Forest Practices Implementation and Effectiveness Monitoring Update

This report summarizes work completed by ODF Private Forests Monitoring Unit personnel since the last Board of Forestry (Board) update in September 2018.

The Board's 2011 Forestry Program (FPFO) for Oregon supports an effective, science-based, and adaptive Oregon Forest Practices Act (FPA) as a cornerstone of forest resource protection on private lands in Oregon. Guiding principles of the FPFO include a commitment to continuous learning, evaluating, and appropriately adjusting forest management policies and programs based upon ongoing monitoring, assessment, and research. Part of how the department achieves this learning is via effectiveness and implementation monitoring.

In 2016 the Board of Forestry approved the department's current Monitoring Strategy which set priorities for the study of implementation and effectiveness of current FPA standards. The Monitoring Unit continuously links our work with that Strategy, as shown in Table 1.

Table 1. Relationship between monitoring studies and questions from the 2016 Monitoring Strategy.

Monitoring study	**Question from 2016 Monitoring Strategy (priority[1])**
Implementation study on reforestation rules	What is the level of compliance with reforestation rules? (M)
Western Oregon and Siskiyou Streamside Protections Reviews	What fraction of riparian areas in forest operation areas are currently on track to meet FPA riparian "desired future condition" targets? (H) Are forest practices, including roads, under current rules effective in meeting all applicable water quality criteria established by the Oregon Department of Environmental Quality (DEQ), including those established by TMDLs, for water quality parameters affected by forest practices on fish and non-fish bearing water bodies? (H)
Tethered Logging review	Are forest practice erosion-related BMPs required by rules dealing with road construction, maintenance, and harvest activities, effective at preventing and limiting surface erosion and landslides and sediment delivery to waters of the state? (L) Are FPA-related BMPs minimizing soil disturbance and compaction and maintaining long-term forest site productivity? (L)
Interagency Water Quality Pesticide Management Team – Pesticide Stewardship Partnerships	Is water quality, including the integrity of aquatic communities and public health, being effectively protected when herbicides or insecticides are applied near streams as stipulated in rules and statutes? (M) What concentrations of chemicals are found in streams when runoff events occur after the initial forest application of chemicals (in accordance with rules and statutes) near streams? Do these concentrations threaten water quality, aquatic biota, or public health, either locally or downstream? (M)

[1] L=low; M=medium; H=high.

Implementation Monitoring

Forest Practices Act (FPA) Implementation Study: Reforestation rules

Annual assessments of FPA compliance is an ongoing core business practice.

The Board was introduced to the implementation study (compliance audit) program in the September 2012 Monitoring Unit update. In a note to the Agency's budget, the Oregon Legislature mandated the Department to hire private contractors to assist the process. In the previous effort, contractors were employed to collect field data and the department determined rates of compliance from those data.

Compliance results inform a legislative report on Key Performance Measures for the agency. These results are also valuable to landowners who participate in certification systems, such as the Sustainable Forestry Initiative, American Tree Farm System, and the Forest Stewardship Council as verification of practices on subject lands. Additionally, monitoring implementation of FPA standards on the landscape provides an objective basis for targeted training efforts by agency and industry alike in support of continuous improvement.

Current Efforts – Identifying Study Topics and Priorities

The current study is focused on FPA Division 610 – Reforestation. This Division applies to forest operations that reduce stocking of free to grow stands below specific site-productivity based standards. The purpose of this Division is to assure continuous growing and harvesting of forest tree species.

This monitoring will focus on timber harvest operations that listed "Clear-cut / Overstory Removal" as the type of harvest in the Notification of Operations. Sampling is stratified by ODF Administrative Area and Landowner Type, and is proportional to acreage harvested in those strata.

Stakeholder Participation –

The Monitoring Unit met with a standing team of stakeholders twice so far in the planning process for this study. Oregon Department of Revenue personnel have recently joined the committee, bringing a unique outlook to a group that also includes the Department of Environmental Quality, forest industries, loggers and landowner groups. As yet, we have not succeeded in garnering participation of private sector stakeholders whose primary focus is on the environmental aspects of forestry in Oregon. The department will continue to explore options to include this perspective.

Process Considerations

In order to collect compliance data on private property, landowner permission is required by law. The rate of return on requests for permission to access subject lands continues be a vexing aspect of the study: To get permission for access to 100 sites, 300+ requests have been required. Owners of private, non-industrial ownerships are by far the least responsive to requests for permission to visit.

Based on feedback from multiple parties, the department realized that the words "compliance" and "audit" may discourage landowner participation in the program. We therefore decided to change the name to "implementation study" since that is perceived to create less of a barrier to landowners' willingness to participate in the program.

Questions have been raised about analyses of our recently-completed implementation study. These questions focused on sites that were not available for sampling due to the absence of landowner permission, and our statistical analysis of compliance data. The Monitoring Unit has recently hired staff from the Department of Statistics at Oregon State University to help us address the population of sites not available for sampling, in addition to overall study design and analysis.

The reforestation requirements of the FPA include a prescriptive schedule for compliance. Therefore, our sampling should be done as closely as possible to the schedule specified in rule (24 months after timber harvest concludes). The department began seeking permissions in 2018 anticipating the beginning of field work in summer 2019. Due to the aforementioned schedule, that sample set has been set aside. Another sample set will be drawn and permissions requested, once questions on process and the statistical integrity of the proposed process have been resolved.

On-boarding of contractors and commencement of data gathering is now slated for late 2019 and/or early 2020. Current plans remain to have the project continue, with annual reporting, for a period of five years.

Effectiveness Monitoring

The Monitoring Unit is currently conducting two effectiveness monitoring projects. One project is in the Siskiyou geographic region, the other project is in the rest of western Oregon (Figure 1). Both projects focus on effectiveness of riparian protections for small and medium Fish streams, and include input from stakeholders and tribes. The Siskiyou Project assesses sufficiency of rules to meet desired future conditions (DFC), and stream temperature and shade. The western Oregon project assesses sufficiency of these rules to meet DFC and large wood recruitment goals. These projects are further detailed below.

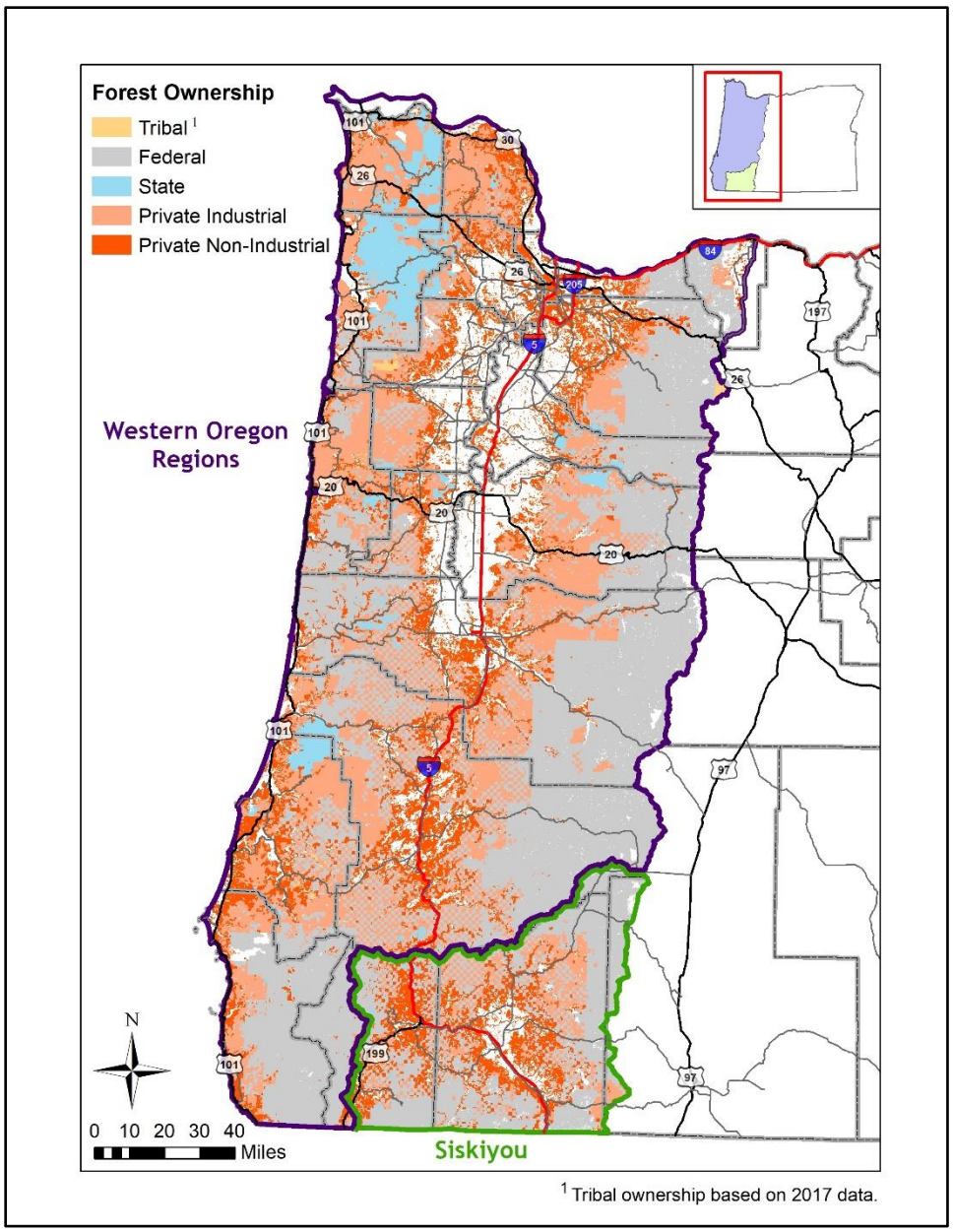

Figure 1. Map of ownership in the two effectiveness monitoring project areas. The purple and green lines denote the western Oregon and Siskiyou effectiveness monitoring projects, respectively.

Western Oregon streamside protections review

Introduction

Updated in 1994, the FPA water protection rules for vegetation retention along streams were designed to produce DFC for riparian stands along streams in Oregon. The DFC of riparian stands along fish use streams is to grow and retain vegetation so that, over time, average conditions across the landscape become similar to mature streamside stands.

In 2002, the Oregon Department of Forestry (ODF) initiated the Riparian Function and Stream Temperature (RipStream) study throughout the Oregon Coast Range. One objective of the RipStream project was to evaluate the effectiveness of FPA rules at promoting DFC and providing an abundance of large wood in streams. This project expands on the RipStream work, and will use multiple lines of analysis of DFC and large wood recruitment, including: 1) RipStream field data, 2) a systematic review of scientific literature, and 3) depending on necessity (based on other analyses), cost and time: modeling analysis to project stand conditions over time.

Collectively, this information will be used to assess sufficiency of FPA rules at meeting FPA statute ORS 527.710(2d). This work focuses on small and medium Fish streams in the Coast Range, South Coast, Interior and Western Cascade geographic regions. The project methodically includes stakeholders and tribes. The timeline for work completed, next steps, and inclusion of stakeholders and tribes can be found in the Current Status of the Western Oregon Riparian Rule Review (see Agenda item 5f).

RipStream Data Analysis

The methods and preliminary results from this analysis can be found in Attachment 2, Agenda item 5f. This part of the study addresses the following questions that were established in the original RipStream protocol:

1. What are the trends in overstory and understory riparian characteristics?
2. What are the trends in riparian area regeneration?
3. Are the riparian rules and strategies effective in maintaining large wood recruitment to streams, and downed wood in riparian areas?

Systematic reviews of scientific literature: DFC and large wood

This review will: 1) define the ranges of key descriptors of DFC and recruitment of large wood; and, 2) assess the effectiveness of FPA riparian protection standards to meet DFC and large wood recruitment. The review will include the development of a rigorous literature review protocol. The protocol will methodically and transparently include stakeholders and tribes. We are currently working with Oregon State University Institute of Natural Resources to conduct an initial literature search related to DFC.

Forest stand modeling

Both DFC and large wood recruitment depend on long-term forest processes. The literature review and pre-and post-harvest data analysis will provide insight on these processes. Modeling of the RipStream forest stand data into the future would add valuable information to complement these analysis. We have reached out to a number of private contractors to gather information about costs, timelines, and types of models that can be used to do the modeling analysis.

<u>Siskiyou streamside protections review</u>

At the November 2016 meeting, the Board directed the Department to initiate a review of streamside protections for the Siskiyou and Eastern Oregon Area regions, starting with the

development of monitoring questions and outreach with stakeholders and tribes. Staff provided a project status report in July 2017, followed by a presentation at the January 2018 Board meeting where results of input from potentially-interested parties was shared. Staff also discussed a coarse assessment of the staff resources, time, and confidence in results of approaching monitoring questions with different methods (e.g., literature review, light field study).

In March 2018, the Board directed the department to conduct a scientific literature review on stream temperature, and the shade and stand structure components of DFC of riparian forests at meeting FPA statutes ORS 527.710(2)(b, d) and 527.765. The review scope was limited to small and medium Fish streams in the Siskiyou geographic region. The review process included transparent documentation of literature searches, inclusion criteria, and a timeline with stakeholder and tribal input at various steps throughout the process. Updates on the review were presented to the Board in September 2018 and January 2019. This latter meeting also included presentations from the Oregon Department of Environmental Quality (DEQ) and the Oregon Department of Fish and Wildlife on contextual information (water quality, fish status and trends in the Siskiyou).

In June 2019, the department presented the results from the literature review. With 13 studies, the systematic review identified information found on mature streamside stands (DFC goal), some information on whether harvested stands met that goal, and some information on stream temperature related to water quality standards. The Board decided that there was not enough information to make a decision on rule sufficiency for both DFC and stream temperature in the Siskiyou region.

The Board directed the department to initiate a collaboration with DEQ in using their Total Maximum Daily Load (TMDL) temperature analyses for forested reaches of small and medium fish streams, and return in September with information on a range of approaches for the next phase of study for the Siskiyou Streamside Protections Review in order to determine sufficiency of rules. Later today, the Board will discuss various study approaches to assess this sufficiency (Agenda item 6).

Other Monitoring Unit and Division work

Tethered Logging Literature Review

Tethered, or cable-assisted, logging systems are gaining popularity among private industrial landowners because they allow for ground-based harvesting on steep terrain, while improving worker safety by reducing the number of timber fallers and workers on the ground and potentially are more economical than timber fallers on certain sites. In tethered logging systems, logging equipment such as feller-bunchers, harvesters, or forwarders are often tethered to an excavator, dozer, or tree located at a higher point. The upslope excavator or dozer uses a winch to maintain tension on the cable, which prevents machine roll-over, serves as an aid in climbing and descending perpendicular to slopes, and improves traction of the logging equipment on steep terrain. Alternatively, a winch can be mounted onto logging equipment that is tethered to a tree upslope from the equipment.

Current FPA rules were developed when shovels, dozers, and skidders were the conventional ground based equipment for harvesting. Given the recent introduction of tethered logging systems in Oregon, they are not specifically addressed under current rules regarding ground-based harvesting on steep terrain. Therefore, operations have been allowed through a Plan for Alternate Practice (PFAP) where we expect outcomes to meet the same purpose of the rules which set standards for ground based operations on steep slopes.

The existing research on tethered logging is limited, and thus the department wanted to identify whether there is sufficient scientific information to guide evaluation of current rules, as well as identifying key knowledge gaps in the scientific literature. In a literature review, we addressed current rules related to harvesting on steep terrain in Oregon, and identified policy questions that need to be addressed. We also provided an overview of the current state of the science on tethered logging's potential effects on soil disturbance, compaction, and slope stability, while highlighting knowledge gaps.

Water Quality Pesticide Management Team (WQPMT)

The Board was last updated on this topic in the September 2016 monitoring unit report.

The Water Quality Pesticide Management Team (WQPMT) is comprised of state agencies responsible for water quality, pesticides, and/or natural resource management in Oregon, and includes: Oregon Department of Agriculture (ODA), Oregon Department of Environmental Quality (DEQ), Oregon Health Authority, Oregon Watershed Enhancement Board, Oregon State University, and Oregon Department of Forestry. The team's work revolves around the Pesticide Management Plan (PMP; Oregon Department of Agriculture, 2011; currently being updated), which was approved by the Environmental Protection Agency (EPA), with the main goal of reducing ground and surface water contamination from pesticides currently registered and used in Oregon. This approach aligns closely with FPA rules that direct the department to work with partners to conduct monitoring and evaluation of the chemical and other petroleum product rules, including placing a high priority on securing adequate resources to conduct monitoring. The Private Forests Division's Water Quality Specialist is the current ODF representative on the WQPMT.

The goals of the WQPMT are to (1) identify and prioritize higher risk pesticides, use patterns, and watersheds; and (2) achieve these goals in a cooperative, voluntary manner. The WQPMT facilitates and coordinates water quality activities such as monitoring, analysis and interpretation of data, effective response measures, and management solutions, generally through the DEQ Pesticide Stewardship Program (PSP). There are currently 10 PSP watersheds located throughout the state (Figure 2). Most watersheds encompass multiple land uses of varying proportions of areas. The recently completed South Yamhill PSP was designed to focus predominantly on pesticide use on forestland.

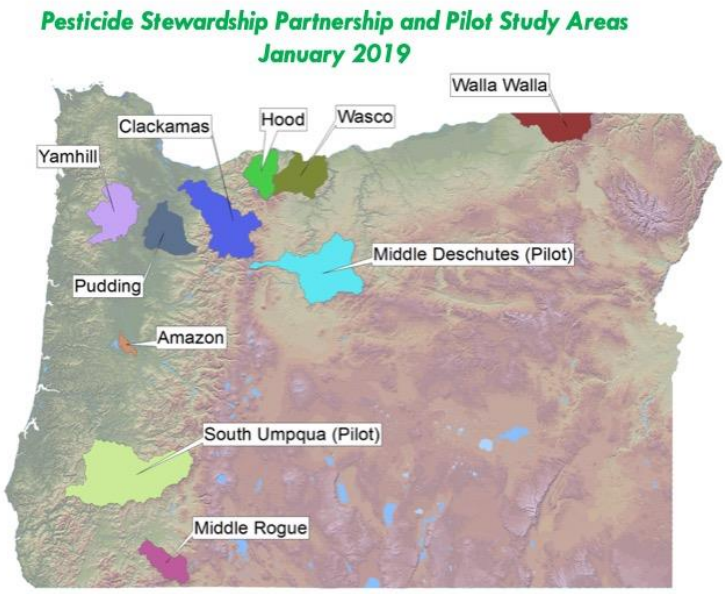

Figure 2: Pesticide Stewardship Partnership watersheds in Oregon.

A final report on the South Yamhill PSP was completed in April 2019 (Oregon Water Quality Pesticide Management Team, 2019). Water quality samples were collected from October 2010 to October 2016 at three locations. At each of these locations approximately 54 water quality samples were collected. DEQ analyzed for approximately 130 individual pesticides for each sample. Additionally, data were obtained from a single passive sampling device (POCIS) installed at one sampling location in October of 2010 for a period of twenty-eight days.

Analytical results from the samples indicate that application of forest herbicides resulted in detections of residues of 6 herbicides or herbicide degradates (or breakdown products). Two other pesticide ingredients detected in samples are not associated with commercial forest use. The overall frequency of detections within the entire South Yamhill PSP varied by herbicide and ranged from a low of .6% (1 detection out of 157 samples) for imazapyr to a high of 5.2% (8 detections out of 153 samples) for the degradate desethylatrazine. Individual analysis of the three sub-basins yielded slightly different results. POCIS sampling detected three herbicides not detected through water quality sampling conducted during the 28-day period of device deployment at one of the monitoring locations. A grab water sample collected at the same location during POCIS deployment period resulted in no detections.

During the sampling period no detections were identified above the EPA aquatic life benchmarks. Aquatic life benchmarks are based on toxicity values reviewed by EPA and used in the Agency's risk assessments as part of the decision-making process for pesticide registration. For those samples where an herbicide was detected, the percentage of the current EPA benchmark ranged from a low of .00002% for the glyphosate degradate aminomethylphosphonic acid (AMPA) to a high of 14% for metsulfuron methyl. Based on the existing monitoring data the South Yamhill PSP is considered to lie within the low concern category as determined by the EPA-approved PMP for Oregon. More refined pesticide application and timing information, such as, stream discharge data to calculate herbicide loading estimates, and additional monitoring techniques to compliment periodic sampling

would allow for additional certainty of the occurrence and concentrations of herbicides in watersheds participating in the Pesticide Stewardship Partnerships.

Other RipStream Analyses

The most recent publication from the RipStream study was released in fall of 2018 (Arismendi and Groom, 2019). The Department provided funding to support completion of this work. The authors examined the effects of timber harvest on propagation of thermal responses in stream temperature downstream pre- (2–3 years) and post-harvest (5 years) at 16 sites. They found that these downstream reaches responded differently to upstream timber harvest operations between pre- and post-harvest summer seasons. In addition, these reaches had distinct patterns of longitudinal variability of temperature across sites and summer seasons with increases, decreases or mixed responses including no change. Overall, the highest difference occurred during the first and second year post-harvest and, in some cases, a distinctive shift in stream warming and cooling occurred between the day and the night. Observed temperature patterns in downstream reaches were most similar to the pre-harvest conditions at the fifth year post-harvest.

Other Engagement and Support

Unit and Division personnel also:

- Represented the department on the interagency water-monitoring group, Stream Team.
- Provided support to Committee for Family Forestlands and the three Regional Forest Practices Committees.
- Participated in two Oregon Department of Environmental Quality efforts on total daily maximum loads (TMDLs) for the mid-coast and Willamette River.
- Participated in Oregon State University's Trees to Tap project.
- Engaged in the Water Quality Pesticide Management Team.
- Participated in training for, and support of, the agency mission for fire protection.

References

Arismendi, I., and J.D., Groom. 2019. A novel approach for examining downstream thermal responses of streams to contemporary forestry. Science of the Total Environment 651: 736–748.

Oregon Department of Agriculture, Oregon Department of Environmental Quality, Oregon Department of Forestry, and Oregon Health Authority. 2011. Pesticide Management Plan for Water Quality Protection. Retrieved June 28, 2019, from Oregon Department of Agriculture: https://www.oregon.gov/ODA/shared/Documents/Publications/PesticidesPARC/PesticideManagementPlanWaterQuality.pdf

Oregon Water Quality Pesticide Management Team. April 2019. Evaluation of South Yamhill Pesticide Stewardship Partnership Area. Retrieved July 18, 2019, from Oregon Department of Agriculture: https://www.oregon.gov/ODA/shared/Documents/Publications/PesticidesPARC/SouthYamhillPSPReport.pdf