Oregon Stream Protection Coalition

M E M O R A N D U M

To: **Oregon Board of Forestry**
From: **Mary Scurlock, Oregon Stream Protection Coalition**
Re: **Information relevant to the need for adaptive change to riparian protection on private forestlands in Eastern Oregon**
Date: **6 March 2018,** *revised*

In 2012, having made a finding of resource degradation on the basis of the RipStream study, this Board decided that it would not include Eastern Oregon regions in the evidence review conducted to lay the groundwork for what became the Protecting Coldwater rule that now applies on Salmon, Steelhead and Bull Trout (SSBT) streams in parts of western Oregon. Six years have elapsed, during which time this Board further decided to exclude the Siskiyou region from the SSBT rule, partly on the rationale that the Siskiyou is inherently more like eastern Oregon than the rest of western Oregon. This decision was made without clear evidence in the record that the fundamental relationship between riparian shade and stream warming differs between regions. On the contrary, DEQ uses the same temperature model to estimate stream network thermodynamics and hydrology statewide, known as Heat Source (Boyd, 1996; Boyd and Kasper, 2003), which would indicate it is safer to assume that these relationships are more alike than different.

The stream protection rules in Eastern Oregon for small and medium fish-bearing streams require a 20 foot no cut area with 50 and 70 foot overall Riparian Management Areas (RMAs) within which minimum basal area (BA) retention standards must be met. These RMAs are the same size as those in western Oregon, but the basal area targets are lower to reflect regional differences in natural forest characteristics. As in western Oregon, BA standards may be attained by leaving a 20 foot no cut buffer. Nonfish streams are protected only by the retention of non-merchantable vegetation within 10 feet.

It is our view that there is as pressing a need for adaptive management attention to Eastern Oregon as to the Siskiyou. The eastside is still recovering from legacy land use effects from riparian logging and decades of heavy grazing that degraded riparian conditions and led to problems with stream temperatures, decreased instream and riparian wood and pool formation, winter ice floes, and fish declines. (Quigley et. al. 1996, Beschta et al. 1991, McIntosh 1992, Bouhle 1994). Although there has been substantial investment in tributary habitat restoration due to the influx of funds available through multiple state and federal sources for work in the Columbia Basin, there is not sufficient evidence that reliance on voluntary measures alone is an adequate approach. (See e.g. Middle Fork John Day Intensively Monitored Watershed Working Group, 2017).

The high resource risk associated with current stream protection rules in Eastern Oregon in a changing climate justifies inclusion of these ODF regions in monitoring efforts at the Department's earliest opportunity. Many Eastern Oregon streams are impaired for parameters affected by forest practices. According to EPA, at least 68% of streams that pass through private forestlands in the Eastern Cascades region are listed for temperature/sedimentation/turbidity, and at least 64% for the Blue Mountains region. (EPA 2017).

When it comes to stream protection from logging impacts, prioritizing riparian protection to the hotter, drier regions of the state appears consistent with the Department's own findings when the current rules were put in place in 1994, i.e. that forestry-related stream temperature problems are worse in the drier regions of the state, including the Siskiyou and on the Eastside, and that recovery from logging of riparian trees is slower. *See e.g.* Lorensen 1994 at pages 17 and 33.

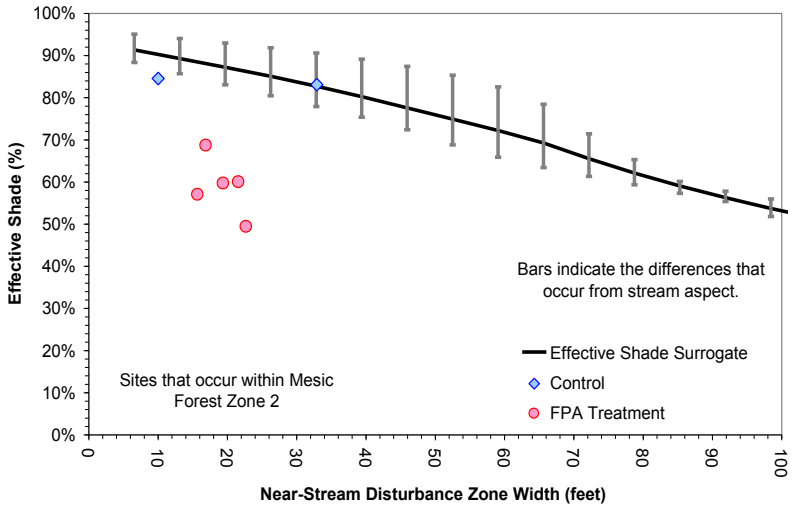
I. Recent Advocacy

In 2012, I provided written input to department monitoring staff as follows:

> **"The [Scientific Evidence Review] scope must extend to Eastern Oregon.** The scope of the SER should extend to information relevant to the relationship between riparian forest management and stream temperatures in Eastern Oregon. The Department has consistently represented to the public and the Board that a decision about the geographic scope of this rulemaking will be made only after the promulgation of proposed alternatives based on the Board's review of "science on the applicability of alternatives. " (See e.g. the ODF rulemaking checklist attached, dated September 25, 2012 – geographic scope is the second to last decision*). By excluding eastern Oregon from the SER process, there can be no meaningful decision point about geographic scope because the lack of a scientific basis will become a self-fulfulling prophecy: we must look for this information in order to find it. (emphasis added).*
>
> Furthermore, it is quite well-known that there is data to support the contention that current FPA requirements in Eastern Oregon reduce shade in violation of water quality standards as expressed through TMDL shade targets, clearly implicating the Protecting Coldwater Criterion which is the focus of this rulemaking. *See e.g*. the graph below from the "319 Shade Study" showing significantly lower effective shade on FPA treated streams than on control sites. (ODF, 1999). [1]

[1] Statement of Mary Scurlock on behalf of Oregon Wild, McKenzie Flyfishers, Native Fish Society, Northwest Environmental Advocates, Oregon Chapter Sierra Club, Rogue Riverkeeper, WaterWatch, & Wild Salmon Center, Re: Agenda Item 4: Systematic Review Findings & Riparian Rule Analysis Alternatives for Rule Development, November 14, 2013.

Grande Ronde River Subbasin TMDL Effective Shade Surrogate Measures (DEQ Data) and Measured Effective Shade Data (ODF Data, 1999)



Specifically, we noted that on the basis of data from the same study underlying the same graph shown above, in 2001, NOAA, EPA and USFWS found – in commenting on the ODF/DEQ sufficiency analysis: "with a high degree of confidence, that practices under the FPA adversely affect temperature-related factors such as shade levels, surface erosion, landslide rates, stream morphology and substrate, and landscape-scale conditions," concurring with ODF and DEQs own stream temperature sufficiency analysis findings of "water quality impairments due to forest management activities even with FPA rules and BMPs." **These concerns were raised for all stream sizes in both the westside and eastside watersheds statewide**. (NMFS, FWS, EPA, 2001):

> "The SAST and other studies and assessments indicate that forest practices under the FPA rules likely contribute to violations of Oregon's numeric water temperature criteria, and of the criteria at 340-041-0205(2)(b)(A) that are intended to implement the state's antidegradation policy and to protect threatened salmonids in Oregon. When monitoring, research, assessments or other information demonstrate that practices under the FPA rules do not meet WQS, the rules need to be revised. The rules could be revised so that practices fully meet WQS and provide functional habitat for ESA-listed fishes during the BOF's consideration of the FPAC proposals. Also, the FPA rules include a provision for basin-specific rule changes that can address water quality issues in a particular watershed, subbasin, or georegion. Based on the substantial body of scientific literature demonstrating that Oregon forest practices likely adversely affect water quality and threatened species of salmonids, we recommend initiation of the basin-specific rule change process. (Id. at 9).

A recent comprehensive watershed monitoring report for the Middle Fork John Day Basin (Middle Fork John Day IMW Working Group 2017, p. ix) concluded that

> "Stream surface area exposed to air and shading from tall riparian vegetation had the largest influence on stream temperatures compared to air temperature and streamflow. These model results suggest that constraining channel width and development of tall riparian vegetation has

the potential to mitigate the deleterious effects of future climate scenarios."

The modeling analysis summarized above suggests that adequate protection and re-growth of forest riparian cover played the principal role in determining whether the mainstem river dramatically warms or dramatically cools in future decades*. Of even more immediate concern here is that maintenance and restoration of forest-derived shade in smaller tributary streams will strongly determine near-term outcomes for salmonid fishes. The report concludes that stream temperature overwhelmingly constrains the capacity of various restoration measures monitored in the study to benefit salmonid fishes*. (Middle Fork John Day IMW Working Group 2017).

II. Research Findings

Several published research articles since 2000 have shed light on the significance of forest shade loss and elevated temperatures in eastern Oregon streams and rivers, the adverse impact to salmonid habitat and populations from resulting temperature increases, and the potential restoration and recovery benefits of policies that would ensure shade protection and restoration in the future.

Danehy and Kirpes (2000) studied relative humidity gradients from stream channel margins into adjacent streamside forests in 12 locations in southeastern Washington and the Grande Ronde Basin in northeast Oregon. They found that riparian forest vegetation helps retain a microclimate zone of buffered relative humidity with 10 meters distance (about 33 feet) each side of stream channels. Reduction of canopy shade by thinning within this zone could reduce relative humidity, harming habitat for amphibians and other riparian-dependent species, and potentially increasing thermal stress on surface waters.

Ebersole et al. (2003) found that existing stream temperatures in streams of the Grande Ronde Basin streams in northeast Oregon were limiting overall summer density and abundance of juvenile steelhead and chinook salmon. They showed that an experimental incremental increase in stream shade produced significant reach-scale stream cooling in the range that could directly benefit salmonids. Ebersole et al. also reported that thermal refugia associated with cold tributaries and groundwater upwelling sites helped sustain juvenile salmonids during the warmest hours of the day in mid summer. Their findings indicate that 1) under prevailing conditions, any loss of shade is likely to translate into lost fish population abundance and productivity, 2) warming of tributary streams resulting from forest thinning in near-stream areas likely harms salmonid fishes in receiving waters, and 3) improvements in riparian shade cover could be expected to benefit salmonid populations.

Justice et al. (2017) calibrated a Heat Source water temperature model using extensive field thermal data derived from the Upper Grande Ronde Basin stream network. Present-day conditions are considerably depleted in shade relative to natural and historical potential, and this is associated with temperature impairment that limits salmonid fish persistence and productivity. By modeling a variety of future land use and climate warming scenarios,

relative to existing conditions, they predicted that policies resulting in restoration of natural potential levels of riparian forest shade and channel morphology could produce summer stream cooling that well more than offsets the expected harms from ongoing climate warming. In the absence of recovery of riparian forest shade and channel form, climate change can be expected to dramatically degrade already temperature-impaired streams in the study region.

III. Relevance of studies from outside the Oregon to establish fundamental processes and relationships

The Board has made much of the differences between Eastern Oregon and Western Oregon as a reason not to address the sufficiency of stream protection rules in eastern Oregon on the basis of RipStream's Western Oregon data. Staff has raised the ominous spectre of supposed "statistical risk of extrapolation," which appears to have discouraged Board action and/or served as an excuse for Board inaction.

But when it comes to riparian shade removal and water quality standards compliance, the similarities would seem to overwhelm these arguments. I have already mentioned above the fact that DEQ uses the same basic model for temperature TMDLs statewide. Additionally, I have previously provided input to this Board as follows about how east/west differences played out in Washington state with regard to a major forest practices rule effectiveness study:

> "Preliminary information emerging from the state of Washington's adaptive management studies on forest practices that indicates substantial similarity of many Eastern Washington streams with those in Western Washington streams. Data from the Forest Hydrology Study suggest that there is a "significant population" of nonfishbearing perennial streams in Northwest Washington that conform to the hydrologic profile of westside streams (i.e. are characterized by continuous surface flow). This finding is strong enough that researchers have proposed the use of study designs developed for westside streams on eastside streams, with minor modification. (CMER Eastside Type N Riparian Effectiveness Research Alternatives, October 2013)."

But we can learn much more from Washington State's forest practices program and related research. Washington's Forest Practices HCP recognizes the importance of riparian stands and riparian functions in achieving water quality goals and the recovery of salmonid and stream associated amphibians. Riparian protection measures are designed to restore and maintain riparian processes that create aquatic habitat by restricting forest practices activities from the most sensitive parts of riparian areas (core area) and by limiting activities in other areas. Trees are retained in riparian management zones (RMZs) adjacent to fish-bearing streams to maintain ecological functions such as LWD recruitment, shade, litter fall and nutrient cycling (WDNR, 2005) – though the primary emphasis is on shade and large wood. The riparian management strategy for eastern Washington is more complex than on the westside because it was intended to produce stand conditions that vary over time by using management practices that are supposed to mimic natural disturbance regimes within a range that achieves functional conditions and maintains general forest health (WDNR,

2005). *Nonetheless, on those Washington streams providing habitat for bull trout, all available shade is retained within 75 feet, and overall buffers extend significantly beyond that.*[2]

Washington's cooperative monitoring and research committee (CMER) has undertaken a number of projects to learn more about eastern Washington streams and riparian areas, including the following:

- Literature review on eastern Washington disturbance regimes (Concurrent Technologies, 2002)
- Literature review on wood loading dynamics (Herrera Environmental, 2004)
- A study to characterize riparian stand composition and structure on fish-bearing streams on state and private land (Bonoff et al., 2008; Schuett-Hames, 2015; Ceder et al., 2017).
- 3 experimental studies evaluated the effectiveness of the eastern Washington riparian prescriptions for fish-bearing streams in the "Mixed Conifer" habitat type:
    - The Solar Radiation/Effective Shade study compared shade retention and solar radiation reaching streams (McGreer et al., 2011).
    - The Eastside Riparian Shade/Temperature study evaluated stream temperature response to the prescriptions (Cupp and Lofgren, 2014).
    - The "Bull Trout Add-On" study collected additional data at a sub-set of the same sites ito complement the previous research on shade and temperature response. The purpose of this study was determine the effect of the AAS and SR riparian prescriptions for fish-bearing (Type F and S) streams in the Mixed Conifer forest types on riparian stand structure, mortality, tree fall and wood recruitment. (Cupp 2017).

IV. Columbia Basin Salmon Recovery Plans Target Tributary Habitat and Riparian Conditions

A. Federal Recovery Plans. Recovery plans and expert reports on ESA listed salmon in

[2] Eastern WA Riparian Management Zones consist of three sub-zones: a core zone closest to the water, an inner zone in the middle and an outer zone farthest from the water. No harvest is allowed within the 30 ft (9.1 m) wide core zone. The width of inner zone is either 45 ft (13.7 m) on small streams ≤ 15 ft (4.6 m) or 70 ft (21.3 m) on larger streams. The riparian prescriptions vary by timber habitat types that are delineated by elevation, including the Ponderosa Pine (0-2500 ft; 0–762 m), the Mixed Conifer (2500-5000 ft; 762-1524 m), and the High Elevation type (>5000 ft; 1524 m). Harvest of trees from within the inner zone is allowed only if basal area exceeds a minimum level that varies depending on timber habitat type and site class. In selecting inner zone leave trees, preference is given to the largest trees, trees that provide shade or lean towards the water, and species on a preferred species list that varies by THT (WFPB, 2016). The canopy provided by leave trees in the core and inner zones must meet minimum shade requirements that differ depending on whether the stream is located within areas designated as potential bull trout habitat (the "bull trout overlay"). Within the bull trout overlay, all shade must be retained within the core and inner zones, ***so only trees that do not provide shade to the stream can be removed***. This is referred to as the "all available shade requirement" (AAS). Outside the bull trout overlay, minimum shade requirements vary depending on water quality classification and elevation. This is referred to as the standard rule (SR). Generally more trees may be harvested within the inner zone under the standard rules than the all available shade requirement.

eastern Oregon have identified the importance of riparian management on both federal and nonfederal lands, and the paramount importance of increasing shade on tributary streams in the Columbia Basin has been widely recognized as a salmon conservation priority in the context of climate disruption:

> "In general, mitigating for changes in hydrology and temperature in tributaries that are caused by climate change will involve many of the same approaches that have been initiated in the basin to date. Any action that can help minimize water temperatures increases or augment stream flow during summer and autumn would contribute to this end. Specifically, protection of cold-water refugia for migrating salmon and restoration of riparian habitats in headwater reaches should have high priority. (Bilby et. al. 2007, at 85).
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> "Adequate protection or restoration of riparian buffers along streams is the most effective method of providing summer shade. ... measures to ensure adequate levels of shade will be one of the most effective approaches to limiting temperature increases." (Bilby et. al. 2007 at vii).

In one example, the recovery plan for Mid Columbia Steelhead ESU is in accord that private lands have a role to play in meeting state and federal goals for salmon recovery. However, the plan fails to provide an adequate evaluation of the sufficiency of private land use controls for either agricultural or timber land uses – leaving the adequacy of these controls in serious doubt. (See e.g. Appendix F of Conservation and Recovery Plan stating that Programmatic Review is incomplete and ongoing).

While ODF often reminds the conservation community that the OFPA is not a compliance mechanism for the federal ESA, it is the only existing mechanism for implementing programmatic enforceable limits on forest practices impacts to aquatic ecosystems. The public deserves a thorough understanding of how the forest practices rules do or do no contribute to or limit recovery of threatened and endangered salmonids in Eastern Oregon.

B. Tribal Recovery Plans. Eastern Oregon tribal recovery plans support an emphasis on riparian protection on all land ownerships. The Columbia River Intertribal Fish Commission's plan specifically notes that when it comes to private land use riparian habitat protections are "weak" and criticizes the low level of protection as unjustified give the important role these streams play in sediment transport, large woody debris, and thermal loads downstream of fish-bearing streams. "Standards are inadequately monitored and enforced and do not reflect the latest scientific findings, among numerous other shortcomings." (CRITFC, 2013, http://plan.critfc.org/2013/spirit-of-the-salmon-plan/technical-recommendations/land-use/)

The CRITFIC plan specifically aspires to

- Maintain and improve integrity of riparian buffers and upland forests. Apply riparian buffers equal in width to those recommended by the Northwest Forest Plan (see Rhodes et al. 1994) and for both fish-bearing and non-fish-bearing streams to fully promote natural stream process restoration. Refrain from harmful salvage logging, especially in riparian buffers but also in upland forests to the degree possible (Beschta et al. 1995, 2004, USFS and BLM 1994).

- Protect structures against wildfire in the wildland-urban interface by clearing buffers surrounding the structures rather than thinning entire forests. Allow fire to assume a natural role in ecosystem modification to the extent feasible. Decrease fragmentation and increase connectivity among tracts of old growth and mature forest.

- Protect and restore natural processes (such as succession and disturbance) that allow aquatic ecosystems to restore and maintain themselves (see Mac et al. 1998a, 1998b, Ripple and Beschta 2004, ISAB 2011)..

- Promote land use practices that will be sustainable under climate change impacts. Manage land use from a "gravel-to-gravel" or life cycle approach. Protect and restore habitats for all life stages of fish and the lateral and longitudinal migration corridors necessary for fish to move between them (see Fausch et al. 2002, Allen 2004, White et al. 2012).

- Monitor habitat conditions in representative watersheds using parameters described in McCullough and Espinosa (1996) and in the Columbia Habitat Monitoring Program (CHaMP) monitoring protocols. Habitat monitoring parameters are designed to follow trends in the habitat characteristics essential for abundance, productivity, genetic diversity, and spatial diversity of listed species (i.e., VSP parameters, McElhany et al. 2000). Improvement in habitat quality and quantity as revealed by a monitoring program such as CHaMP can imply the potential for species recovery by removal of limiting factors. Also needed are more comprehensive monitoring projects like the Integrated Status and Effectiveness Monitoring Program (ISEMP) that couples habitat and fish population monitoring.

- Use data on habitat quality trends in a full lifecycle model for each listed species to project population response to habitat trends and land restoration scenarios. A data-driven and formal model-based approach is urgently needed as a replacement to the qualitative, "expert-opinion" approach to habitat evaluation.

- **Implement and improve existing land use regulations. Implementing and enforcing land use regulations to provide full protection of fish habitat was an emphasis of the 1995 Spirit of the Salmon Plan; it remains a critical need that demands new strategies. These include land use practices cited in the Umatilla River Vision (Jones et al. 2008) and Oregon Department of Forestry and Oregon Department of Environmental Quality (2002**)(emphasis added); recommendations for protecting and restoring aquatic and terrestrial resources to sustainable levels in Rhodes et al. (1994), Spence et al. (1995), and Washington Coast Sustainable Salmon Partnership (2012); and actions known to improve and maintain water temperature regimes of streams cited in Rhodes et al. (1994), McCullough (1999), Independent Scientific Advisory Board (2007) and Beechie et al. (2012).)

The Umatilla Tribal recovery plan states that:

- Strategies should emphasize the importance of: 1) hydrology (including the timing, volume, and quality of water flows); 2) geomorphic processes; 3) longitudinal, lateral, and vertical connectivity among habitats and across the network**; 4) the health of the riparian vegetative community;** and 5) the health of the native aquatic species**. (emphasis added)**
- *Near natural hydrologic regime*. to support summertime connectivity with the rest of the Columbia River Basin and maintain summertime aquatic habitats, a functional Umatilla River would experience interannual variation in high and low baseflow conditions similar in magnitude and frequency to the interannual occurrence of high and low baseflows prior to Euro-American settlement.
- *Water quality:* A "functional river is defined by the physical, chemical, and biological aspects of water quality. The river should be free from pollutants (e.g., toxicants or excess nutrients) that impair drinking water supplies, alter stream water pH, and stress or kill native aquatic fauna**.**

> **Maintenance of appropriate water temperature regimes (Poole et al. 2004), including cool temperatures during the summer, is especially important because water temperature influences dissolved oxygen concentrations, stress levels of aquatic organisms, growth of pathogens, and the competitive abilities of non-native fishes vs. native fishes. "** (emphasis added)

V. Voluntary Restoration Actions Alone Appear to be Insufficient to address Riparian Shade and Stream Temperature, Critical Issues for Eastside Stream; Restoration Needs Cannot all be met through Voluntary Site-level actions

As far as we are aware, most collaborative restoration and voluntary measures are focused on federal lands or private agricultural or nonforested rangelands, and even these extensive and expensive efforts have not been in place long enough to detect changes in key ecological indicators. An OWEB-funded intensive monitoring effort of the effects of restoration actions in the Middle Fork John Day River basin is illustrative:

- "Evidence strongly indicates that elevated stream temperature remains the most significant limiting factor for steelhead and Chinook populations, overriding the benefits to salmonids from observed instream habitat improvements from restoration actions in the MFJDR.
- Without the simultaneous and effective mitigation of high stream temperatures, restoration actions that targeted quantity and quality of instream habitat were insufficient to generate positive fisheries metric reponses at all scales monitored.
- High stream temperatures, and their negative effects on fisheries responses, are the direct result of a warming climate, reduced snow pack, **and severely modified riparian habitats. (emphasis added).** While riparian restoration efforts have been and are being implemented, habitat improvements resulting from these are slow to progress, due to insufficient extent of plantings throughout the watershed and the unexpected magnitude of ungulate browsing."

VI. ODF Obligations to Monitor to Validate Presumed Sufficiency of FPA as a TMDL Implementation Plan

Consistent with its general statutory obligations, ODF also has a duty under approved TMDLs and Implementation Plans to monitor eastside forest practices to determine whether the minimum rules actually are sufficient to meet load allocations. For example, the John Day TMDL highlights language regarding the Department's commitment to conduct monitoring to assess sufficiency to meet load allocations within 18 months of TMDL issuance. (DEQ, 2005). See Attachment 1 for excerpts.

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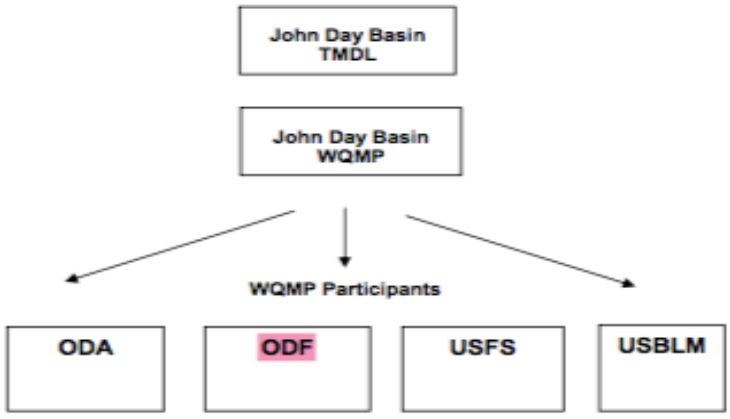
ATTACHMENT 1

Excerpts from DEQ, 2012. John Day River Basin Total Maximum Daily Load and Water Quality Management Plan.

Figure 3-1. TMDL/WQMP/Implementation Plan schematic

[This schematic example addresses the four DMAs that address much of the Basin land area. The other DMAs, several in number, are listed in Section G. (Agency abbreviations are for: Oregon Departments of Agriculture and Forestry, US Forest Service and US Bureau of Land Management)]



Adaptive Management

DEQ recognizes that the relationship between management actions and pollutant load reductions is often not precisely quantifiable. An ***adaptive management*** approach is encouraged, including interim objectives and feedback through monitoring. Adaptive management can be defined as a *systematic process for continually improving management policies and practices by learning from the outcomes of operational programs* (**Figure 3-2**). In employing adaptive management to the TMDL and the WQMP, the following strategy is employed:

- In conducting its review DEQ will evaluate progress towards achieving the TMDL (and water quality standards) and the success of implementing the WQMP.
- DEQ expects that each designated organization will also monitor and document its progress in carrying out the provisions of its Implementation Plan. This information should be provided to DEQ for its use in reviewing the TMDL.
- As implementation of the WQMP and the associated Implementation Plans proceeds, DEQ expects that planners will develop benchmarks for attainment of TMDL surrogates that can then be used to measure progress.
- Where performance of the Implementation Plans or effectiveness of management techniques is found to be inadequate, DEQ expects designated participants to revise their plan components to address the deficiencies.
- When DEQ in consultation with the DMAs and other parties, concludes that all feasible steps have been taken to meet the TMDL, its associated surrogates and water quality standards, and that the TMDL or the associated surrogates and standards are not practicable, the TMDL may be reopened and revised as appropriate.
- DEQ will consider reopening the TMDL should new information become available indicating that the TMDL or its associated surrogates need revision.

At 151:

Form of Response to TMDL

Based on existing and evolving inter-agency programs and agreements, the expected form of planning is listed below for the DMAs identified in this section. DEQ expects that planning mechanisms will be updated in response to TMDL issuance and periodically thereafter, as needed to layout all feasible steps toward meeting the TMDL. Expected elements of TMDL Implementation Plans are listed previously in the section entitled **Water Quality Management & Implementation Plan Guidance**.

Oregon Department of Agriculture: ***Agricultural Water Quality Management Area Plan*** (Water Quality Restoration Plan (DEQ-ODA Memorandum of Agreement 1998)

Oregon Department of Forestry: ***Oregon Forest Practices Act***, with provisions for basin-specific rules if existing rules are not sufficient (DEQ-ODF Memorandum of Understanding 1998)

At 152:

Planning Preparation Time Line

The Department will issue formal letters specifying time frames for planning responses, as identified below. In terms of plan implementation, for each listed DMA except the Oregon Department of Transportation, standard monitoring and reporting schedules apply, as discussed in DEQ's 2007 Internal Management Directive *TMDL Implementation Plan Guidance – for State and Local Government Designated Management Agencies* (DEQ 2007).

Oregon Department of Agriculture: These plans are programmatically updated once each two years. Plans have been developed and are being implemented in the Basin and will be updated as needed after the TMDL is issued, through the ***biennial schedule*** of ODA.

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At 154:

Planning Preparation Time Line

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