Forest Thinning in Pacific Northwest Riparian Areas: Rationale, Risks, and Policy Calibration

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Riparian Reserves in the NW Forest Plan

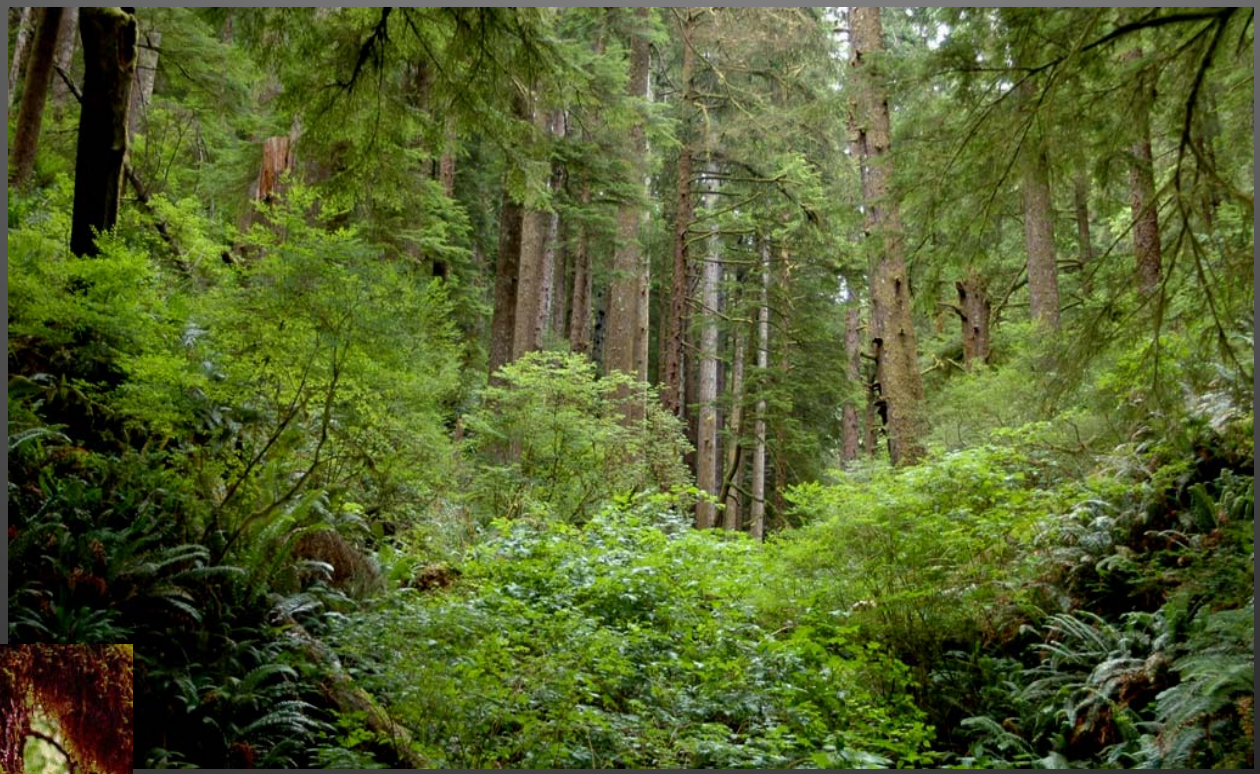
- The Northwest Forest Plan:
  - Established wide, function-based Riparian Reserves
  - Established a new burden of proof such that *timber harvest is prohibited* in Riparian Reserves unless demonstrably *necessary to attain Aquatic Conservation Strategy Objectives*
  - Actions that could potentially meet this criterion:
    - *Control tree stocking, reestablish and manage stands, acquire desired vegetation characteristics, fuels treatment and fire suppression activities*

- BLM's Western Oregon Plan Revisions, and
- Timber sale projects of the BLM and the Forest Service

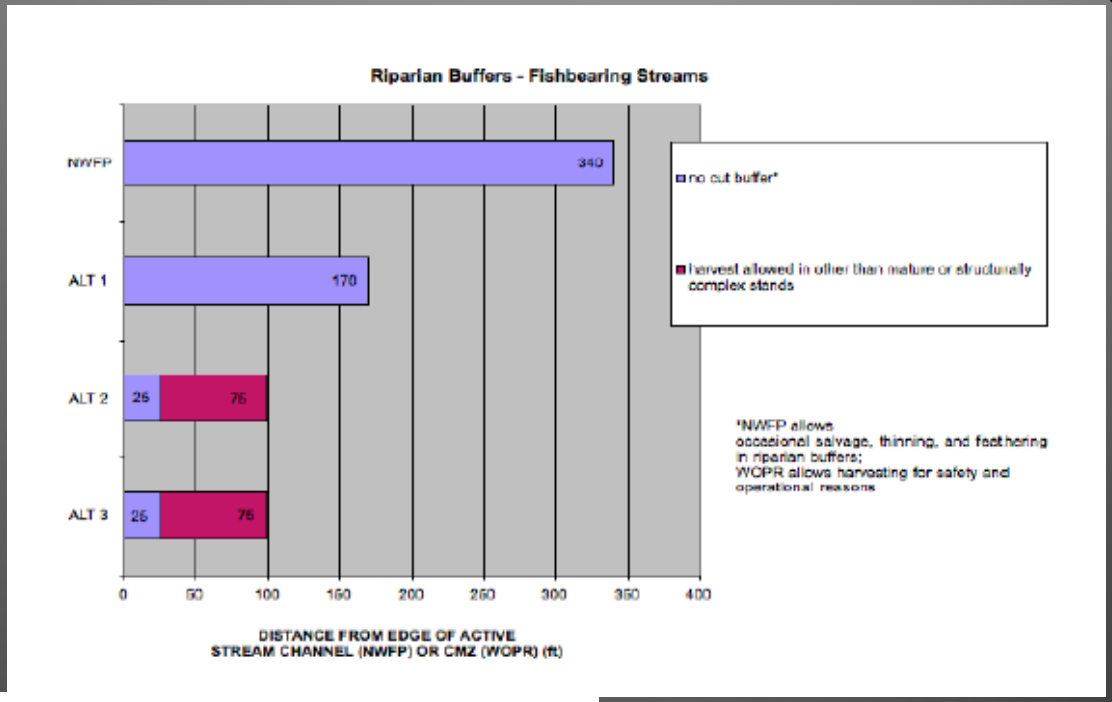
…have proposed or implemented stepped-up programmatic logging within NWFP RRs, contending that thinning is useful or necessary under a wide variety of prevailing forest conditions to hasten growth of some trees or meet fuels objectives

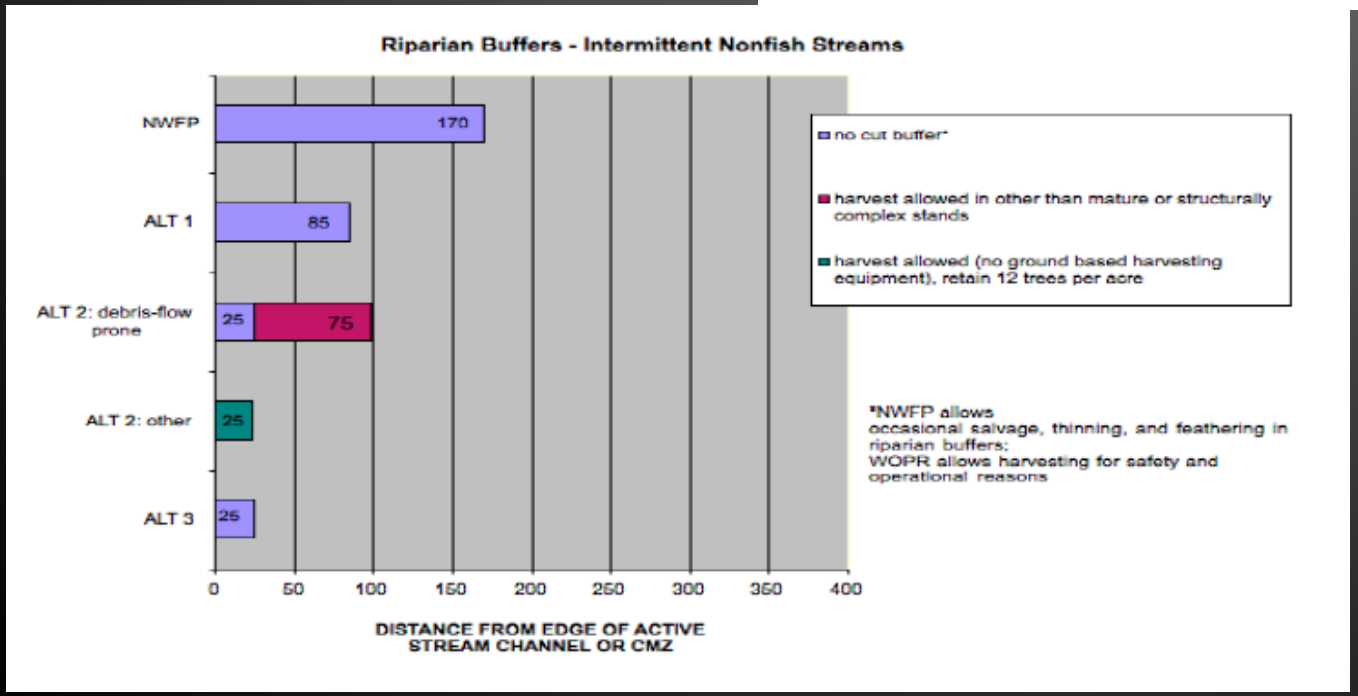
- NMFS/USFS/BLM Aquatic Restoration Biological Opinion 2008; reinitiated consultations on RR thinning in 2008 (kicked upstairs by Streamlining Team)
- PRC letter to USFS R6 + OR BLM 14 Sep. 2010) nudging.
- The Elevation: Interagency science panel

Besides influencing water quality and habitat for freshwater species including fish and amphibians, riparian forests provide late-successional habitat for a variety of bird, mammal and other species



Riparian Protection: NW Forest Plan v. BLM WOPR





The BLM WOPR eliminates NWFP riparian guidance.

Outside of 25ft no cut zone, harvest allowed “if the stands are not mature or structurally complex.”

Common Rationales for Thinning in Riparian Reserves

- *Density reduction*
  - Hasten or rejuvenate growth of selected "leave" trees
  - "Prepare" forests for future, presumed drier climates
    - Reduce moisture competition around large trees
    - Propagate residual dry-site species

- *Fuels management*
  - Remove ladder fuels around residual large trees
  - Break up "fuels continuity" (inhibit "wicking")

Riparian thinning trades off postulated long-term benefits against likely adverse effects

Evidence for net ecological benefit of riparian thinning is sparse and speculative, while evidence of known adverse effects is ample and growing.

Cascades Frog, Umpqua NF, OR

- Near-stream soil disturbance and sediment delivery
- Depletion of near- and medium-term recruitment of woody debris
- Risk of thermal and microclimate stress from canopy removal
- Intensified fire effects in some circumstances
- Impact of road networks
- Risk of pathogen dispersal (e.g., Port-Orford-cedar root disease).
- Depletion of green tree diversity

Dwire et al. 2010. **Potential Effects of Fuel Management Activities on Riparian Areas.** USDA Forest Service RMRS-GTR-231.

Near-stream erosion and sediment delivery

Post-thin burned pilesMalheur NF, OR

Metolius R, Deschutes NF, OR

Short-term disturbance from felling and yarding, sustained erosion from altered soils and roads

• Rhodes JJ (2007) The watershed impacts of forest treatments to reduce fuels and modify fire behavior. Pacific Rivers Council, Eugene, 103 pp

• Rashin, E. B.et al. 2006. Effectiveness of timber harvest practices for controlling sediment related water quality impacts. J.Am.Water Resour. Ass. 42:1309-1327.

Ecological Conditions for Vegetative Response Differ Substantially between Riparian Areas & Uplands

(Where most Thinning growth release studies have been conducted)

- Higher soil moisture, extensive areas not water-limited (and less nutrient limited)
- Moderated, moister and cooler microclimates
- Greater density and diversity of tree and shrub species
- Large hardwood component
- High Diversity and frequency of natural disturbances
- Moderated fire behavior under many conditions

Riparian Area Disturbance Processes

Herbivory
Porcupine, BC
(K. Colburn)

Blowdown
Umpqua
NF, OR

Landslide and
fluvial erosion
Cape Cr, OR

Riparian Disturbances and Successional Pathways are Diverse and Abundant

- *Diversity of species and natural disturbance processes, coupled with good growing conditions, commonly leads to complex, robust riparian forests without thinning.*

- Natural <u>Disturbances:</u>
  - Fire
  - Floods
  - Fluvial channel migration
  - Root throw/blowdown
  - Slope erosion and landslide deposition
  - Herbivory
  - Disease

Yes, even in plantations
Toketee RD, Umpqua NF

Wildfire in Riparian Areas: *Variable Effects*

Malheur NF, OR

North Umpqua R, OR

Most Often: Low-Impact Thinning

Biscuit Fire, Rogue R-Siskiyou F, OR

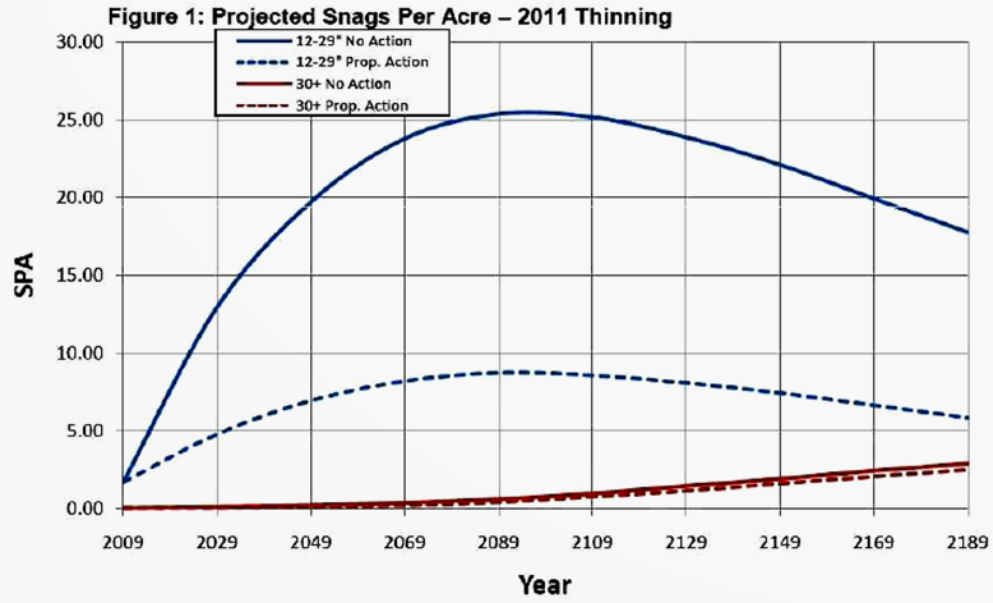
B. K. Jackson and S. M. P. Sullivan. 2009. Influence of wildfire severity on riparian plant community heterogeneity in an Idaho, USA wilderness. Forest Ecology and Management 259: 24–32.

Heiken (2010) compiled dead wood recruitment data and model projections from FS, BLM EIS & EA records

DEAD WOOD RESPONSE TO THINNING:
SOME EXAMPLES FROM MODELING WORK

2011 Thinning EA, Eugene BLM, Oregon

- Stands 30-70 years old
- Thinned to 60 to 120 trees per acre, and
- 120 to 160 square feet of basal area per acre
- 400 acres located in riparian reserves

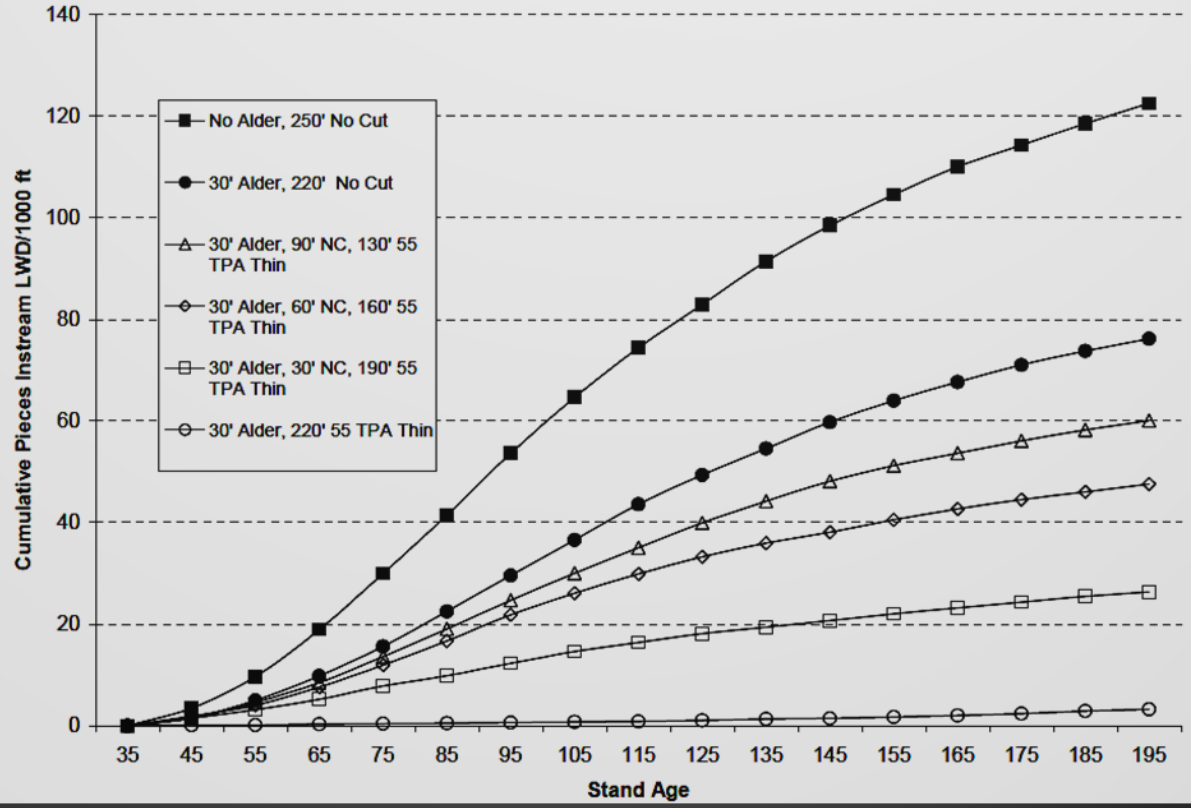


- *"In this study, treatments providing rapid development of live, late-successional attributes generally produced relatively lower densities of shade-tolerant stems, lower amounts of Douglas-fir basal area, and fewer snags and logs over a rotation compared to other treatments."*
- Garman, Steven L.; Cissel, John H.; Mayo, James H. 2003. Accelerating development of late successional conditions in young managed Douglas-fir stands: a simulation study. PNW-GTR-557.

Pollock (2010, 2011) NWFSC study:

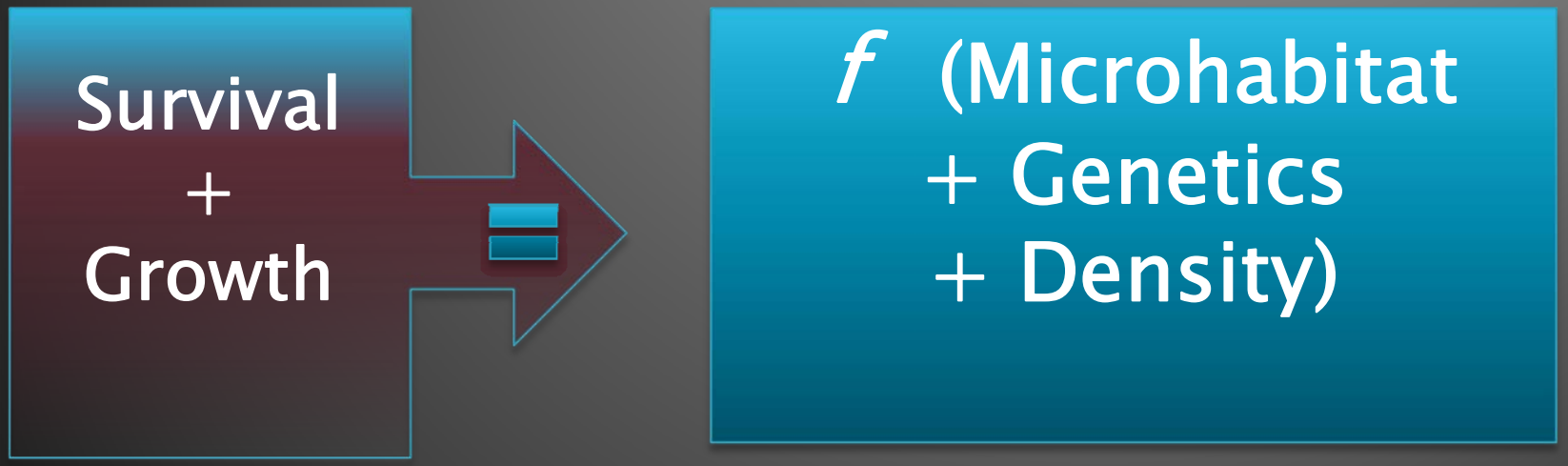
Modeled Riparian Thinning and Projected LWD Recruitment to streams

Figure 4. Cumulative pieces instream lwd/1000 ft delivered to a stream under different thinning scenarios, assuming 30 foot wide alder forest at edge of stream, then a df riparian forest from 30-250 ft.



NMFS to Interagency Coordinating Subgroup (ICS):
On February 23 (2010), the Northwest Oregon Level 2 consultation streamlining team elevated two issues pertaining to implementation of the Northwest Forest Plan to the Regional Executive Team for resolution. The first issue concerns the effects of thinning in riparian reserves with respect to wood recruitment, shade and water temperature…

Stand Dynamics: Thinning Sacrifices Tree Diversity to favor Density



1) *Microhabitat* and *Genetic Diversity* are **directly** proportional to Abundance

2) *Density* effects are **inversely** proportional to Abundance

Conditions Under Which Riparian Reserve Thinning can be Justified?

Minimum Risk:

- Moderate and gentle slopes, outside of inner gorge slope breaks and erosion-prone soils
- Outside of 100-foot zone where most shade and woody debris recruitment is generated
- "Lop and drop" (boles remain on site)
- Near-stream or permanent roads not required

AND

Specific Benefit:

- Where thinning is necessary to remove planted, off-site or exotic trees.
- Where thinning is needed to preserve hardwoods or dry-site species under rapidly closing canopy
- Ladder fuel reduction to increase fire resistance of largest trees
- (treatments to alter large-scale fuels continuity and fire behavior are dubious and unproven)

Policy Recommendations for Riparian Reserve Thinning:

1) Field inventory and analysis of forest and aquatic conditions justifies a site-specific objective & treatment
2) Canopy reduction will not cause warming of streams or wetlands
3) All larger woody material is retained on site
4) Treatment can be accomplished from existing roads
5) Cumulative area of Riparian Reserves impacted by silvicultural treatment, yarding & transportation does not exceed 10% within any 10-yr period in any sixth-field subwatershed
6) Firm agency commitment to monitor & report silvicultural and environmental outcomes

Well-designed monitoring... .is needed to provide a scientifically-defensible basis for the continued and growing implementation of these treatments.
Stone et al. (2010) Env. Mgmt. 46:91