



Eastside Modeling Evaluation Project

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May 12th, 2021





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Presentation Overview

- Brief project background
- Review methods
- Select results
- Discuss Study implications
- Questions and Answers

EMEP Purpose

To model how current riparian stands in eastern Washington respond to the eastside riparian prescriptions over time

- 1. How will stand characteristics change over time with no timber harvest and with timber harvest applied to the limits that rules allow?*
- 2. To what extent do the current riparian stands meet the size and basal area thresholds for timber harvest across regulatory habitat types (elevation bands)?*
- 3. Are there differences in stand characteristics associated with distance to the stream?*
- 4. What are the projected rates and characteristics of stand mortality in riparian stands with and without management intervention?*
- 5. How susceptible to insect, disease, and crown fire are stands, and how does their susceptibility change over time?*

EMEP Purpose

1. Use FVS to simulate harvest under eastside riparian prescriptions
2. Evaluate Stand metrics as well as insect and fire risk
3. Compare between managed and no action alternatives

Methods

Riparian Stand Data

- Eastern Washington Riparian Assessment Project (EWRAP) data from Bonoff *et al.* (2008)
 - Variable-width line sampling
 - Tree species, size, distance from stream
- Compiled data into “stands” by regulatory zone (WAC 222-30-022)
- Insufficient data to classify by ecological zone

SF

TYPE 'S' OR 'F'
EASTERN WASHINGTON
RMZ REQUIREMENTS

Bankfull width less than or equal to 15 feet

	River/Stream	Channel Migration Zone	Core Zone Width	Inner Zone Width	Outer Zone Width
SITE CLASS I 130' WIDE RMZ			30'	45'	55'
SITE CLASS II 110' WIDE RMZ			30'	45'	35'
SITE CLASS III 90' WIDE RMZ		Bankfull Width/Channel Migration Zone	30'	45'	15'
SITE CLASS IV 75' WIDE RMZ			30'	45'	
SITE CLASS V 75' WIDE RMZ			30'	45'	

Not all streams in Eastern Washington will have an outer zone.

The width of the inner zone depends on the width of your river/stream(s).

No Harvest
The only timber allowed to be cut in the core zone is what is approved for yarding corridors and/or road construction for a stream crossing. Timber cut for yarding corridors must be left on site.

TYPES 'S' AND 'F' ARE FISH HABITAT STREAMS

SF

TYPE 'S' OR 'F'
EASTERN WASHINGTON
RMZ REQUIREMENTS

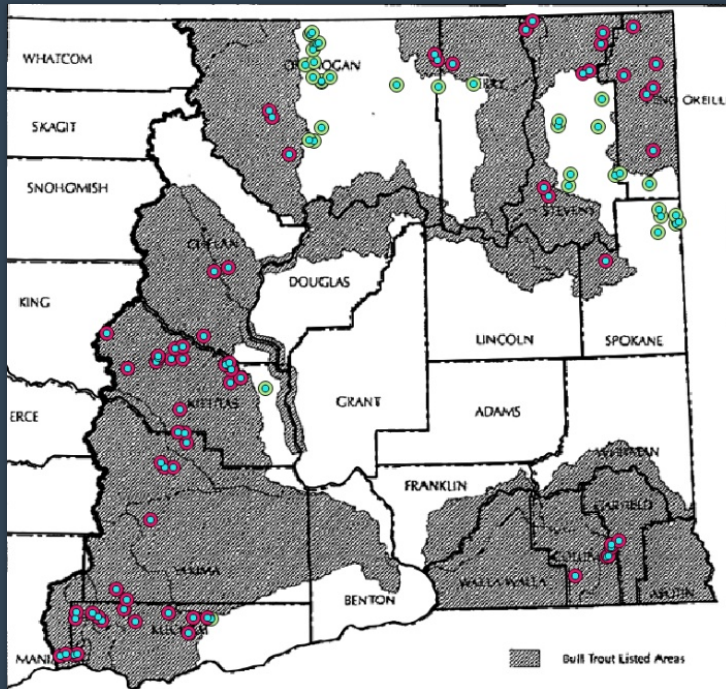
Bankfull width greater than 15 feet

	River/Stream	Channel Migration Zone	Core Zone Width	Inner Zone Width	Outer Zone Width
SITE CLASS I 130' WIDE RMZ			30'	70'	30'
SITE CLASS II 110' WIDE RMZ			30'	70'	10'
SITE CLASS III 100' WIDE RMZ		Bankfull Width/Channel Migration Zone	30'	70'	
SITE CLASS IV 100' WIDE RMZ			30'	70'	
SITE CLASS V 100' WIDE RMZ			30'	70'	

Not all streams in Eastern Washington will have an outer zone.

No Harvest

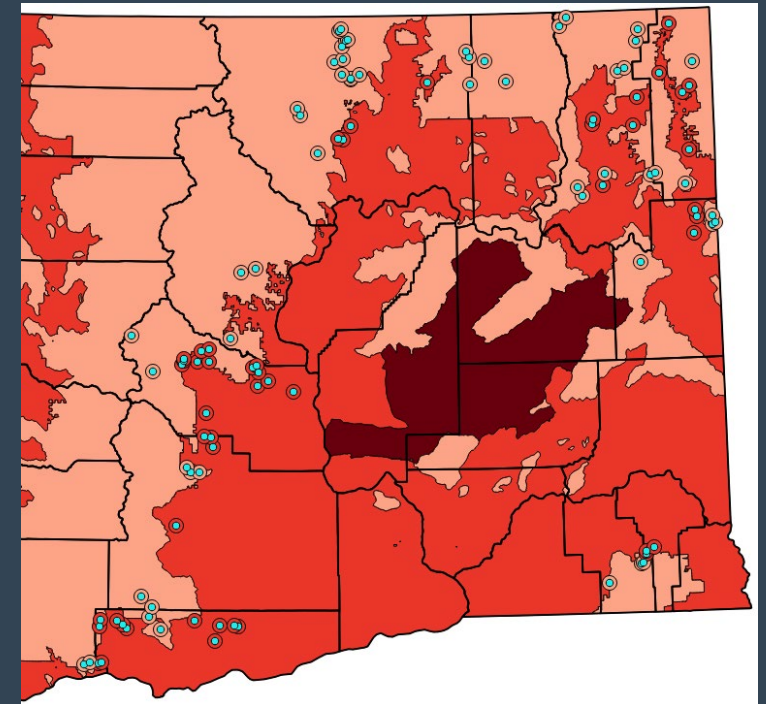
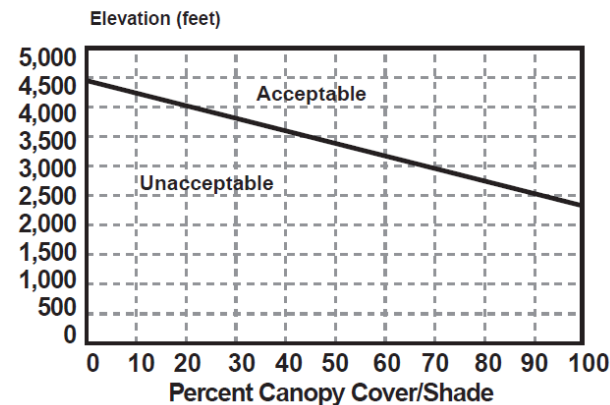
Bull Trout Overlay and Shade Data



Bull Trout Overlay
WAC 222-16-010

Canopy Cover Nomograph

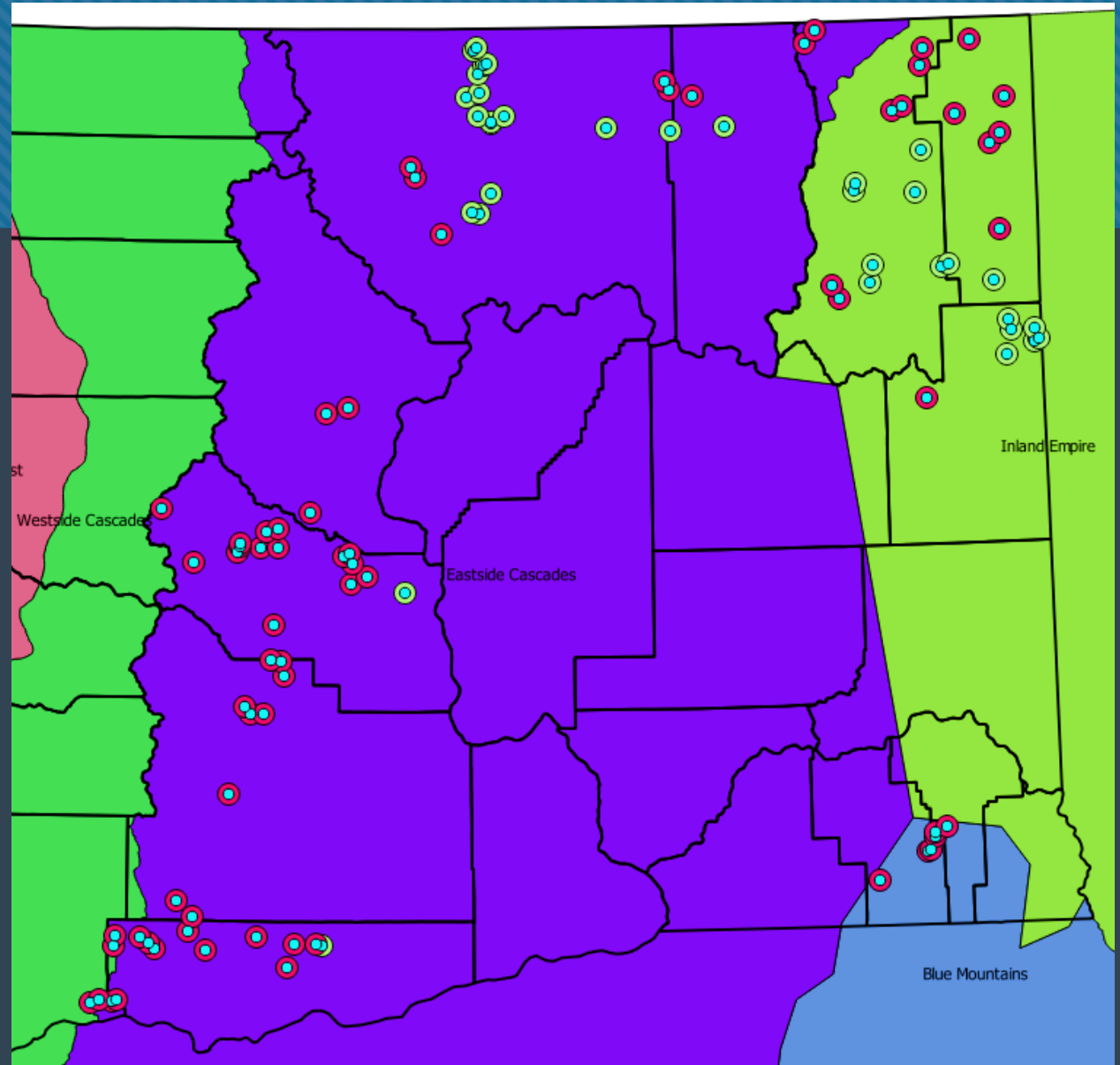
Eastern Washington Canopy Cover Required
16 degrees C



DNR Stream Temperature Layer

FVS Simulations

- Three regional variants
 - East Cascades
 - Inland Empire
 - Blue Mountains
- 50-year simulations
- No Action plus all possible harvests under the Forest Practices Rules
- Fire and Fuels Extension (FFE) included

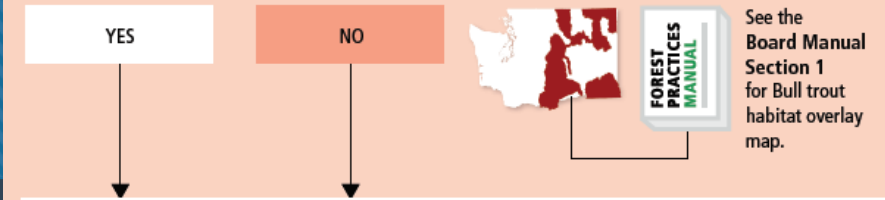


Harvest Simulations

- Followed (complex) Forest Practices Rules to determine prescriptions
- Inner zones harvest eligible only if they met shade and basal area requirements
- Outer zone harvest eligible if TPA limits met
- Zone and forest type leave targets applied

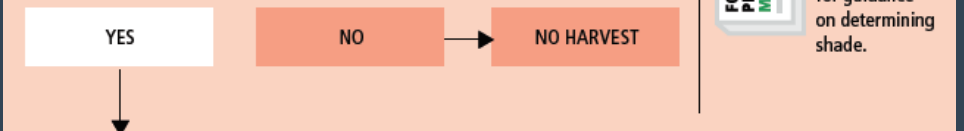
B. IS YOUR HARVEST IN THE BULL TROUT OVERLAY?

Harvest units within the bull trout overlay must leave all available shade within 75 feet of the bankfull width or CMZ, whichever is greater.

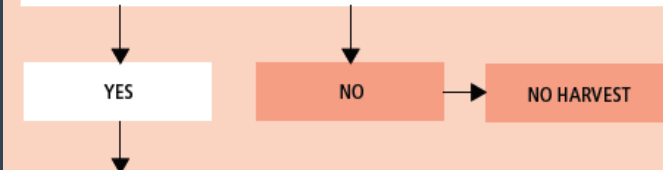


C. DO YOU HAVE ADEQUATE SHADE?

You can harvest inside the inner zone only if there is adequate shade present. The amount of shade required depends on whether the harvest unit is within the bull trout habitat overlay.



D. DO YOU MEET THE BASAL AREA REQUIREMENTS?



YOU ARE ALLOWED TO HARVEST | With the Following Requirements

Inner Zone

Leave tree requirements are based upon habitat type and elevation:

Ponderosa Pine

Elevations at or below 2500 feet.

Mixed Conifer

Elevations from 2501 feet to 5000 feet.

High Elevation

Elevations above 5000 feet.

The stand must meet certain basal area requirements. You must leave a certain number, size, and type of leave trees.

The stand must meet certain basal area requirements.

Outer Zone

Leave tree requirements are based upon habitat type and elevation:

Ponderosa Pine

Leave 10 dominant or co-dominant trees per acre.

Mixed Conifer

Leave 15 dominant or co-dominant trees per acre.

High Elevation

Leave 20 dominant or co-dominant trees per acre.

See Leave Tree Requirements graphics on next pages



Data Summary

Standing, Mortality and Harvested Trees

- Quadratic mean diameter (QMD)
- Basal area per acre (BA)
- Trees per acre (TPA)
- Stand Density Index (SDI)
- Curtis' Relative Density (RD)
- Board-foot volume per acre
- Cubic-foot volume per acre

Forest Health and Risk

- Surface flame length
- Total flame length
- Hessburg *et al.* (1999) insect and disease ratings

Insect and Disease Ratings

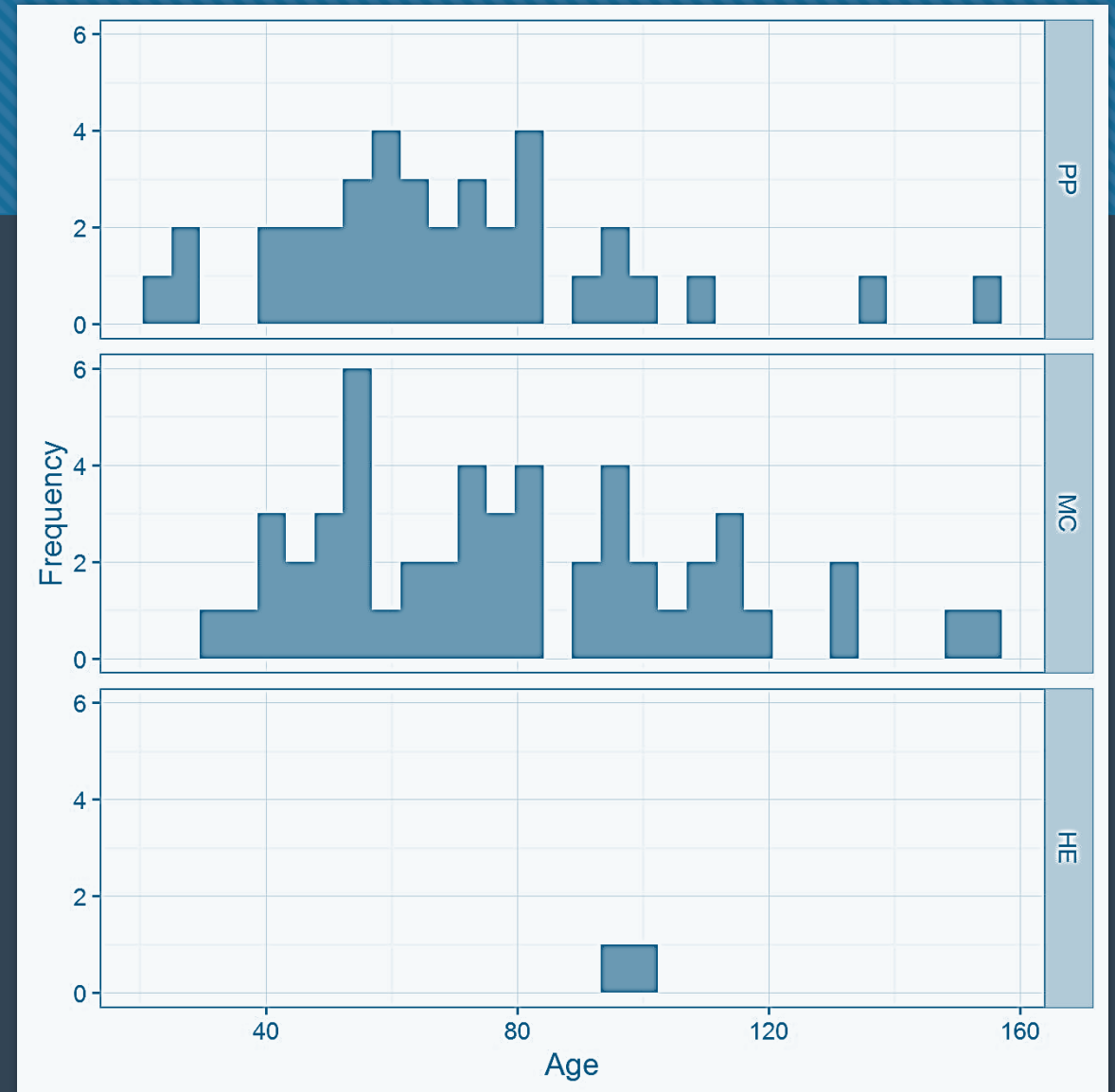
Code	Insect or Disease
WSB	Western spruce budworm
DFB	Douglas-fir beetle
T1WPB	Western pine beetle in mature and old ponderosa pine stands
T2WMPB	Western pine beetle and mountain pine beetle in immature, high density ponderosa pine stands
T1MPB	Mountain pine beetle in immature, high density lodgepole pine stands
FEB	Fir engraver beetle
SB	Spruce beetle
DFDM	Douglas-fir dwarf mistletoe
PPDM	Western dwarf mistletoe
WLDM	Western larch dwarf mistletoe
LPDM	Lodgepole pine dwarf mistletoe
AROS	Armillaria root disease
PHWE	Laminate root rot
HEANS	S-group annosum root disease
HEANP	P-group annosum root disease
TRBR	Tomentosus root and butt rot
SRBR	Schweinitzii root and butt rot
T1WPRB	White pine blister rust in western white pine
T2WPBR	White pine blister rust in whitebark pine
RRSR	Rust-red stringy rot

Current Conditions

Current Conditions

Timber Habitat Type & Age

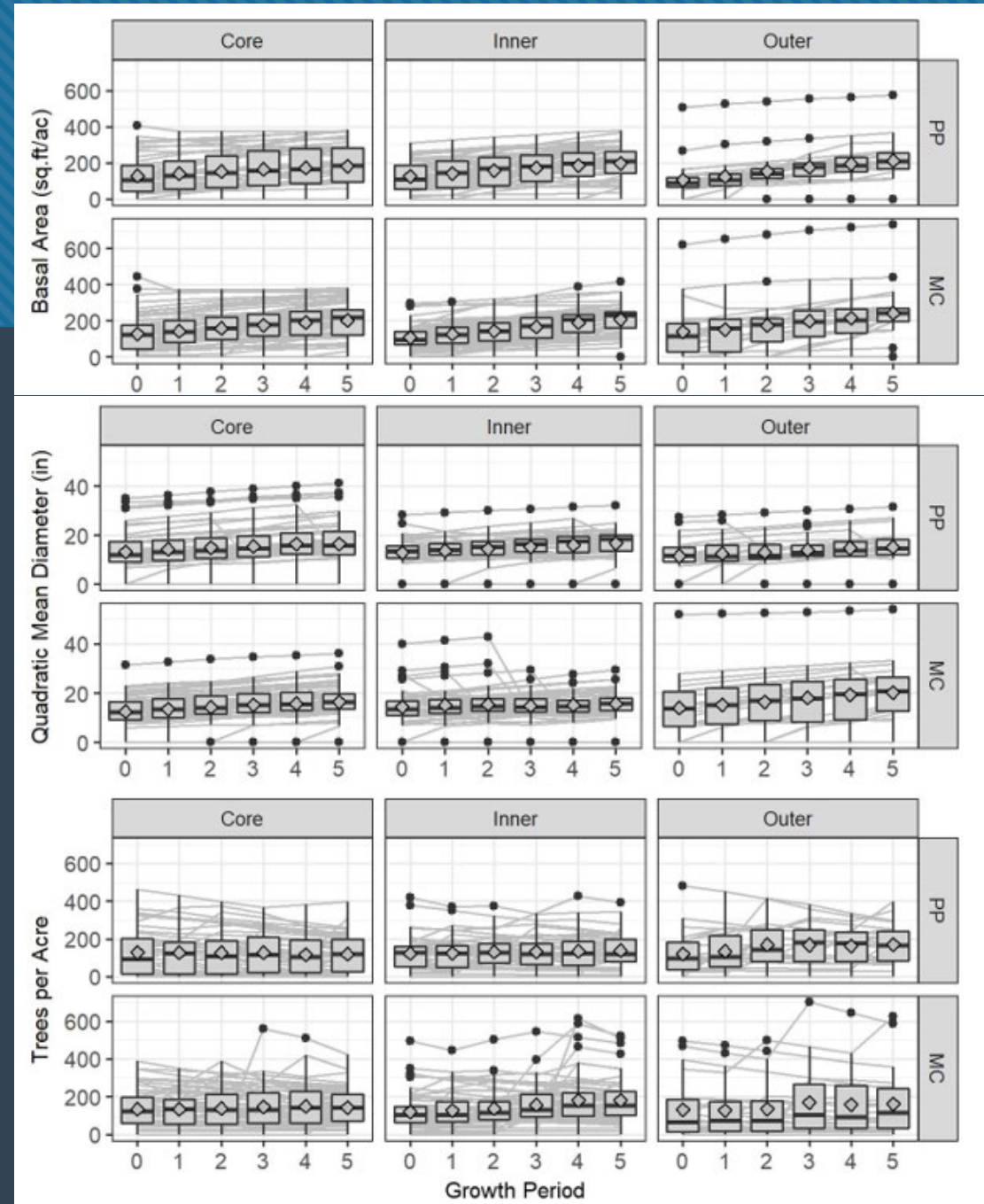
- 42 Ponderosa Pine sites
- 56 Mixed Conifer sites
- 2 High Elevation sites
- Generally 40 – 120 years old
- Higher proportion of young stands in Ponderosa Pine



Current Trajectories

Density

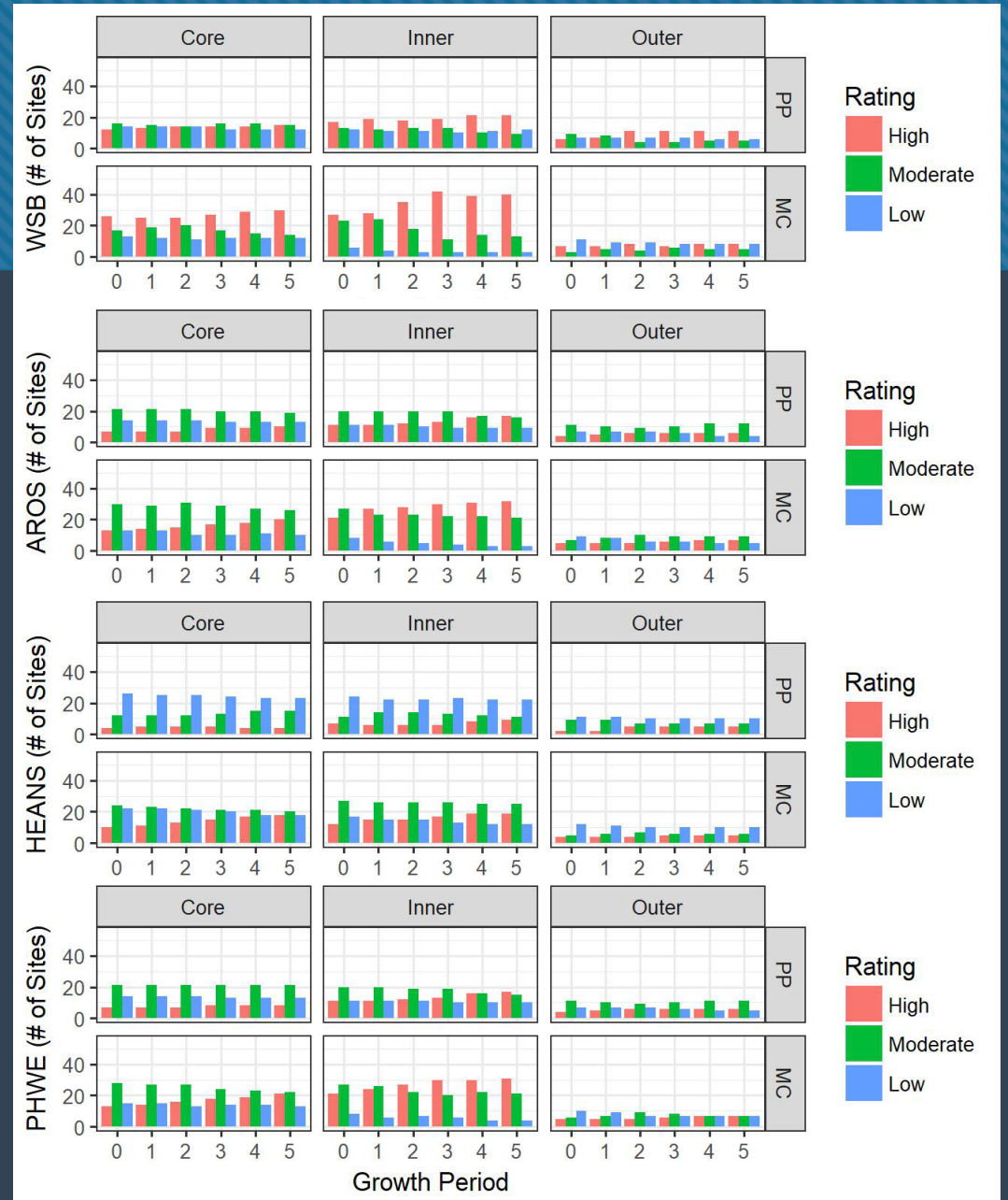
- Stands continue to increase in stand density and tree size without management
- Basal area PAI increased moving away from stream.
(Core: 1.3%, Inner: 1.7%, Outer: 1.9%)



Current Trajectories

Insect and Disease

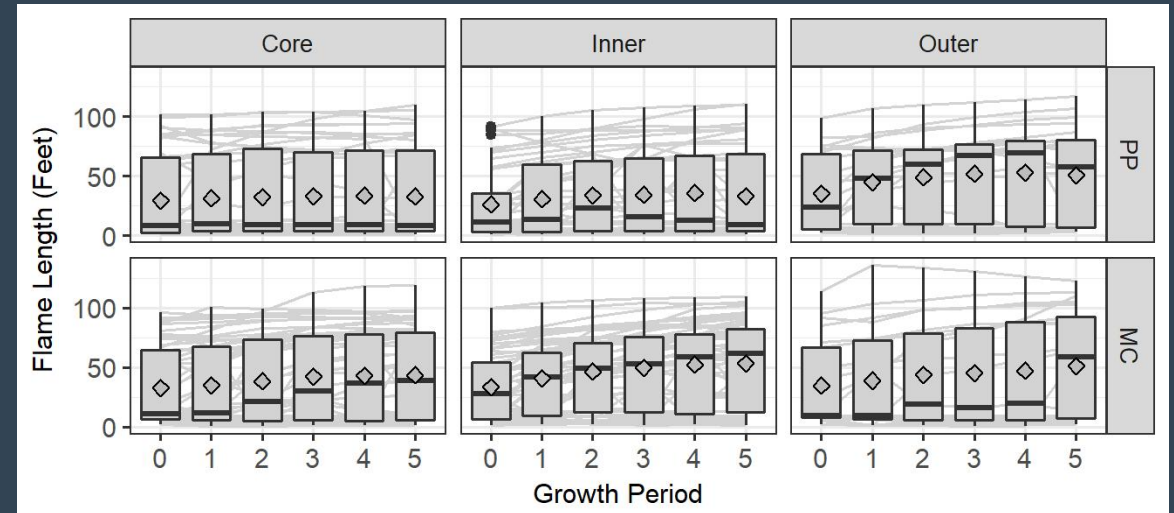
- Increase as predicted with out management.
- Large increase in
 - WSB
 - AROS
 - PHWE



Current Trajectories

Wildfire Risk

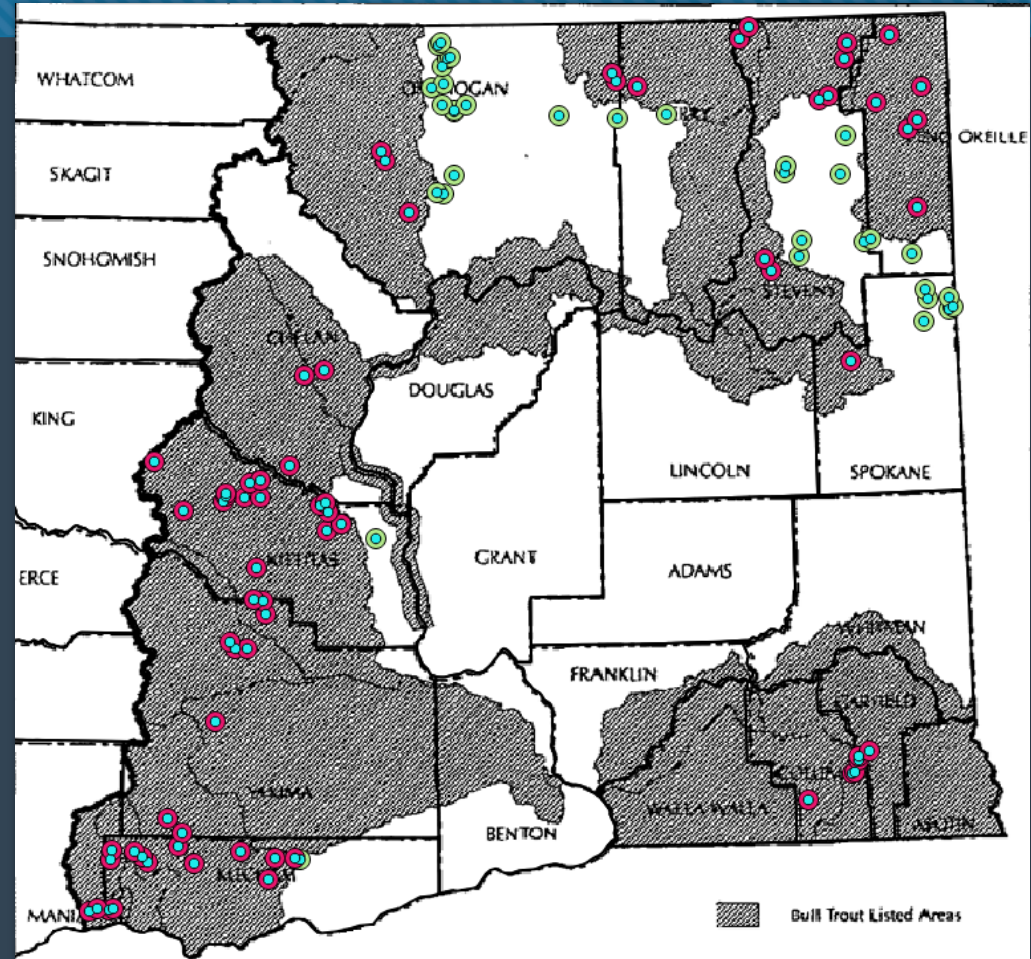
- Assuming no management or natural disturbance, total flame length continues to grow, with significant change detectable by year 30
- Average length from 31 to 43 feet across all sites



Managed Scenarios

Bull Trout Overlay Harvest Eligibility

- 68 Sites in BTO
 - 31 Ponderosa Pine
 - 37 Mixed Conifer
- Sites in BTO must retain shade within 75' of the stream

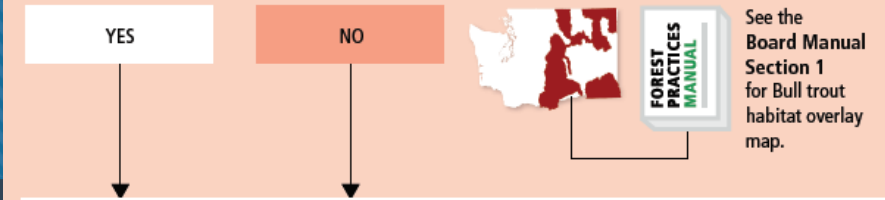


Shade Modeling

- Instream shade canopy closure data were not collected as part of the EWRAP project
- Shade assessments using methods from the Washington Forest Practices Watershed Analysis Manual Riparian Function Module for wide streams
- “View of sky” from center of stream
- Model assumptions documented in report

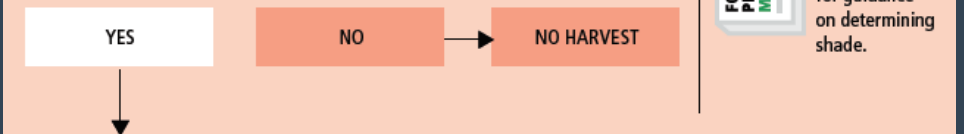
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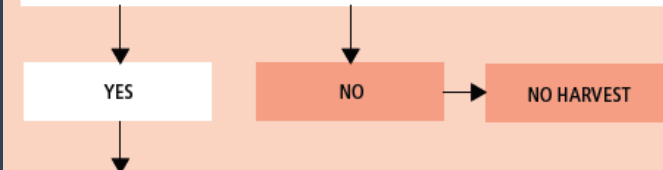


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See Leave Tree Requirements graphics on next pages



Inner Zone Harvest Eligibility

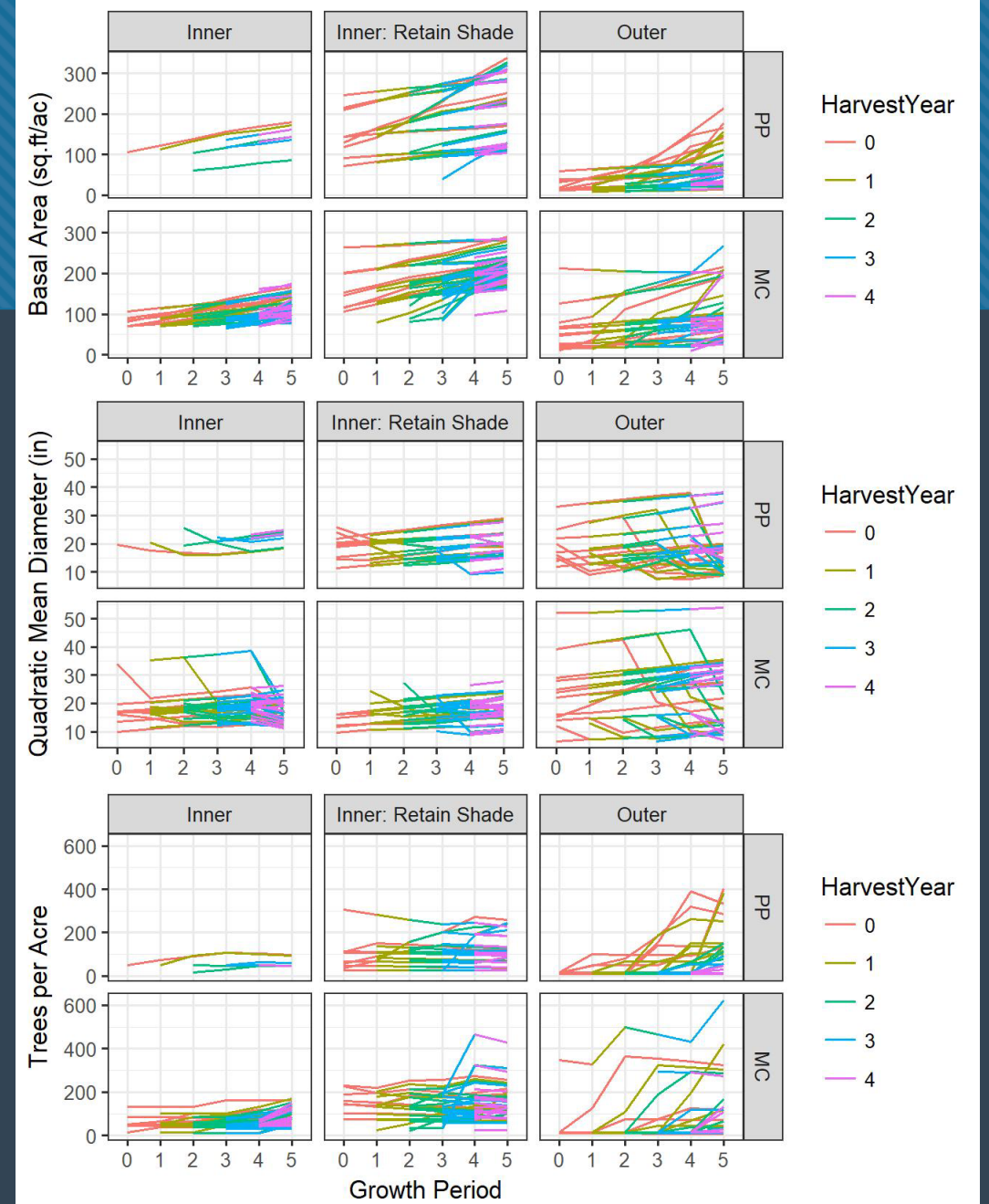
		Year 0		Year 10		Year 20		Year 30		Year 40		Year 50	
Meets Shade Requirements		N	Y	N	Y	N	Y	N	Y	Y	N	N	Y
		67	31	68	30	67	31	66	32	65	33	64	34
Meets Stocking Requirements	N	35	16	26	13	21	9	15	6	14	4	10	2
	Y	32	15	42	17	46	22	51	26	51	29	54	32

- Shade and basal area criteria not met are not harvested (red)
- Shade not met but basal area is met can have harvest beyond 75' (yellow)
- Shade and basal area criteria both met can be harvested throughout (green)

Managed Trajectories

Stand Dynamics

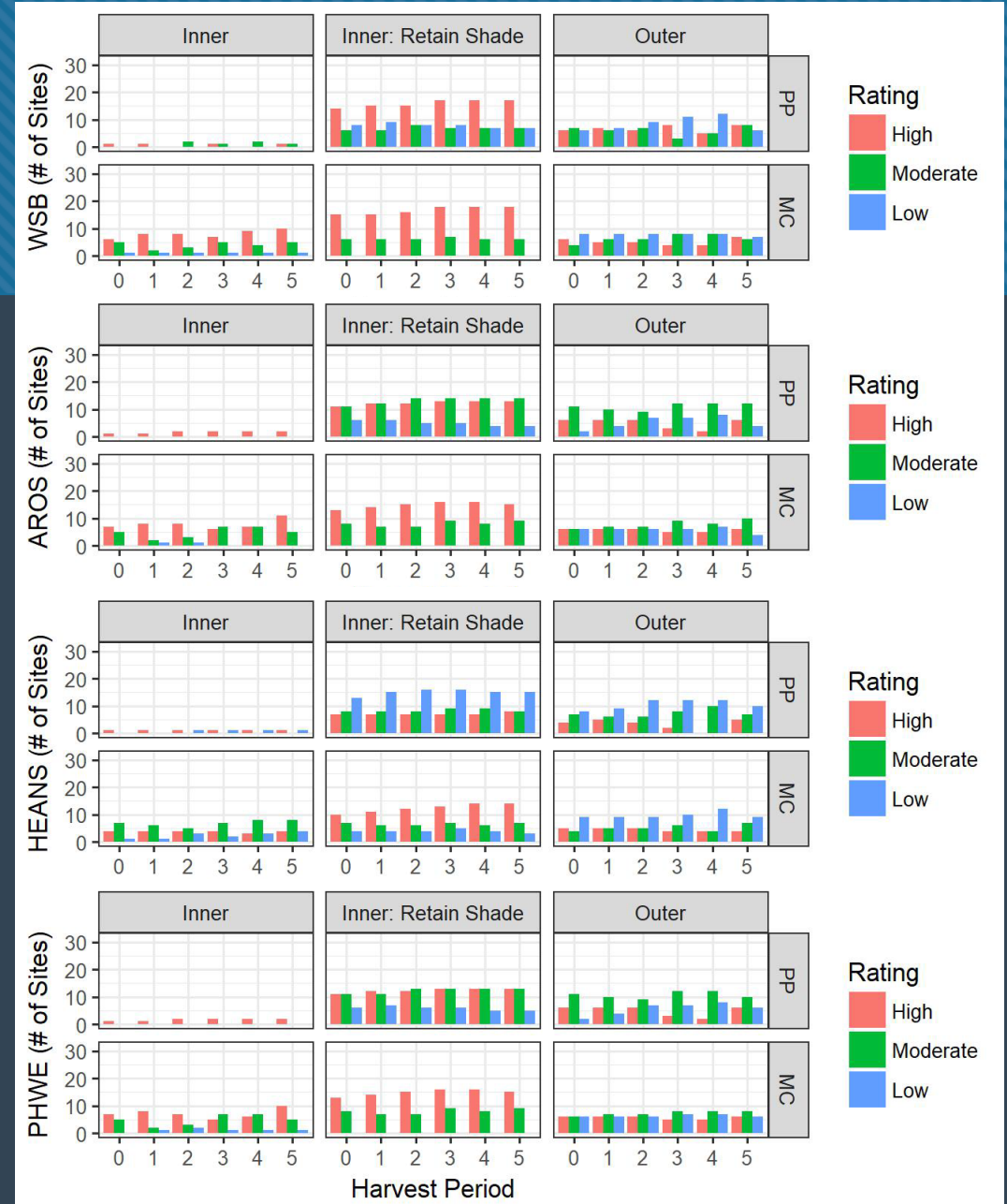
- Overall, predicted QMD growth was very stable under post-harvest growing conditions created by following forest practice rules.
- With management, stands continued to increase in stand density, tree size, and tree volume, on average, over the 50-year simulation period.
- Decreases in TPA did not include mortality from episodic events such as windthrow that could occur post-harvest.



Managed Trajectories

Insect and Disease

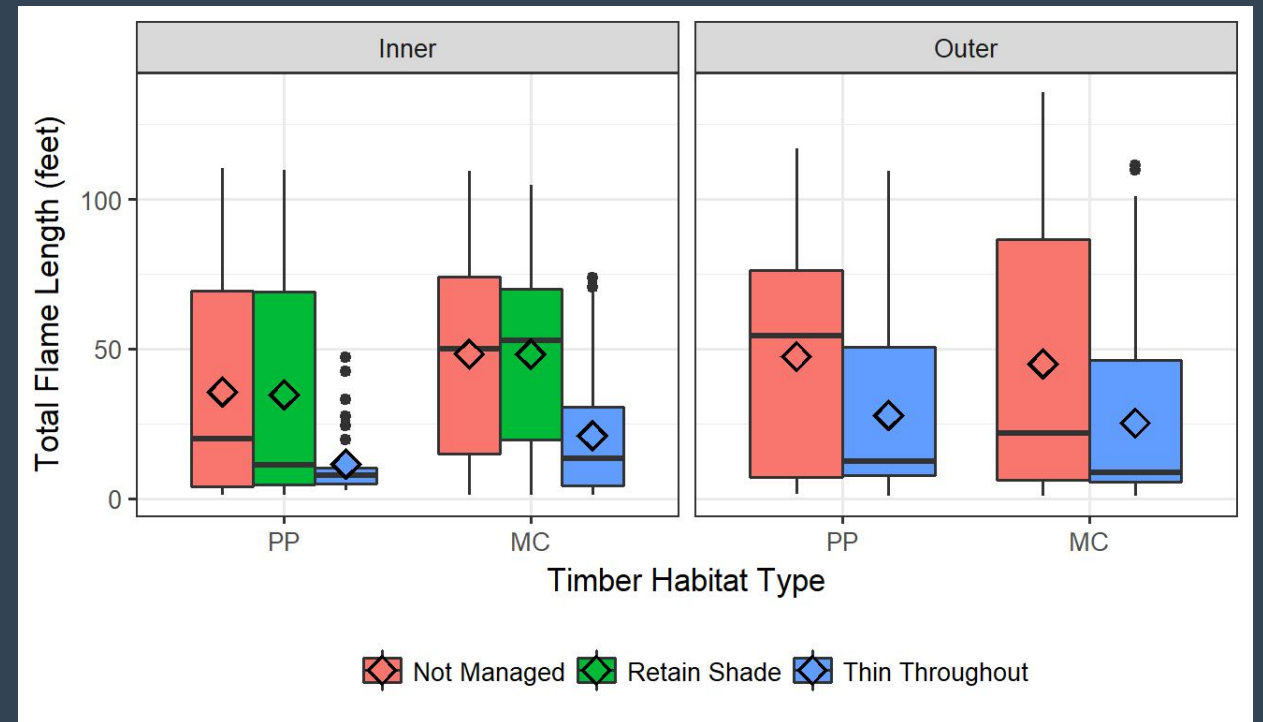
- Overall reduced increase with management.
- Full thinning (inner) often produced larger reductions compared to retaining shade.



Managed Trajectories

Wildfire Risk

- Low levels of management made minor changes
- However, full thinning made for dramatic decreases in flame length
 - Especially for Inner zone!
 - PP: 37' to 12'
 - MC: 50' to 20'



Summary

- Stocking and shade requirements limit harvest eligibility in inner zones
- Growth increases post harvest, primarily in outer zone
- Susceptibility to insects and disease decreases even with low levels of management
- Wildfire flame lengths are reduced, but primarily in outer zone

Discussion

Discussion: Riparian Data

- Coarse scale designation of ecological forest typing weakens comparisons
- Low stocking at sample sites may indicate issues with transect methodology
- No direct shade measurements were a major limitation

Discussion: Modeling

- Models fell within ranges that FVS can support
- Did not including potential climatic components
- Landscape level assessments for insect and disease used for stands
- Shade modeling was coarse, and had major effects on potential harvestability

Conclusions

- Overall, as riparian zone growth was simulated with FVS for 50-years with and without management, tree size and stand density increased (Project Objectives 1, 4), along with some increases in insect and disease susceptibility and potential fire severity without management, and decreases with management (Project Objective 5).
- Across the EWRAP sites, many inner riparian management zones were not eligible for harvest primarily because they were located within the BTO or lacked sufficient shade to allow management treatments, which was consistent throughout management simulations (Project Objective 2).
- When inner zones could be managed, either thinning throughout the zone or only thinning the outer 25 feet along larger streams in the BTO or where shade was deficient, management with available prescriptions had minimal effects on tree growth and minimal reductions in insect and disease susceptibility (Project Objectives 1, 3).
- Management in outer zones, which removed more trees, increased tree growth and reduced insect and disease susceptibility, and potential wildfire severity (Project Objectives 1, 3).



???

If you have any questions, I'm happy to go over them!

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