list:

2. For stream adjacent roads parallel to Type S or F waters:

- Minimize impacts by locating the road in the outer zone where construction can avoid current or future riparian leave trees. For any future harvest, tree counts are to be satisfied regardless of the presence of a stream adjacent parallel road in the outer zone;

OR

- Minimize impacts by locating the road as far to the outside of the RMZ inner zone as possible and leaving sufficient standing trees in the inner zone and adjacent core zone to satisfy the applicable Stand Requirements and riparian leave tree requirements for current or future harvests.

3. For all new stream adjacent parallel roads provide for the replacement of lost function by insuring that for future harvests at the location of the new road:

- For stream adjacent roads parallel to Type S or F waters, sufficient standing trees equivalent to the Stand Requirements including any shortfall that is lost to the road and any riparian leave trees are permanently marked for retention. These trees must be located as close as possible to the stream edge but no farther than $\frac{1}{4}$ site potential tree from the stream edge. Where replacement trees are not available on site, they must be located elsewhere on the same stream within $\frac{1}{4}$ mile of the place where function is lost and no farther from the stream than the proposed road location. Off-site replacement trees are in addition to local Stand Requirement and riparian leave trees.
- For stream adjacent roads parallel to perennial Type N waters, the sensitive site protection and minimum no harvest buffer requirements will be met on an area basis by providing an equivalent area of buffer on the same stream to replace buffer lost to the stream adjacent parallel road.

4. Restore affected areas by: planning the road for abandonment; removing temporary road sections upon the completion of the project; treating disturbed areas to prevent potential sediment delivery; and replanting the disturbed areas to the appropriate conifer species.

Schedule D-2 -- Mitigation Sequence Guidance for Construction of New Stream Adjacent Parallel Roads

In all cases, the impacts of stream adjacent parallel roads shall be minimized by locating the road on a natural bench, reducing the clearing to the minimum safe width or otherwise reducing the surface area of soil exposed by construction. All exposed soil shall be treated for short term and long term erosion control in a manner approved by the department and all such roads shall be constructed and maintained with sediment delivery control measures necessary to meet overall sub-basin limitations on sediment delivery.

New Type F stream-adjacent parallel roads will be constructed under Class III-30 status, and will require on-site review by an I.D. team which includes federal participation.

Schedule E-1

Application of Forest Pesticides Recommendations for Forest Practices Board Manual

Forest management operations and Christmas tree operations using herbicides shall have the following restrictions:

- Nozzle orifice: Minimum size of D10 (0.156") when core plates are used or minimum size of D7 (0.109") when no core plates are used.
- Core plate: No. 46 or larger size.
- Nozzle orientation: Maximum of 45 degrees downward and backward from the direction of flight. (Note: illustrate with a diagram.)
- Operating pressure: Not to exceed 30 pounds per square inch.
- Boom length: Maximum length of 6/7 of rotor span for rotors less than 40 feet, and 3/4 or rotor span for rotors 40 feet or greater.
- Airspeed: Not to exceed 60 miles per hour.
- Release height: Minimum height consistent with safe operations. Nozzles must be shut off when ascending or descending over an obstacle that would alter the application release height by more than 10 feet.

Forest management operations and Christmas tree operations using insecticides or fungicides shall have the following restrictions:

- Nozzle orifice: Minimum size of D8 (0.125") when core plates are used or minimum size of D4 (0.063") when no core plates are used.
- Core plate: No. 46 or larger size.
- Airspeed: Not to exceed 60 miles per hour on swaths adjacent to spray buffers.
- Restrictions on nozzle orientation, operating pressure, boom length, and release height are the same for insecticides and fungicides as for herbicide operations.

The nozzle size restrictions are based on conventional or disc or disc-core nozzles on helicopters. Use of different aerial application equipment which produces an equivalent or lower volume-based percentage of droplets in the less than 100 micron size range will be considered under Alternate Plan provisions (WAC 222-12-040).

Applicators will follow the following weather restrictions:

- Wind speed: Do not apply when wind speed exceeds 7 miles per hour.
- Temperature: Do not apply when ambient air temperature exceeds 70 degrees Fahrenheit for ester formulations or 85 degree Fahrenheit for other pesticides.
- Relative humidity: For Western Washington (WAC 222-16), do not apply when relative humidity is below 50% for ester formulations, or below 40% for other pesticides.
- Precipitation: If applying pesticides during early foliar or dormant seasons, when precipitation runoff events are most common, avoid direct over-spraying of segments of Type N streams which are temporarily dry.

Pesticide records shall be maintained by the landowner that show all streams within and adjacent to the application area and indicate which streams were buffered. Documentation signed by a landowner representative must be included in such records to certify that any Type N Water which was not buffered had no significant surface water at the time of spraying based on direct observation of the stream channel. Direct observation is recommended, although this is not intended to preclude best professional judgment of the field forester. Direct observation may include walking all streams or a representative sample of the stream segments, checking culverts for flow, provided that the culverts are in a suitable downstream location, and the use of infrared aerial photography. Aerial surveillance is not adequate if the stream segment is obscured by slash or vegetation. Direct observation can be made by a landowner representative, pesticide applicator, or a state agency or tribal representative.

Schedule H-1

Native Fish Found in Washington

Native Fish

Pacific lamprey (*lampetra tidentata*)
River lamprey (*L. ayerst*)
Western brook lamprey (*L. richardsoni*)
Pygmy whitefish (*Prosopium coulteri*)
Olympic mudminnow (*Novumbra hubbsi*)
Chiselmouth (*Acrocheilus alutaceus*)
Redside shiner (*Richardsonius balteatus*)
Longnose dace (*Rhinichthys. cataractae*)
Speckled dace (*R. osculus*)
Leopard dace (*R. falcatus*)
Umatilla dace (*R. Umatilla*)
Northern Pikeminnow (*Prychocheilus oregonensis*)
Tui chub (*Gila bicolor*)
Lake chub (*Causius plumbeus*)
Peamouth (*Mylocheilus caurinus*)
Largescale sucker (*Catostomus macrocheilus*)
Bridgelip sucker (*C. columbianus*)
Longnose sucker (*C. catostomus*)
Mountain sucker (*C. platyrinchus*)
Salish sucker (*C. carli*) (species pending)
Three-spine stickleback (*Gasteroseius aculeatus*)
Sandroller (*Percopsis transmontana*)
Coastrange sculpin (*Cottus aleuticus*)
Prickly sculpin (*C. asper*)
Reticulate sculpin (*C. perplexus*)
Riffle sculpin (*C. gulosus*)
Shorthead sculpin (*C. confusus*)
Torrent sculpin (*C. rhotheus*)
Slimy sculpin (*C. cognatus*)
Piute sculpin (*C. beldingi*)
Margined sculpin (*C. marginatus*)
Mottled sculpin (*C. bairdi*)
The Mountain Whitefish (*Prosopium willaimsoni*)
Longfin Smelt (*Spirinchus thaleichthys*)(anadromous)
White Sturgeon (*Acipenser tranmountanus*)(anadromous)
Burbot (*Lota lota*)

Native Salmonids

Including all races of the following:

Schedule H-1 – Native Fish Found in Washington

Dolly Varden/Bull Trout (resident & anadromous)
Cutthroat Trout (resident & anadromous)
Chum Salmon (anadromous)
Steelhead/Rainbow Trout (resident & anadromous)
Pink Salmon (anadromous)
Sockeye Salmon (anadromous)
Chinook Salmon (anadromous)
Coho Salmon (anadromous)

Marine Fish:

Green Sturgeon (*Acipenser tranmountanus*)
Eclachon (*Theleichthys pacificus*)
Shiner Perch (*Cymotagaster aggregata*)
Pacific Staghorn Sculpin (*Leptocottus armatus*)
Starry Flounder (*Platichthys stellatus*)

SCHEDULE L-1

KEY QUESTIONS, RESOURCE OBJECTIVES, AND PERFORMANCE TARGETS FOR ADAPTIVE MANAGEMENT

[This schedule contains implementation details and will be subject to further revisions and clarifications as the provisions of the agreement are implemented through rule, statutes and programs]

Overall Performance Goals: Forest practices,²⁰ either singly or cumulatively, will not significantly impair the capacity of aquatic habitat to:

- a) Support harvestable levels of salmonids;
- b) Support the long-term viability of other covered species; or
- c) Meet or exceed water quality standards (protection of designated uses, narrative and numeric criteria, and antidegradation).

Resource Objectives are defined below for the key aquatic conditions and processes affected by forest practices. These resource objectives are intended to meet the overall performance goals.

Performance Targets are also defined below. These are the measurable criteria defining specific, attainable target forest conditions and processes. These targets are intended to meet the resource objectives.

Key Questions. The key questions driving adaptive management can be summarized as follows:

1. *Are forest practices being conducted in compliance with the prescriptions contemplated in this Report?*

Compliance monitoring will answer this question. Compliance monitoring will be conducted by DNR and is outside the scope of this adaptive management process.

2. *Will the prescriptions produce forest conditions and processes that achieve the performance targets in appropriate time frames?*

Effectiveness monitoring and research will answer this question. Effectiveness monitoring and research should also test whether less costly alternative prescriptions would be effective in producing conditions and processes that meet performance targets.

3. *Are the targets the right ones to achieve the resource objectives?*

²⁰ "Forest practices" are defined in the Forest Practices Rules and include road construction, timber harvesting, reforestation, brush control, etc.

Validation monitoring and research will answer this question. Validation monitoring and research should be designed to validate or verify the assumptions underlying the targets. Targets must work to achieve the overall performance goal, yet also be attainable within the context of a viable forest products industry. Current targets are those the authors believe will be met by the prescriptions in this Report.

Heat/Water Temperature

Resource objective: Provide cool water by maintaining shade, groundwater temperature, flow, and other watershed processes controlling stream temperature.²¹

Measures	Stream temperature	Shade
Performance targets	<ul style="list-style-type: none"> Water quality standards—current and anticipated in next triennial review 	<ul style="list-style-type: none"> Westside, Type F & S streams: that produced by shade model or, if model not used, virtually all available shade Westside, Type N streams: shade available within 50’ for at least 50% of stream length Eastside: virtually all available shade within 75’ of designated bull trout habitat per predictive model; elsewhere, shade produced by leave tree requirements per habitat series and selection criteria

1) Priority research

Effectiveness monitoring and research	<ul style="list-style-type: none"> a) Improve shade model to better predict relationships between shade and temperature at a regional level and at different spatial scales, and update it to reflect current research and any updated water quality standards. b) Determine how local conditions, including elevation, affect the ability of streams to meet targets. c) Test the cumulative effect (at basin scale) of the westside Type N “smart buffers” in meeting temperature targets. d) Understand the effects of forest practices on groundwater influences on stream temperature (e.g., hyporheic zones) and their relationship to temperature targets.
Validation monitoring and research	<ul style="list-style-type: none"> e) Calibrate the shade model to meet bull trout temperature targets²².

²¹ Stream temperature is affected by the interaction of a complex set of factors, including shade, air temperature, pool depth and frequency, flow, and groundwater influences. These factors are addressed in resource objectives for other conditions or processes (e.g., hydrology, sediment, LWD) in addition to the targets selected for stream temperature.

²² Bull trout temperature standards are expected to be an outcome of DOE’s triennial review of water quality standards.

2) Other research

<p>Effectiveness monitoring and research</p>	<p>a) Test the effectiveness of the 75' alternative to the shade rule line in meeting shade targets.</p> <p>b) Test the effectiveness of the eastside basal area prescriptions in meeting shade targets.</p> <p>c) Test whether the management prescriptions for buffers are achieving shade and temperature targets, including:</p> <ul style="list-style-type: none"> • how local conditions affect the performance of the prescriptions; and • the cumulative effects of yarding corridors on meeting temperature targets. <p>d) Investigate basin-wide cumulative effects of forest practices, and potentially other land uses, on attainment of temperature targets.</p> <p>e) Test whether the wetland prescriptions are effective in preventing downstream temperature increases beyond targets.</p>
<p>Validation monitoring and research</p>	<p>f) Determine whether amphibians or other designated uses require different temperature targets.</p>

LWD/Organic Inputs

Resource objective: Provide complex in- and near-stream habitat by recruiting large woody debris and litter fall to streams.

Measures	Riparian condition	In-stream LWD	Litter fall
<p>Performance targets</p>	<ul style="list-style-type: none"> • Westside: Desired Future Condition targets; current stands on pathways to meeting DFCs • Eastside: Desired Future Condition; current stands on pathways to achieve Eastside DFCs for each habitat series 	<ul style="list-style-type: none"> • Westside: 85% of recruitment potential for a stand on the trajectory toward DFC conditions; additional recruitment from trees in the outer zone • Eastside: to be developed based on eastside disturbance regimes 	<ul style="list-style-type: none"> • Westside Type N²³: At least 50% of recruitment available from within 50' • Eastside Type N: At least 70% of recruitment available from within 50'

²³ Targets for Westside and Eastside Type S and F streams are a low priority because adequate leaf litter is expected to be a by-product of riparian stand conditions.

1) Priority research

<p>Effectiveness monitoring and research</p>	<ul style="list-style-type: none"> a) Test the effectiveness of the riparian stand requirements (basal area, stem density, diameters, etc.) (“pathways”) on meeting DFC targets and maintaining windfirm stand; <i>research to be conducted within two years of report.</i> b) Improve and validate growth models for conifer/hardwood interactions <i>within three to five years of report.</i> c) Test the effectiveness of prescriptions on Type N streams in meeting LWD targets (determined below). d) Test the effectiveness of the hardwood conversion prescriptions in meeting LWD targets. e) Test the effectiveness of thinning prescriptions on achieving LWD targets. f) Assess the cumulative impacts of yarding corridors on meeting LWD targets. g) Test the effectiveness of wood placement in helping achieve targets. h) Test the effect of natural regeneration and stand mortality on the ability of buffers to meet LWD targets, and identify practices to reduce adverse impacts if needed.
<p>Validation monitoring and research</p>	<ul style="list-style-type: none"> i) Validate the Desired Future Condition targets <i>within two years of report.</i> j) Determine LWD targets for type N streams (e.g., for sediment retention and amphibians).

2) Other research

<p>Effectiveness monitoring and research</p>	<ul style="list-style-type: none"> a) Investigate the delivery of LWD from off-site, upstream locations, and test the cumulative effectiveness of the riparian and mass wasting prescriptions in contributing LWD to down-stream channels. b) Test the effectiveness of trees in the Outer Buffer in contributing LWD to streams. c) Test the effectiveness of the riparian prescriptions for recruiting LWD under different site conditions. d) Test the regeneration capacity of forested wetlands in riparian zones. e) Evaluate the effectiveness of current WMZs in meeting in-stream LWD targets.
<p>Validation monitoring and research</p>	<ul style="list-style-type: none"> f) Validate the assumptions underlying in-stream LWD targets by determining the effectiveness of different LWD sizes (key piece, etc.) in habitat formation and the probability of recruitment. g) Develop and validate eastside LWD targets in relation to eastside disturbance regimes. h) Determine targets for LWD for Dunn and Van Dyke salamanders, and determine the effectiveness of Type N prescriptions in meeting them. i) Determine basin-wide targets for LWD loading, and test the cumulative effectiveness of the prescriptions in meeting them; validate models to predict regional LWD recruitment. j) Determine targets for nutrient cycling on type N streams, and test the effectiveness of the prescriptions in meeting them. k) Investigate the role of groundwater in nutrient cycling in aquatic ecosystems, whether forest practices have significant adverse impacts, and whether additional targets or prescriptions are needed.

Sediment

Resource objective: Prevent the delivery of excessive sediment to streams by protecting stream bank integrity, providing vegetative filtering²⁴, protecting unstable slopes, and preventing the routing of sediment to streams.

²⁴ Vegetative filtering can be measured by riparian vegetation, which is covered under the target for riparian condition under LWD.

Schedule L-1 – Key questions, resource objectives, and performance targets for adaptive management

Measures	Mass wasting sediment delivered to streams	Road sediment delivered to streams	Streambank disturbance (caused by forest practices)
Performance targets	<ul style="list-style-type: none"> • Virtually none triggered by new roads • Virtually none triggered by new harvesting on high risk sites verified per Report criteria • Favorable trend on old roads 	<ul style="list-style-type: none"> • New roads—virtually none • Old roads—no more than 50% above background levels or favorable trend, whichever is more protective 	<ul style="list-style-type: none"> • Type S&F: none outside road crossings • Type N: ≤10%

1) Priority Research

Effectiveness monitoring and research	<ul style="list-style-type: none"> a) Determine the effectiveness of road maintenance BMPs on a site- and subbasin-scale in meeting road sediment targets. b) Test the accuracy and lack of bias of the criteria for identifying unstable landforms in predicting areas with a high risk of instability. c) Test the effectiveness of the equipment exclusion zone on Type N streams at meeting targets for streambank disturbance. d) Identify the best available model to predict shallow-rapid landslides. e) Develop a screen for deep-seated landslides (needs to be done state-wide). f) Develop 10m DEM state-wide; explore laser mapping.²⁵ g) Test the effectiveness of yarding corridor prescriptions at meeting targets for streambank disturbance, including the cumulative effects of allowable corridors.
Validation monitoring and research	(none)

²⁵ This is included in DNR's budget request. DNR is also budgeting for regional reviews by geotechnical experts.

2) Other research

Effectiveness monitoring and research	a) Test the effectiveness of mass wasting prescriptions in meeting mass wasting targets.
Validation monitoring and research	b) Validate mass wasting and road sediment targets by determining what levels of cumulative sediment inputs are harmful to the resource at the basin scale.

Hydrology

Resource objective: Maintain surface and groundwater hydrologic regimes (magnitude, frequency, timing, and routing of stream flows) by disconnecting road drainage from the stream network, preventing increases in peak flows causing scour, and maintaining the hydrologic continuity of wetlands.

Measures	Road run-off	Peak flows	Wetlands
Targets	<ul style="list-style-type: none"> • Significant reduction in delivery of water from roads to streams 	<ul style="list-style-type: none"> • West side: Increases in 2-year peak flows related to forest management (roads and harvest) are $\leq 20\%$ 	<ul style="list-style-type: none"> • No net loss in the hydrologic functions of wetlands

1) Priority research

Effectiveness monitoring and research	<p>a) Test the effectiveness of the roads program at disconnecting road drainage from the stream network.</p> <p>b) Test the effectiveness of prescriptions in meeting peak flow targets (rain-on-snow issue). (Includes validation of the model in the watershed analysis hydrology module used to predict forest-management related peak flows.)</p> <p>c) Test the effectiveness of the prescriptions in meeting targets for groundwater influences on low flows (see below).</p> <p>d) Develop a process to accurately identify wetlands in the dry season, especially on the Eastside.</p>
Validation monitoring and research	<p>e) Validate the target for peak flows as sufficient to prevent increases in the frequency of peak flows causing extensive redd scour.</p> <p>f) Investigate the role of groundwater influences on low flows, their relationship to forest practices, and develop targets if appropriate.</p>

2) Other Research

Effectiveness monitoring and research	<ul style="list-style-type: none"> a) Improve models of the effects of forest practices on stream flows. b) Refine the demarcation between perennial and seasonal Type N streams. c) Determine wetland size and function requiring mitigation sequencing to achieve targets.
Validation monitoring and research	<ul style="list-style-type: none"> d) Assess the hydrologic functions of forested wetlands, the effects of harvesting on stream flows, and the effectiveness of prescriptions in meeting wetland targets. If needed, revise the classification system based on wetland function.

Chemical Inputs

Resource objective: Use forest chemicals in a manner that meets or exceeds water quality standards and label requirements by buffering surface water and otherwise using best management practices.

Measures	Entry to water	Entry in RMZs
Performance targets	<ul style="list-style-type: none"> • None²⁶ for large droplets; minimized for small droplets (drift) 	<ul style="list-style-type: none"> • Core zone—none except conversions, toxic weeds • Inner zone—levels cause no significant harm to native vegetation

1) Priority Research
(none)

2) Other Research
(none)

²⁶ Targets are for forest chemicals other than Bt and fertilizer. BMPs for both are not priorities for adaptive management.

Other Priority Research

Effectiveness monitoring and research	<p>a) Verify the accuracy and lack of bias of the following predictive models:</p> <ul style="list-style-type: none">• Bull trout distribution• Stream-associated amphibians• Last-fish habitat <p>b) Test the effectiveness of fish passage prescriptions at restoring and maintaining passage.</p> <p>c) Test the effectiveness of the “smart buffer” prescriptions for westside type N streams in maintaining the long-term viability of amphibians (likely two different study designs for tailed frog/torrent salamanders and Plethodon salamanders, respectively).</p> <p>d) Develop an effective strategy to retain snags in riparian areas on the Eastside.</p>
Validation monitoring and research	<p>e) Assess the historical ranges of conditions and disturbance regimes of the eastside riparian ecosystems.</p>

DRAFT SCHEDULE L-2

Schedule L-2 lists specific projects associate with the issues identified for adaptive management research in the Forests and Fish Report. All of the definition and Key Questions identified on pages one and two of Schedule L-1 apply. Text and tables in the first column, titled Performance Targets and Measures should be identical to the wording that appears in Schedule L-1.

Column Headings

1. Performance targets and measures are taken from Schedule L-1. 6/21/00
2. Projects are from the "Research Budget FWS_NMFS" (L-1b) dated 1/31/00.
3. First year of funding denotes project initiation priority from "Research Budget FWS_NMFS" (L-1b) dated 1/31/2000.
4. Total \$ x 1000 - the total project cost estimated by "Research Budget FWS_NMFS" (L-1b) dated 1/31/2000.
5. Priority: PR = Priority Research, OR = Other Research from FFR 4/29/99
6. FFR. This column references the origins of the project in FFR 4/29/99. App refers to Appendix. Sch refers to Schedule

Other Notes: Yellow highlighted or shaded text in the Project column show FFR L-1 text that varied from the FWS_NMFS list (L-1b)
The "G" general projects are mostly from "Other Priority Research" on the last page of L-1.

Research questions that are in FFR Schedule L01 but do not appear in FWS_NMFS list (L-1b) and are not in this draft of L-2.

Heat/Water Temperature Other Research b): Test the effectiveness of the eastside basal area prescriptions in meeting shade targets.

LWD/Organic Inputs Priority Research j): Determine LWD targets for type N streams (e.g., for sediment retention and amphibians).

Sediment Priority Research f): Develop 10 m DEM state-wide; explore laser mapping. (Included in DNR budget and task list).

Other Priority Research e): Assess the historical ranges of conditions in disturbance regimes of the eastside riparian ecosystem.

Fish Habitat

Functional Objective: 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 like 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 (measures in bold)¹	Project² (First Year of Funding³)	Tot \$⁴	Priority⁵	FFR⁶
Accuracy of predictive model Fish habitat model: statistical accuracy of +/- 5% with line between fish and non-fish habitat waters equally likely to be over and under inclusive.	G1. Develop a predictive model (e.g. the logistic regression model in FFR) to serve as the basis for stream typing in Washington State. (00)	1,000	PR	<u>App B.1(a)</u>
	G3. Develop and validate habitat suitability and distribution protocols for bull trout currently under development by AFS. (00)	700	PR	<u>Sch L-1 Other Pri. Res. a)</u>
	G5. Validate last-fish habitat model for upper extent of bull trout and other fish. (00)	300	PR	<u>Sch L-1 Other Pri. Res. a)</u>

Amphibians

Functional Objective : (In Progress)

Performance Target (measures in bold)¹	Project² (First Year of Funding³)	Tot \$⁴	Priority⁵	FFR⁶
In progress	G4. Verify the stream-associated amphibian models. (00)	620	PR	<u>Sch L-1 Other Pri. Res. a)</u>
	G7. Test the effectiveness of the “patch buffer” prescriptions for westside type N streams in maintaining the long-term viability of amphibians. (00)	670	PR	<u>App B.4(d)(iv)</u>
	Also see TH9 (Platform for developing amphibian performance targets)			

Fish Passage

Functional Objective: Maintain or restore for fish in all life stages and provide for the passage of some woody debris by building and maintaining roads with adequate stream crossings.

Performance Target (measures in bold)¹	Project² (First Year of Funding³)	Tot \$⁴	Priority⁵	FFR⁶
Access Barriers Eliminate road-related access barriers over the time-frame for road management plans.	G6. Test the effectiveness of fish passage prescriptions at restoring and maintaining passage. (03)	200	PR	<u>Sch L-1 Other Pri. Res. b)</u>

Other Research

Functional Objectives: (In progress)

Performance Target (measures in bold) ¹	Project ² (First Year of Funding ³)	Tot \$ ⁴	Priority ⁵	FFR ⁶
	G8. Develop an effective strategy to retain snags in riparian areas on the Eastside. (03)	200	OR	Sch L-1 Other Pri. Res. d)

Performance Target (measures in bold) ¹	Project ² (First Year of Funding ³)	Tot \$ ⁴	Priority ⁵	FFR ⁶
	G2. Long-term Course-Level Ambient Monitoring of FFR, incl. Infrastructure for data management and archiving. (01)	200	PR	App L.3 (a)

Heat Temperature

Functional Objective: Provide cool water by maintaining shade, groundwater temperature, flow, and other watershed processes controlling stream temperature

Performance Target (measures in bold)¹	Project² (First Year of Funding³)	Tot \$⁴	Priority⁵	FFR⁶
Stream Temperature <ul style="list-style-type: none"> Water quality standards - current and anticipated in next triennial review (e.g., for bull trout). 	TH1. Validate cumulative effects of forest practices upon temperatures of F and S streams at the basin scale. (00) (FFR: Investigate basin-wide cumulative effects of forest practices, and potentially other land uses, on attainment of temperature targets.)	550	OR	Sch L-1 Heat/Water Temp 2) d)
Groundwater <ul style="list-style-type: none"> To be developed. (See TH5) 	TH2. Improve shade model to better predict relationships between shade and other microhabitat variables and temperature at the reach scale. (00) (FFR: Improve the shade model to better predict relationships between shade and temperature at a regional level and at different spatial scales, and update to reflect current research and any updated water quality standards.)	500	PR	Sch L-1 Heat/Water Temp 1) a)
Shade <ul style="list-style-type: none"> Type F & S streams, except eastside bull trout habitat: that produced by shade model or, if model not used, 85-90% of all effective shade. Westside and eastside high elevation, Type N streams: shade available within 50' for at least 50% of stream length Eastside: all available shade within 75' of designated bull trout habitat per predictive model 	TH3. Test effectiveness of 75' alternative to the shade rule in meeting temp and shade targets. (02) (FFR did not include the word "temperature" in this research issue)	450	OR	Sch L-1 Heat/ Water Temp 2) a)
	TH4. Test the cumulative effect (at basin scale) of the westside Type N patch buffers and eastside type N buffers in meeting temperature targets. (00) (Eastside Type N buffers was added to PR wording)	800	PR	Sch L-1 Heat/Water Temp 1) c)
	TH5. Understand the effects of forest practices on groundwater and on stream temperature (e.g. -hyporheic zones) and their relationship to temperature targets. (00)	900	PR	Sch L-1 Heat/Water Temp 1) d)
	TH6. Calibrate the shade model to meet bull trout temperature targets. (00)	100	PR	Sch L-1 Heat/Water Temp 1) e)
	TH7. Test whether the management prescriptions for buffers are achieving shade and temperature targets, including: TH7a. Understand how local conditions affect the performance of the prescriptions (03); and TH7b. understanding the cumulative effects of yarding corridors on meeting temperature targets. (03)	400	OR	Sch L-1 Heat/Water Temp 2) c)
	TH8. Test whether the wetland prescriptions are effective in preventing downstream temperature increases beyond targets. (03)	400	OR	
	TH9. Determine whether amphibians or other designated uses require different temperature targets. (03)	200	OR	Sch L-1 Heat/Water Temp 1) e)
		300	OR	Heat/Water Temp 1) f)

Large Woody Debris/Organic Inputs

Functional Objective: Provide complex and productive in- and near-stream habitat by recruiting large woody debris and litter.

Performance Target (measures in bold) ¹	Project ² (First Year of Funding ³)	Tot \$ ⁴	Priority ⁵	FFR ⁶																								
Riparian Condition <ul style="list-style-type: none"> Westside and high elevation eastside habitat: riparian stands are on pathways to meet Desired Future Condition (DFC) targets (species, basal area, trees per acre, growth, mortality) Eastside (except high elevation): Desired Future Condition; current stands on pathways to achieve eastside condition ranges for each habitat series 	<p>LWD1. Validate assumptions, models and data used to develop Desired Future Condition (DFC) targets and eastside stand conditions. Conduct field reconnaissance of mature riparian reference stands and compare results with interim targets. (00) (FFR: Validate desired future condition targets)</p> <p>LWD2. Validate the assumptions, models, and data used to develop growth and succession pathways to riparian DFC's. Conduct field reconnaissance of riparian stands (management age and mature); utilize new data on validation and refinement of growth models. (00) (FFR: Test the effectiveness of the riparian stand requirements, basal area, stem density, diameters, etc, "pathways" in meeting DFC and maintaining windfirm stand.)</p>	1050	PR	Sch L-1 LWD/Org Input 1) i)																								
Litter fall <ul style="list-style-type: none"> Westside Type N: at least 50% of recruitment available from within 50' Eastside Type N: at least 70% of recruitment available form within 50' 	<p>LWD3. Improve and validate growth models for conifer/hardwood interactions, older ages, and riparian zone conditions. (02) ("older ages and riparian zone conditions" add to FFR version)</p>	100	PR	Sch L-1 LWD/Org Input 1) b)																								
Pool Frequency <ul style="list-style-type: none"> < 2 channel widths per pool 	<p>LWD4. Determine rates of natural regeneration and tree mortality in riparian management zones and their effects on the ability of management prescriptions to provide riparian function(s), including LWD recruitment. Identify practices to reduce adverse impacts. (01) (Reworded from FFR no change in meaning)</p>	560	PR	Sch L-1 LWD/Org Input 1) h)																								
Instream LWD targets Westside: <ul style="list-style-type: none"> Streams <20 m bankfull width: > 2 pieces (total wood) per channel width Streams <10 m bankfull width: >0.30 key pieces per channel width Streams ≥10 m bankfull width: >0.50 key pieces per channel width Eastside: <ul style="list-style-type: none"> (To be developed see LWD10) 	<p>LWD5. Assess the historical ranges of conditions and disturbance regimes of the eastside riparian ecosystems. (04) (Not in FFR but similar to LDW17 which is)</p> <p>LWD6. Test the effectiveness of the hardwood conversion in placing riparian forest stands on trajectory to DFC's. (04) (FFR: Test the effectiveness of hardwood conversion in meeting LWD targets)</p>	400	OR	Sch L-1 LWD/Org Input 2) g)																								
Residual Pool Depth <table border="1"> <thead> <tr> <th>Mean Segment Residual Pool</th> <th>Min Unit Size</th> <th>Minimum Depth M</th> </tr> </thead> <tbody> <tr> <td>Bankfull Width M</td> <td>M</td> <td>Depth M</td> </tr> <tr> <td>0 to <2.5</td> <td>0.5</td> <td>0.10</td> </tr> <tr> <td>≥2.5 to <5.0</td> <td>1.0</td> <td>0.20</td> </tr> <tr> <td>≥5.0 to <10.0</td> <td>2.0</td> <td>0.25</td> </tr> <tr> <td>≥10 to <15</td> <td>3.0</td> <td>0.30</td> </tr> <tr> <td>≥15 to <20</td> <td>4.0</td> <td>0.35</td> </tr> <tr> <td>≥20</td> <td>5.0</td> <td>0.40</td> </tr> </tbody> </table>	Mean Segment Residual Pool	Min Unit Size	Minimum Depth M	Bankfull Width M	M	Depth M	0 to <2.5	0.5	0.10	≥2.5 to <5.0	1.0	0.20	≥5.0 to <10.0	2.0	0.25	≥10 to <15	3.0	0.30	≥15 to <20	4.0	0.35	≥20	5.0	0.40	<p>LWD7. Evaluate the effects of riparian prescription Options I and II (thinning or clearcutting to DFC/floor) on LWD recruitment relative to riparian reference stand conditions. (01)</p> <p>LWD8. Assess the cumulative impacts of yarding corridors on LWD recruitment. (01)</p> <p>LWD9. Test the effectiveness of wood placement in helping achieve instream habitat conditions. (04)</p>	90	PR	Sch L-1 LWD/Org Input 1) e)
Mean Segment Residual Pool	Min Unit Size	Minimum Depth M																										
Bankfull Width M	M	Depth M																										
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Large Woody Debris/Organic Inputs (Continued)

Functional Objective: Provide complex and productive in- and near-stream habitat by recruiting large woody debris and litter.

Performance Target (measures in bold) ¹	Project ² (First Year of Funding ³)	Tot \$ ⁴	Priority ⁵	FFR ⁶
	LWD10. Develop (or validate current) Performance Targets for instream LWD amounts for all stream types. (00)	100		Not in FFR
	LWD11. Investigate the delivery of LWD from off-site, upstream locations, and test the cumulative effectiveness of the riparian and mass wasting prescriptions in contributing LWD to down-stream channels. (03)	400	OR	Sch L-1 LWD/Org Input 2) a)
	LWD12 Test the effectiveness of trees in the outer buffer (outer zone) in contributing LWD to streams. (01)	250	OR	Sch L-1 LWD/Org Input 2) b)
	LWD13. Test the effectiveness of the riparian prescriptions for recruiting LWD under different site conditions. (01)	250	OR	Sch L-1 LWD/Org Input 2) c)
	LWD14. Test the regeneration capacity of forested wetlands in riparian zones. (01)	350	OR	Sch L-1 LWD/Org Input 2) d)
	LWD15 Evaluate the effectiveness of current WMZ s in meeting in-stream LWD targets (Not certain of intent/scope of this study. Need to discuss) (02)	100	OR	Sch L-1 LWD/Org Input 2) e)
	LWD16. Validate the assumptions underlying in-stream LWD targets by determining the effectiveness of different LWD sizes in habitat formation and the probability of recruitment and long-term stability. (03)	300		Not in FFR
	LWD17. Develop (priority) and validate indexes of LWD recruitment in relation to eastside disturbance regimes. (02)	100	OR	Sch L-1 LWD/Org Input 2) f)
	LWD18. Determine targets for LWD for Dunn and Van Dyke salamanders, and determine the effectiveness of Type N prescriptions in meeting them. (02)	300	OR	Sch L-1 LWD/Org Input 2) h)
	LWD19. Determine basin-wide targets for LWD loading, and test the cumulative effectiveness of the prescriptions in meeting them Validate models to predict regional LWD recruitment. (03)	300	OR	Sch L-1 LWD/Org Input 2) i)
	LWD20. Determine targets for nutrient cycling on type N streams, and test the effectiveness of the prescriptions in meeting them. (02)	100	OR	Sch L-1 LWD/Org Input 2) j)
	LWD21. Investigate the role of groundwater in nutrient cycle in aquatic ecosystems, whether forest practices have significant adverse impacts, and whether additional targets or prescriptions are needed. (02)	100	OR	Sch L-1 LWD/Org Input 2) k)

Sediment

Functional Objective: Provide clean water and substrate and maintain channel forming processes by minimizing, to the maximum extent practicable, the delivery of management-induced coarse and fine sediment to streams (including timing and quantity) by protecting stream bank integrity, providing vegetative filtering, protecting unstable slopes, and preventing the routing of sediment to streams.

Performance Target (measures in bold) ¹	Project ² (First Year of Funding ³)	Tot \$ ⁴	Priority ⁵	FFR ⁶																		
<p>Mass wasting sediment delivered to streams</p> <p>Road-related mass wasting</p> <ul style="list-style-type: none"> Virtually none is triggered by new roads; favorable trend on old roads. <p>Timber Harvest-related mass wasting</p> <ul style="list-style-type: none"> No increase over natural background rates on a landscape scale on high risk sites. <p>Road erosion sediment delivered to streams</p> <ul style="list-style-type: none"> New roads: virtually none. <p>Ratio of road length delivering to streams to total stream length (miles/mile)</p> <p>Old road not to exceed:</p> <table> <tr> <td>Coast</td> <td>West of</td> <td>East of</td> </tr> <tr> <td>Spruce zone</td> <td>Cascade Crest</td> <td>Cascade Crest</td> </tr> <tr> <td>0.15-0.25</td> <td>0.15-0.25</td> <td>0.08-0.12</td> </tr> </table> <p>Ratio of road sediment production delivered to streams to total stream length (Tons/year/mile)</p> <p>Old roads not to exceed:</p> <table> <tr> <td>Coast</td> <td>West of</td> <td>East of</td> </tr> <tr> <td>Spruce zone</td> <td>Cascade Crest</td> <td>Cascade Crest</td> </tr> <tr> <td>6-10</td> <td>2-6</td> <td>1-3</td> </tr> </table> <p>Streambank equipment limitation zone disturbance (caused by forest practices)</p> <ul style="list-style-type: none"> Type S&F : No streambank disturbance outside of road crossings. Type N: Less than or equal to 10% of the equipment limitation zone. <p>Fines in Gravel</p> <ul style="list-style-type: none"> Less than 12% embedded fines (<0.85 mm). 	Coast	West of	East of	Spruce zone	Cascade Crest	Cascade Crest	0.15-0.25	0.15-0.25	0.08-0.12	Coast	West of	East of	Spruce zone	Cascade Crest	Cascade Crest	6-10	2-6	1-3	<p>S1. Develop road sediment targets and determine the effectiveness of road maintenance BMPs on a site-scale in meeting those targets. (00) "Develop road sediment targets" added to FFR</p> <p>S2. Determine the effectiveness of road maintenance BMPs on a sub-basin scale in meeting road sediment targets. (02)</p> <p>S3. Test the accuracy and lack of bias of the criteria for identifying unstable landforms in predicting areas with a high risk of instability. (00)</p> <p>S4. Test the effectiveness of the equipment exclusion zone on Type N streams at meeting targets for streambank disturbance. (00)</p> <p>S5. Identify the best available model to predict shallow-rapid landslides. (00)</p> <p>S6. Develop a screen for deep-seated landslides (needs to be done state-wide). (00)</p> <p>S7. Test the effectiveness of yarding corridor prescriptions at meeting targets for streambank disturbance, including the cumulative effects of allowable corridors. (01)</p> <p>S8. Test the effectiveness of mass wasting prescriptions in meeting mass wasting targets. (03)</p> <p>S9. Develop and validate mass wasting and road sediment targets by determining what levels of cumulative sediment inputs are harmful to the resource at the basin scale. (03)</p>	<p>200</p> <p>100</p> <p>300</p> <p>400</p> <p>200</p> <p>300</p> <p>120</p> <p>400</p> <p>400</p>	<p>PR</p> <p></p> <p>PR</p> <p>PR</p> <p>PR</p> <p>PR</p> <p>PR</p> <p>OR</p> <p>OR</p>	<p>Sch L-1 Sediment 1) a)</p> <p>Not in FFR</p> <p>Sch L-1 Sediment 1) b)</p> <p>Sch L-1 Sediment 1) c)</p> <p>Sch L-1 Sediment 1) d)</p> <p>Sch L-1 Sediment 1) e)</p> <p>Sch L-1 Sediment 1) f)</p> <p>Sch L-1 Sediment 2) a)</p> <p>Sch L-1 Sediment 2) b)</p>
	Coast	West of	East of																			
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	Spruce zone	Cascade Crest	Cascade Crest																			
	6-10	2-6	1-3																			

Hydrology

Functional Objective: Maintain surface and groundwater hydrologic regimes. (magnitude, frequency, timing, and routing of stream flows) by disconnecting road drainage from the stream network, preventing increases in peak flows causing scour, and maintaining the **hydrologic** continuity of wetlands.

Performance Target (measures in bold) ¹	Project ² (First Year of Funding ³)	Tot \$ ⁴	Priority ⁵	FFR ⁶
Road Runoff	H1. Test the effectiveness of the roads program at disconnecting road drainage from the stream network and the effect roads have on the hydrology of streams. FWS/WDFW priority. (00) "and the effect roads have on the hydrology of streams. FWS/WDFW priority" added to FFR	200	PR	Sch L-1 Hydrology 1) a)
Ratio of road length delivering to streams to total stream length (miles/mile)	H2. Test the effectiveness of prescriptions in meeting peak flow targets (rain-on-snow issue). (Includes validation of the model in the watershed analysis hydrology module used to predict forest-management related peak flows.) (01)	750	PR	Sch L-1 Hydrology 1) b)
Old road not to exceed:	H3. Develop a process to accurately identify wetlands in the dry season, especially on the Eastside. (01)	100	PR	Sch L-1 Hydrology 1) d)
Coast West of East of Spruce zone Cascade Crest Cascade Crest 0.15-0.25 0.15-0.25 0.08-0.12	H4. Develop and validate the target for peak flows as sufficient to prevent increases in the frequency of peak flows causing extensive redd scour. (01)	200	PR	Sch L-1 Hydrology 1) e)
Ratio of road sediment production delivered to streams to total stream length (Tons/year/mile)	H5. Investigate the role of groundwater influences on low flows, their relationship to forest practices, and develop targets if appropriate. Test the effectiveness of the prescriptions in meeting the targets. (02)	100	PR	Sch L-1 Hydrology 1) f)
Old roads not to exceed:	H6. Improve models of the effects of forest practices on stream flows. (02)	100	OR	Sch L-1 Hydrology 2) a)
Coast West of East of Spruce zone Cascade Crest Cascade Crest 6-10 2-6 1-3	H7. Refine the demarcation between perennial and seasonal Type N streams. (02)	300	OR	Sch L-1 Hydrology 2) b)
Peak Flows	H8. Determine wetland size and function requiring mitigation sequencing to achieve targets. (03)	150	OR	Sch L-1 Hydrology 2) c)
Westside: Do not cause significant increase in peak flow recurrence intervals resulting in scour that disturbs stream channel substrates providing actual or potential habitat for salmonids, attributable to forest management activities.	H9. Assess the hydrologic functions of forested wetlands, the effects of harvesting on stream flows and the effectiveness of prescriptions in meeting wetland targets. If needed, revise the classification system based on wetland function. (02)	100	OR	Sch L-1 Hydrology 2) d)
Wetlands				
No net loss in the hydrologic functions of wetlands.				

Schedule M-1

Proposed Statute Implementing Report Recommendations

See Engrossed Substitute House Bill 2091.

Schedule M-2

Clean Water Act Section 303 Assurances

Background:

Forest practices on private and state-owned lands in the State of Washington are regulated by the Forest Practices Board. The Department of Ecology (Ecology) and the Forest Practices Board (FPB) jointly adopt rules, and enforcement is performed by the Department of Natural Resources (DNR). For over a decade, an advisory group known as Timber, Fish, and Wildlife (TFW) attempted to resolve disputes and put forward a consensus position which would avoid prolonged litigation and protect resources. TFW's recommendations are advisory only.

In 1997 there was a recognition that present and future listings of salmonids under the Endangered Species Act (ESA) required a new look at forest practices. TFW resolved to negotiate a new set of forest practices, and invited a federal caucus consisting of the Environmental Protection Agency (EPA), the US Fish and Wildlife Service (USFW), US Forest Service (USFS) and National Marine Fisheries Service (NMFS) to the table. The goals of TFW were to meet the Clean Water Act (CWA), the ESA, and return salmon to harvestable levels.

TFW is made up of six caucuses:

- The forest products industry, including small landowners
- Counties
- Selected state agencies
- Tribes
- Environmental groups
- Federal agencies

Negotiations continued for over a year, at which time the environmental caucus withdrew from the negotiations and insisted that if negotiations were to continue the process could not be termed TFW. The negotiations then became known as the Forestry Module.

EPA Region 10 and Ecology are co-stewards of the Clean Water Act. As an agreement appears to be feasible, EPA and Ecology are putting forward what have been come to be known as the CWA assurances. These assurances spell out the terms and conditions of how Section 303(d) will be applied to lands subject to the Report and its recommendations. EPA and Ecology make no assurances regarding Tribal lands or jurisdiction.

Attainment of water quality standards remains the goal of the agencies, and we will expect steady progress in improving water quality trends while acknowledging that meeting the standards in some cases will take many years. It is also an objective of all agencies that the

CWA and the ESA can and should act in concert. To that end, we believe that the assurances offered here are or can be made to be consistent with the ESA.

Ecology and EPA agree that forest practices in the State of Washington need considerable improvement to meet CWA concerns. The comprehensive and largely consensus-based Forests and Fish Report will result in substantial improvement in forest practices affecting water quality, and particularly salmon habitat protection. However, even if all forested lands meet water quality standards, there would still remain a large number of water bodies impaired by urban pollution, agricultural practices, hydro-power, mining, and some point source contribution. Our support of the Report addressing forest practices signals other sectors that we hold similar expectations for them and will provide similar assurances if our expectations are met.

These assurances are made with the knowledge that EPA's national Total Maximum Daily Load (TMDL) regulations are being revised and that we cannot prejudge the public process and what those regulations may say. These assurance are also made with the knowledge that many future decisions need to be made in state and federal CWA programs that are subject to notice and comment processes called for in the Administrative Procedures Act.

Structure:

These assurances are a stand-alone document and an appendix to the Forests and Fish Report which will be submitted to the Forest Practices Board for consideration. The Report referred to here is the document, approved by the authors, known as the Forests and Fish Report. This Report contains numerous appendices including the riparian strategy, roads, enforcement, adaptive management, assurances and other components.

Basis for Assurances:

EPA and Ecology acknowledge that the Report, when implemented, will significantly advance forest practices in the State of Washington, will improve water quality in the short term, and is anticipated to meet water quality standards in the longer term. The urgency of developing TMDLs for water bodies impaired by current forest practices will be reduced significantly by this Report. The Report anticipates a package of state regulations, guidance, funding, and restoration programs, plus the anticipated federal ESA 4(d) rule for aquatic species listed in the Report leading to an HCP. The State forest practice regulations when promulgated and the authority for ESA sanctions, taken together provide a basis of reasonable assurance of implementation of this Report and its recommendations.

Ten years is a reasonable minimum time frame for this initial exercise of priority-setting discretion (described below) based on the overall protectiveness of the Report, and is consistent with the schedule for TMDLs which is part of the Washington TMDL settlement agreement. Ten years will provide time to test the assumptions underlying the proposed regulatory provisions and the effectiveness of adaptive management. Ten years should be a reasonable time frame to determine some initial water quality trends resulting from the changes to forest practices.

We base this judgement on an analysis of the Report and its recommendations, and highlight the following provisions:

Monitoring and Adaptive Management: The Report's monitoring and adaptive management plan offers a significant improvement over the current program. This plan promises to provide both effectiveness and trend monitoring, and to inform a rigorous and reliable adaptive management process.

Baseline rules: New baseline rules will significantly improve riparian buffers for both fish habitat and non-fish habitat streams. Restrictions on steep and unstable slope harvest, road building maintenance and abandonment standards, and other regulations offer both enforceability and water quality improvement.

Enforcement: With the staffing requested in the funding package, and enforcement provisions contained in the Report, the baseline rules will be more effective. Nonetheless, a visible and measurable enforcement presence is necessary to maintain these assurances.

Regulatory and voluntary programs: The Forest Practices Regulations and their enforceability by DNR and Ecology, combined with the take authority provided in an enforceable ESA 4(d) rule, and eventual enforceable HCP, is a strength of the Report. Landowner incentives should complement regulatory elements, but the Report is predominately a regulatory approach rather than voluntary.

Adaptive management: We acknowledge uncertainty exists as to when water quality standards will be met. This is understandable given the scale of the Report (state and private forest lands in the State of Washington) and the long time frame necessary for natural processes to recover. We rely on monitoring and adaptive management to inform us whether the buffers and other practices are adequate and will be fully protective of functions and water quality standards. EPA and Ecology will evaluate the effectiveness of baseline rules and adaptive management for the life of the assurances.

Implementation: The Report assures implementation and as such it offers early water quality protection that precedes any TMDL or potential TMDL alternative that would be produced at a later date, should that become necessary. These early actions offer substantial environmental benefit, and these early actions should not wait for the preparation of a TMDL or potential TMDL alternative.

Assurances and Contingencies:

The assurances are contingent on:

1. The final Forests and Fish Report;
2. Passage of State legislation (if necessary), adoption of emergency or final regulations by the FPB, and appropriations for the funding package pursuant to the Report; and

3. Landowners will share water quality data collected in cooperative research, and adaptive management, and TDML development. Landowners are further encouraged to share all pertinent water quality data to assist in water quality planning efforts.

EPA and Ecology offer these assurances:

1. EPA and Ecology have confidence that the Report, when signed and implemented, provides the quickest and most efficient means for achieving environmental goals and State of Washington water quality standards. Accordingly, TMDLs for waters impaired by sediment, habitat degradation, flow, turbidity or temperature caused by forest practices covered in the Report and recommendations (private and state lands subject to Board regulation) affecting a current or future 303(d) listed water body, become a lower priority for EPA and Ecology. Therefore, these TMDLs need not be prepared prior to July 1, 2009 (note exceptions below). Ecology will submit its year 2000 section 303(d) list and priorities consistent with this provision. EPA will review and approve the priorities as expressed here subject to notice and comment. EPA and Ecology will not add new TMDL CWA requirements to current or future 303(d) listed water bodies subject to the FPB regulations prior to 2009, except through the agreed upon adaptive management program set out in the Report, or made necessary by changes to the CWA or CWA implementing regulations.
2. If new regulations promulgated by EPA support alternatives to TMDL's, EPA and Ecology will make every reasonable effort to exercise these TMDL alternatives on a time frame consistent with the development of a Habitat Conservation Plan approved by NMFS and USFWS for this Report.
3. If new regulations do not support alternatives to TMDLs, EPA and Ecology, with voluntary participation of landowners at their option, will develop TMDLs on an appropriate scale beginning in 2009 and completed by 2013. Landowners may request a TMDL from Ecology for their holdings prior to 2009. Where EPA and Ecology have approved a TMDL for forested lands subject to the FPB regulations, and the prescriptions in the TMDL implementation plan differ from FPB regulations, for the purposes of the Clean Water Act, the prescriptions should qualify as an alternate plan.
4. Allocations or water quality targets in the TMDLs or TMDL alternatives may be expressed using measures appropriate to the characteristics of the water body and pollutants being addressed. Habitat surrogates for example, that are quantitatively linked to the attainment of water quality standards, can be used to help develop TMDLs and evaluate progress toward attaining water quality standards, especially narrative criteria.
5. TMDLs produced prior to 2009 in mixed use watersheds:
 - a. For mixed use watersheds with water bodies impaired by forest practices and the activities of other landowners, we expect that the landowners subject to the Forest Practices Board regulations will participate in watershed planning and restoration efforts. Consistent with the intent of the Report and these assurances, EPA and Ecology will not require more stringent forest practices in a mixed-use watershed-

based TMDL before July 1, 2009 except through adaptive management and subject to reopeners. Assurances for forested landowners in mixed use and single use watersheds will be the same, and subject to the same conditions.

- b. If a TMDL is produced in mixed use watersheds, and if achievement of the TMDL load allocations cannot be met through the forest practices regulations, the adjustment of those management practices will be through adaptive management as contained in the Adaptive Management appendix of the Report. Over the long term, failure of adaptive management to meet CWA goals is a potential cause for withdrawal of the assurance. Forest landowners are encouraged to participate in broader cooperative watershed planning and restoration efforts to improve water quality impaired by land uses other than regulated forest practices. Examples of this involvement include:
 - i. Attending watershed planning meeting to describe new protection measures contained in the Forests & Fish Report.
 - ii. Sharing watershed assessment data cooperatively collected as appropriate to assist in characterizing the watershed.
 - iii. Sharing data and modeling information cooperatively collected related to expected improvements in water quality in forested riparian habitat due to implementation of the Forestry Module baseline rule package.
 - iv. Collaboratively working with other watershed planning participants to prioritize restoration opportunities on forested sections of watersheds.
6. EPA and Ecology will make every effort to integrate the CWA in coordination with the Endangered Species Act. Specifically, EPA and Ecology will work with NMFS and USFWS to coordinate progress reviews, with the goal of having at least one federal-tribal-state-public review every five years.
7. EPA is developing new regulations concerning section 303(d). For the purposes of discussion, we assume that water bodies listed as impaired under 303(d) will remain listed until water quality standards are met, consistent with the recommendations of the CWA 303(d) FACA. No assertions to the contrary have been made in negotiations.
8. Landowners with individual Habitat Conservation Plans wishing CWA assurances may petition EPA and Ecology for such assurances. Landowners should expect to demonstrate in writing to the agencies that the HCP, on balance, meets or exceeds the functions provided by the prescriptions contained in the Report and will result in meeting water quality standards in a reasonable time frame. Landowners providing such a demonstration would receive the same assurances contained in this Appendix.

Reopeners, Modifications, and Causes of Withdrawal of Assurances

Any one of the following items may cause withdrawal or modification of the assurances:

Statewide:

1. New water quality standards not anticipated in this Report unless those new standards can be accommodated with adaptive management. This Report specifically targeted the State of Washington's numeric sediment and temperature criteria and narrative water quality standards relevant to aquatic habitat including anti-degradation. This Report also anticipated potentially lower temperature standards as needed to protect fish or amphibians covered by this Report.
2. Failure to implement for any reason, including:
 - a. A significant loss of funding or staffing to the state regulatory agencies dedicated to forest practice regulation or monitoring.
 - b. A lack of enforcement of forest practices on the part of state regulatory agencies.
 - c. Broad scale landowner non-compliance with forest practice regulations or the Report.
 - d. Lack of final regulations consistent with the Report.
3. Weakening of enabling State statutes or regulations which affect the Report and its implementation.
4. General failure to upgrade regulations or guidance called for in adaptive management. This includes failure to develop agreed upon resource objectives, research priorities, and compliance monitoring programs.
5. Court orders, changes to the CWA, state or federal regulatory changes that cannot be otherwise addressed.

Prior to withdrawal of these assurances, EPA and Ecology will advise the Forest Practices Board and the cooperators of the concerns. If modification of the Report would preclude the necessity for complete withdrawal of the assurances, a reasonable time period will be allowed for such modifications. Termination of the assurances will be explained in writing.

Individual landowner:

If an individual landowner fails to implement forest management practices or demonstrates a pattern of non-compliance, such as repeated enforcement actions, the assurances may be withdrawn for that landowner. All available enforcement and other options under federal and state law will be considered. This will include, but not be limited to: the requirement for a TMDL; enforcement of water quality standards violations and forest practice laws and regulations.

Role of EPA, Ecology and the Tribes in CWA Assurances

While EPA will primarily look to Ecology and DNR to monitor progress and compliance with the Report, EPA will participate in periodic progress reviews to ensure that the assurances remain appropriate. EPA will pay particular attention to implementation of baseline rules, adaptive management, retention of funding for state regulatory agencies, enforcement, and monitoring results including water quality trends. EPA will invite affected Tribes to participate in these progress reviews.

Ecology will continue in its role of reviewing and concurring on rule changes with the Forest Practices Board, assuring compliance with the forest practice regulations with DNR, monitoring compliance with water-quality standards, pursuing necessary changes through adaptive management, and participating in water quality research on forest practices. Ecology will track water bodies affected by the Report in a manner consistent with CWA 303(d) and the settlement agreement.

Department of Ecology

By: _____

Its: _____

Environmental Protection Agency, Region 10

By: _____

Its: _____