Attachment 1. Current Status of the Western Oregon Streamside Protections Review

1. Informing Policy Decisions from Applied Scientific Monitoring and Research

The Western Oregon Streamside Protections Review will use existing research and data analysis to provide the Board of Forestry (Board) with scientific information to make a decision on rule sufficiency. The Board continually assesses the adequacy of the Forest Practices Act (FPA) based on an adaptive approach to forest management. The adaptive management approach is a scientifically-based and structured approach that tests and monitors management plans, assumptions, predictions and actions, and then uses the resulting information to improve management plans, policies, or practices. The Monitoring Unit is an important component of the adaptive management process. The Monitoring Unit reports study findings to the Board, who then considers the findings and associated recommendations.

Updated in 2016, the Monitoring Unit strategy outlines prioritized questions that address various FPA topics, which were developed from stakeholder input. The high priority questions reflect topics related to riparian buffers along streams and address whether current FPA rules on riparian buffers are effectively protecting water quality, providing large wood to adjacent streams, and attaining desired future conditions.

2. Work Completed

At the March 2018 Board meeting, the Board directed the Monitoring Unit to complete the Riparian Function and Stream Temperature study (RipStream) analysis for desired future condition and large wood recruitment analysis (i.e., Western Oregon Streamside Protections Review). More details on the RipStream methods and study design are described in Dent et al. (2008) and Groom et al. (2011). In September 2018, the Monitoring Unit presented the general approach and components of the Western Oregon Streamside Protections Review.

The monitoring unit has made it a priority to present and discuss our work with stakeholders and tribes, which is described in more detail below within each section. An example includes presenting our work to the Network of Oregon Watershed Councils, which comprises representatives from various watershed councils throughout the state. We also presented to the Marys Peak Society of American Foresters (SAF) chapter, as well as the Northwest and Southwest Regional Forest Practices Committees. In addition to presenting on this project, the Marys Peak SAF presentation provided us an opportunity to inform forestry college students of the Oregon Department of Forestry as a state agency and how we fit into the broader scope of forestry in Oregon.

For the Western Oregon Streamside Protections Review, the primary objective is to assess the effectiveness of the FPA in achieving the goals for DFC and large wood recruitment. More specifically, the following questions from the original RipStream protocol will serve as a guide for the analysis and systematic review:

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

Work products will include: 1) data analysis of pre- and post-harvest field data on streamside vegetation and large wood from the RipStream study, 2) a systematic literature review addressing desired future conditions and in-stream large wood, and 3) a modeling analysis that will project riparian forest stand growth, mortality, understory regeneration, and large wood recruitment. The following sections address the work that has been completed since the September 2018 Board meeting:

2.1. RipStream Data Analysis

2.2. Systematic Literature Review

2.3. Gathering Modeling Information

2.1. RipStream Data Analysis

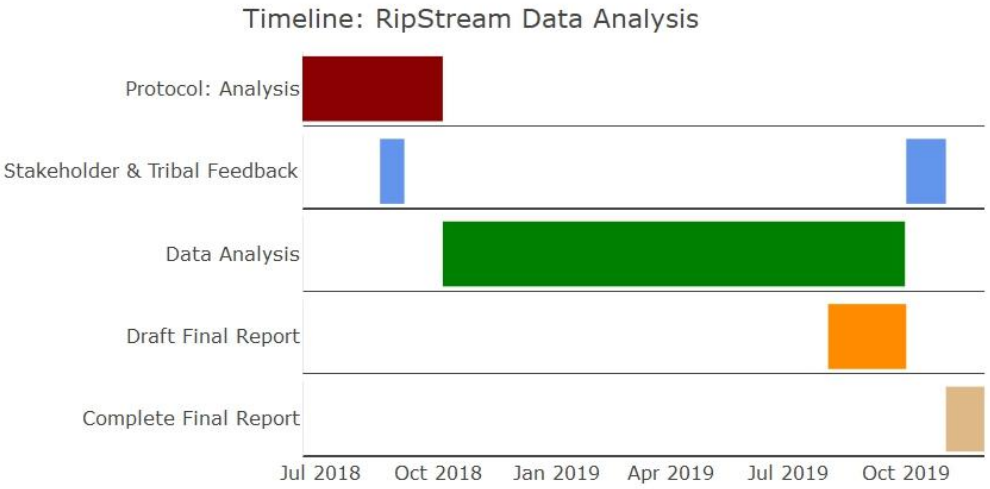

Figure 1. Timeline of completed and future work on the RipStream data analysis.

Data Analysis Protocol and Stakeholder and Tribal Engagement

The protocol for the RipStream data analysis was completed in August 2018 and sent to 30 stakeholder groups and nine tribes. Stakeholder groups included federal and state agencies, non-profit organizations, and private industrial and non-industrial landowners. The protocol described the RipStream methods for data collection on vegetation, downed wood, and large wood in the stream channel, as well as proposed figures and analysis of the RipStream data. Many valuable comments were submitted by reviewers representing nine stakeholder groups and tribes. We used our best professional judgement to address these comments and revise the protocol. The common themes from reviewers are described below in addition to how the comments were addressed by ODF in italics:

- The length of the RipStream data collection period (2-6 years) limits the implications of the study with respect to desired future conditions, because processes such as large wood recruitment, stand dynamics, and forest growth operate over a much longer time period.
    - *ODF: The systematic review and modeling analysis will address stand-level processes that occur over a longer time frame than the RipStream study.*

- Reference conditions are not clearly defined in the FPA, so it will be difficult to assess whether these stands are on target.
    - *ODF: The ambiguity surrounding the goals for DFC and large wood recruitment will be addressed in the discussion of the report on the RipStream data analysis. Also, the systematic review may provide more insight into mature stand conditions, as well as specific targets that are representative of mature stands.*

- The age range for a mature forest as described in the FPA (80-200 years) is not correct. One reviewer noted that a mature forest is 40-80 years, while another reviewer felt that mature forests are older than 120 years.
    - *ODF: Currently out of scope because the FPA characterizes mature stands as 80 to 200 years.*

- The analysis should include hardwoods in the riparian management area and not restricted to conifers.
    - *ODF: We included hardwoods in our analysis that evaluates harvest effects on tree diameter distribution, tree density, and basal area.*

- The analysis should account for disturbances such as blowdown, landslides, and debris flows.
    - *ODF: We included blowdown in our analysis because that data was available from the RipStream data. However, disturbances such as landslides and debris flows are out of scope and not possible to address with the current data set.*

Preliminary Results of RipStream Data

The protocol was used as a guide for the data analysis, which started once the protocol was finalized in January 2019. Prior to January 2019, a considerable amount of work was done to understand methods, site locations, status of the vegetation data analysis, and data files. Preliminary results of the RipStream field study are provided in Attachment 2. A summary of the preliminary findings for riparian areas along small and medium type-F streams on private land are summarized below.

- On average, riparian stands were 38 years old at the time of the pre-harvest data collection and likely became established from the late 1950s through the early 1970s.
- After ~40 years of growth, these stands displayed a wide range in the number of conifers and hardwoods. Most stands were generally conifer-dominated or mixed conifer-hardwood stands.
- Red alder was the most common hardwood species and Douglas-fir and western hemlock were the most common conifer species.
- Pre-harvest conditions, namely conifer basal area, determine the amount of harvesting in the stand due to current FPA rules.
- Conifer-dominated stands and mixed conifer-hardwood stands with a greater conifer basal area experienced more harvesting in the riparian management area (RMA) than did hardwood stands.
- Harvesting tended to target smaller diameter conifers (6-22") near the edge of the RMA that were furthest from the stream. Western hemlock and Douglas-fir were targeted species for harvesting along medium and small streams, respectively.
- There was very little evidence for harvesting of large diameter conifers (>36") and hardwoods, which may be explained by a few reasons described in Attachment 2.
- Assumptions regarding site index for the Coast Range appear to be valid for conifer species growing in riparian areas. Further analysis such as modeling stand growth will be appropriate for testing assumptions regarding riparian stand growth over time.

We plan to complete a draft of the data analysis report by October 2019. The report will be sent out to stakeholders for review. We will review and incorporate stakeholder and tribal comments using our best professional judgement. Comments from stakeholders and tribes will be saved and summarized in order to present to the Board at later date. We plan to complete the final report by December 2019.

2.2. Systematic Literature Review

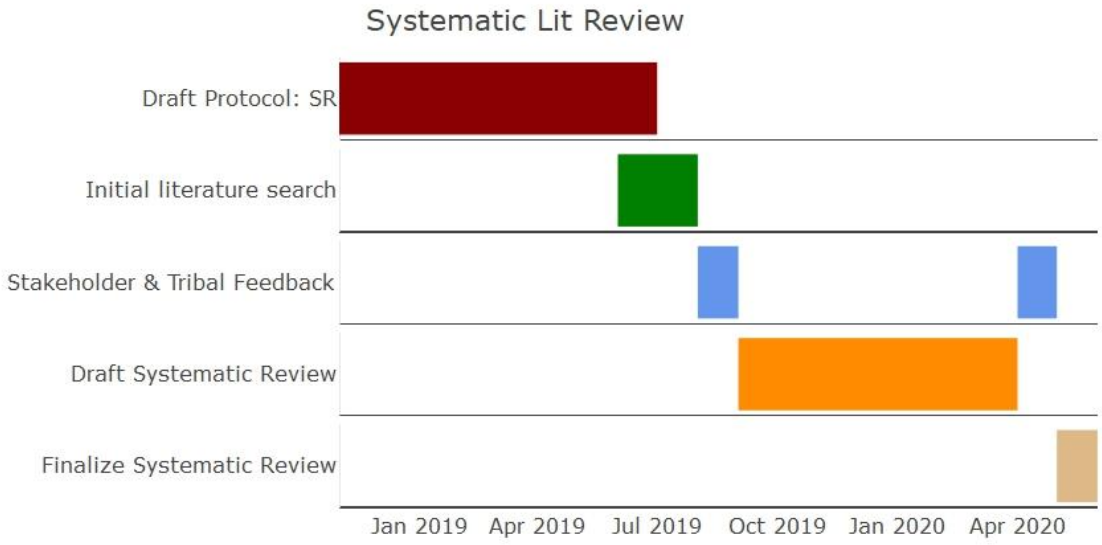

Figure 2. Past and future timeline for the systematic literature review.

The purpose of the systematic literature review is to provide the Board a thorough summary of all relevant scientific literature to identify whether the FPA rules are effective in achieving the goals for desired future conditions and large wood recruitment for small and medium fish-bearing streams. The systematic review will include fundamental concepts found in the literature, summaries of extracted data and results, and a synthesis of key conclusions from relevant studies.

The protocol for the systematic review lays out the scope, research questions, objectives, and methods for the literature review. The methods describe how the literature search, paper selection, and data extraction will occur for both DFC and large wood. The protocol was initially started in October 2018 and was modeled after the protocol that was developed for the Siskiyou systematic review.

The initial literature search for DFC was contracted through the Oregon State University Institute of Natural Resources (INR) in June 2019. In collaboration with INR, modifications were made to the protocol for the initial search phase. First, we extended the geographic scope to include regions of California, Oregon, and Washington west of the Cascades, as well as British Columbia and Alaska. Second, slight modifications were made to keywords. INR conducted the literature search through two major databases (Google Scholar and Web of Science), as well as websites from other natural resource agencies and organizations. INR will provide a list of citations from each search. ODF has also reached out to researchers at the U.S. Forest Service Pacific Northwest Research Station to receive direction in the literature search, namely for research studies and papers that were part of larger collaborative projects (e.g., BLM Density

Management & Riparian Buffer Study). We plan to continue to work with INR for the large wood recruitment literature search throughout the summer.

The protocol, along with the initial list of citations will be sent to stakeholders and tribes. Stakeholders and tribes will have an opportunity to provide feedback on the protocol and citations that are relevant to the topic. Once we incorporate their feedback, we plan to draft the systematic literature review from the fall of 2019 to early summer of 2020. We will then send the systematic review to stakeholders and tribes in May of 2020. Our plan is to finalize and complete the literature review in June of 2020.

2.3. Gathering Modeling Information

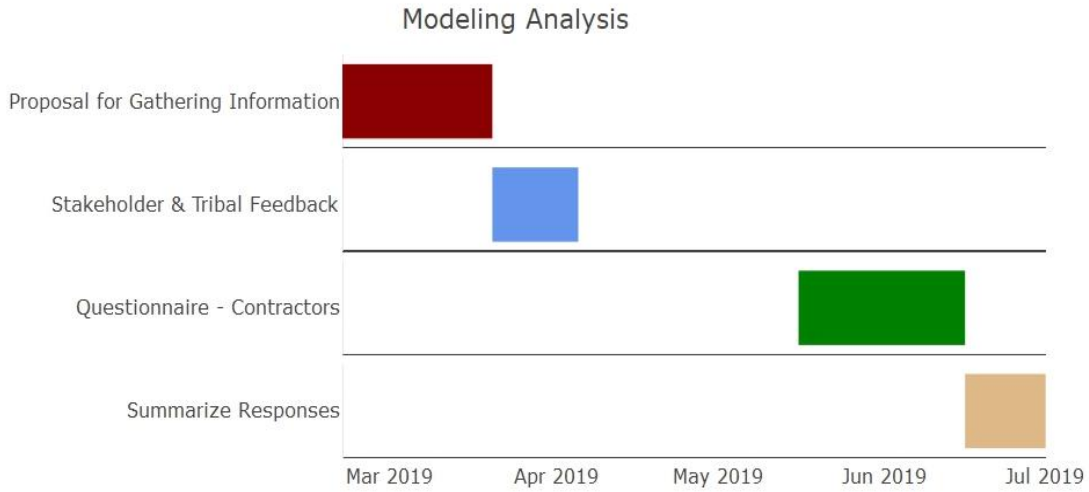

Figure 3. Timeline for gathering information to help with a decision on whether to conduct a modeling analysis.

Given the timespan of the RipStream study (1-5 years post-harvest), there are likely information gaps that need to be addressed before effectively answering the questions listed in *Section 2. Work Completed*. Mature riparian stands that are within the 80-200 year old age span for DFC that have also been managed under current FPA rules for 80-200 years do not exist. Therefore, the next best option is to perform a modeling analysis to predict a range of outcomes of riparian stands under the current rules. Modeling stand growth, mortality, regeneration, and large wood recruitment will provide additional lines of evidence in addressing this question. Data from the RipStream study will be used to establish a starting point for the modeling. We describe below the work completed to engage stakeholders and tribes on a proposed modeling approach and market research conducted to understand the level of interest, time, and cost for completing modeling analyses.

Stakeholder and Tribal Engagement

We developed a proposal that described our approach to gather information about costs, timelines, and additional details for the modeling analysis to be conducted under a contract or inter-agency agreement. We sent this proposal to seven stakeholder groups representing the conservation community, forest industry, and small woodland owners, as well as all Oregon tribes to receive feedback about our approach to contacting private consultants, Oregon State University (OSU) staff, and U.S. Forest Service (USFS) staff. We received comments and suggestions from two stakeholder groups and one tribe. Comments from the tribe included suggestions for potential contractors. These contractors were included in our initial outreach to contractors. Another stakeholder group provided specific modeling comments (i.e., sensitivity analysis of growth models), which will be helpful when we're able to conduct the modeling analysis and when we give further consideration of the types of models to use and contractors to hire.

Summary of Questionnaire Responses: Costs and Timeline

As part of this effort, we provided consultants, OSU, and USFS with: 1) an overview of the Western Oregon Streamside Protections Review and RipStream study, 2) data that we currently have that are useful for modeling, 3) data that we need from the modeling analysis, and 4) a questionnaire with 9 questions that address timeline, costs, types of models that can be used, amount of experience with those models, and whether additional data would be required to run the model.

We initially reached out to 10 consultants and 3 researchers at OSU via phone call or email when the phone number was not publicly available. We received questionnaires from 5 consultants from private companies.

DFC
The total estimated costs for modeling stand growth, regeneration, and mortality ranged from $11,500 to $80,000 (n = 4). The amount of time required to perform the analysis and provide the model output ranged from 2.5 weeks to 6 months. Responses spanned three different forest stand growth models that consultants could use to perform the modeling. Additional data collection that was recommended include site index, diameter growth over time, and increment core data to calibrate models.

Large Wood Recruitment
The total estimated costs for modeling large wood recruitment ranged from $10,000 to $28,900 (n = 4). The amount of time required to perform the analysis and provide the model output ranged from 1 week to 1 year. Consultants indicated that the large wood recruitment models were developed by them and/or fellow collaborators. Additional data collection that was recommended included a field study of in-stream wood recruitment, which would help to estimate rates of wood recruitment by various causes, forest mortality rates, bank erosion rates, decay rates, tree fall trajectories, and information on wood transport. These data can inform

wood recruitment models. One consultant also provided costs for a field study ($22,500) and a cost for adding a debris flow recruitment of large wood modeling ($12,000).

DFC and Large Wood Recruitment
Three consultants also provided a total cost for both stand growth and large wood recruitment modeling, which ranged from $15,250 to $100,300. The amount of time required to conduct both modeling analyses ranged from 1 to 8 months. One consultant that was capable of modeling large wood indicated that it was possible to subcontract out the DFC modeling component, but did not provide an estimate for DFC modeling.

The Department is currently assessing its budget and options for moving the modeling forward in the contracting process.

3. References

Dent L, Vick D, Abraham K, Schoenholtz S, and S Johnson. 2008. Summer temperature patterns in headwater streams of the Oregon Coast Range. *JAWRA* 44:803-813.

Groom JD, Dent L, Madsen LJ, and J Fleuret. 2011. Response of western Oregon (USA) stream temperatures to contemporary forest management. Forest Ecology and Management 262:1618-1629.