

## Riparian Function Literature Synthesis<sup>[JFM1]</sup>

### Description

In ~~Western~~ Washington ~~lands subject to~~,<sup>[TA(2)]</sup> the riparian policy and management guidelines ~~on State and private forests covered by the FFRHCP and laid out in the 1999 Forests and Fish report~~ are strongly influenced by the science of riparian processes ~~that was~~ articulated in the 1993 Forest Ecosystem Management Assessment Team (FEMAT) report, “Forest Ecosystem management: an ecological, economic, and social assessment”. ~~Although the Forests and Fish Report basis and the rules derived from it included additional sources through that time, However,~~ our scientific understanding of riparian processes has evolved since ~~then~~1993. Some aspects of the ~~then-current state of knowledge on riparian processes and the influences of timber harvest on them~~FEMAT report have been affirmed by more recent science, ~~but while~~ for other parts the scientific conclusions are changing<sup>[HJR(3)]</sup>. This literature review and synthesis will look at literature that has been completed since the FEMAT ~~report and~~ Forests and Fish reports ~~that will~~ inform~~s us regarding~~ timber harvest impacts to riparian functions<sup>[JFM4]</sup>. The following types of information addressing timber harvest effects on riparian functions will be included:

- Electronic databases
- ~~Bibliographies~~
- Peer-reviewed publications
- Other published material – conference proceedings, white papers, newsletters, blogs
- Geotechnical reports
- ~~Forest practice applications~~<sup>[HJR(5)]</sup>
- Unpublished data

The literature review will include literature pertinent to, and relevant citations related to timber harvest impacts on the five forest practices functions of the riparian zone; **sediment filtration, shade, LWD recruitment, leaf and litterfall, and bank stability**. A synthesis of the literature will also be ~~produced~~~~produce~~ that summarizes the overall findings and provides initial recommendations regarding the effectiveness of the current forest practices rules in protecting the functions of the riparian zone and may include recommendations for future research.<sup>[JFM6]</sup> The Systematic Literature review will address specific questions (listed below) and identify appropriate variables and associated metrics that can be used to quantify and assess timber harvest effects on the above mentioned riparian zone functions.

### Focal Questions for Literature Synthesis

- ~~For the FFR landscape, how is the quality and quantity of anadromous fish smolts affected by riparian forest thinning or patch clearcutting tree removals?~~
- ~~How do site specific conditions of forests, topography and weather affect these smolt production responses?~~

- a. For the FFR landscape, what are the water temperature changes that result from thinning or patch clearcutting riparian forest?
- 1) What are the effects of harvest intensity and extent within the riparian area on the five riparian functions (sediment filtration, shade, LWD recruitment, leaf and litterfall, and bank stability) in comparison to conditions before harvest?
    - a. Unthinned buffers of various widths
    - b. Buffers thinned to various intensities
    - c. Skips and clearcut gaps
  - 2) How do specific site conditions (e.g., topography, weather) influence the response to riparian treatment for the five functions of riparian zones (sediment filtration, shade, LWD recruitment, leaf and litterfall, and bank stability)?
    - ~~— For the FFR landscape, how do the changes in stream flow, that result from timber harvest, affect the quality and quantity of smolt production?~~
    - ~~— For the FFR landscape, how do site productive tree height stream buffers affect the quality and quantity of smolt production. How do site specific conditions of forests, topography and weather, affect the functional metrics of site productive tree height stream buffers?~~
    - ~~— For the FFR landscape, how much does riparian forest thinning and partial cutting change the metrics of the five functions of riparian zones?~~
  - 3) For the FFR landscape, what are the minimum buffer widths, for thinning and partial cutting riparian strategies, necessary for long term recovery to pre-harvest metrics of the five functions? What is the magnitude of post-harvest weather effects (e.g., windthrow events) on the long-term recovery of the five functions?
  - 4) How do the recovery rates of the functions change over time? Are there feedback mechanisms related to, for instance, microclimate changes due to treatments in the riparian buffer that affect the recovery rates of riparian functions?
  - 5) What are the potential cumulative effects (spatial and temporal) of timber harvest on the five riparian functions? If so, what are the effects?
  - 6) What data gaps and uncertainties exist relative to timber harvest effects on the five forest practices functions?

- ~~1. What are the potential effects from timber harvest (even aged, partial cuts, thinnings, etc.) on the five forest practices functions of the riparian zone? What site specific factors (timber type, aspect, channel morphology, stream size, topography, elevation, etc.[JFM7]-) affect the magnitude and duration of the harvest effects on the five functions?~~
1. How does leaving riparian buffers around streams maintain the five functions? Is there a minimum buffer width needed to preserve these functions?[JFM8]

2. ~~What effects do contributing environmental factors, such as antecedent storm precipitation, have on the five forest practices functions? How may **might** these factors be exacerbated **or improved** by timber effects~~<sup>[JFM9]</sup>?
3. ~~Does the riparian area~~<sup>[JFM10]</sup> require a minimum volume/percentage of mature (greater than 50 years) timber to preserve the five riparian functions? If yes, what is the minimum amount and what metric is best for measuring this (basal area, TPA, etc.) Are there site specific situations that would deviate from this minimum?
- 4.1. ~~Are **What are there potential cumulative effects (spatial and temporal) of timber harvest on the five riparian functions? If so, what are the effects?**~~
- 5.2. ~~Based on the literature review, is the current FEMAT curve, used in the 1993 Forest Ecosystem Management Assessment Team report “Forest Ecosystem management: an ecological, economic, and social assessment” still appropriate or should it be revised? If the FEMAT curve~~<sup>[JFM11]</sup> ~~should be revised, provide recommended changes.~~<sup>[TA(12)]</sup>
- 6.3. ~~What data gaps and uncertainties exist relative to timber harvest effects on the five forest practices functions?~~

### **RSAG review timeline**

<sup>[JFM13]</sup>

- ~~● RSAG review riparian functions literature synthesis: October 16, 2017—November 13, 2017~~
- ~~● Discuss with CMER at November 14, 2017 meeting upcoming review timeline and assign reviewers~~
- ~~● Contractor and PM develop response matrix: November 14, 2017—November 27, 2017~~
- ~~● RSAG review and approve response matrix: November 28, 2017—December 13, 2017~~
- ~~● Contractor revise report: December 14, 2017—January 2, 2018~~
- ~~● RSAG re-review report to insure comments incorporated: January 3, 2018—January 10, 2018~~
- ~~● RSAG approve final report at January 10, 2018 meeting~~
- ~~● Contractor presentation at January 23<sup>rd</sup>, 2018 CMER meeting~~
- ~~● Assigned CMER reviewers begin review period: January 11, 2018—February 8, 2018~~
- ~~● Contractor receives CMER reviewer comments, contractor revises report: February 9, 2018—February 16, 2018~~
- ~~● RSAG receives CMER reviewer comments and submits a CMER request for approval of literature synthesis: February 9, 2018—February 16, 2018~~
- ~~● CMER reviewers re-review report to insure comments incorporated: February 19, 2018—February 26, 2018~~
- CMER approves riparian literature synthesis document or approves it to go to ISPR at the February 27, 2018 meeting