Oregon's Submittal for Remaining Management Measures
For Approval of Oregon's Coastal Nonpoint Pollution Control Program

July 1, 2013

New Development Management Measure

The State of Oregon will meet the CZARA New Development Management Measure through a combination of voluntary and regulatory programs. The voluntary program will be implemented by DEQ through its TMDL authorities and the regulatory program will be implemented by DEQ under its permitting authorities.

1. DEQ will finalize its "Guidance for TMDL Implementation Plan Development for Urban/Rural Residential Land Uses within the Coastal Nonpoint Management Area". As previously agreed, the draft guidance is being submitted today and is attached. Additional edits may be needed after federal review. Timing for the final document will depend upon when comments are received by DEQ.

   The guidance will provide information and recommendations for Designated Management Agencies (DMAs). Specifically, the guidance will remind DMAs that they are required under the existing provisions in OAR 340-042-0080 to develop TMDL Implementation Plans in accordance with the applicable Water Quality Management Plan (WQMP). The guidance will also recommend, but not require, that DMA's expand their TMDL Implementation Plans to include control measures applicable to operators of regulated small MS4 sources and the control measures recommended by EPA in the "CZARA New Development Management Measure."

2. The regulatory component will be implemented through the stormwater permitting program and will be implemented once USEPA finalizes the national stormwater rule required per a settlement agreement with the Chesapeake Bay Foundation.

   A. DEQ will recommend to the EQC adoption of rules as needed to implement the finalized federal national stormwater rule;

   B. DEQ will use this authority to implement the federal national stormwater rule. DEQ could implement the stormwater rule by taking one or more of the following actions:

      1. Including performance standards in the 1200C NPDES general construction stormwater permit;

      2. Include performance standard language in MS4 phase two general permits and eventually MS4 phase one permits;

      3. Develop a new general stormwater permit.

C. The permit or permits will incorporate the new development management measure targets in Item 4. A, B, C;

D. The permit or permits would be developed consistent with the federal national stormwater rule and anticipated to be required for > 1 acre projects. Smaller projects could also be required to get a permit when DEQ determines the project could be a significant source and affect TSS or hydrology in areas 303(d) listed, have ESA listed species, or water quality sensitive.

3. TMDL Implementation Plans and stormwater permits developed to implement the federal national stormwater rule could include practices consistent with the CZARA new development management measure:

   A. Practices that reduce post-construction development TSS loadings by 80% OR practices that reduce TSS loadings so that the average annual TSS loads are no greater than pre-development loadings; and,

   B. Maintain post-construction development peak runoff rate and average volume to pre-development levels.

4. DEQ will develop a process and schedule for training and educating DMAs and other stakeholders about the guidance and the new stormwater permits developed to address the CZARA new development management measure.

Onsite Disposal Systems Management Measure

The state of Oregon will meet the CZARA OSDS measure through a voluntary approach for time-of- property-transfer inspections and a regulatory approach under DEQ's Total Maximum Daily Loads authorities.

Time- of-Transfer Inspections: In September 2012, DEQ proposed rules that would require onsite system inspections at the time of property transfer in the coastal nonpoint program management area. DEQ anticipated taking those rules to the Environmental Quality Commission (EQC) for adoption in March 2013. However, due to the unforeseen circumstances described below, DEQ is pursuing a different path.

1. In the fall of 2012, DEQ was approached by state legislators and the Association of Oregon Realtors regarding their concerns with the proposed regulations, and suggested DEQ consider a voluntary approach instead of a regulatory approach. It became apparent through these conversations that these parties were considering introducing a bill that could prevent DEQ from imposing the inspection requirement should the agency follow through with the rulemaking.

2. In November of 2012, Oregon voters approved a ballot measure prohibiting certain real estate transfer fees and taxes. This has been interpreted to eliminate DEQ's ability to impose a reporting fee for the submittal of time-of-transfer inspection reports. The reporting fee was going to be the funding mechanism for implementing the time-of-transfer inspection program.

In light of the implications of the ballot measure and follow-up conversations with the Association, DEQ believes that with the Association's assistance, DEQ will be able to implement a voluntary time-of-transfer inspection initiative that will be equally as effective as the regulatory approach and would be more effective than an unfunded regulatory program. The voluntary approach has the added benefit of being applied statewide rather than restricted to the coastal area, which results in more widespread benefit to public health and the environment.

A key component of the voluntary approach has been accomplished through adoption of House Bill 3172. This bill amends the Sellers Disclosure Statement to include the following questions regarding onsite systems. If a question is preceded by an asterisk, the seller is required to attach a copy or explain on a separate sheet:

A. Is the property connected to a public or community sewage system? [ ]Yes [ ]No [ ]Unknown

B. Are there any new public or community sewage systems proposed for the property? [ ]Yes [ ]No [ ]Unknown

C. Is the property connected to an on-site septic system? [ ]Yes [ ]No [ ]Unknown
(1) If yes, when was the system installed? [ ]Unknown [ ]NA
*(2) *If yes, was the system installed by permit? [ ]Yes [ ]No [ ]Unknown [ ]NA*
*(3) *Has the system been repaired or altered? [ ]Yes [ ]No [ ]Unknown*

*(4) *Has the condition of the system been evaluated and a report issued? [ ]Yes [ ]No [ ]Unknown*
(5) Has the septic tank ever been pumped? [ ]Yes [ ]No [ ]Unknown
If yes, when? [ ]NA
(6) Does the system have a pump? [ ]Yes [ ]No [ ]Unknown
(7) Does the system have a treatment unit such as a sand filter or an aerobic unit? [ ]Yes [ ]No [ ]Unknown
*(8) *Is a service contract for routine maintenance required for the system? [ ]Yes [ ]No [ ]Unknown*
(9) Are all components of the system located on the property? [ ]Yes [ ]No [ ]Unknown

*D. *Are there any sewage system problems or needed repairs? [ ]Yes [ ]No [ ]Unknown*

E. Does your sewage system require on-site pumping to another level? [ ]Yes [ ]No [ ]Unknown

In addition, DEQ and the Oregon Association of Realtors have agreed to work together to complete the following actions. Most actions will be completed within six months of the Environmental Quality Commission's action on the proposed onsite rules, currently planned for October or December 2013:

1. Work together to promote and increase education and awareness on the importance of onsite septic system inspections at the time of property transfer, and the importance of proper use and regular maintenance of onsite septic systems.

2. Work together to recommend amendments to the *Law and Rule Required Course*, under ORS 696.174 and OAR 863-022-0055 to the Oregon Real Estate Board. The amendments would define a time-of-transfer evaluation and who is qualified to perform a time of transfer evaluation.

3. Develop training materials and a webinar as part of the continuing education program for Realtors that educations members on what a comprehensive onsite system inspection entails, the "do's and don'ts" for owners of septic systems, and maintenance requirements for septic systems.

4. Amend the Buyer Advisory to include recommendations for having septic systems inspected at the time of property transfer.

5. Amend the Seller Advisory to include recommendations for having septic systems inspected at the time of property transfer.

6. Develop a new home buyer packet that will include the "do's and don'ts" for owners of septic systems, maintenance requirements for septic systems and references to additional resources.

7. Work together with the Oregon Bankers Association to determine lender requirements for providing loans for property served by septic systems.

DEQ will provide up to 1.0 FTE of staff time for one year to fulfill these agreements. At this time, DEQ is not committing to develop and implement a tracking and evaluation system. DEQ lacks the resources to take on this new work and feels that the objectives of the OSDS

management measures will be better served if DEQ applies its limited resources to promoting the voluntary program.

Total Maximum Daily Loads: If there are impairment listings that can be traced back to failing onsite systems or the inability of the local soils or groundwater to handle existing onsite systems, these problems will be addressed as part of a TMDL. Onsite systems will be assigned a load allocation and entities having authority over onsite systems will be required to meet their TMDL and Water Quality Management Plans responsibilities. These responsibilities may include developing TMDL Implementation Plans that could include identifying and implementing technologies, best management practices, and/or measures and approaches to be implemented by each source to reduce pollution.

Currently, onsite systems are being evaluated as potential sources of bacteria in the Mid Coast bacteria TMDL. In 2007, DEQ issued a TMDL for the Tenmile Lakes Watershed TMDL that assigns a load allocation to septic systems for total phosphorus to septic systems and includes implementation measures in the Water Quality Management Plan (http://www.deq.state.or.us/wq/tmdls/docs/southcoastbasin/tenmile/tmdl.pdf).

Forestry Measures

Background

In July 1995, Oregon submitted its Coastal Nonpoint Pollution Control Program to EPA and NOAA for review. At that time forestry management measures were perceived by EPA and NOAA to be inadequate to protect and maintain water quality. Specifically, forest practices on non-federal land with regards to riparian area protections for small and medium fish bearing streams, small non-fish bearing streams, protections for landslide prone areas, management and maintenance of forest roads, and ensuring adequacy of stream buffers for application of certain chemicals were topics that needed to be further addressed in order to grant full approval of Oregon's Coastal Nonpoint Pollution Control Program.

In a May 29, 2013 email to Greg Aldrich (DEQ) and Patty Snow (DLCD), Christine Psyk (EPA) stated that "Oregon needs to explain how it intends to implement specific BMPs, backed by enforceable authority, to:

- protect medium, small, and non-fish bearing streams
- protect high-risk landslide areas
- effectively address the impacts of road operation and maintenance, particularly legacy roads; and
- ensure the adequacy of stream buffers for the application of certain chemicals."

Oregon's Response

Oregon will meet the objectives of these measures through a comprehensive, science-based program of regulatory and voluntary measures with an adaptive management loop that includes ongoing evaluation and course correction to ensure environmental outcomes can be achieved. The approach includes specific BMPs, but it is the overall approach that ensures that Oregon actions will achieve CZARA's objectives of reducing the pollution of coastal waters from nonpoint sources.

This submittal begins with a description of Oregon's regulatory and policy framework for managing private forestlands to ensure the protection of water quality and associated beneficial uses. The submittal then describes, for each measure listed above, how the objectives for these measures are achieved through Oregon's comprehensive, adaptive management approach. Each section will describe the background on the issue; relevant monitoring data and scientific; current management measures, both regulatory and voluntary, and how those measures have changed over time in response to data on what is necessary to ensure water quality protection; the adequacy of the measures; and additional management measures to be implemented.

Oregon's Policy and Regulatory Framework for Protecting Water Quality on Nonfederal Forestland

Oregon's policy and regulatory framework for protecting water quality on nonfederal forestland relies on two main regulatory approaches augmented by voluntary measures and incentives. Oregon's strong land use laws that maintain forestland in forest use provides water quality protection by avoiding the negative impacts to natural resources from development. Statewide Planning Goal 4 – Forest Lands – keeps forestland from being divided into parcels too small to manage effectively for timber, habitat, recreation, watershed protection, and other purposes. Oregon's set of forest protection laws, the Forest Practices Act works in concert with land use to ensure economically efficient forest practices that ensure the continuous growing and harvesting of forest tree species and the maintenance of *forestland* for such purposes as the leading use on privately owned land, consistent with sound management of soil, air, water, fish and wildlife resources. The Oregon Plan for Salmon and Watersheds provides a framework for additional voluntary approaches to improve water quality outcomes on forestland. This three-tiered approach results in forestland having the highest water quality in Oregon.

Oregon's Land Use Program

Oregon's Land Use Program is fundamental to the protection of natural resources in Oregon. For more than three decades, Oregon has maintained strong protections for forestland as a primary land use. Statewide Planning Goal 4 – Forest Lands – calls for forestland to be conserved primarily for commercial timber production but also for other forest uses. Oregon's land use program places major emphasis on maintaining commercial forestland. Forest zoning limits development that could conflict with forestry practices. It keeps forestland from being divided into parcels which are too small to manage effectively for timber, habitat, recreation, watershed protection, and other purposes. Lands in these zones may be eligible for forest tax assessment through the local county.

The main tool for carrying out that policy is the Statewide Planning Program. Oregon's Land Conservation and Development Commission (LCDC) sets standards for such planning. The cities and counties then apply the standards through local comprehensive plans and land use ordinances. Under this system, all counties in Oregon with forestland have adopted planning and zoning measures to protect forestland as a primary use. Oregon's program, first adopted in 1973, provides resource protection through the adoption of enforceable local comprehensive land use plans.

This program provides resource and water quality protection by slowing the largest threat to sustainable forestry, the conversion and fragmentation of forestland. As timber harvests have declined over the last two decades, forestland owners are increasingly under pressure to sell and/or develop their properties. The resulting fragmentation of the forestland base and introduction of dwellings into forestland settings creates challenges and risks for the management of adjacent forestlands for both timber and other forest uses and values. The presence of dwellings also increases the risk of fire danger both to forests as well as to other dwellings in the forest.

When forestlands are developed into urban and rural residential uses, it is accompanied by a decline in ecosystem services as compared to undeveloped or wildland forests (Smail and Lewis 2009). Increased housing density in forested areas and decreased parcel sizes can be associated with long-term modifications to and reductions in water quality and aquatic diversity when forests can no longer regulate the movement of storm water across the landscape, leading to changes in streamflows, increases in sediment, reshaped stream bottoms and banks, and impacts on water quality and aquatic species such as fish (Stein, et al. 2005). A recent report by the US Geological Survey documents the decline in water quality associated with urban development on forestland (Coles, et al. 2012).

Oregon's Forest Practices Act (FPA)

Oregon's public policy for forest practices regulation is to encourage economically efficient forest practices that ensure the continuous growing and harvesting of forest tree species and the maintenance of forestland for such purposes as the leading use on privately owned land, consistent with sound management of soil, air, water, fish and wildlife resources and scenic resources within visually sensitive corridors as provided in ORS 527.755 and to ensure the continuous benefits of those resources for future generations of Oregonians. Oregon's policy additionally recognizes that it is essential to avoid uncertainty and confusion in enforcement and implementation of forest laws and regulations and to provide a stable regulatory environment to encourage investment in private forestlands. To encourage practices that implement the FPA policy, Oregon has declared that it is in the public interest to vest in the State Board of Forestry (Board) exclusive authority to develop and enforce statewide and regional rules and to coordinate with other state agencies and local governments which are concerned with the forest environment (ORS 527.640).

The focus on economically efficient practices and stable regulatory environment support Goal 4 of the land use laws to maintain working forests. The focus on economically efficient practices is further sharpened in policy though the FPA rule process, which requires research or monitoring evidence that an actual problem exists, prior to the adoption of additional restriction on forest practices (ORS 527.714). This prudent, rational approach to forest regulation directs the Board, when solving a problem, to consider a broad range of alternatives, including non-regulatory alternatives, and to select the least burdensome approach. The 2011 Forestry Program for Oregon reflects this policy and includes the following statement that the Board:

> *Supports an effective, science-based, and adaptive Oregon Forest Practices Act and a strong, but flexible, Land Use Planning Program as the cornerstones of forest resource protection on private lands in Oregon. The Board will use non-regulatory methods as much as feasible to achieve public-policy goals on private forestlands, and consider the use of additional regulatory methods only when non-regulatory methods are either not feasible or are not likely to achieve the desired outcome.*

This objective recognizes that regulatory approaches tend to be more costly than non-regulatory alternatives, and every increase in management cost increases pressure on economically marginal forestland to convert to non-forest uses.

The Board's economically efficient regulations require effectiveness monitoring to ensure rules and best management practices are adequate to protect resources. The Board oversees the FPA effectiveness-monitoring program to ensure data collection that informs the Board's adaptive management approach of establishing BMPs, monitoring effectiveness, and updating rules based on science. FPA rules specifically require monitoring in the areas of water quality, streamside forests (OAR 629-635-0110), pesticide use (OAR 629-620-0700) and landslides and public safety (OAR 629-623-0000). The Department of Forestry's (ODF) 2002 Monitoring Strategy prioritizes key questions as based on public input to promote efficiency in designing and implementing projects to assess the effectiveness of forest practices into the future.

ODF actively seeks to conduct monitoring and research in coordination with other agencies. These efforts include participation in the inter-agency Water Quality Pesticide Management Team. This team facilitates and coordinates monitoring, analysis and interpretation of pesticide data throughout the state and across all land uses, effective response measures, and management solutions. As the Designated Management Agency for maintaining water quality on forestland under the Clean Water Act, ODF coordinates monitoring and research projects with the DEQ to ensure success in meeting statewide environmental standards. ODF also participates in three paired watershed studies as part of the Watershed Research Cooperative (WRC). These efforts inform the adaptive management approach at multiple levels, challenging scientific assumptions via watershed-level research while simultaneously evaluating forest practices effectiveness at operational scales. The WRC creates and disseminates new knowledge about the relationships between forest management and natural resources, particularly water-related resources, to address questions framed by policy makers and forest practitioners.

Effectiveness of Oregon's Approach of Maintaining Forestland to Protect Resources

While the nation as a whole is facing an alarming rate of loss of forestland, Oregon's integrated approach has been very successful at maintaining forestland. Nationwide, the total area of private forestland has been gradually declining since the mid 20th century. From 1953 to 1997, 10.3 million acres of nonfederal forestland, mostly private, were converted to developed uses and urban areas. This is the equivalent of 680,000 acres per year. The rate of conversion jumped to 1 million acres per year during 1992 to 1997, when 5 million acres of nonfederal forest land were permanently converted (Alig et al. 2003). In contrast, as of 2009, Oregon has maintained 98 percent of all nonfederal land and 98 percent of private land that was in forest, agricultural, and range land uses in 1974. While forestland conversion rates were stable overall, the change in the area in wildland forest use in Oregon varied by landowner class between 1974 and 2009. The area of land in wildland forest use owned by forest industry and by other public (non-Federal) owners remained nearly constant. However, land in wildland forest use owned by other private owners declined 6 percent in Oregon, 8 percent in western Oregon, and 3 percent in eastern Oregon (Lettman et al. 2011).

In evaluating Oregon's forestry management measures, the EPA and NOAA refer to Washington state Forest and Fish Report rules as providing "substantial increases in fish stream protection, non-fish stream protection, protection for high risk landslide prone areas, and a comprehensive forest roads program." While the Forests and Fish rules provide in some cases buffer widths two to three times as wide as some of the widths under the FPA, the actual difference in the riparian protection function as compared to the FPA is limited, and is provided at much higher cost to landowners (Zobrist 2005). The caucus that drafted the recommendations recognized that the proposed rules would have significant economic impact, especially on small landowners (Zobrist and Lippke 2003). While Washington established a compensation program, the program was vastly under-funded for anything but low participation rates. Furthermore, the compensation program did not mitigate the loss in bare forestland value, which is the ultimate motive for maintaining land as forestland (Lippke 2001). Washington's family forestlands represent over half of the total private forestland acres in the State, and are lower in elevation than industrial forestlands; these parcels are often found in the spawning regions of many of Washington State's salmon streams. The biggest losses in the Puget Sound area are caused by sprawling development and conversion of forestlands. Twenty-five percent of working forests in Puget Sound were converted out of forest to development and other uses between 1988 and 2004 (Goldmark 2010).

Oregon has been more successful in retaining forestland relative to Washington. In the western parts of the states, Oregon and Washington have been similarly successful in maintaining industrial forestland, 0% and -1% loss, respectively. However, western Washington has lost 23% of family forestland, compared to 8 % loss of family forestland in western Oregon. Figure 1 shows the percent of 1974 forestland in the coastal zone management areas (6217) part of the states remaining in forest for Oregon and Washington[1].

[1] Data, analysis, and figures prepared by Gary Lettman and Andy Herstrom, Oregon Department of Forestry, and Joel Thompson, USDA Forest Service, Pacific Northwest Forest Inventory and Analysis.

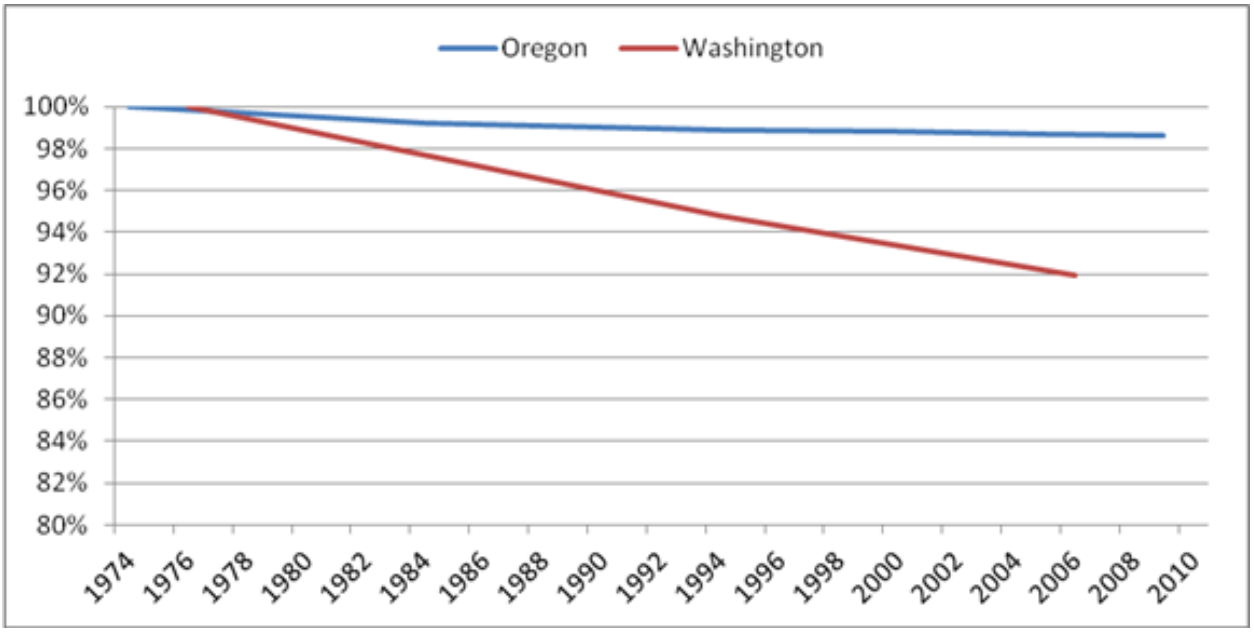

Figure 1: Percent of 1974 forestland in coastal zone management areas remaining in forest for Oregon and Washington

Table 1 shows the change in acres and percent of land use change by land use categories in the coastal zone management areas (6217) for Oregon and Washington. Oregon has been more successful in retaining all resource lands relative to Washington. In regards to forestland, Washington has lost over 400,000 acres compared to Oregon's 40,000 acres. The majority of the conversions in both states have been to Low-Density Residential and Urban land uses. However, Washington shows a much higher conversion to Urban. See Figure 2 for a spatial representation of the resource land conversion in Oregon and Washington coastal zones.

Table 1: Land Use Change in the Coastal Zone Management Areas (6217) for Oregon and Washington.

	Washington Change 1974-2006		Oregon Change 1974-2009	
Land Use	Acres	Percent	Acres	Percent
Wildland Forest	-424,028	-7%	-40,325	-1%
Mixed Forest/Ag	-72,040	-29%	-4,172	-4%
Intensive Ag	-132,206	-21%	-2,781	-2%
Low-Density Residential	415,168	53%	43,106	33%
Urban	212,624	63%	4,635	11%
Other	482	1%	-464	-2%
Total Resource Lands	-628,274	-9%	-47,277	-1%

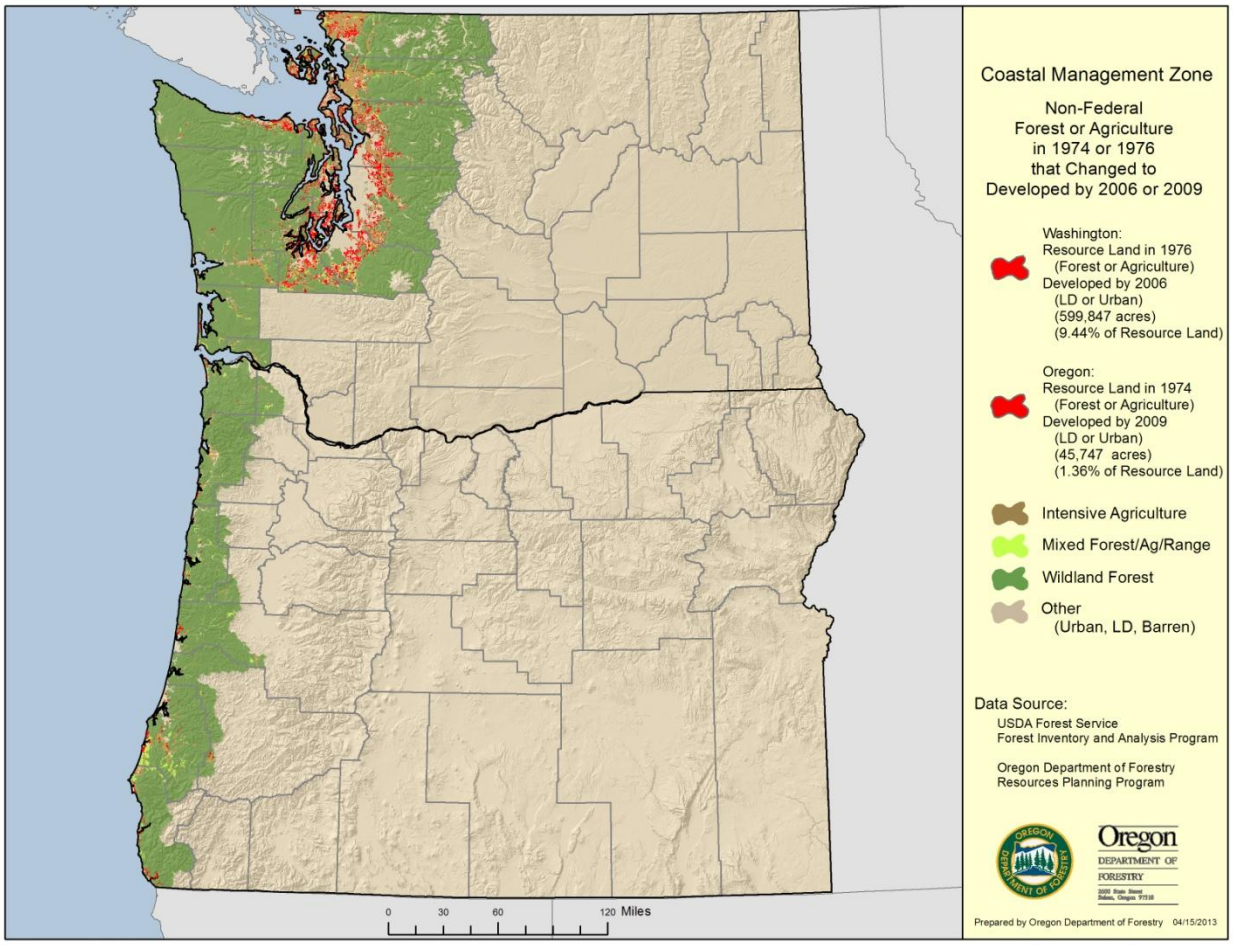

Figure 2: Resource land conversion in Oregon and Washington Coastal Zone Management Areas

While Oregon's land use laws have been effective, the Board has identified the current and future risks of forest fragmentation (i.e., increasing density of structures and parcelization) and the conversion of forests to non-forest use as the primary, overarching challenge to sustainable forestry and keeping working forests working. Oregon's private forests at risk of parcelization and/or conversion have significantly expanded in recent years. As development pressures, population growth, and real estate values increase, more forestland will be at-risk of conversion. An estimated 330,000 acres of Oregon's forestland—about 5 percent of the state's private forestland—exist inside urban growth boundaries or other development zones. Another 1.8 million acres of private forestland exist within one mile of developable areas. The majority of these acres are in family forestlands.

Oregon's 4.7 million acres of family forestlands (44 % of private forestlands) provide key functions for rural landscapes, societies and economies. These lands dominate the urban and wildland-urban interfaces areas, comprising 80% (1.7 million acres) of the private forests in these areas. Family forestland ownership acreages are generally smaller in size, their objectives and land uses are varied and their forestland is diverse. There are 87,000 family forests in the 1-9 acre size and another 69,000 family forests in the 10-500 acres

size class. As forestland value often exceeds timberland values, family forestland owners are under economic pressure to convert their forestland to non-forest use. Many family forestlands are also shifting ownership to the next generation of family members.

Much of Oregon's family forestland – with many exceptions, occupies ecologically important, lower elevation settings, often near residential areas. In the coastal zone, 81 percent of the area adjacent to high-intrinsic-potential stream reaches for coastal Coho salmon is privately owned, with the majority being in family forestland ownership (Burnett 2007). Past management appears to have concentrated family forestland ownership, agriculture, and developed uses adjacent to these reaches. By the late 1800s, extensive alteration of stream channels, floodplains, and forests along most major Pacific coastal rivers may have particularly impacted coastal coho habitat on family forestlands, reflected in the smaller volumes and fewer pieces of large wood compared to streams on other ownerships

As in Washington State, smaller landowners experience larger economic impacts from new forest practice regulations. Because of their geographic location, the differential impacts are even more pronounced with current and additional water quality regulations. Given their critical location in the coastal zone, additional management measures, particularly measures that come with a high economic impact for a marginal change in water quality, may be counterproductive. These social and economic impacts will strain Oregon's land use program, and will result in significant conversion of forestlands to developed uses.

Oregon Plan for Salmon and Watersheds

Executive order 99-01 established the Oregon Plan for Salmon and Watersheds (OPSW, implemented as ORS 541.985). This uniquely Oregon approach to improving water quality, salmon habitat, and watershed health is an overarching plan that prioritizes necessary actions throughout Oregon for restoring and protecting watershed health and function thus providing for a resilient ecosystem. The Oregon Plan is meant to achieve healthy salmon populations and water quality with a major goal of not only removing salmonids from threatened and endangered status but recovering populations to an historic abundance. The Oregon Plan allows limited resources to be invested in locations with the highest potential for habitat improvement. With the Oregon Plan, landowners and land management agencies now have a tool to describe necessary actions to be accomplished and locations where those actions will provide the highest benefit to the resource to achieve the greatest economic efficiency.

The Oregon Plan achieves environmental outcomes by using a flexible approach to implementation. As is often the case, a regulatory approach as compared to a voluntary approach such as the Oregon Plan, will often result in additional rules and processes for land management. Additional rules and processes result in additional restrictions for land management and landowners. In the best case, additional restrictions may cause some landowners to forgo voluntary restoration efforts for fear of additional regulation and in the worst case additional restrictions may cause some landowners to sell and develop property into other, less beneficial, land use with respect to water quality, salmon habitat,

and watershed health. By allowing flexible approaches to implementation, landowners can take diverse paths to achieve the desired outcomes. Some landowners may choose to implement in-stream large wood placement actions to improve stream complexity in a highly degraded stream reach. Meanwhile, a neighboring landowner may choose to inventory a road system and invest in improving fish passage at undersized culverts to increase access to existing high quality fish habitat. It should be noted that the Oregon Plan helps achieve this vision by engaging landowners and land management agencies with voluntary restoration funding that might not be available if additional regulations were placed on these activities.

The executive order also directed Oregon to complete a comprehensive review of current forest practices in regard to state water quality standards and the protection and restoration of salmonids. This comprehensive review, the Sufficiency Analysis (ODF and DEQ 2002), coupled with recommendations of from the Independent Multidisciplinary Science Team (IMST 1999) and Forest Practice Advisory Committee (ODF 2000) identified additional forestry measures to address gaps in current FPA rules and BMPs that may lead to potential negative impacts from forest activities near streams.

The Board formally completed addressing all rule concepts identified in the FPAC report on April 2009[2] with the inclusion of the remaining two rule concepts in and endorsement of the Oregon Plan for Salmon and Watersheds voluntary measures (Morgan 2012). While the April meeting closed the FPAC process, the Board's ongoing adaptive management process, including policy analysis, rules and BMPs review, research, and monitoring frameworks, continues with ongoing review and improvement of forest practices resources protection issues. A key example includes the ongoing Watershed Research Cooperative work at Hinkle Creek Paired Watershed Study, Trask River Watershed Study, Alsea Watershed Study[3] and the Board's rule analysis on small and medium fish streams.

[2] See Board of Forestry archives and meeting materials for agenda topics C and 2, available at http://www.oregon.gov/ODF/Pages/board/BOF_042409_Meeting.aspx (last accessed June, 13, 2013).
[3] See Watershed Research Cooperative website for more details, http://www.watershedsresearch.org/ (last accessed June, 13, 2013).

ISSUE: Protect Medium, Small, and Non-Fish Bearing Streams

Background

As described above, executive order 99-01 directed Oregon to complete a comprehensive review of current forest practices in regard to state water quality standards and the protection and restoration of salmonids. The Statewide Evaluation of Forest Practices Act Effectiveness in Protecting Water Quality (ODF and DEQ 2002) identified additional forestry measures to address gaps in current FPA rules and BMPs that may lead to potential negative impacts from forest management activities near streams. The analysis concluded that, with respect to all applicable standards (temperature, sedimentation, turbidity, aquatic habitat modification, and bio-criteria):

> *Standards for some medium and small Type F streams in western Oregon may result in short term temperature increases at the site level. However, the significance and scope of this increase is uncertain, and it may be offset at the landscape scale by other factors. Relevant to the habitat modification standard and criteria, large wood potential for some of these streams are less than what was assumed under the 1994 rules.*
>
> *Standards for some small Type N streams may result in short-term temperature increases at the site level that may be transferred downstream (this may impact water temperature and cold-water refugia) to fish-bearing streams. The significance and scale of this change is uncertain, and it may be offset at the landscape scale. Relevant to the habitat modification standard and criteria, large wood potential delivered by debris torrents (typically in areas of very steep topography) along these streams may be less than optimal.*

Oregon's concerns were consistent with the 1998 Findings for the Oregon Coastal Nonpoint Program (NOAA and EPA 1998). Under Section X, "Critical Coastal Areas, Additional Management Measures and Technical Assistance" the NOAA and EPA found:

> *Under existing State forest practices, medium, small, and non-fish bearing streams may be subject to loss of sediment retention capacity, increases in delivery of fine sediments, and increases in temperature due to loss of riparian vegetation. Another concern is provision of adequate long-term supplies of large woody debris in medium, small, and non-fish bearing streams, a shortage of which can result in decreased sediment storage in upstream tributaries, increased transport and deposition downstream, and overall adverse impacts to beneficial uses.*

As described above, Oregon remains concerned regarding the adequacy of forest practices for protecting of streams and maintaining water quality. The Board has completed implementation of the sufficiency analysis recommendations, but has continued to address water quality as a high priority topic. Ongoing research and monitoring are informing this public process for adapting forest practices rules and BMPs.

Forestry Management Measures for Stream Protection

Non-Fish Bearing Stream Protections – The FPA contains language that prescribes management measures which protect small non-fish bearing streams from potential impacts during forest management activities (OAR 629-630-0700 (5), 629-630-0800 (2)), stream crossings (OAR 629-630-0800 (4)), and requires vegetation retention in certain instances (OAR 629-640-0200 (6)).

In addition, the FPA requires prompt reforestation after harvest along small non-fish bearing streams (OAR 629-610-0040 (2)). This requirement ensures rapid recovery of riparian protection provided by forest tree species. An exception to prompt reforestation does exist however when an approved land use change is filed. When forestland is converted to another land use incompatible with forest tree species a different set of land use laws would apply.

Riparian Management Areas (RMAs) Upstream of Artificial Barriers –In 2007, the Board adopted new rules that apply to streams classified as non-fish bearing as a result of an electrofishing survey upstream of a man-made barrier to fish migration. The new rule stated that the upstream portion of the stream should be correctly classified as fish-bearing (Type F), upstream to the first natural barrier. This rule change closely aligns with stream crossing improvements being completed as a result of voluntary or regulatory measures and preserves an intact RMA to benefit fish and water quality when upstream habitat access is restored. The Board also adopted a rule that allows fish presence/absence to be determined by the use of field-based physical habitat criteria surveys in addition to electrofishing field surveys. Use of the physical habitat criteria is likely to result in more conservative estimates, in terms of fish use miles, of the end of fish use.

Voluntary Stream Protection Management Measures

High Aquatic Potential (HAP) Streams – The Board adopted a new voluntary measure in 2005 that clearly describes physical stream conditions that have the highest potential to benefit fish habitat by the active placement of large wood or other in-stream structures. This voluntary measure compliments the 2003 Board decision to approve additional voluntary measures designed to increase stream complexity through active in-stream wood placement and voluntary tree retention in the RMA's of fish bearing streams. Additional voluntary measures include a 60% basal area cap for medium and small fish bearing streams, no harvest within ½ of the RMA width, and retaining the largest trees in the RMA. The Board also approved adoption of a voluntary measure to promote large and medium non-fish bearing streams to be treated with the respective fish bearing stream buffer.

Small and Medium Fish-bearing Rulemaking

Small and Medium Fish Bearing Streams – Currently, the Board is conducting a rule analysis process for riparian protection standards for small and medium fish bearing streams. The rule objective is: "Establish riparian protection measures for small and

medium fish-bearing streams that maintain and promote shade conditions that insure, to the maximum extent practicable, the achievement of the Protecting Cold Water criterion." The rule analysis was initiated in response to results from ODF's Riparian Function and Stream Temperature (RipStream) effectiveness monitoring project. RipStream is designed to monitor the effectiveness of stream protection rules as prescribed for State Forests and private forestlands. RipStream study sites are located throughout the Coast Range geographic region on small and medium sized fish-bearing streams. Currently, all 33 sites (18 Private and 15 State) have at least three years of post-harvest data and most sites have complete data sets (5-years post) for stream temperature, shade and channel data.

The first effectiveness analysis (Groom et al. 2011a) focused on a strict regulatory perspective of stream temperature and evaluated RipStream sites for effectiveness in meeting stream temperature standards. The analysis evaluated DEQ temperature standards, with respect to the Protecting Cold Water Standard (PCW). For the PCW standard, timber harvests on state lands did not exceed the PCW more frequently than expected under natural background conditions (5%). Timber harvests designed to the meet the FPA riparian protection standards for Medium and Small Type F streams exceeded the PCW at a greater frequency than would be expected by chance (40 % vs. 5 % for all other stream reaches). Note: because of stream temperature complexity, this analysis estimated the probability of an exceedance of the PCW criterion across pre-harvest to post-harvest treatment reach year-pair comparisons, and cannot be used to estimate the percentage of sites that exceeded the PCW or the magnitude of temperature change. The analysis indicated that all study sites performed well in regard to the maximum temperature thresholds established by the Numeric Criteria standard (16° C, 18° C) an additional peer-reviewed journal article regarding the Numeric Criteria is pending.

A second analysis (Groom et al. 2011b) examined the magnitude of the expected change. At sites managed to FPA standards, maximum temperatures increased after harvest by an overall average of 0.7 °C. Sites exhibited variability in responses; some sites increased by up to 2.5 °C while others declined by 0.9 °C. The average change in maximum temperatures for state forest sites was 0.0 °C, and supported temperature models that considered state forest post-harvest years to resemble pre-harvest conditions. In turn, shade overall declined post-harvest at private sites but not at state sites.

Based on these results, the Board determined that the there is monitoring or research evidence that documents the degradation of resources maintained (i.e., that there is evidence that forest practices conducted under existing regulations do not insure forest operations meet the state water quality standard for protecting cold water on small and medium fish streams). The Board directed the department to begin the rule analysis process that could lead to revision of the riparian protection standards to increase the maintenance and promotion of shade on small and medium fish streams. Currently, the process for potential increase in basal area and/or riparian management area widths is under discussion with the Board and will follow Oregon's public policy process under ORS 527.714. In November 2013, ODF staff will present the results of a systematic review of science related to the rule objective and proposed rule alternatives to the Board. The

Board of Forestry has the legal authority to regulate forest practices through administrative rule making for the protection of water quality.

Ongoing Monitoring Efforts Small and Medium Fish-bearing Streams

The main objective of the RipStream project is to evaluate the effectiveness of FPA forest practices rules and State Forests' management strategies at protecting stream temperatures and promoting desired riparian structure. Most of the focus to date, including the ongoing riparian rule analysis process, has been on the effectiveness of FPA and the State Forest Northwest Forest Management Plan (NWFMP) riparian protections for stream temperature. Further analyses are planned on the following topics:

- Analysis of stream temperature and shade response one to five years post-harvest. Preliminary results were presented to the Board in November 2011. A draft manuscript describes the results but has not yet been finalized.
- Analyses of downstream temperature outcomes following forest harvest. The RipStream study does not address effects of multiple harvest units but results can provide inferences about how far downstream a single harvest unit can influence stream temperature. The Department currently has a contract with two external scientists to complete analyses of the downstream data. The analyses focus on downstream temperature outcomes, the thermal dynamics of heat transfer processes, and potential biological impacts.
- Large wood recruitment. A conference proceedings on a case-study of a State Forests RipStream site using the OSU Streamwood model will be published soon. Future analysis on a broader scope of sites is planned with input on methodology from the RipStream external technical review team. ODF Private and State Forests staff are currently collaborating on how this analysis will take place.
- Riparian stand characteristics and functions. Future analyses will examine RipStream data sets in relation to the purpose and goals of the riparian rules and strategies for riparian structure and function as laid out in the FPA and NWFMP. This work may take place in concert with the large wood recruitment analysis.

Ongoing Monitoring Efforts Non Fish-bearing Streams

"Small Type N" is an Oregon regulatory label for very small, non fish-bearing headwater streams. While the body of information is growing on these very small streams, the definition for "headwater" streams varies, such that some of the available studies may actually be looking at the equivalent of "Medium" streams as defined by Oregon. Small Type N streams make up the majority of the stream network (estimates range from 70-90%) in most Oregon regions. Responses to harvest are highly variable in characteristics, functions, and relative influence on downstream reaches. Reasons cited in the literature for variable responses to harvest include:

- Even without harvest water quality, sediment, wood loading, nutrient (etc.) patterns tend to be highly variable which can make it difficult to detect a harvest response, especially if the harvest affect is small;

- Ground water (which tends to remain stable/water quality not influenced by harvest) comprises a larger percentage of their surface water than in larger streams which can moderate harvest responses;
- Spatially intermittent streams with coarse gravels tend to be thermally non-responsive;
- Narrow channels can be shaded my grasses, ferns, shrubs, channel banks which may reduce the importance of overstory shade.

The influence of Small Type N streams on downstream reaches has not been well documented. The WRC Paired Watershed Studies (Hinkle, Alsea, and Trask) are well situated to test hypotheses related to harvest effects on site as well as downstream. Results from the Hinkle Creek study confirms that not all non-fish bearing streams increase in temperature in response to harvest. The study did not detect a downstream effect from harvest adjacent to three Type-N streams (Kibler 2007).

Oregon continues to participate in the Oregon Watersheds Research Cooperative (WRC) at the OSU College of Forestry. The WRC conducts multi-agency, adaptive management, watershed research projects, including the Hinkle Creek, Trask River and Alsea paired watershed studies. Housed and led by OSU, Cooperative members include state and federal agencies, forestland owners, and other organizations. The WRC specifically examines the effectiveness of State Forests Forest Management Plan (SFMP) strategies and FPA standards to maintain and protect headwater stream processes and conditions. The Trask River Watershed Study is evaluating how small streams respond to forest harvest and if responses are carried downstream. The research evaluates water quality effects in small non-fish and fish bearing streams, and determines the process-level links between harvest related water quality effects to the biological effects on fish and other biota. The study uses a whole-watershed, integrated design that links biological with physical studies in order to document responses and evaluate ecological tradeoffs. Information will help guide policy and management decisions in an adaptive management context for both state and private forests to determine if current management achieves goals for aquatic conservation. Oregon committed annual fiscal and technical support to ensure completion of this study.

ISSUE: Protect High-Risk Landslide Areas

Background

In the 1998 Findings for the Oregon Coastal Nonpoint Program, in Section X, "Critical Coastal Areas, Additional Management Measures and Technical Assistance," the NOAA and EPA found:

> *Regarding concerns with harvest activities in high risk landslide areas, evidence indicates that timber harvests on unstable, steep terrain can result in increases in landslide rates of approximately 200 to 400 percent. There are also indications that a relatively small proportion of potentially unstable ground in the Oregon Coast Range is responsible for the majority of landslides in Oregon.*

In 1996, Oregon experienced two very large storm events that produced hundreds of landslides throughout Western Oregon and parts of Northeast Oregon. The department engaged in a three year monitoring study designed to evaluate the accuracy and precision and remote-sensing data for landslide identification, determine landslide frequency and channel impacts, and determine the relationship between storm impacts and forest stand structure. The study (Robison 1999) focused on areas representing the most severe impacts from the 1996 storms. Therefore, results from red zones do not represent the average forestland responses to these 1996 storms. In addition, by only measuring landslides that resulted from the February and November storms, the study focuses on individual storm events and results cannot be extrapolated to predict long-term conditions.

The study reported key points that help explain the relationship between storm intensity, characterized by a "return interval" and the frequency of landslides. The majority of landslides were not associated with roads; slopes of over 70% to 80% (depending on landform and geology) had the highest hazard for shallow rapid landslides. Concave shaped slopes appear to be more susceptible to landslides than other landforms. The study used analysis of variance to test landslide density differences between the four age classes (0–9, 10–30, 31–100, and 100+-year-old forests) on the four multi-age red zone study areas. Partly because of the small number of study areas, there is no significant difference for the four study areas between the four age classes. In three out of four study areas in very steep terrain both landslides density was greater in stands 0–9 years old (19.2/mi^2). On the other hand, stands between 10–30 (9.0/mi^2) and 31–100 (7.9/mi^2) years in age typically had lower landslide densities (9.0/mi^2 and 7.9/mi^2, respectively) as compared to forest stands older than 100 years (13.5/mi^2). Landslides in clearcuts are not different in size than landslides in older forests.

Results from this work led to revisions in the FPA regarding identification of landslide prone areas and implementing specific BMP's designed to mitigate the risk of forest harvest on landslides in regard to public safety rules (629-623-0000). The study results applied in this case, because the criterion was the change in public safety risk from current condition for a specific site, given the probability of a storm event.

For water quality concerns, the analysis needs to be applied at an appropriate landscape scale. While one could postulate that the 1996 study results imply that forest management lowers the landscape-scale risks because a greater proportion of the landscape is in the 10-30 age class compared to unmanaged forests, that conclusion extrapolates study results to predict long-term conditions.

An unusually powerful storm in 2007 resulted in record flooding and thousands of landslides across southwest Washington and northwest Oregon. This event provided the opportunity to examine the effects of both natural factors and forest management practices on landslide density. The study (Turner et al. 2010), examined associations between landslide density, precipitation, topography, and forest stand age across a 152,000 ha forested landscape in Washington. The study found that very few landslides occurred in areas with less than or equal to the 100-year rainfall category, regardless of stand age or slope gradient class. At higher rainfall intensities, significantly higher landslide densities occurred on steep slopes (>70% gradient) compared to lower gradient slopes, as expected. Above 150% of 100-year rainfall, the density of landslides was 2–3 times larger in the 0–5 and 6–10 year stand age categories than in the 11–20, 21–30, 31–40, and 41+ categories. The effect of stand age was strongest at the highest rainfall intensities. The study noted that because it evaluated the distribution of landslide densities for a single storm in an area with highly variable terrain, landslide histories, and historic land use practices, the results cannot be extrapolated to estimate long-term landslide rates, including ''background'' rates for unmanaged forest lands, or the effects of specific current forest management practices relative to past practices, within or outside of the study area.

Forests Management Measures High Risk Landslide Area

Protection along Debris Torrent-Prone Streams - Streams that occur on debris torrent-prone slopes are subject to additional management measures to ensure that effects from forest operations do not increase public safety risk and that, where appropriate and as directed by the state forester, to leave standing live trees along the channel to slow debris torrent movement downstream. Additional BMP's in effect with this rule are designed to decrease slash loading in the stream channel by felling trees in a manner to minimize slash and other debris accumulations in the channel and to remove logging slash piles and continuous logging slash deposits.

Voluntary Management Measures High Risk Landslide Area

Leave Trees on Landslide Prone Slopes - In addition to the regulatory landslide and public safety rule is a voluntary measure under the OPSW. This voluntary measure is designed to give landowners credit for leaving standing live trees that otherwise meet the requirement for the mandatory leave tree requirement along landslide prone slopes. The intent of this measure is to provide a future source of large wood that will be deposited into a stream channel if a landslide does occur. Large wood in streams contributes to the formation of stream complexity, which is a key limiting factor for coastal coho salmon.

ISSUE: Effectively Address the Impacts of Road Operation and Maintenance, Particularly Legacy Roads

Background

The Forest Practices has three definitions for three types of roads: Active, Inactive and Vacated. Based on legal advice and department guidance any road used for forest management access since the effective date of the Forest Practices Act in 1971 falls into one of these categories. Active and Inactive roads must be maintained as needed to protect water quality as per the BMPs described under OAR 629-625-0600. A vacated road must be stabilized for permanent drainage and slope stability. If it is not stabilized, it is not a vacated road, and falls under the maintenance requirement for an inactive road.

Sufficiency of Forest Road Management Measures

As described above, executive order 99-01 directed Oregon to complete a comprehensive review of current forest practices in regard to state water quality standards and the protection and restoration of salmonids. The Statewide Evaluation of Forest Practices Act Effectiveness in Protecting Water Quality (ODF and DEQ 2002) concluded that current (except for measures described below) road related BMPs are likely to maintain water quality standards if implemented in compliance with the FPA. Results from 2002 compliance monitoring showed high levels of compliance with road related rules.

The following four paragraphs provide a brief summary of the additional forestry measures developed in response to the recommendations in the sufficiency analysis. These enforceable administrative rules were adopted by the Board of Forestry through Oregon's current public policy process. Additional OPSW voluntary measures have also been recommended by the Department and approved by the Board (see below).

Critical Locations Policy – In 2002, the BOF approved management measures for avoiding roads in critical locations. Critical locations include high landslide hazard locations, slopes over 60 percent with decomposed granite-type soils, within RMAs or within 50 feet of stream channels or lakes, or within wetlands. These are locations where direct impacts to streams are likely even when the best forest road building techniques (the road design and construction rules) are all used correctly. See "Avoiding Roads in Critical Locations," Forest Practices Technical Note Number 7, 2003 (ODF 2003).

Wet-weather hauling – Additional rules designed to prevent adverse impacts from road related sediment delivery occurring during wet periods associated with log hauling activities were adopted by the BOF in 2003. This new rule requires landowners to provide durable road surfacing, or other measures to prevent sediment delivery to waters of the state. It also allows the state forester to require that a landowner cease hauling activities if sediment delivery from log hauling activities results in visible turbidity increases in an adjacent stream.

Ground based harvesting on steep slopes – A new rule, designed to reduce the potential of sediment delivery from steep, erosion prone slopes was adopted by the BOF in 2002. This rule applies to ground based harvesting operations and specifies conditions and BMP's that shall be followed to maintain water quality and beneficial uses.

Road drainage – The department evaluated and revised the existing rule on road drainage to provide additional clarity on the priority of corrective BMP's to reduce potential sediment delivery. An additional rule was added that allows the state forester to require installation of additional cross drains prior to hauling for prevention of sediment delivery to waters of the state. These rules were adopted in 2003.

With the addition of these regulatory management measures described above, Oregon has identified effective BMPs for road siting, construction, operation, maintenance, abandonment, and closure to ensure road stability, drainage of road runoff back to the forest floor rather than directly to streams and other water bodies; and adequate protection of all waters of the state.

Legacy Forest Roads

The Federal government has indicated that they remain concerned about the adequacy of forest road measures to effectively address the impacts of road operation and maintenance, *particularly legacy roads* (emphasis added). The NOAA and EPA (1998) define "Legacy forest roads" as, "roads constructed and used prior to adoption of the FPA and not used and maintained since then) were not required to be treated and stabilized before closure. In some locations, this has resulted in significantly altered surface drainage, diversion of water from natural channels, and serious erosion or landslides."

A former road that has not been used for forest management access since 1971 will be covered with trees and other vegetation, have fills which were washed out by the many high flows over the last 40 years, and based on ODF state forests road surveys actually be less connected to streams (less of a risk of chronic erosion) than active or inactive roads. They may still have locations at risk of landslides. However, to access and repair these roads requires clear cutting the trees on the road prism, reconstruction of washed out sections, and then removal of these reconstructed sections. All of these activities will increase chronic erosion for the sake of reducing episodic erosion.

In more recent communication, the EPA extended the definition of legacy roads to include "forest roads that do not meet current State requirements with respect to siting, construction, maintenance, and road drainage. Legacy roads could be temporarily (abandoned) or permanently (orphaned) not in use or include forest roads currently being used for active silvicultural operations. The definition of legacy road is less important to EPA than having a State CNPCP that ensures the subset of forest roads contributing to water quality or beneficial use impairment are identified and addressed within a reasonable timeframe" (June 4, 2013 email from David Powers, Regional Manager for Forests and Rangelands).

Roads with attributes that do not meet current State requirements for siting, construction, and road drainage are addressed through OPSW voluntary measures, backed by enforceable authority.

Voluntary Forest Road Management Measures

With the advent of OPSW, private and state forestland owners implemented efforts to improve water quality, including the road risk and remediation program (ODF-1 and 2). Under this effort, forestland owners surveyed roads to identify 11 risks that the roads may pose to salmonid habitat. Risks were identified and prioritized for remediation following an established protocol.

As of 2011, private forestland owners have invested over $93 million in OPSW voluntary measures, as documented by the Oregon Watershed Restoration Inventory. These voluntary efforts continue; between 2004 and 2011, inclusive, industrial forestland owners (accounting for 6.0 million acres) have invested over $24 million, and non-industrial (primarily family forestland owners with 4.7 million acres) have invested $2 million. Oregon recognizes the challenge with family forestland owners, who often do not have capital resources to address costly road remediation. As of 2010, forestland owners have surveyed over 16,000 miles of roads, and have completed significant improvements (see Table 1).

Table 1: Statewide Summary of Forestry Accomplishments on Private Forest Lands (1997-2010)

Activity	Reported Accomplishments
Road Miles Surveyed	16501
Road Miles Improved	3241
Road Miles Vacated, Closed or Relocated	547
Number of Peak Flow Improvements	7863
Number of Surface Drainage Improvements	18222
Number of Stream Crossings Improved for Fish Passage	1696

Based on projects completed and reported to the Oregon Watershed Restoration Inventory

These OPSW voluntary measures are backed by enforceable authority under ORS 527.990 criminal penalties and ORS 527.992 civil penalties. Current rules allow for enforcement actions on active or inactive roads that are at risk or currently deliver sediment to waters of the state (for example see above discussion of road drainage). EPA is concerned that only road construction or reconstruction activities will provide the trigger for improving road drainage (from 1998 and 2004 interim decision). As implemented by the Board of Forestry in Administrative Rules (OAR 625 Division 670), the State Forester may initiate enforcement action by issuing and serving a written statement of unsatisfactory condition to the landowner or operator when timely corrective action is needed to eliminate the potential for resource damage or other consequences from any active or inactive road. A written statement of unsatisfactory condition identifies the nature of the unsatisfactory condition (e.g., plugged culvert or log puncheon), the corrective action to be taken by a specific date, and a notice that a citation will be issued if damage results before corrective action is completed, or if corrective action is not completed by the specific date. While

Oregon prefers to work collaboratively with forestland owners on road remediation, Oregon does issue statements of unsatisfactory conditions, if warranted.

Ongoing Evaluation of Forest Road Management Measures

In 2011, as directed by the legislature, Oregon undertook a third-party evaluation of administration of the Forest Practices Act. Oregon redesigned it notification and inspection process, which has increased the number of field inspections to ensure implementation and compliance with rules and BMPs. Oregon has instituted an annual audit to measure compliance with the FPA. This year's audit focuses on measuring compliance with rules that govern forest road construction/maintenance and timber harvesting regulations. The audit will also examine selected rules related to planning forest operations, protecting water resources, and harvest operations near streams and waterways. Results of the audit will be used to help focus educational and training programs related to FPA implementation.

Voluntary reporting of OPSW voluntary measures has diminished in past years, however it is reasonable to assume that voluntary measure implementation has not. Additional effort is planned to increase knowledge of OPSW voluntary measures that currently exist and to encourage landowners to voluntarily report their activities to the Oregon Watershed Restoration Inventory (OWRI). Future training will help increase voluntary measures implemented and the number of reported projects. In addition, core business function improvements within ODF may lead to an opportunity to educate landowners on the menu of voluntary measures and to streamline the reporting process.

Additional Forest Road Management Measures for Inventory and Reporting

Many private landowners have been implementing the Road Hazard Identification and Risk Reduction Project since 1997. Thousands of miles of roads have been inspected and repaired as part of this project (OWEB 2005). However, there is no consistent monitoring of road conditions after these repairs. Current information indicates that conditions of roads vary by land manager, by landscape, and by relative position of roads in watersheds.

Oregon has entered into a cooperative agreement with the USDA Forest Service to update its statewide forest road geographic information data. The updated data layer is needed to redevelop a sample for a statewide survey of forest roads for the Board of Forestry's indicator D.c., Forest roads risks to soil and water resources.

The survey design uses a stratified random sample by landowner class and geographic area. The objective of the rapid road survey protocol is to efficiently and effectively evaluate road risks to soil and water resources. The survey is designed to consistently evaluate current conditions and also near-term future road conditions likely to be affected by major storms. This survey can identify road elements that pose the greatest risk to soil and water resources. The survey can be used to quantify stream crossing condition, washout risk, and hydrologic connection to streams. Oregon hopes to start the survey in 2014, depending on cooperation with federal partners.

Oregon also requires a management plan for all family forestland owners in order to receive federal cost-share dollars administered by ODF. The plan requires a description of the roads and their characteristics that lie within your forest based upon a onsite review of the roads. Roads should be identified as to their purpose, surface, length, drainage type, and number and type of stream crossings. Problem areas – poor drainage, rutting, clogged ditches and culverts, culvert failures, and road failures – need to be called out and flagged for taking action. The standards in the uniform plan have been developed and adopted by many cooperators, including the USDA Forrest Service and Natural Resource Conservation Service, Forests Stewardship Council, American Tree Farm system. Currently, plans are in place on 18% of 4.7 million acres.

ISSUE: Ensure the Adequacy of Stream Buffers for the Application of Certain Chemicals

Background

In 1994, the Board of Forestry (Board) extended the fish-use designation to many smaller streams that previously had not received the setback protection. In 1997, the board adopted revised pesticide rules, which extended spray setbacks along fish use streams to 300 feet for application of fungicides and nonbiological insecticides, based on the relative higher toxicity of these materials to animals as compared to the toxicity of herbicides. This change was a response to results of ODF monitoring conducted in 1992 and 1993, which indicated that the earlier, narrower setbacks for use of these materials might not have adequately protected water quality. With the assistance of Oregon State University and Portland State University, the Board determined that, with these and other measures included, public health and the environment would be adequately protected by the chemical rules.

The Board designed the Chemical and Other Petroleum Product Rules to mesh with regulations administered by other agencies. The total intended effect is that all of the regulations apply to a given forest pesticide application, and where there is any difference, the more stringent requirement applies.

- Federal Pesticide Registration Requirements: The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) ensures that adequate product testing is done, and that label requirements will minimize harm to humans and the environment. The forest practice rules include a requirement for forest pesticide users to comply with product labels.
- Oregon Pesticide Control Law: In Oregon, pesticide sellers and users must also comply with the state Pesticide Control Law (ORS 634), which requires state product registration and applicator licensing, and prohibits faulty, careless, or negligent applications.
- Pesticide Spills and Hazardous Material Disposal: DEQ typically takes primary jurisdiction on requirements for spill reporting, control, and clean up, but ODF has some authority through the forest practice rules as well if spills result from forest operations.
- Worker Protection Standards: The Oregon Occupational Safety and Health Division (OR-OSHA) administers regulations for protection of workers when pesticides are being used.

The Board provided specific purpose statements in the Chemical Rules, as follows:

- Operators are encouraged to use integrated pest management practices.
- When properly used as part of an integrated pest and vegetation management system, pesticides and other chemicals can be effective tools in the growing and harvesting of forest tree species.

- The purposes of the rules are to ensure that chemicals do not occur in soil, air, or waters in quantities injurious to water quality or the overall maintenance of terrestrial or aquatic life; and vegetation in riparian management areas and sensitive resource sites is protected as required by other forest practice rules.

The Board also specifically required effectiveness monitoring and evaluation of the chemical rules to determine the effectiveness of the rules to meet the goals of the Forest Practices Act and the purposes stated in the rules, as well as their workability and operability (OAR 629-620-0700).

At the time of the issuance of the 1998 findings, effectiveness monitoring results had not been published. Under Section X, "Critical Coastal Areas, Additional Management Measures and Technical Assistance" the NOAA and EPA (1998) found that,

> Forest practice rules in effect at the time the Oregon 6217 program was submitted for approval did not require buffers for aerial application of herbicides or fertilizers for type N (non- fishbearing) streams. Such streams comprise significant portions of total stream length in the coastal zone. In January 1997, the ODF revised its rules governing application of chemicals. The new rules require a 60 foot buffer on type N streams for direct aerial application of fungicides and nonbiological insecticides except as approved by the State forester. *The rules do not contain restrictions for aerial application of herbicides, which would appear to leave type N streams still at risk* (emphasis added).

Forestry Management Measures for Chemicals

The FPA affords waters protection through the Chemical and Other Petroleum Rules (OAR 629-620-0000-0800). There are five sets of BMP's that define adequate protection measures waters of the state. The rules include standards and BMPs for mixing, transport, equipment leak prevention, disposal, and completion of daily spray records. The rules also provide for protection of the waters of the state and other resources when applying chemicals (OAR 629-620-0400). The rules require that:

- When applying chemicals aerially or from the ground, operators shall protect waters of the state and other forest resources by following the requirements of the chemical product label and by meeting the additional protection measures listed in this rule.
- When applying herbicides near or within riparian management areas or waters of the state, operators shall maintain vegetation required to be protected by the water protection rules.
- Weather conditions such as temperature, relative humidity, wind speed, wind direction, atmospheric temperature inversions, and precipitation may strongly affect the deposition and drift of chemicals during aerial and pressurized, ground-based chemical applications. Operators shall apply chemicals only under weather conditions which will protect non-target forest resources and comply with the product label and the other sections of this rule.

In addition to the above management measures, forestry operators must not directly apply chemicals within specified distances of certain waters. The setbacks are outlined as follows:

- For herbicides and most other pesticides, no direct application is allowed within 60 feet (for aerial applications) or 10 feet (for ground-based applications) of streams with fish use or domestic use, lakes or wetlands greater than eight acres, estuaries, bogs, lakes with fish use, or areas of standing water exceeding ¼ acre.
- For fungicides or nonbiological insecticides, no direct application is allowed within 300 feet (for aerial applications) or 10 feet (for ground-based applications) of streams with fish use or domestic use, lakes or wetlands greater than eight acres, estuaries, bogs, lakes with fish use, or areas of standing water exceeding ¼ acre. Aerial application of these pesticides is also prohibited within 60 feet of any other streams with flowing water at the time of application.

Except for additional protections for fungicides or nonbiological insecticides, Oregon relies on BMPs set by the ODA and EPA (under FIFRA) for protection of small non-fish bearing streams during pesticide applications. In setting forest practice chemical rules, the Board of Forestry determined that forestry chemical rules should not be product-specific. Regulation of specific chemicals is best accomplished through clearly written, legally binding product labeling enforcement by ODA and EPA.

Monitoring for Effectiveness of Pesticide Management Measures

Per Board direction, ODF conducted effectiveness of riparian buffers for protecting fish bearing streams (Dent and Robben 2000). At the time of the study, there were no regulatory aquatic benchmarks set for the forestry pesticides analyzed in the study. With assistance from scientists from Oregon State and Portland State Universities, ODF staff established "thresholds of concern" against which monitoring results were compared. Monitoring results determined that "No pesticide contamination levels at or above 1 ppb were found in any of the post-spray samples analyzed". By comparison, the study thresholds of concern ranged from 7 – 52,000 ppb. Seven of 25 post-spray samples (2 of 5 sites) were tested at levels lower than 1 ppb (mdl 0.5 to 0.04 ppb) contained trace levels of pesticides. Contamination levels ranged from 0.1 to 0.9 ppb. The contaminants included hexazinone at one site and 2 4-D ester from one site. The study concluded that the rules are effective at protecting water quality on Type F and D streams. If the current scientific knowledge of hazard levels for human and aquatic biota does not change, no changes are recommended to the forest practice rules.

This 2000 study was not able to address the question impacts to water quality that might occur as a result of other mechanisms besides drift or direct applications (e.g., runoff, seepage, and leaching). The study also did not address water quality protection of streams that do not have an overstory riparian buffer (small Type N streams).

The WRC, Alsea Paired Watershed Study in central coastal Oregon included monitoring to address delayed impacts to water quality and impacts from streams that do not have an

overstory riparian buffer (Louch and Ice, in press). This study measured concentrations of dissolved glyphosate, aminomethylphosphonic acid (AMPA), imazapyr, sulfometuron methyl, and metsulfuron methyl in streamwater collected during and after application of herbicides to a harvested commercial forestry site in the Oregon Coast Range. Samples were collected at three sites, one representing a small non-fish bearing stream (Type N) with no overstory vegetation retention requirements (NBH). . The other two sampling sites were downstream; one (NBU) at the bottom of the harvest unit and the other (NBL) well downstream. Samples were collected during the application, multiple days after treatment, and during storm events. No detections were found for any herbicide except glyphosate. Minimum detection levels ranged from .015 to 1 µg/L. The study did detect dissolved glyphosate at NBH during the application (baseflow conditions). This pulse maximized at 40 to 60 ng/L and persisted for two to three hours. An associated pulse was not detected (<20 ng/L) at the farthest downstream sampling site (NBL). Subsequent baseflow samples collected three days after treatment showed ≈25 ng/L dissolved glyphosate at all three sites and less than 20 ng/L at 19 days after treatment. Samples collected during the first storm event (8 days after treatment) detected dissolved glyphosate at NBU, but not at NBH or NBL. The maximum concentration observed during this pulse at NBU was 115 ng/L, and the pulse persisted for about six hours. During the next storm event (10 days after treatment) dissolved glyphosate was detected at NBH, but not at NBU or NBL. The maximum concentration observed was 42 ng/L, and this pulse persisted for about ten hours. Results from all subsequent storm events showed dissolved glyphosate at <20 ng/L in all samples. A limited number of analyses on suspended sediment showed de minimis masses of glyphosate and AMPA.

The Alsea study results are supported by reconnaissance monitoring of land-use sources of pesticides in the McKenzie River Basin conducted the US Geological Service (USGS) in cooperation with the Eugene Water and Electric Board (EWEB). Kelly and others (2012) conducted the study from 2002 through 2010 to investigate different land use activities in the watershed for potential sources of pesticides. The analysis included more than 175 compounds, of which 43 were detected at least once across the range of 28 sites upstream of EWEB's Hayden Bridge Water Filtration facility. The study focused on three land use categories – urban, forestry and agricultural. A total of nine pesticides were detected out of 14 samples from the intake of the utility's drinking-water treatment plant from 2002 through 2010, seven of them only once, and two of them twice. Concentrations were quite low, less than one part per billion, indicating that the potential threat from these compounds to human health was negligible. The largest number of pesticide detections occurred during spring storm events and primarily were associated with urban stormwater drains in Springfield that feed into the lower McKenzie. In contrast to urban runoff, compounds associated with commercial forestry pesticide use were rarely detectable in the McKenzie River, even though forest land accounts for the majority of property in the basin (Kelly, et al. 2012).

Additional Monitoring and Management Measures

In addition to regulations described above, DEQ and ODF have additional programs that address pesticide use. These programs include the formation of the Water Quality Pesticide

Management Team in 2007 by DEQ, ODF, the Department of Agriculture and the Oregon Health Authority. One of the team's primary tasks was to develop and implement an inter-agency Water Quality Pesticide Management Plan (WQPMP)[4] to guide statewide and watershed-level actions intended to protect surface and groundwater from the potential impacts of current use pesticides. Although the plan was not developed in direct response to Coastal Zone Act requirements or Biological Opinions, it addresses protecting water quality and beneficial uses, including threatened and endangered species, from pesticide use.

EPA approved the WQPMP in 2011. The plan focuses on the use of water monitoring data, primarily through local Pesticide Stewardship Partnerships (PSPs), as the driver for management actions. A continuum of management responses is outlined in the plan based on the monitoring data, with an emphasis on collaborative solutions in the short-run to address areas of concern highlighted by the data. Current monitoring under the PSP program has been limited to one watershed where there are monitoring locations directly downstream of managed forest lands. The data collected in this watershed indicate that pesticides in water adjacent to forestland are a low priority concern based on the multi-agency approved matrix in the WQPMP. Pesticide concentrations observed on forestland are well below any of the lowest benchmarks provided by EPA. Regulatory actions are to be used with existing agency authorities under federal law, such as Fungicide, Insecticide and Rodenticide Act and the Clean Water Act, or state law, if the water quality concerns are not resolved through collaborative efforts.

Sufficiency of Forest Chemical Management Measures

While there is a lack of aquatic benchmarks for most forestry pesticides, recent studies and collaborative monitoring efforts indicate that current forestry measures are effective at ensuring that chemicals do not occur in waters in quantities injurious to water quality or the overall maintenance of terrestrial or aquatic life. Current studies indicate that concentrations from forestry applications occur at levels below 1 µg/L (1 ppb) which are much lower than currently available thresholds of concern for aquatic life (e.g., NMFS 2011 Biological Opinion set value of 100 µg/L for the maximum concentration limit on 2,4-D).

[4] Available at http://www.oregon.gov/ODA/PEST/docs/pdf/wqpmtpmp.pdf (last accessed June 13, 2013).

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Under ORS 468B.110(2), ORS 527.765, and ORS 527.770, the Board of Forestry establishes BMPs or other control measures by rule that, to the maximum extent practicable, will ensure attainment and maintenance of water quality standards. If the Environmental Quality Commission does not believe that the FPA rules accomplish this result, the Commission is authorized to petition the Board for more protective rules. If more than two years pass and the Board and Commission have not reached an agreement on whether new rules or needed, or the Board and Commission agree that new rules are needed but the Board fails to adopt the rules within two years, the BMP shield in ORS 527.770 is no longer applicable. (The BMP shield prevents DEQ from taking enforcement action against operators for failure to comply with water quality standards if the operator is complying with the FPA.)

Under ORS 468B.110(2), the EQC cannot adopt rules regulating nonpoint source discharges from forest operations and the DEQ cannot issue TMDL implementation plans or similar orders governing forest operations unless "required to do so by the CWA." This authority would be triggered in the case of a failure of ODF to develop adequate measures to implement TMDL load allocations for forestry, but only after the EQC has pursued the petition process described above.

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