Riparian Rule Analysis for Oregon Board of Forestry

WESTERN REGION COUNCIL ON FOREST ENGINEERING

14 January, 2016

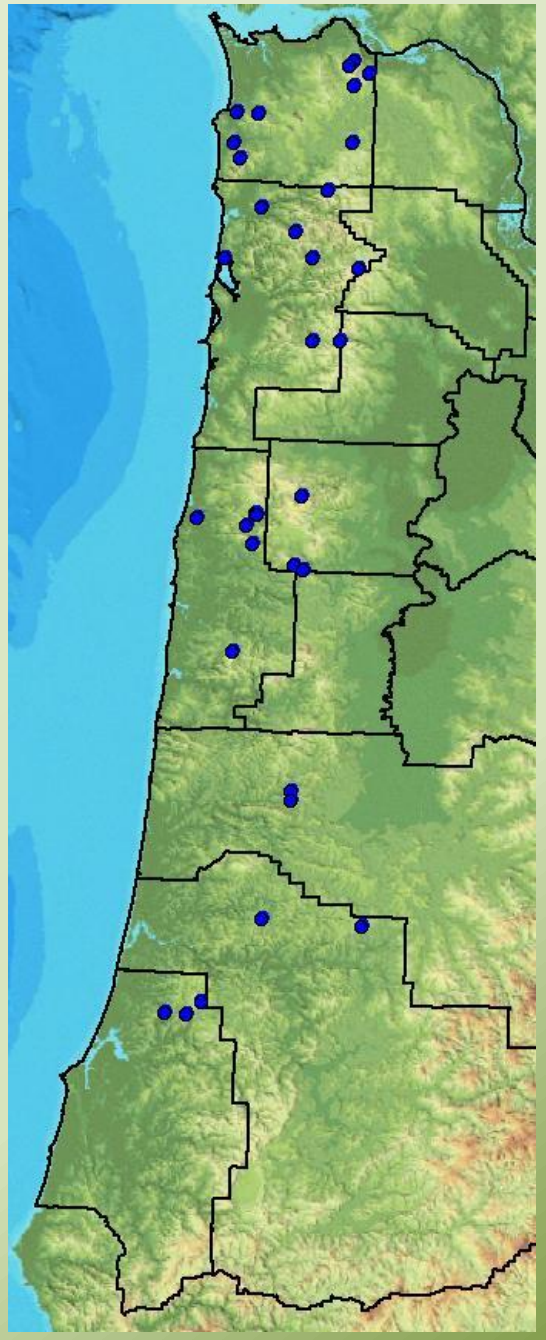
Presentation Outline

- ODF study (RipStream) – origin of riparian rule analysis
- Board Actions + analyses of rule and options
- Board Decision
- Next steps

RipStream Study

- 33 Sites (18 Private forests, 15 State forests; medium, small F streams)
- Objective: Evaluate effectiveness of FPA rules at protecting stream temperature, promoting riparian structure

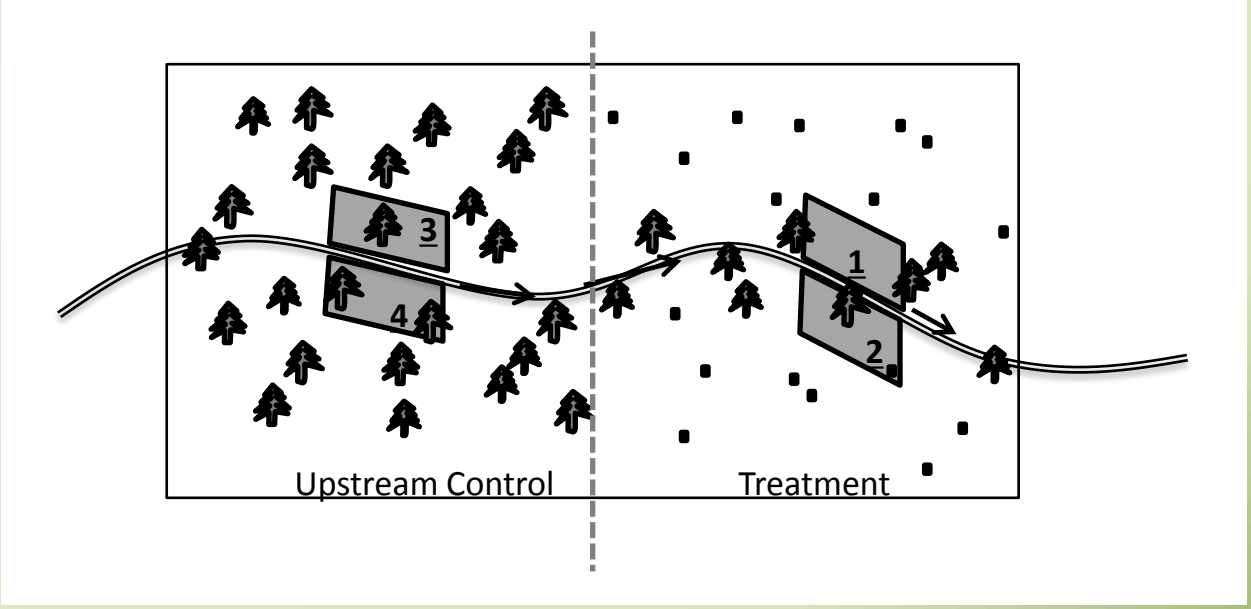
- External review team – industry, agencies



RipStream – Data Collection

2 years Pre-harvest, 5 years Post-harvest:

- Stream temperature
- Shade
- Channel morphology (e.g., gradient, widths)
- Riparian vegetation (e.g., tree heights, DBH, distances)



RipStream Findings

- **RipStream - small & medium F streams with FPA protections:**
  - **Meet Biologically-based numeric temperature criteria**
  - **Not meet Protecting Cold Water (*PCW*) criterion (≤0.3 °C increase due to human activity)**

Board actions + Rule Analysis

Board actions: timeline

- **Oregon Board of Forestry ("Board") finding of degradation (PCW)→ began rule analysis (Jan. 2012)**
- **Rule objective (April 2012)**

Establish riparian protection measures for small and medium fish-bearing streams that maintain and promote shade conditions that insure, to the maximum extent practicable, the achievement of the Protecting Cold Water criterion

Board actions: timeline

- Range of alternatives to consider (July 2012)
- Scientific info: Systematic Review protocol (March 2013) & subsequent findings (Nov. 2013) → Develop alternatives
- Science and policy workshop (June 2014; workshop summary Sept. 2014)
- Methods for evaluating prescriptions (April 2015) and associated results (June and July 2015)
- Decision on rule change (November 2015)

Riparian Rule Analysis: Context

<u>Throughout analysis, ODF worked with:</u>

– Board advisory committees:
  - Regional Forest Practices Committees,
  - Committee for Family Forestlands,

–stakeholders

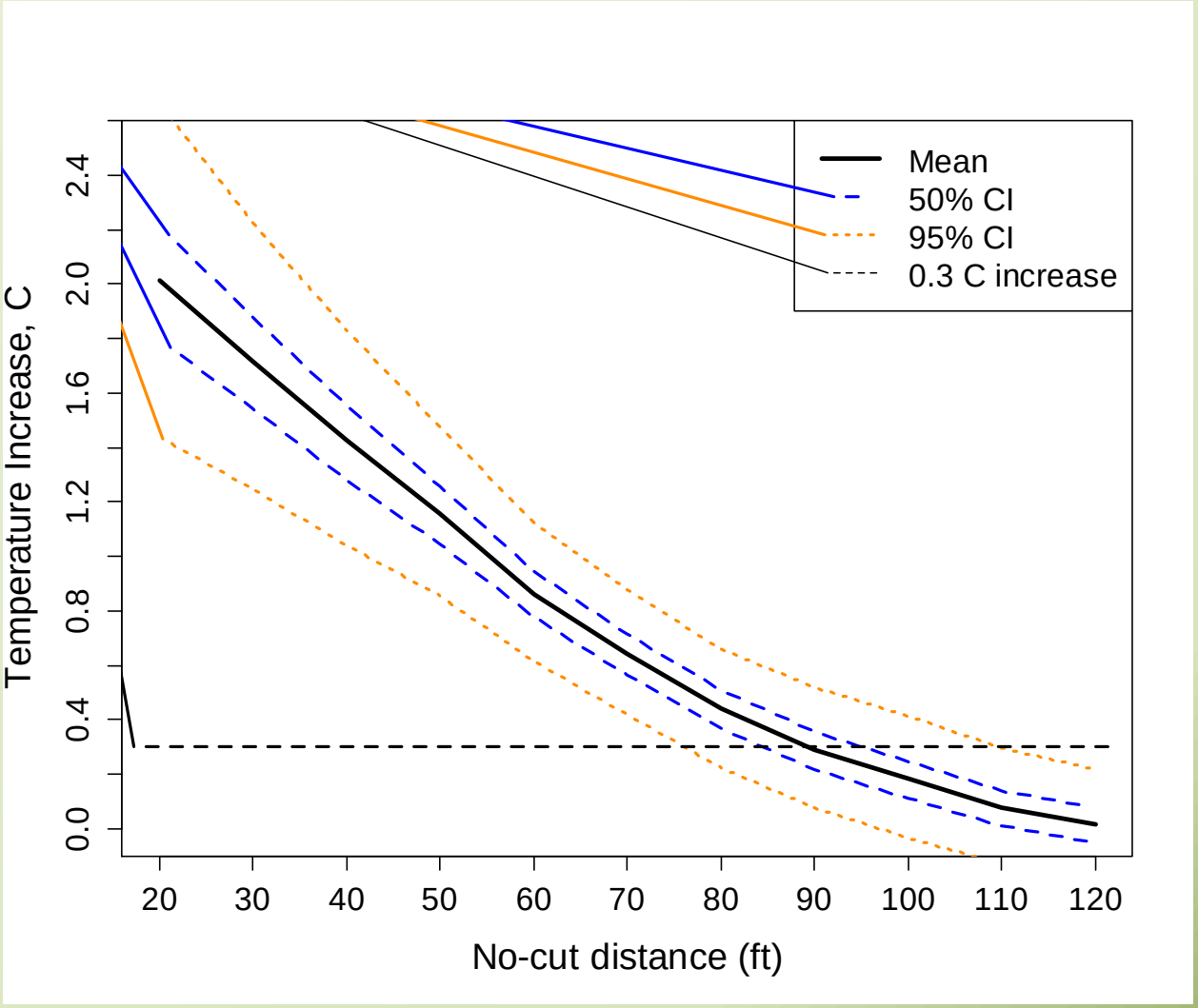
–partner agencies

Rule Analysis: RipStream Predictions

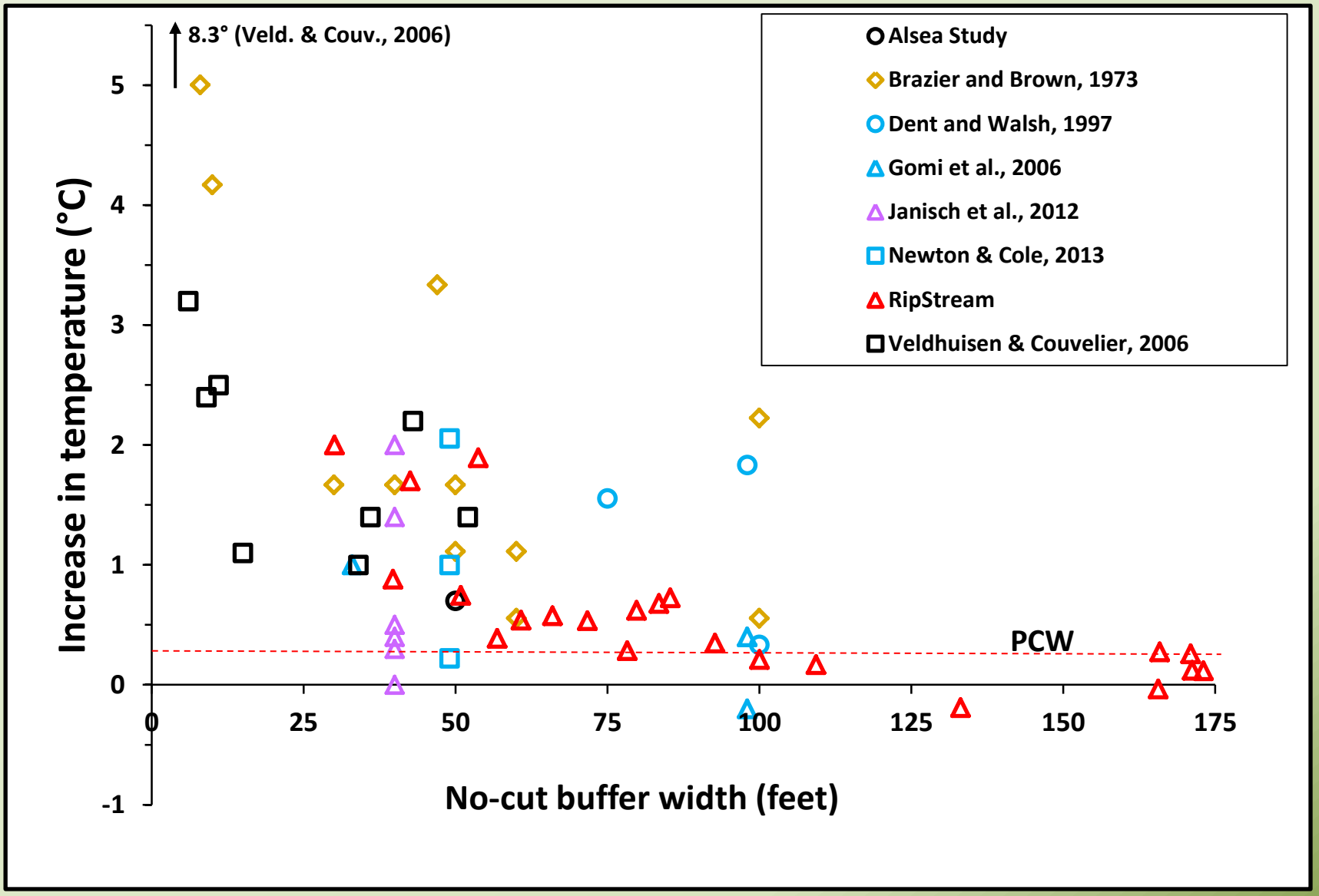
- **Based on vegetation plots, shade and stream temperature data**
  - Estimates of harvest-related warming
  - Predictions of proposed harvest effects on temperature
  - Measure of confidence in model results

  Developed in consultation with external review team, professional statisticians

Rule Analysis: RipStream Predictions



Rule Analysis: RipStream findings in context (Systematic Review)



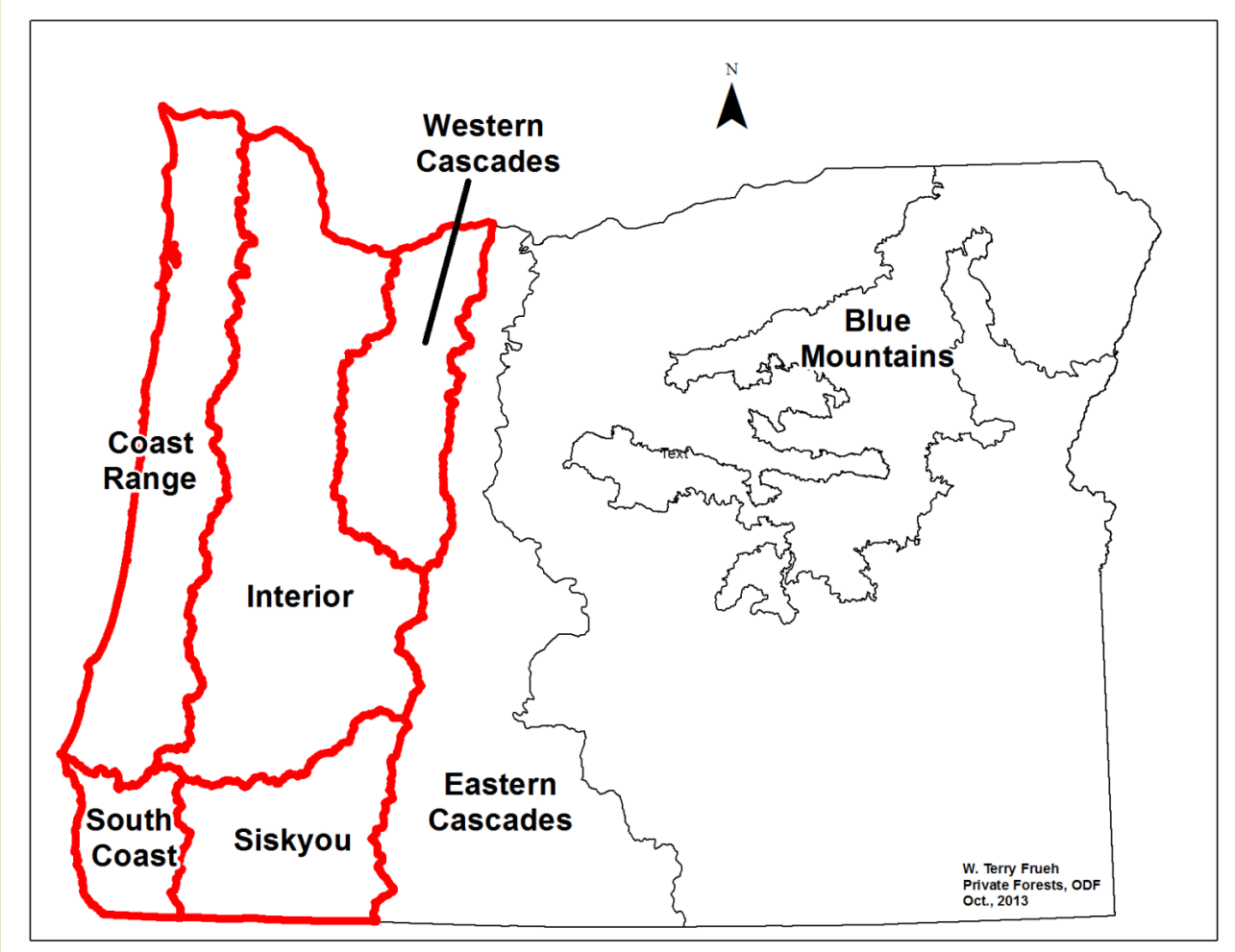
Rule Analysis: Geographic Extent

- Two aspects of where rules could apply:
  - **Geographic Regions** in W. Oregon
  - **Stream Extent: which small & medium streams**
    - Only streams with salmon, steelhead, or bull trout (SSBT)
    - Fish streams
    - Combination of SSBT and F streams
- Largely policy questions, science provides minimal direction

Rule Analysis: W. Oregon Geographic Regions

- Information from Systematic Review
- Implications of current policy as identified in rule

BOTH equivocal



Rule Analysis: Stream Extent

Guidance:

- Rule analysis objective:

Establish riparian protection measures (Small, Medium F streams) to meet PCW

- PCW [OAR 340-041-0028 (11)(a)]:
  - "…applies to *all sources taken together at the point of maximum impact* where salmon, steelhead or bull trout [**SSBT**] are present."
  - Indicates need contributing waters (i.e., **upstream**)]

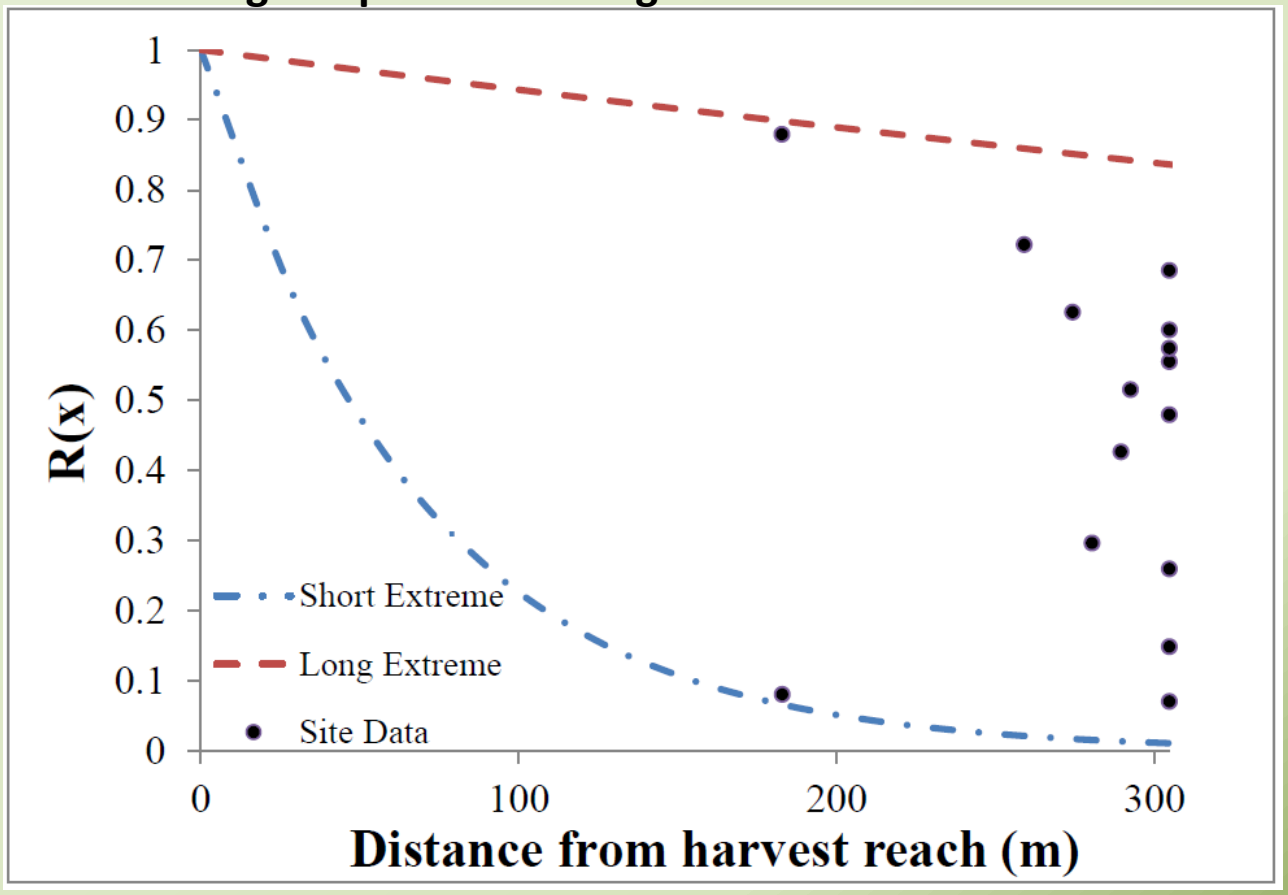
Board bookends (small & medium streams): SSBT to all F

Rule Analysis: Stream Extent - upstream

Challenges:

1. Distance upstream of main stem: some science, lots of variance

Remaining temperature change downstream of harvest



Rule Analysis: Stream Extent - upstream

Challenges:

2. Tributaries: volume-weighted flow (complicated modeling, much uncertainty) plus challenge #1
3. All sources taken together: timing of heat load arrival from multiple streams at point of maximum impact

Minimal scientific direction; Board policy call

Summary of Information provided to Board

For each prescription:

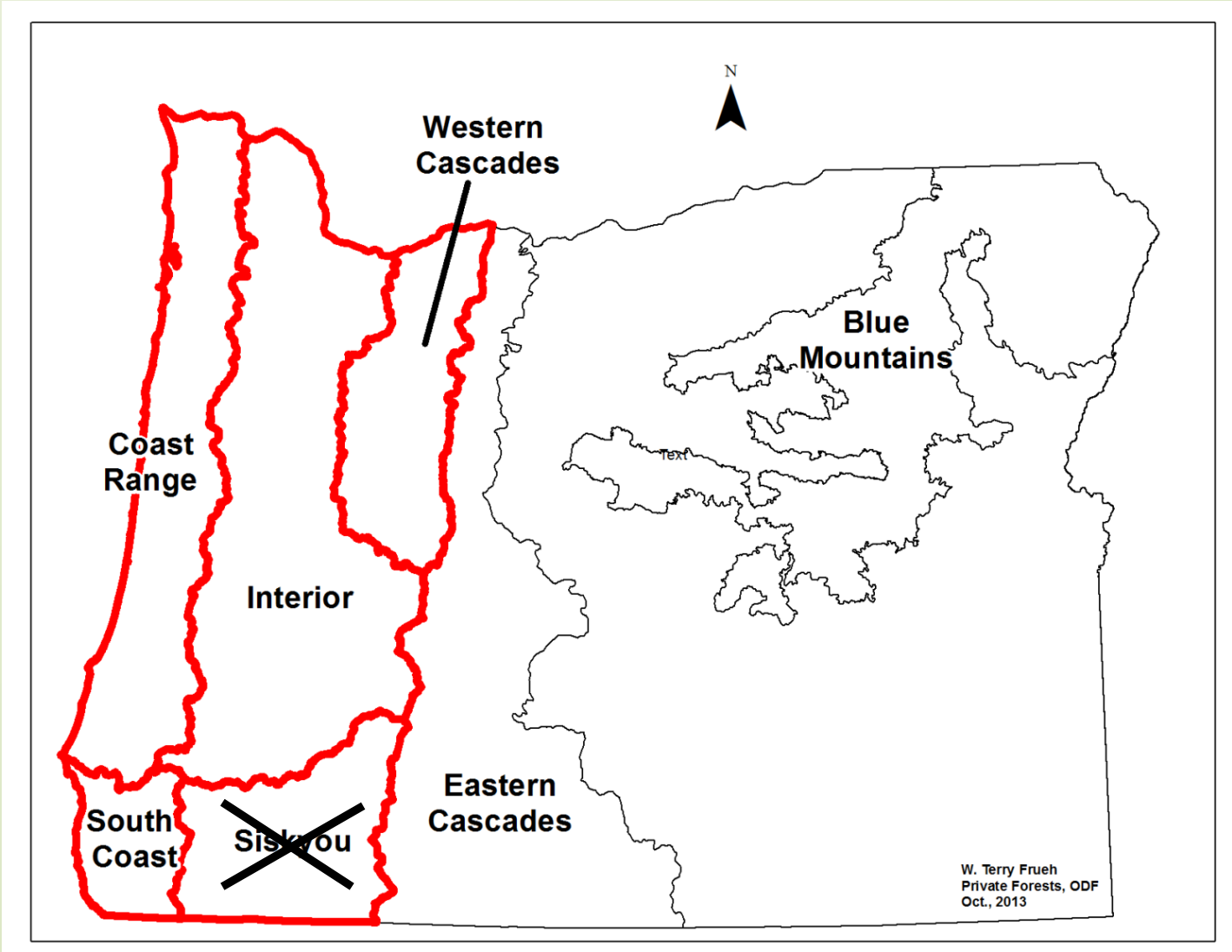
- Predicted temperature change with measure of confidence
- Equivalent fixed width of buffer
- Large wood recruitment, decrease in shade, fish response
- Additional encumbered acres by georegion ownership, stream type (SSBT or all Fish)
- Land and Timber Value of these additional encumbered acres

Board Decision on Riparian Rule
November 2015

Coarse level, not yet formal rule language

Board Decision - Georegions

Rule to apply in: Coast Range, Interior, Western Cascades, South Coast



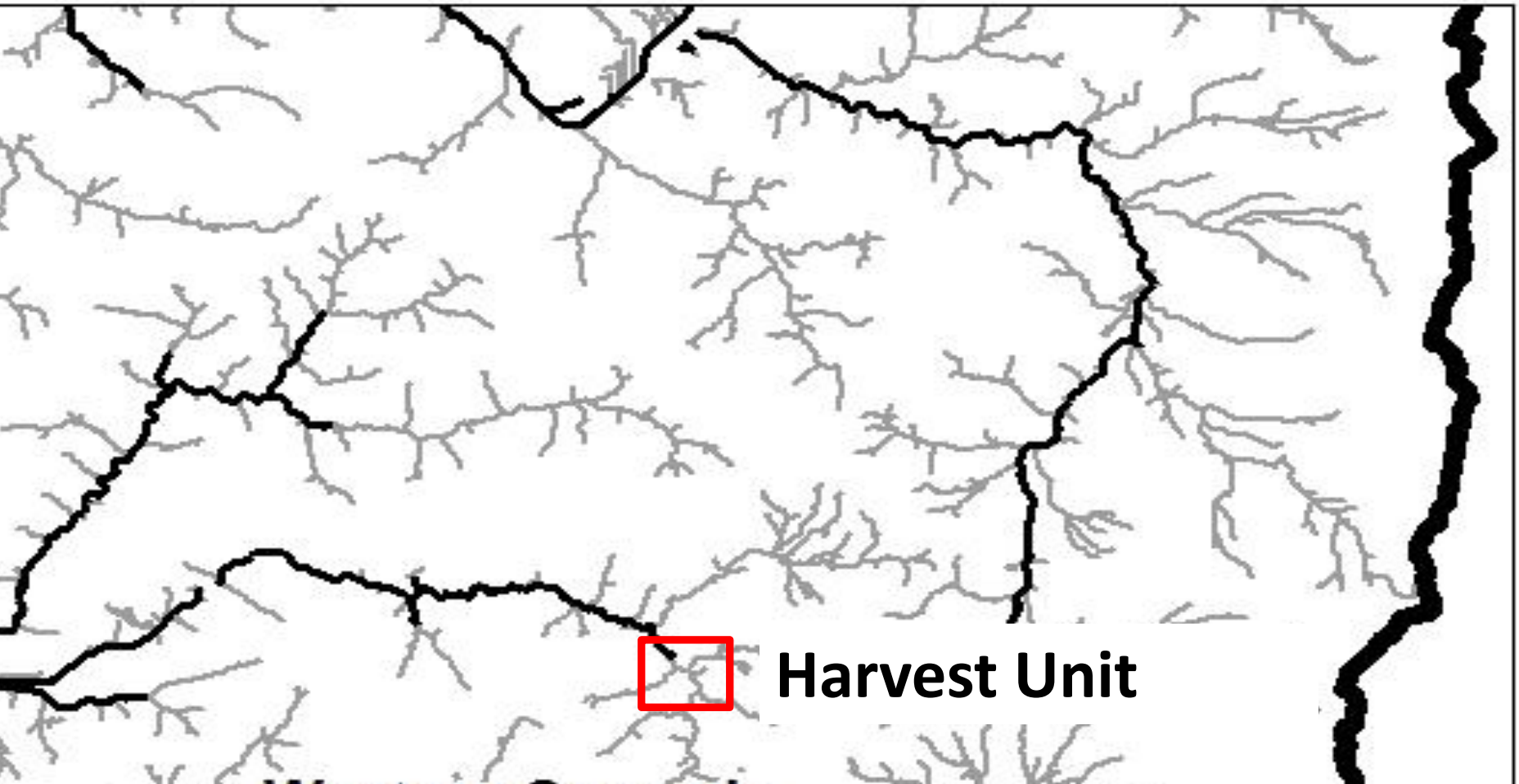
Board Decision - Stream extent

Rule to apply to:

- **Small, Medium Salmon, Steelhead, and Bull Trout (SSBT) streams**

  ~30% of Small + Medium F streams

- **Fish Streams immediately upstream of end of SSBT within same harvest unit**


Salmon, Steelhead, Bull Trout
ODF Fish
N
Harvest Unit

Board Decision: New Rule Prescriptions

Landowners can pick any of options

<u>Option 1, No-cut buffer</u>

- 60’ Small SSBT streams
- 80’ Medium SSBT streams

Board Decision: New Prescriptions

<u>Option 2, Variable Retention</u>

- 60’ RMA Small SSBT streams (per 1,000 feet):
  - 110 ft.^{2} (maximum 37 ft.^{2} from 0-20 foot no-cut zone)
  - 15 conifers in the 20-60 foot zone
- 80’ RMA Medium SSBT streams (per 1,000 feet):
  - 184 ft.^{2} (maximum 46 ft.^{2} from 0-20 foot no-cut zone)
  - 30 conifers in the 20-80 foot zone
- Trees well-distributed throughout RMA
- Hardwoods count equal to conifers

Board Decision: New Prescriptions

Option 3, North-side buffers

- 40’ no-cut north-side buffers (stream segments with valley azimuth within 30˚ of east-west)
- South-side buffers meet Options 1 or 2

Next Steps


Phase 1
November 2015 – January 2016
• Identify Advisory Committee Members
• Develop Communication Strategy
• Develop communication tools for outreach
Phase 2
February 2016 – August 2016
• Prepare Draft rule language and FIS
• Outreach to different groups/stakeholders
• File Proposed rule language and FIS
Phase 3
September 2016 – December 2016
• Draft guidance for proposed rules
• Conduct Public Hearings; Compile Public Survey Data
• Prepare Public Hearings/Comments Report for BOF
Phase 4
January 2017 – September 2017
• Incorporate Public Comment into proposed rules
• Draft permanent rules; Seek approval from BOF
• File permanent rules; Rules effective 9/1/17
October 2017 – January 2018
• Finalize guidance for field; provide training
• Update website
• Publish FPA rules and statutes newsprint by 1/1/18

Conclusion

- Intensive RipStream study led to Board's rule analysis
- Rule analysis: 3+ years, multiple analyses, transparent & inclusive process
- Board decisions on new rules: geographic extent, prescription options
- Next steps: draft rule language with public input, secretary of state process (estimate: rule effective 9/1/2017)

Questions?

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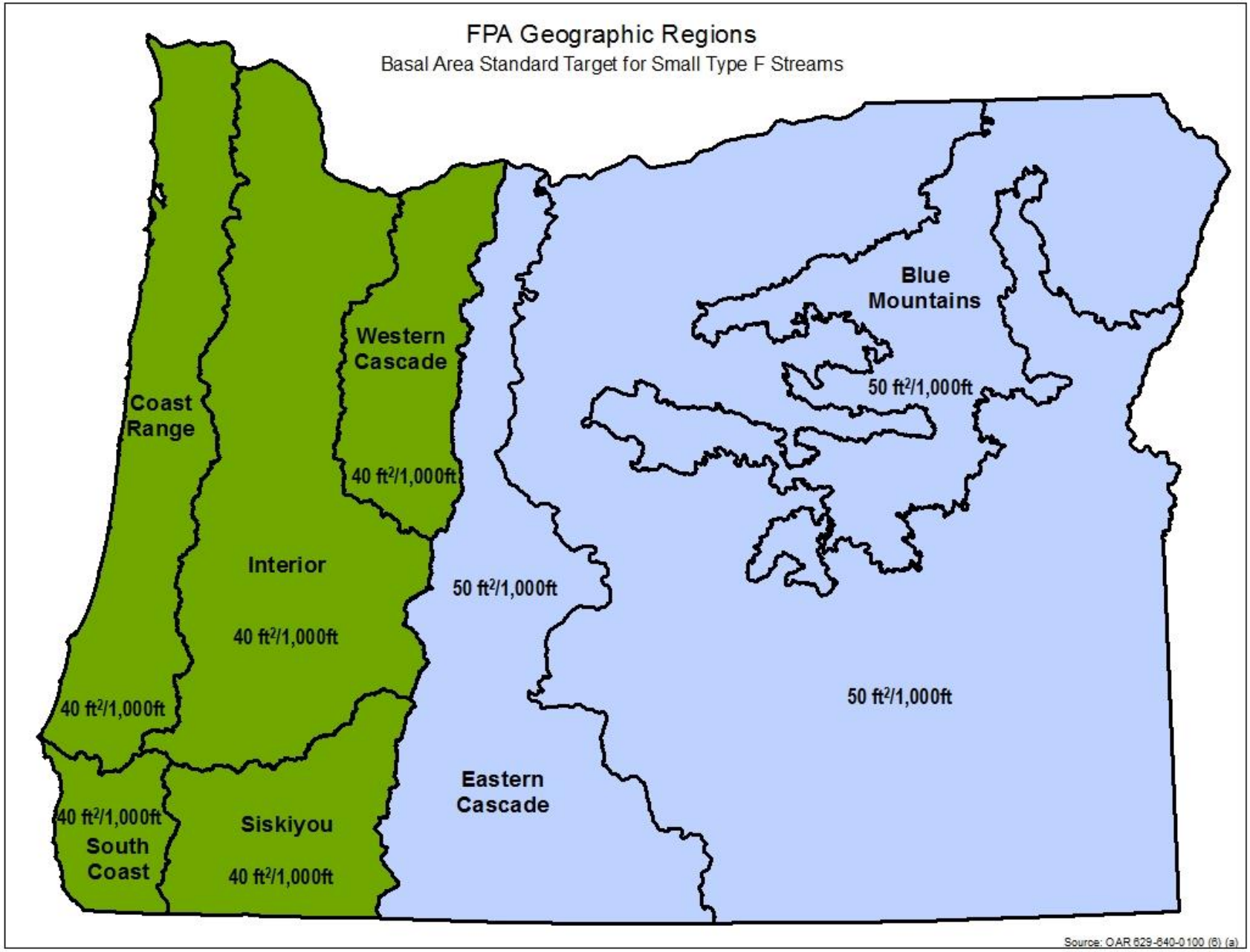
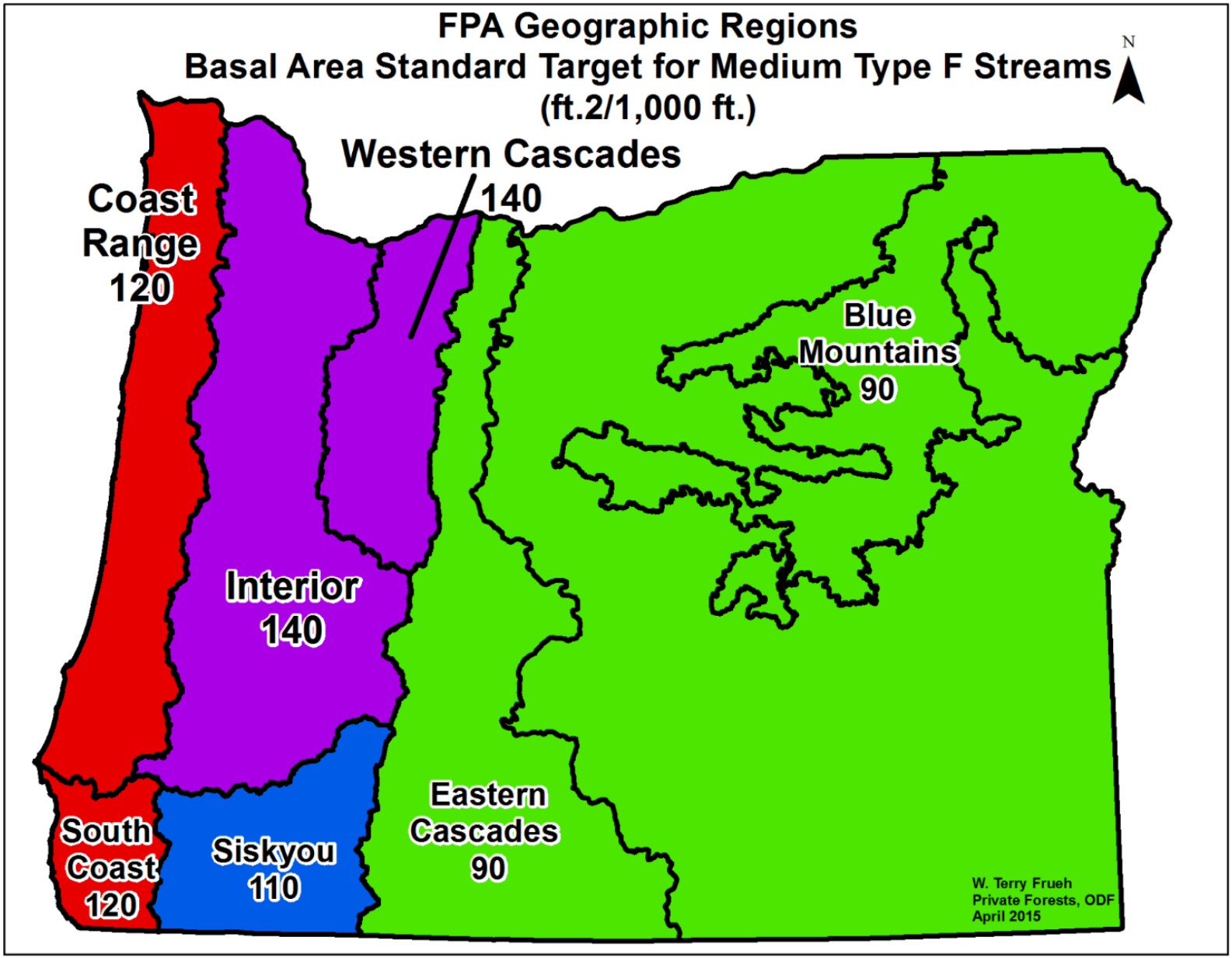
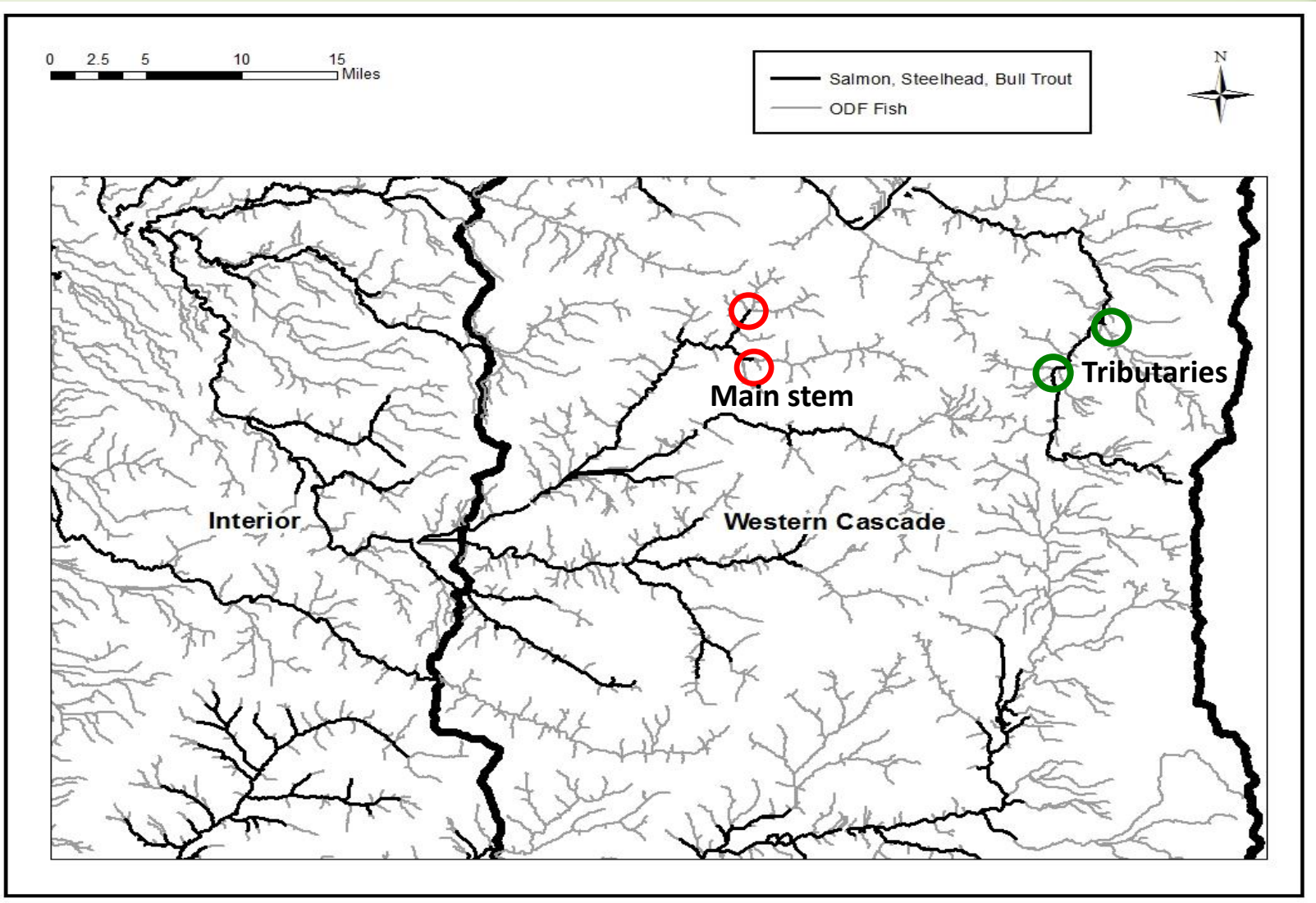
Extra slides to help answer questions


FPA Geographic Regions
Basal Area Standard Target for Small Type F Streams
Coast Range
40 ft²/1,000ft
Western Cascade
40 ft²/1,000ft
Interior
40 ft²/1,000ft
Blue Mountains
50 ft²/1,000ft
50 ft²/1,000ft
50 ft²/1,000ft
Eastern Cascade
40 ft²/1,000ft
South Coast
Siskiyou
40 ft²/1,000ft
Source: OAR 629-640-0100 (6) (a)

Geographic Regions & Stream Size



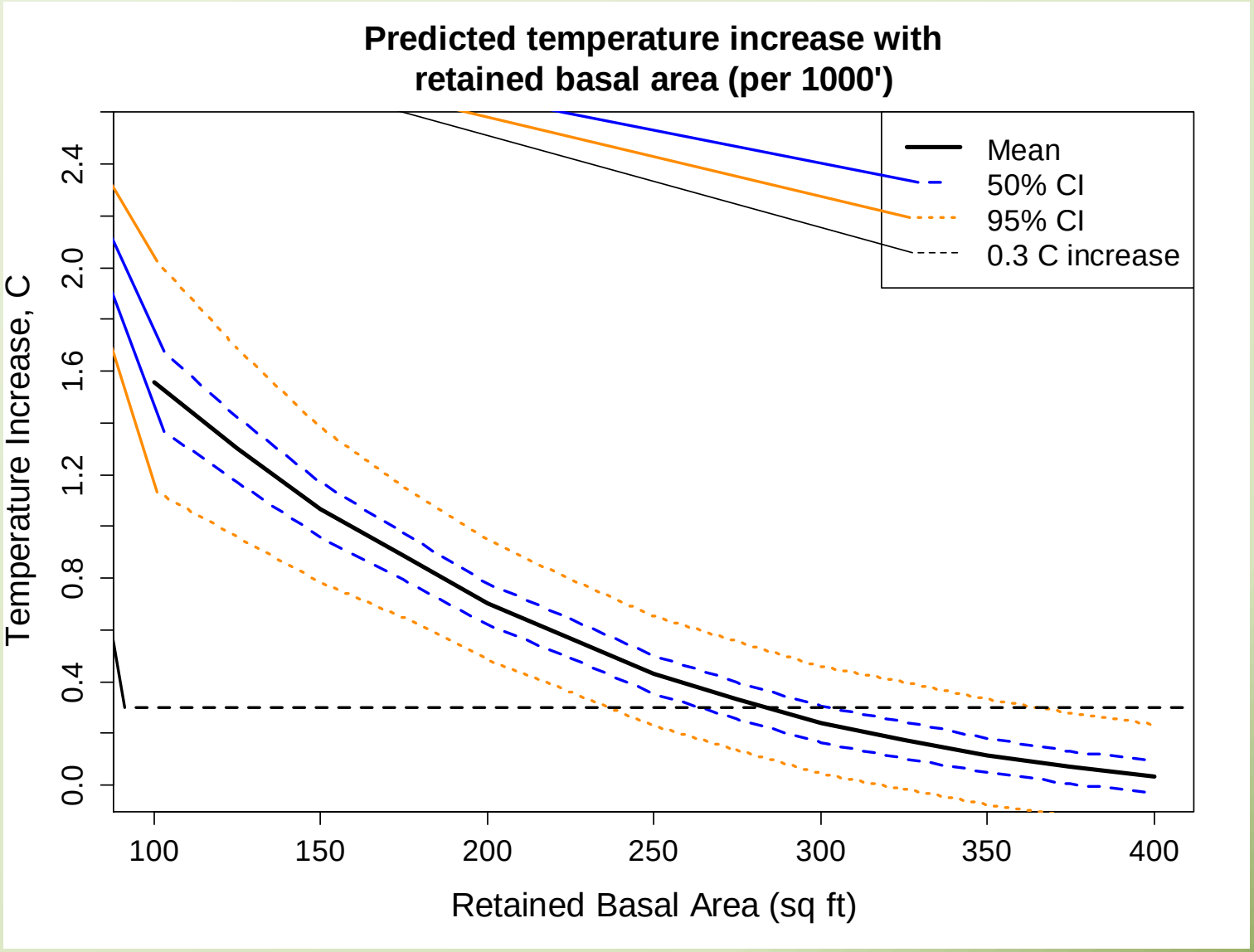
Two types of “upstream”



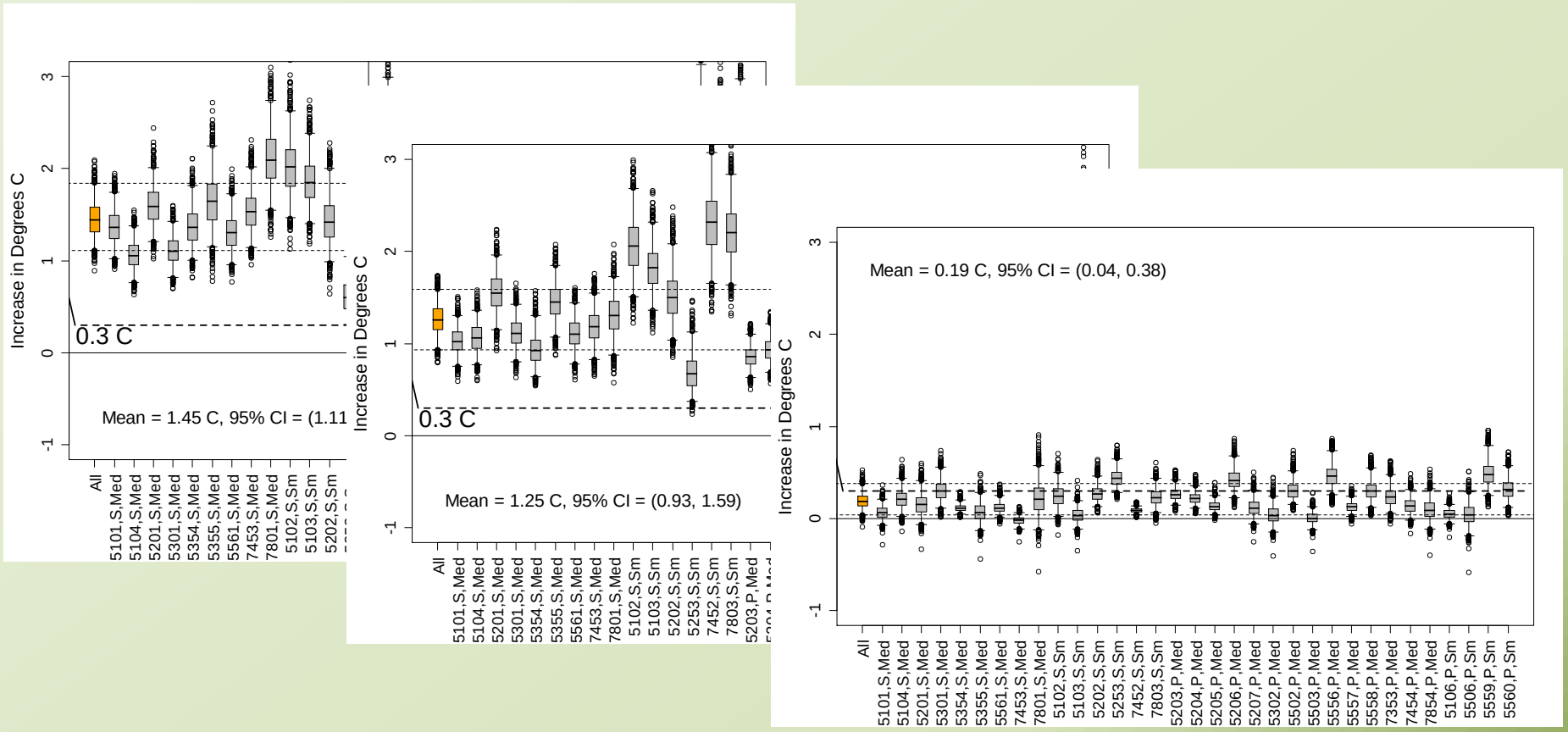
Temperature response: South-sided Prescriptions

Stream	Buffer width (left, right; ft.)	Change in 7-day maximum through the unit (°C)
Cascade	Not available	0.1
Mill	85, 82	0.0
Scheele	62, 31	1.4

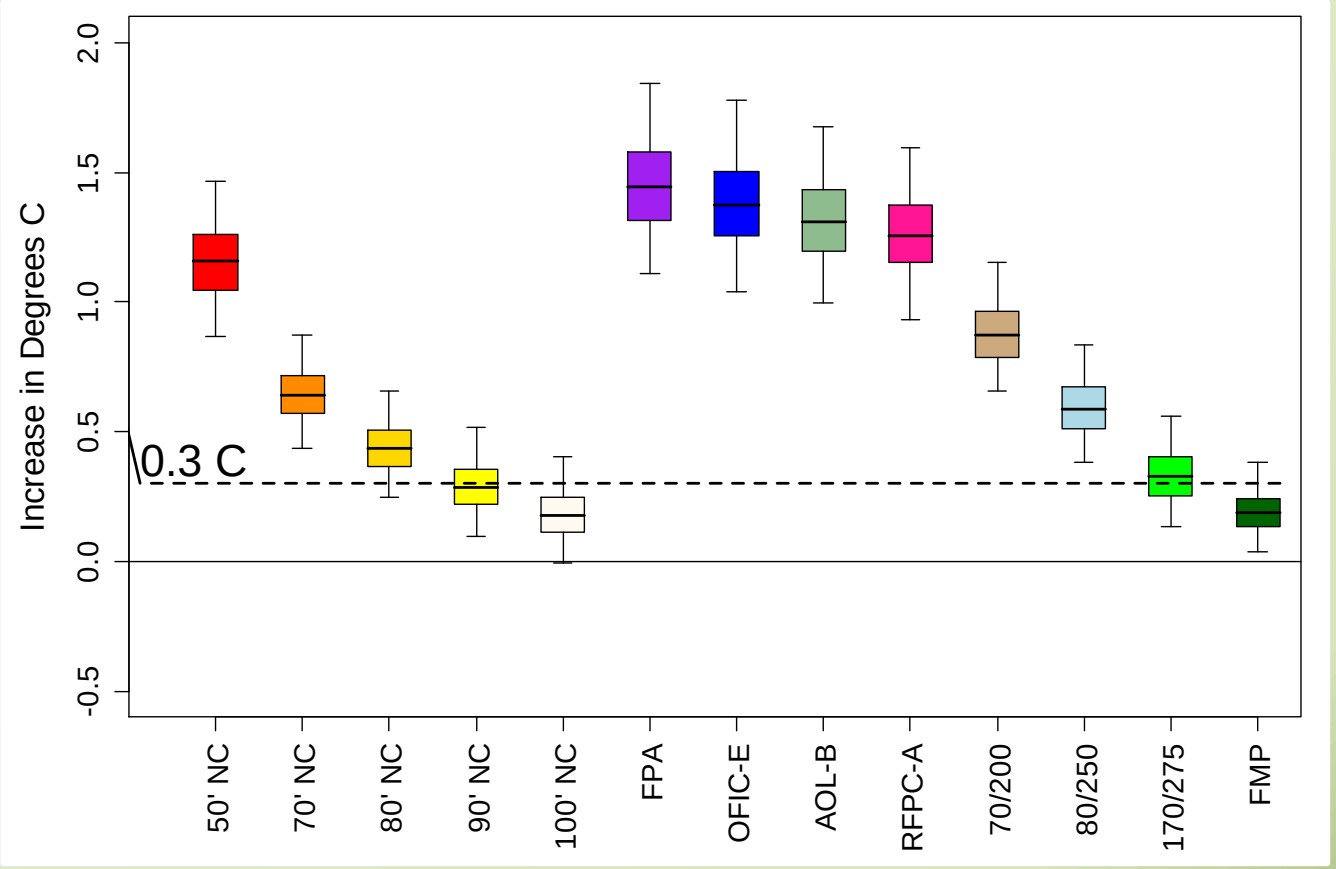
Predicted temperature change as a function of total basal area

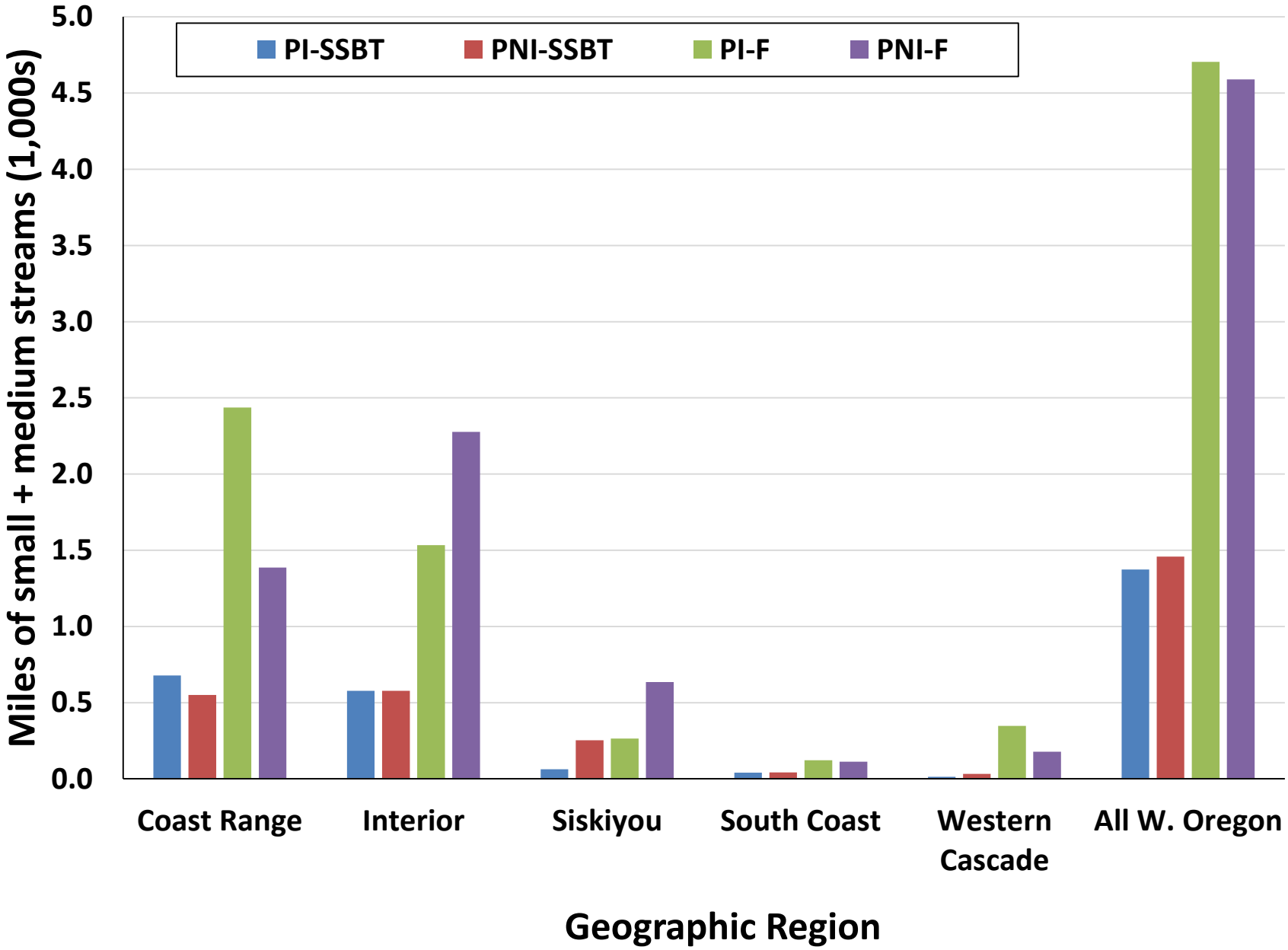


Predicted temperature change for each prescription

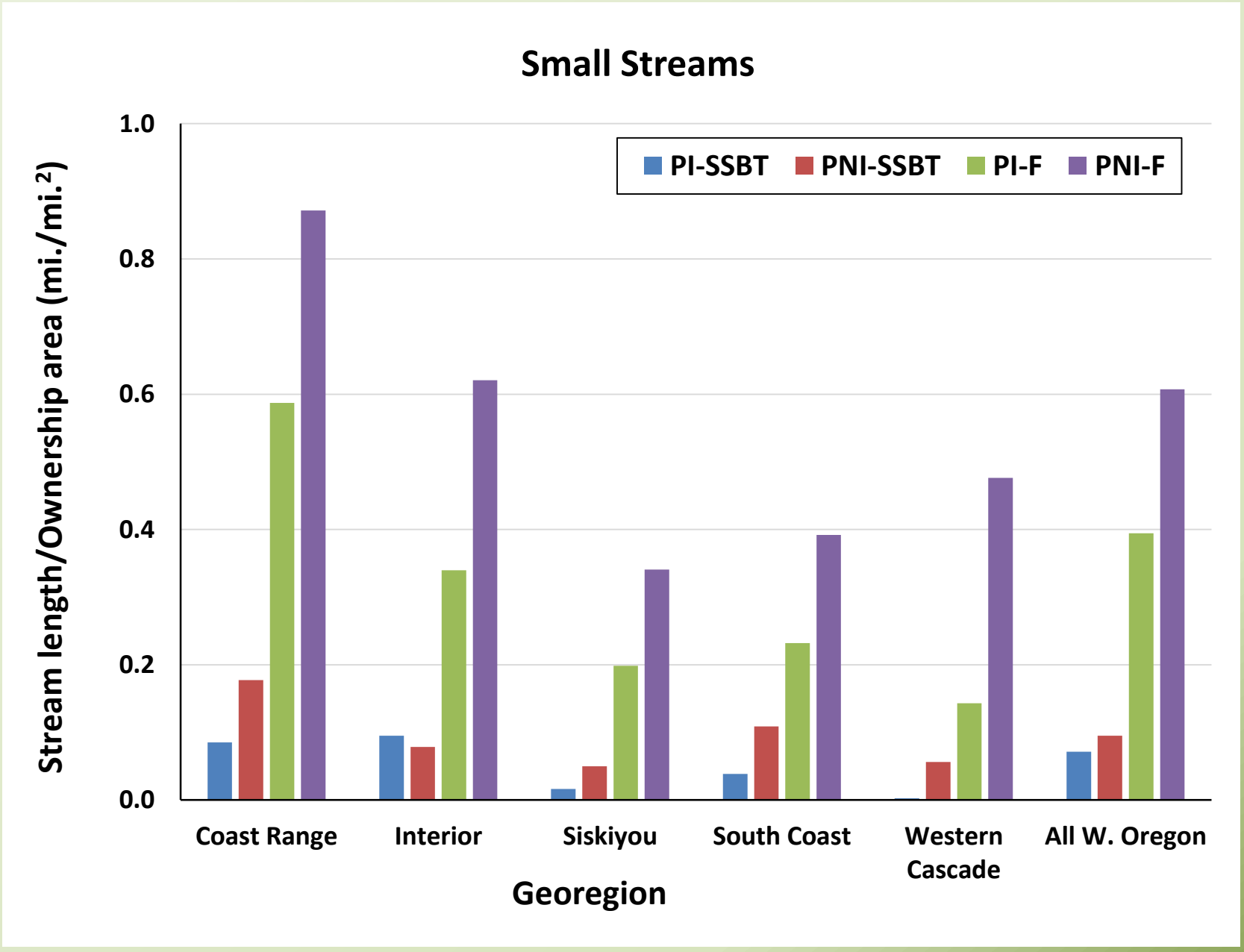


Predicted temperature change for each prescription

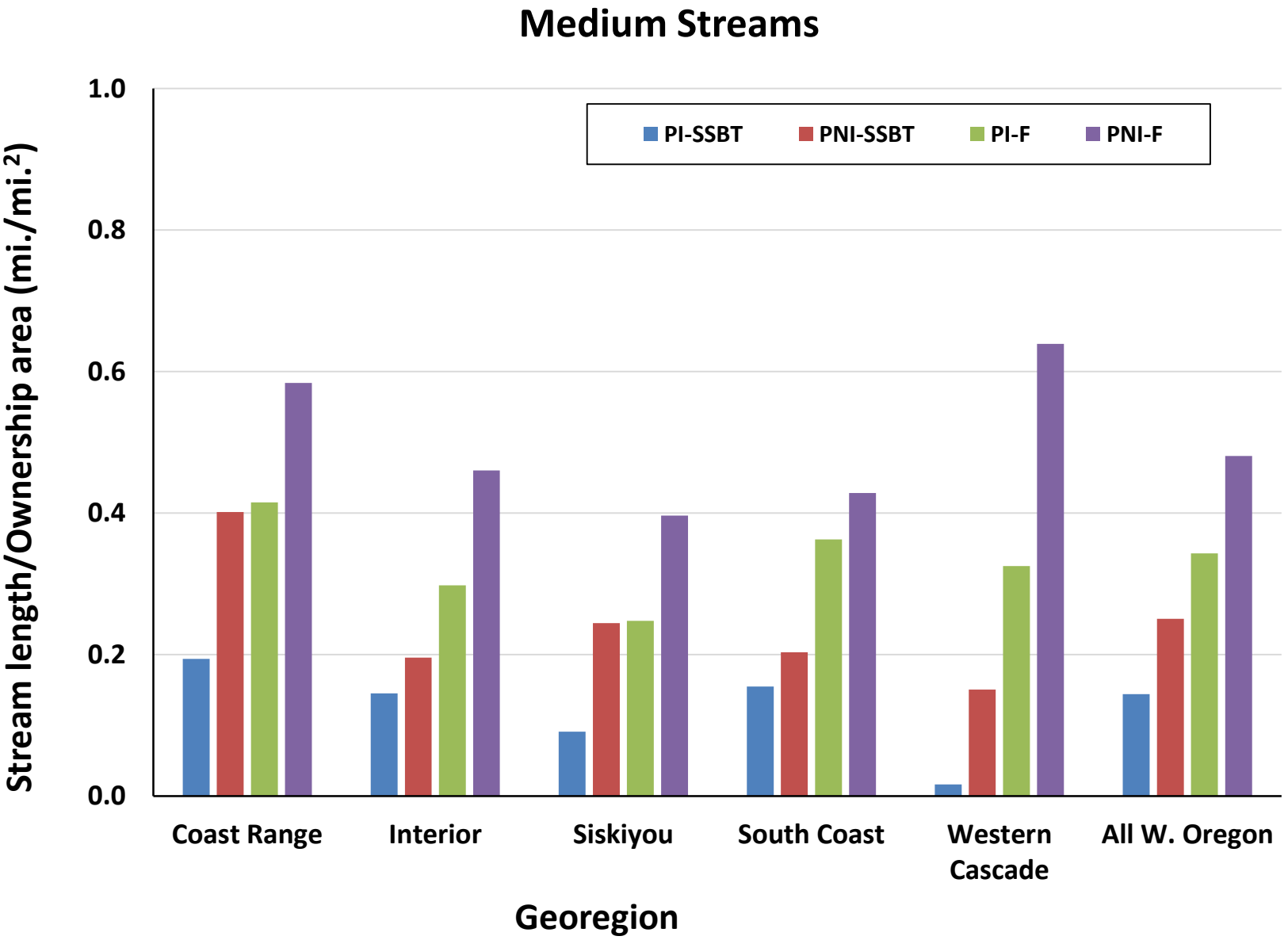


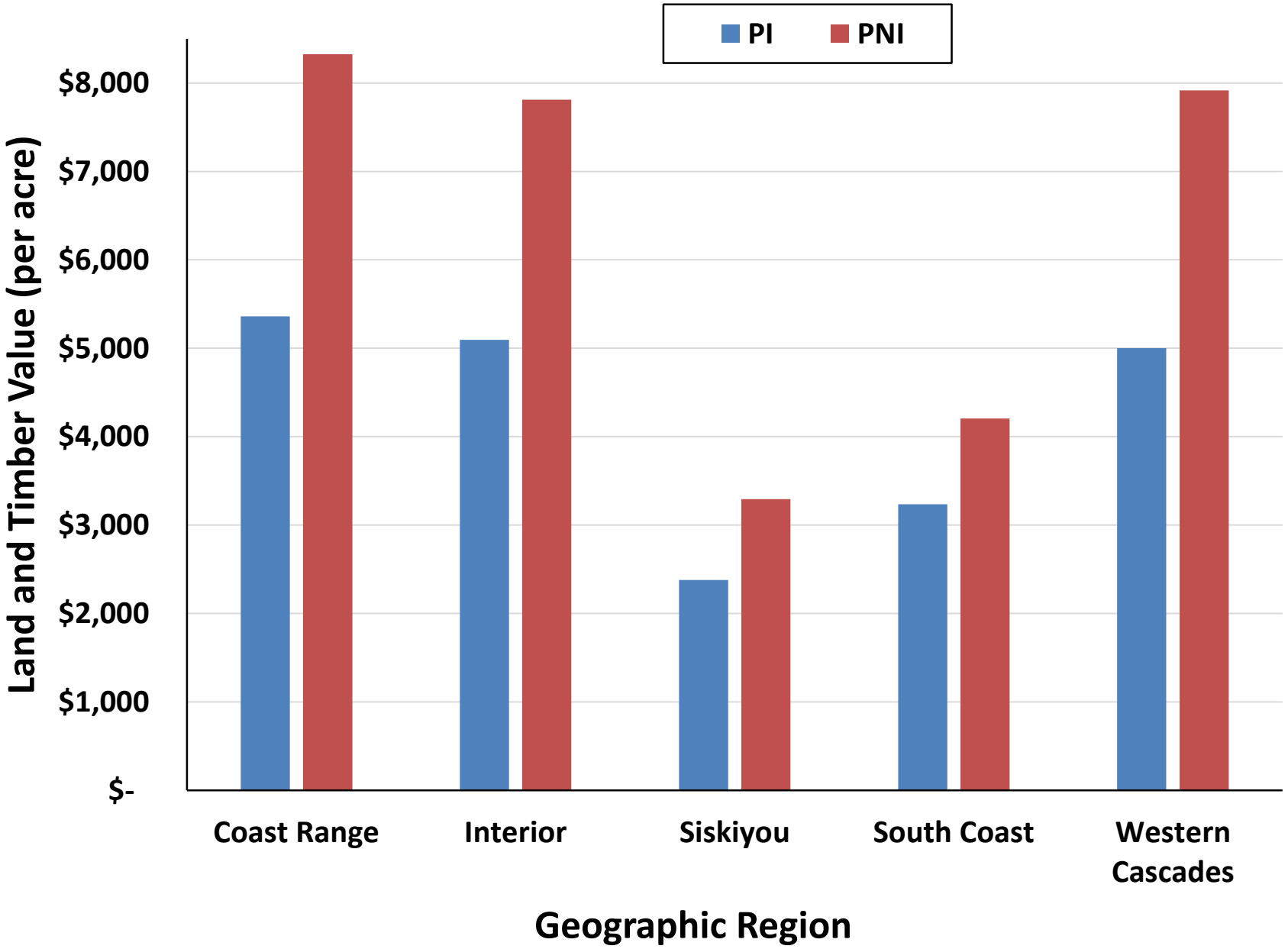

PI-SSBT
PNI-SSBT
PI-F
PNI-F
Miles of small + medium streams (1,000s)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Coast Range
Interior
Siskiyou
South Coast
Western Cascade
All W. Oregon
Geographic Region

Differential Impact to small landowners



Differential Impact to small landowners




PI
PNI
$8,000
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$-
Land and Timber Value (per acre)
Coast Range
Interior
Siskiyou
South Coast
Western Cascades
Geographic Region

1. Watershed- and Reach-scale Studies

A. <u>Watershed studies (e.g., Hinkle, Alsea, Trask)</u>
   - More info on why/process at a site
   - Few sites, less inference beyond sites

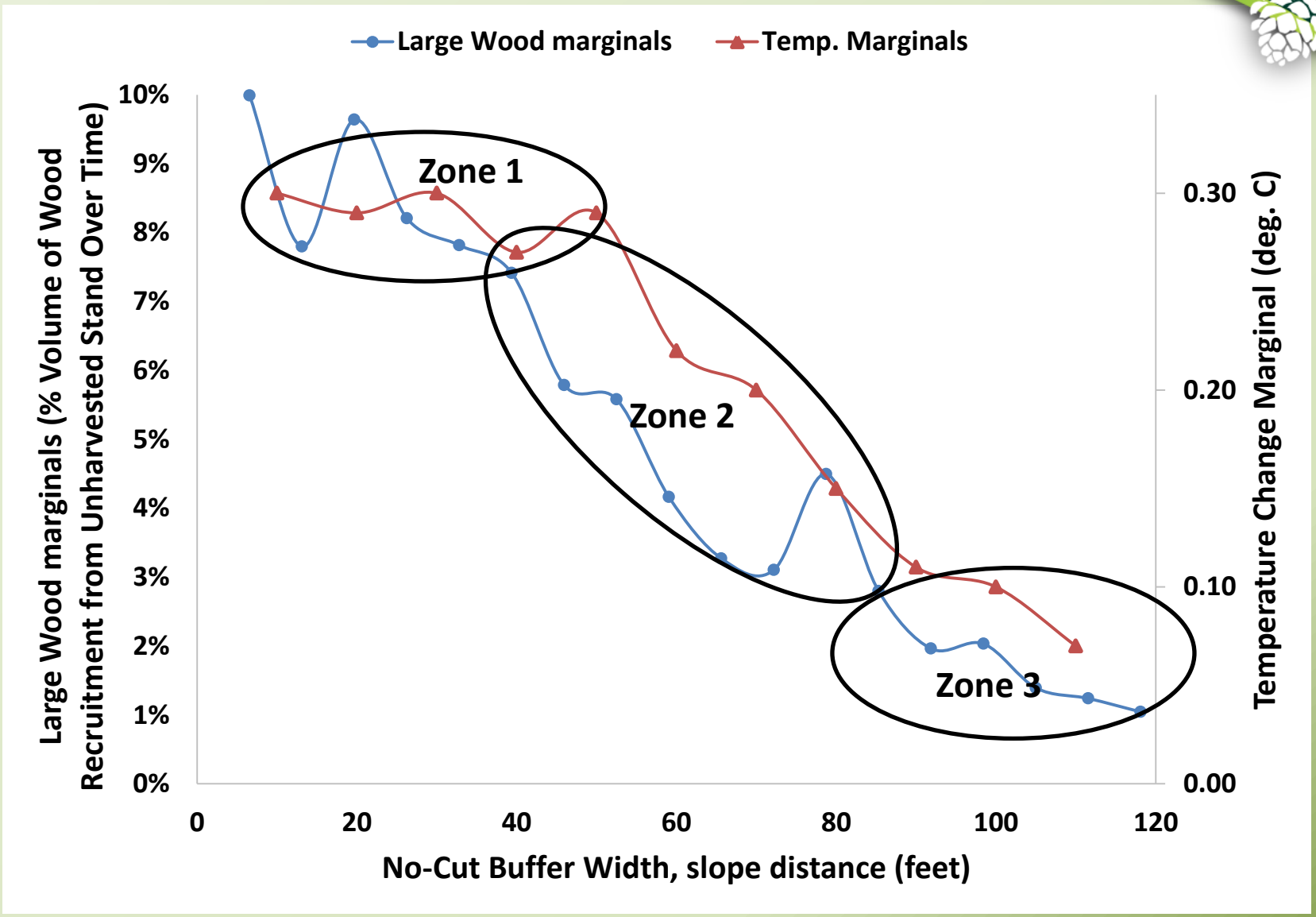
B. <u>Reach-scale studies (e.g.,RipStream)</u>
   - More sites, greater inference across landscape and "population"-level effects
   - Less info on why/process

C. Study types = complimentary

Conclusions: RipStream & Other studies

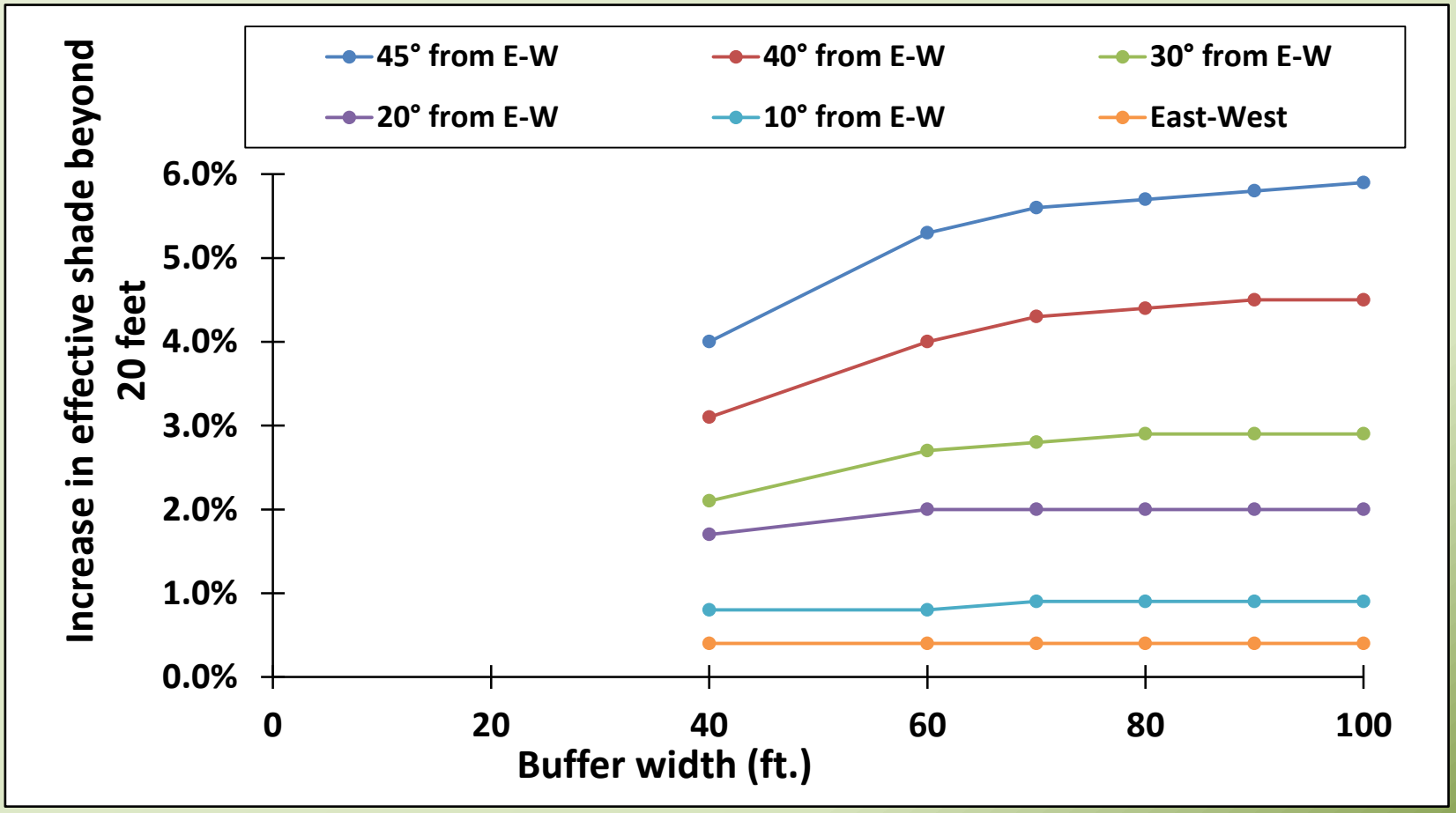
1. **Wide range in shade & temperature responses to harvest-adjacent buffers, yet clear relationships exist:**
   - **Shade with basal area, buffer width**
   - **Temperature with buffer width**
2. **Temperature & shade variability:**
   - **Appears to decrease with increasing: buffer width, basal area**
   - **Reason to assess effectiveness across landscape for robust statistics**

Marginal Curves



North Side Buffers

DEQ model to assess additional gains in shade from trees on North side of stream



South-sided Buffers

- 1 study, 3 sites; temperature change: 0.0-1.4 °C
- Additional Encumbered Acres & Value, large wood recruitment
- Numerous assumptions, thus put bounds on values

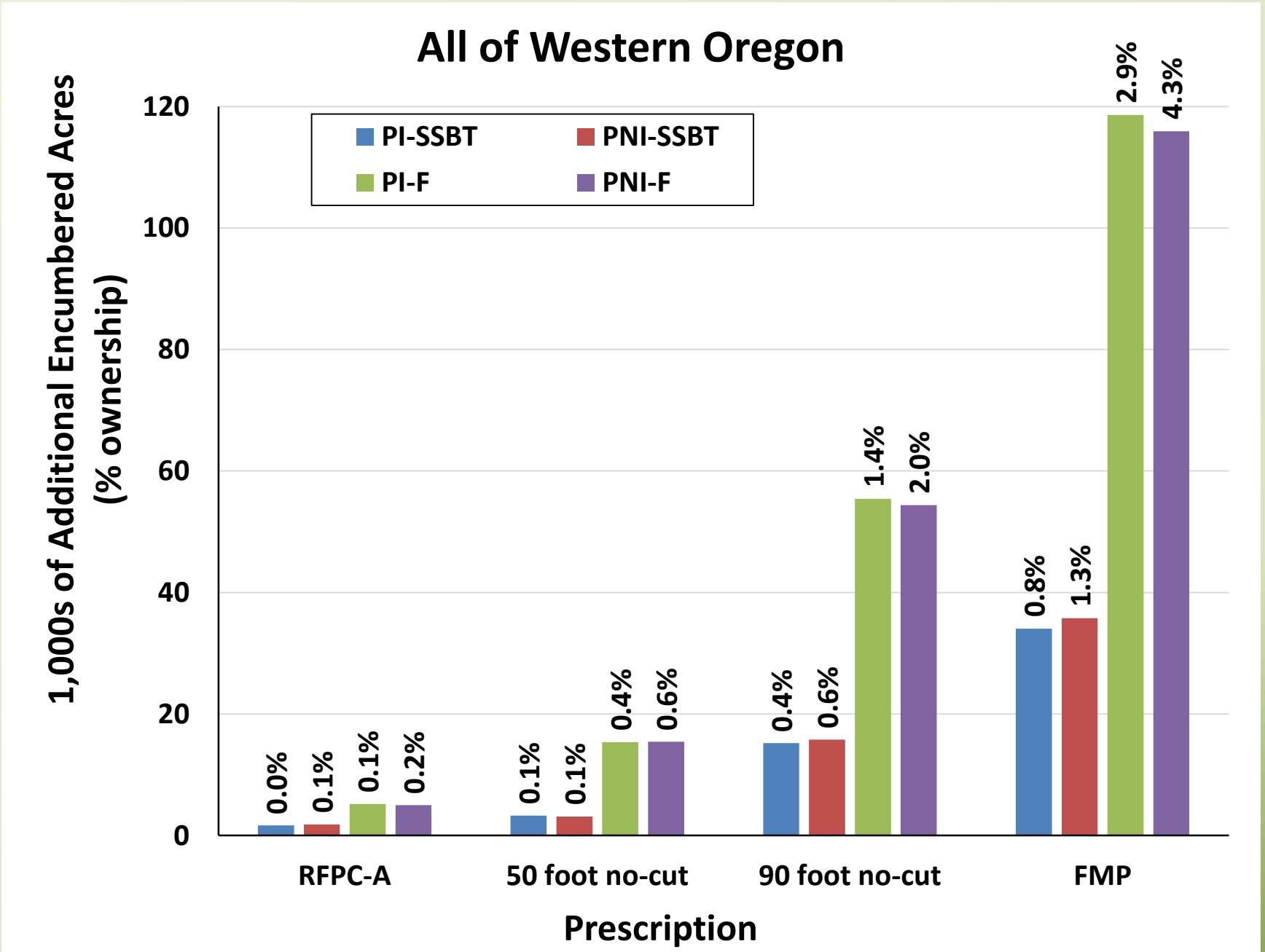
Fish Response

- Responses from 5 fish biologists
  - One biologist convened 2 panels of 12 additional fish biologists
- State and federal agencies, landowners, environmental community
- Matrix Responses: { + - 0 ? }
- Complexity, uncertainty of response at stream reach level
- Different assumptions, metrics

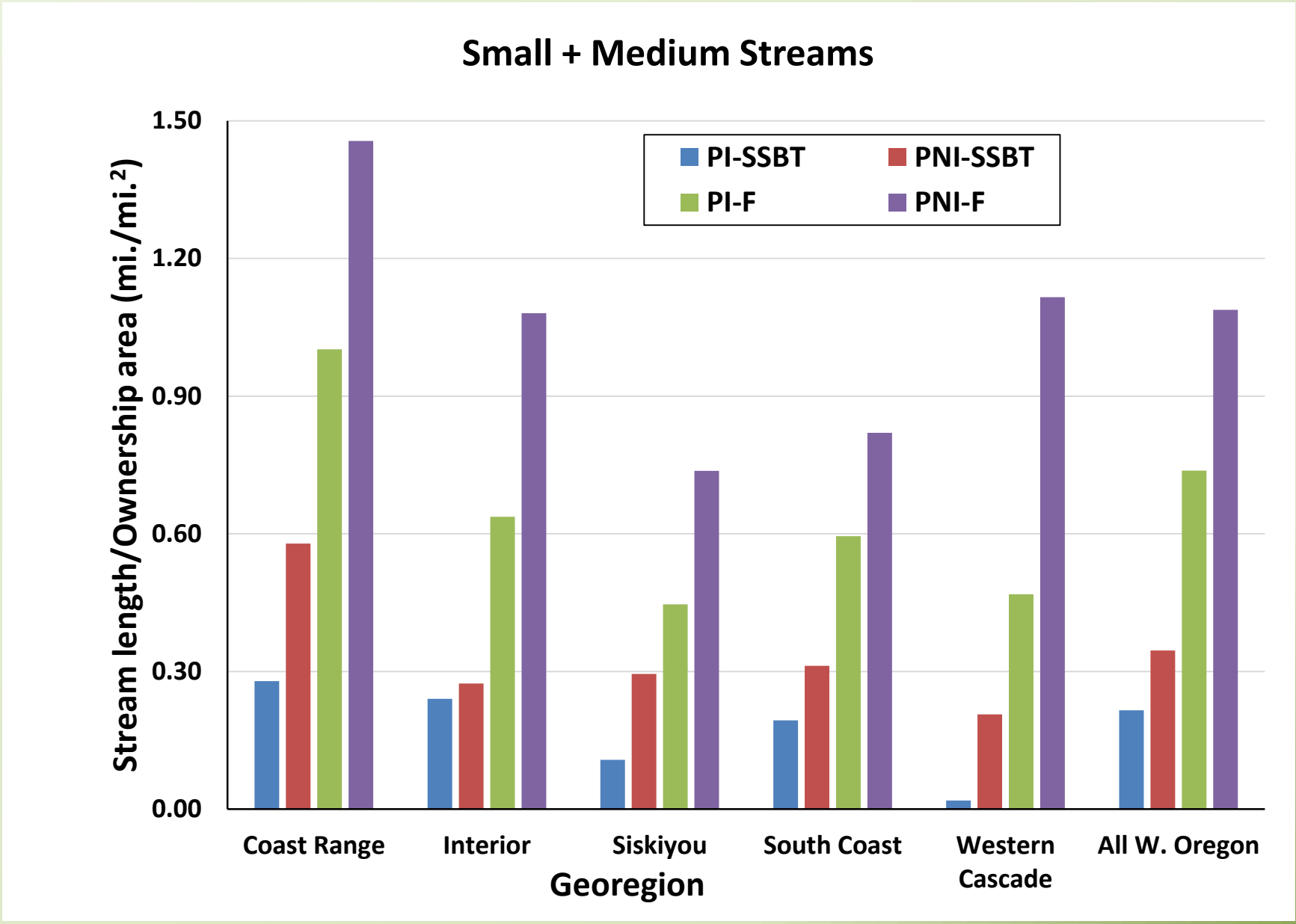
Fish Response

- Common themes:
  - Existing temperatures matter
  - Different starting points affect responses
  - Complex issue, particularly when not taking into account other factors

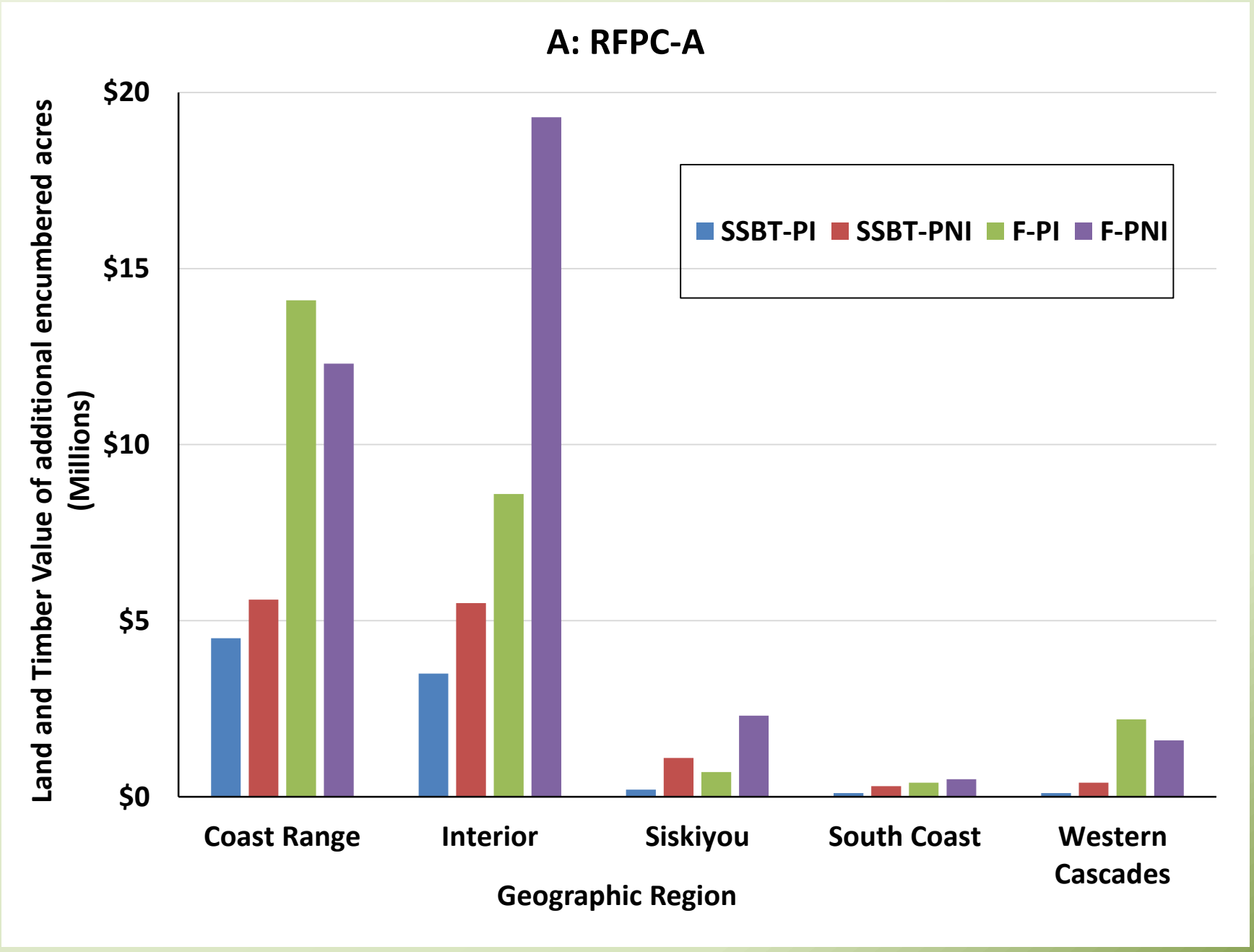
(large wood availability, climate change, cumulative effects, other stream characteristics)

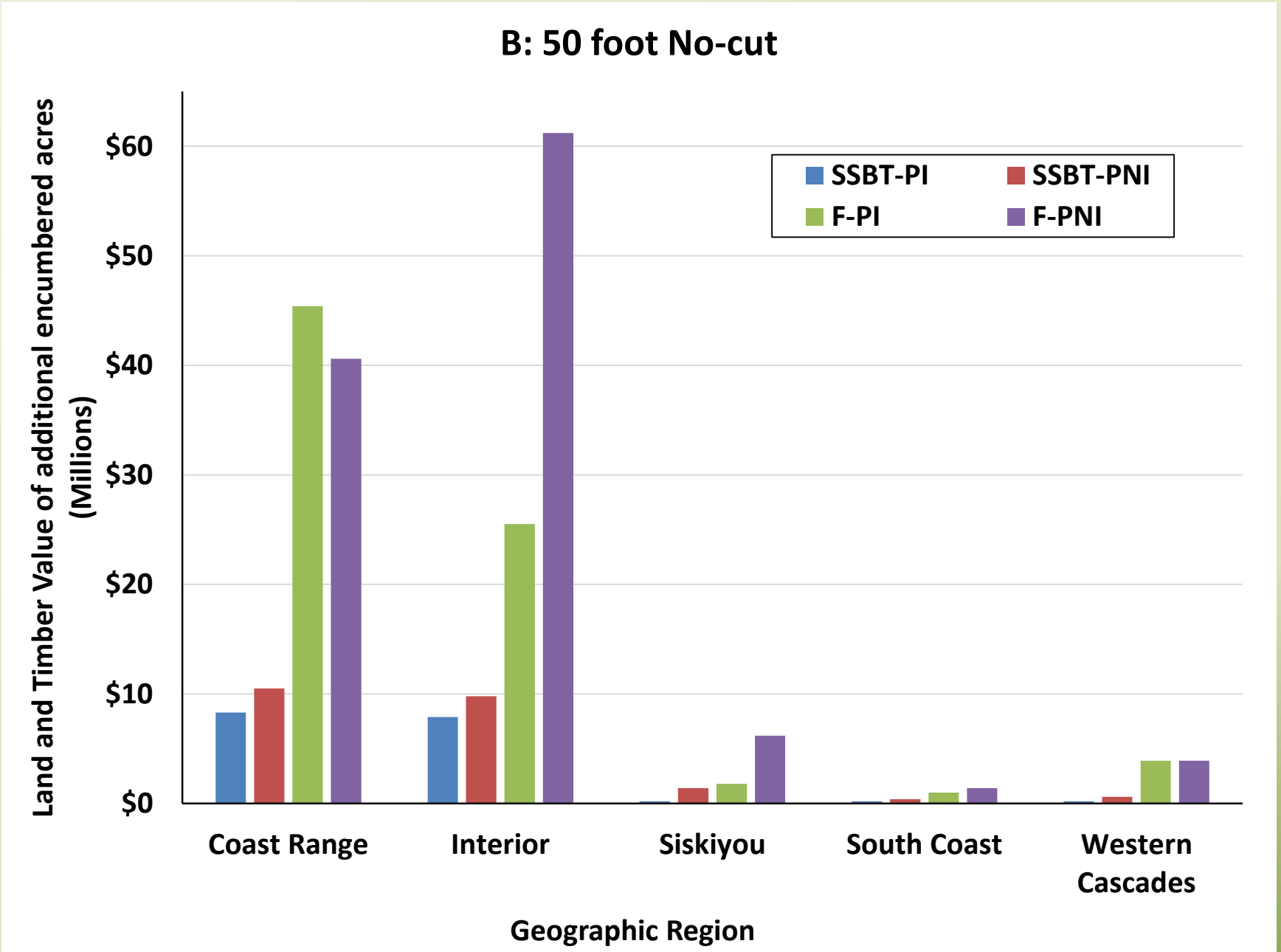

All of Western Oregon
1,000s of Additional Encumbered Acres (% ownership)
120
100
80
60
40
20
0
PI-SSBT
PNI-SSBT
PI-F
PNI-F
0.0%
0.1%
0.1%
0.2%
0.1%
0.1%
0.4%
0.6%
0.4%
0.6%
1.4%
2.0%
0.8%
1.3%
2.9%
4.3%
RFPC-A
50 foot no-cut
90 foot no-cut
FMP
Prescription

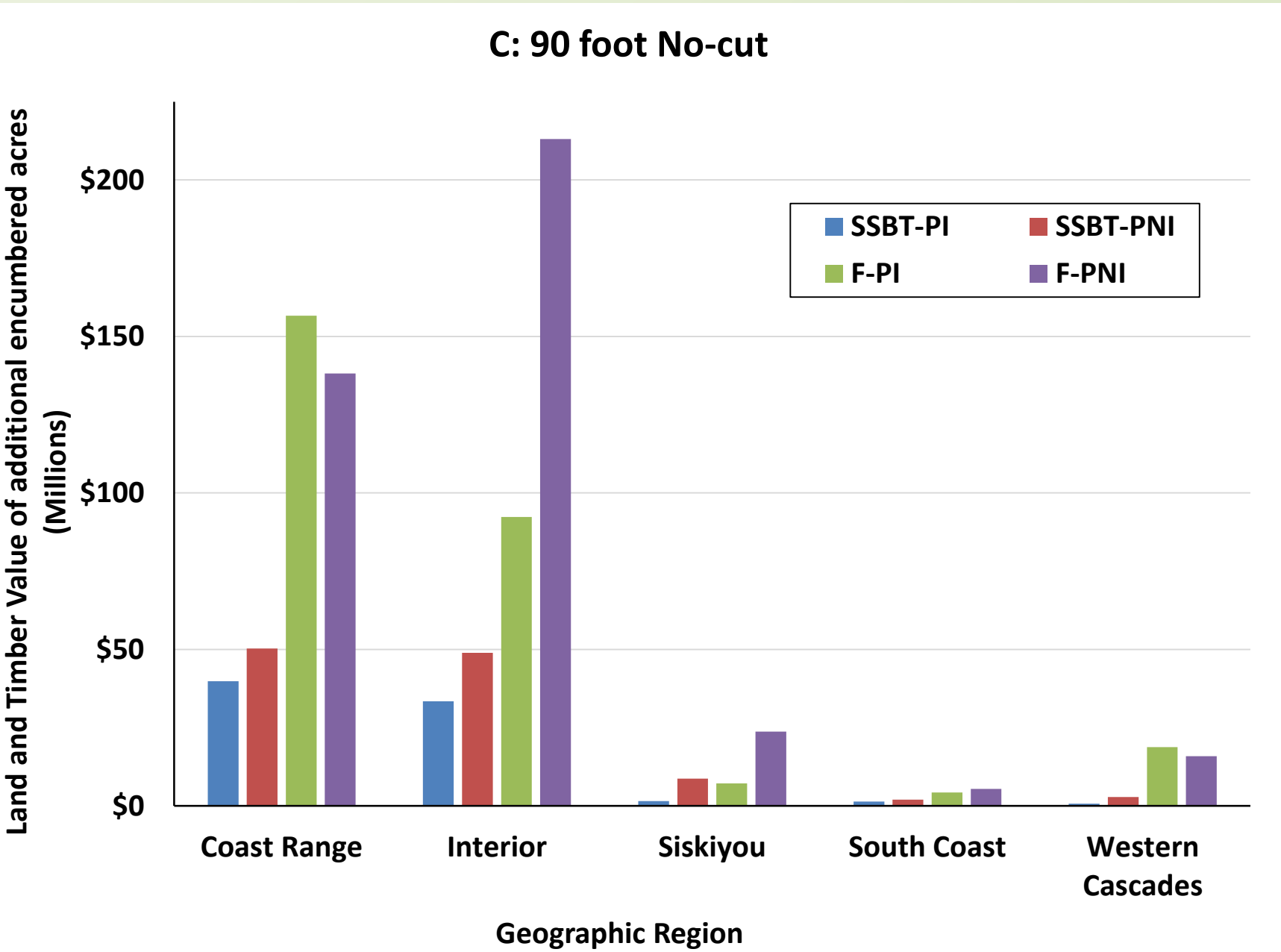
Differential Impact based on Ownership

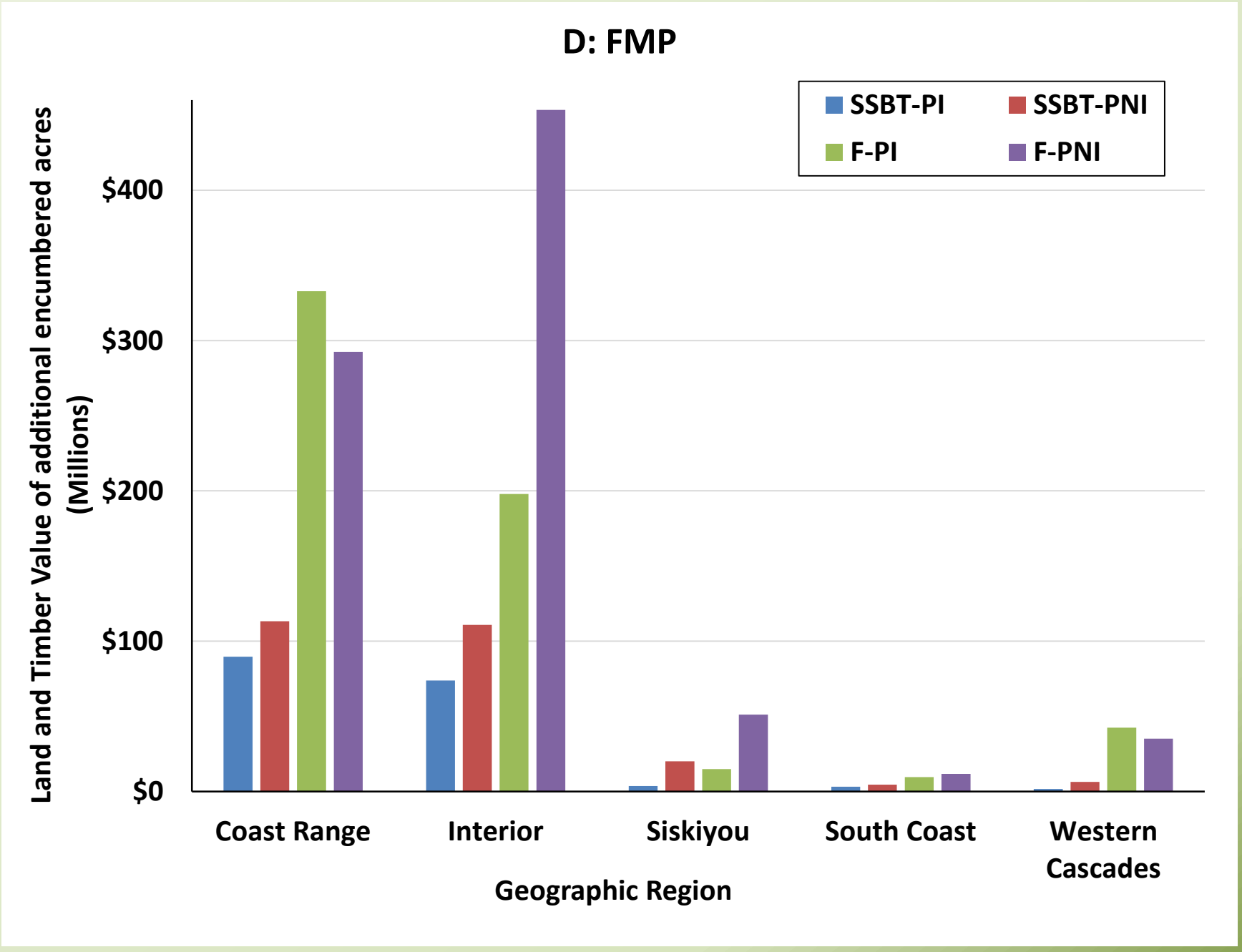


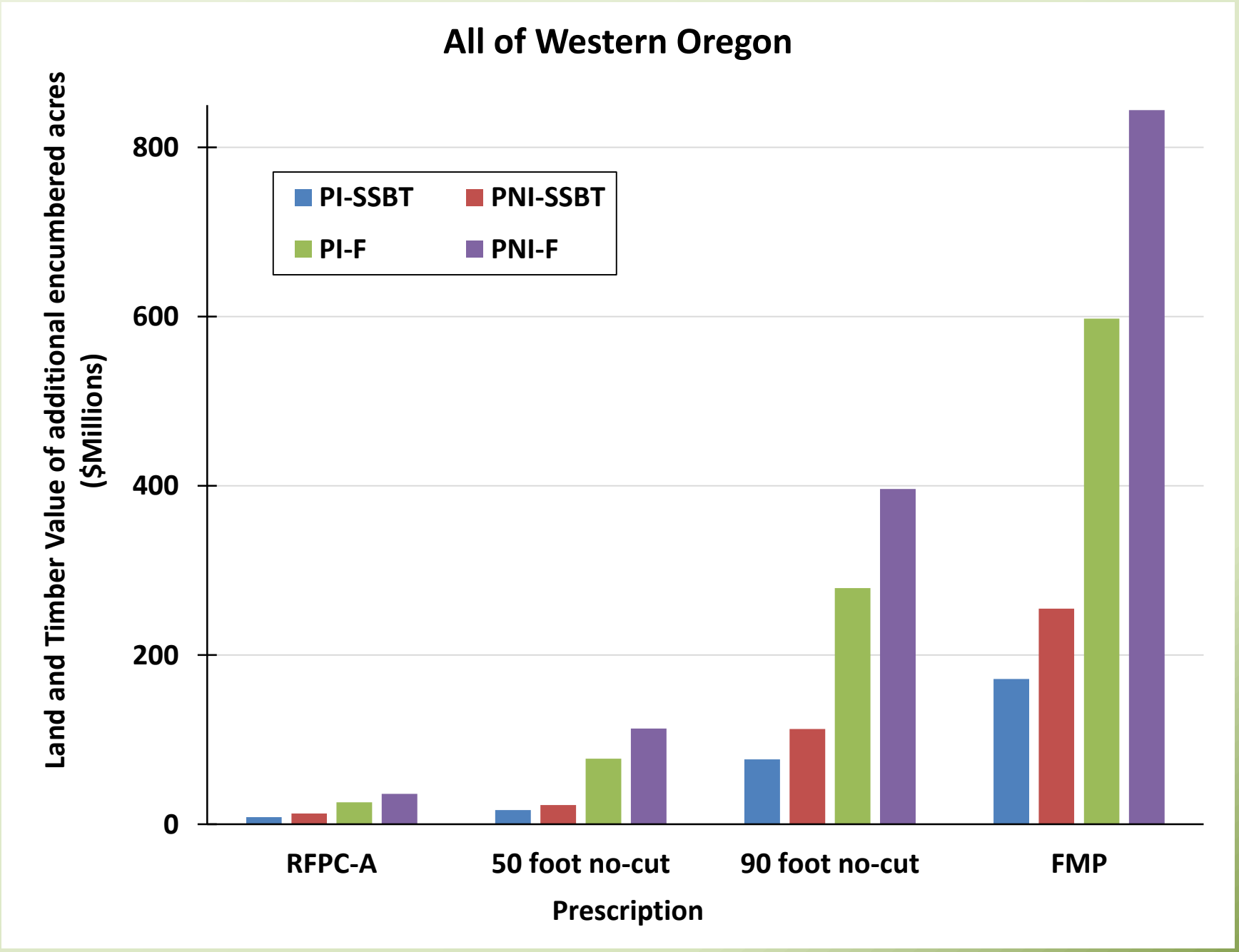
Land and Timber Values of Additional Encumbered Acres


A: RFPC-A
Land and Timber Value of additional encumbered acres (Millions)
$20
$15
$10
$5
$0
SSBT-PI
SSBT-PNI
F-PI
F-PNI
Coast Range
Interior
Siskiyou
South Coast
Western Cascades
Geographic Region


B: 50 foot No-cut
Land and Timber Value of additional encumbered acres (Millions)
$60
$50
$40
$30
$20
$10
$0
SSBT-PI
SSBT-PNI
F-PI
F-PNI
Coast Range
Interior
Siskiyou
South Coast
Western Cascades
Geographic Region


C: 90 foot No-cut
Land and Timber Value of additional encumbered acres (Millions)
$200
$150
$100
$50
$0
SSBT-PI
SSBT-PNI
F-PI
F-PNI
Coast Range
Interior
Siskiyou
South Coast
Western Cascades
Geographic Region


D: FMP
SSBT-PI
SSBT-PNI
F-PI
F-PNI
Land and Timber Value of additional encumbered acres (Millions)
$400
$300
$200
$100
$0
Coast Range
Interior
Siskiyou
South Coast
Western Cascades
Geographic Region


All of Western Oregon
Land and Timber Value of additional encumbered acres ($Millions)
800
600
400
200
0
PI-SSBT
PNI-SSBT
PI-F
PNI-F
RFPC-A
50 foot no-cut
90 foot no-cut
FMP
Prescription

Board Considerations and Policy Framework

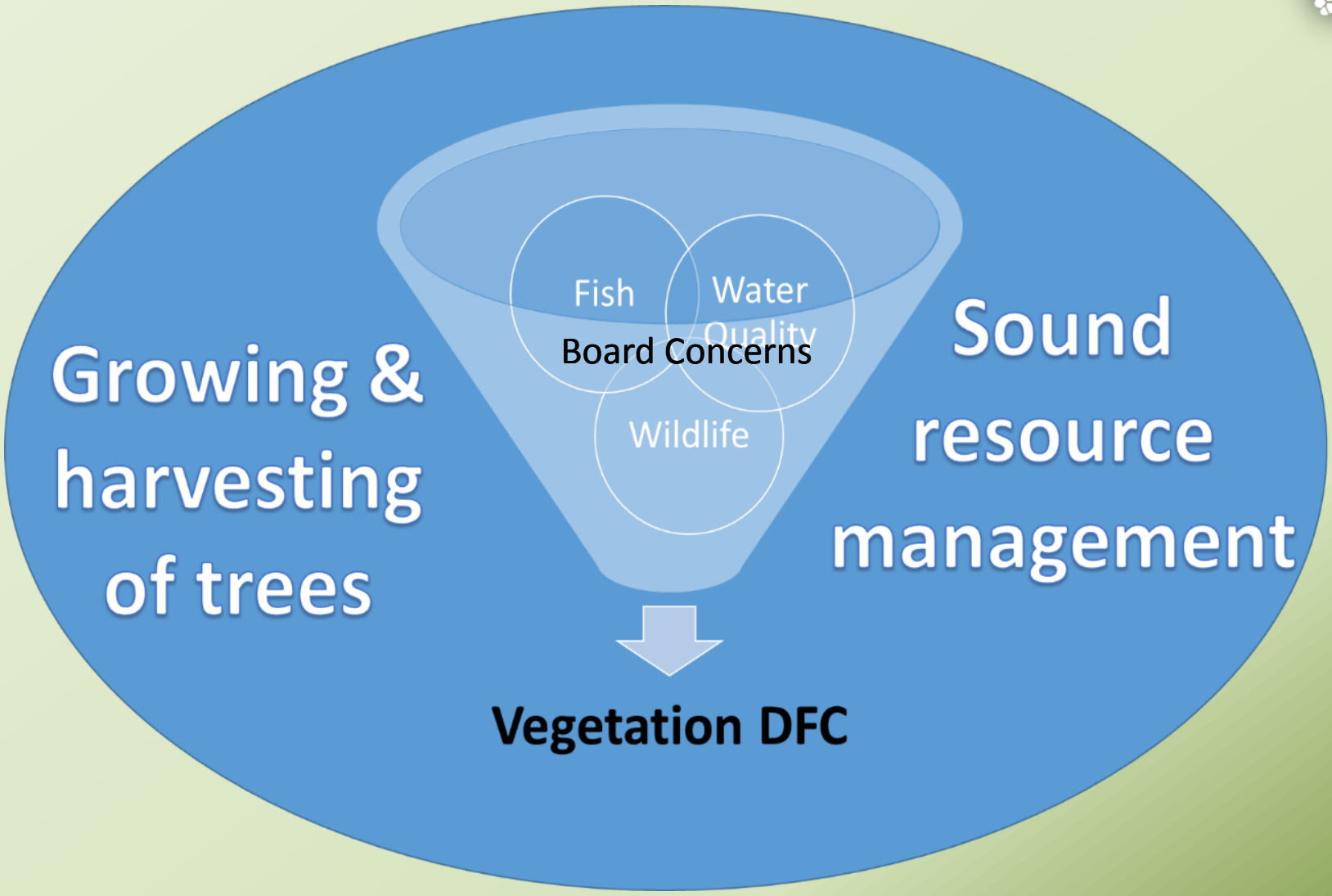
ORS 527.765 Factors to Consider

a) Beneficial uses of waters: SSBT
b) Effects of past practices on beneficial uses: RipStream sites were second growth; WRC results
c) Appropriate practices of other forest managers: other states, Oregon State Forests, Systematic Review
d) Feasibility
    i. Economic: info from ODF
    ii. Institutional: ODF staff
    iii. Technical: RFPCs
e) Natural variations in geomorphology, hydrology: Systematic Review, breadth of RipStream sites, Geographic Regions

Board Considerations

Balance:

- Meet Protecting Cold Water Criterion to Maximum Extent Practicable
- Attain Desired Future Conditions
- Avoid unintended consequences


Growing & harvesting of trees
Fish
Water Quality
Wildlife
Board Concerns
Sound resource management
Vegetation DFC

Board Considerations & Origin of Analysis Framework

- Current FPA policy framework already intertwines
  - Meeting the PCW to the maximum extent practicable
  - Riparian desired future condition
- Board expressed desire to consider unintended consequences
  - Economic impacts
  - Active management of riparian areas & large wood placement
  - CZARA disapproval
  - Data extrapolation
  - Complex or layered scientific assumptions

Analysis Framework Concept

Meet PCW to Maximum Extent Practicable In Context of….				
Consideration	**Anticipated Outcomes or Risks**	**Decision Range**		
				
DFC, goals, unintended consequences				

Consideration	Anticipated Outcomes	Decision Range		
		Unchanged or Small Temperature Performance	**Improved Temperature Performance**	**Threshold Temperature Performance**
Goal - Water Quality (Temperature)	**Prescriptions with similar responses**	No-Cut: ≤~70 feet FPA, OFIC-A, AOL-B, RFPC-A Variable: ≤~250 ft^2/1000 ft. Staggered-Harvest options	No-Cut: ~70-90 feet Variable: ~250-275 ft^2/1000 ft.	No-Cut: ≥~90 feet Variable: ≥~275 ft^2/1000 ft.
	Likelihood temp. change includes 0.3°C (PCW)	Low	Moderate to high	High
	Likelihood of temperature improvements	Zero - Moderate	Moderate to high	High
	Range of estimated mean temperature increases	0.64-1.45°C	0.29-0.64°C	0.2-0.33°C
	Marginal returns for temperature	Zone 1- high	Zone 2- moderate, starts diminishing	Zone 3- low /very low

(Continued)

Consideration	Anticipated Outcomes	Decision Range		
		Unchanged or Small Temperature Performance	Improved Temperature Performance	Threshold Temperature Performance
Water protection rule purpose	Protect, maintain and improve fish resources	Unknown	Unknown	Unknown
Goal – Fish (Wood recruitment)	Range of wood recruitment rates relative to unharvested stands	Small: ~40-78% Medium: ~62-78%	Small: ~76-88% Medium: ~76-88%	Small: ~84-100% Medium: ~84-100%
	Likelihood of active wood placement	Moderate	Low	Low
Unintended consequence	Increasing encumbrance, economic cost to forest landowners	Lower	Moderate	High

(Continued)

Consideration	Anticipated Outcomes	Decision Range		
		Unchanged or Small Temperature Performance	**Improved Temperature Performance**	**Threshold Temperature Performance**
Vegetative Desired Future Condition (DFC)	**Likelihood of meeting DFC**	• Only FPA, FMP have goal, pathway to a DFC • Risk overstocking and/or insect and disease without flexibility for forest health treatments. • Increasing hardwood component in riparian targets may put DFC goal for increased conifer retention at risk		

Geographic Extent Policy Considerations

- Insufficient science to support empirical Board decision
- Reaffirm or alter current policy re: rule specific to geographic region and stream size?
  - Reaffirm policy – Limit rule analysis to Coast Range, assume a risk-intolerant position re:extrapolating RipStream results.
  - Alter policy – Assume risk-tolerant position relative to RipStream results, include 2+ regions and/or define new region(s), and/or establish a single protection standard across all streams regardless of size.
- CZARA Disapproval

CZARA


Blue Mountains
Western Cascade
Coast Range
Interior
Eastern Oregon
South Coast
Siskiyou
Eastern Cascade
FPA Geographic Regions
Oregon Coastal Nonpoint Pollution Control Program Area

Decision	Consideration	Risk statement	Decision Range		
			Coast Range only	Two or more regions	Most or all regions
Geographic Region Extent	Goals - Water Quality and Fish	Areas with unaddressed temperature & wood recruitment concerns	Temperature – High Wood - High	Temperature – Moderate Wood - Moderate	Temperature – Low Wood - Low
	Water protection rule purpose	Outcome will protect/improve fish resources	Unknown	Unknown	Unknown
	Unintended consequence	Extrapolating RipStream results (Statistical perspective)	Low	Moderate	High
	Unintended consequence	Unaddressed CZARA temperature concerns	High	Moderate - High	Low
	Unintended consequence	Risk of increasing economic costs to forest landowners	Lower	Moderate	Higher

Decision	Consideration	Risk statement	Decision Range		
			Zero (0) feet Upstream	1000 feet Upstream	One mile Upstream
Stream Reach Extent (Above SSBT main stems and SSBT tributaries)	Goals - Water Quality & Fish	Significant portions of streams with unaddressed temperature, wood recruitment concerns	Temperature – High Wood - High	Temperature – Moderate Wood - Moderate	Temperature – Low Wood - Low
	Water protection rule purpose	Outcome will protect/improve fish resources	Unknown	Unknown	Unknown
	Unintended consequence	Incorrect and/or complex and layered assumptions, modeling, and difficult field implementation	Main stem – none Tributaries – none	Main stem - Moderate Tributaries - High	Main stem - High Tributaries - High
	Unintended consequence	Increasing economic costs to forest landowners	None	Moderate	Higher

Prescription Packages

Prescription Packages

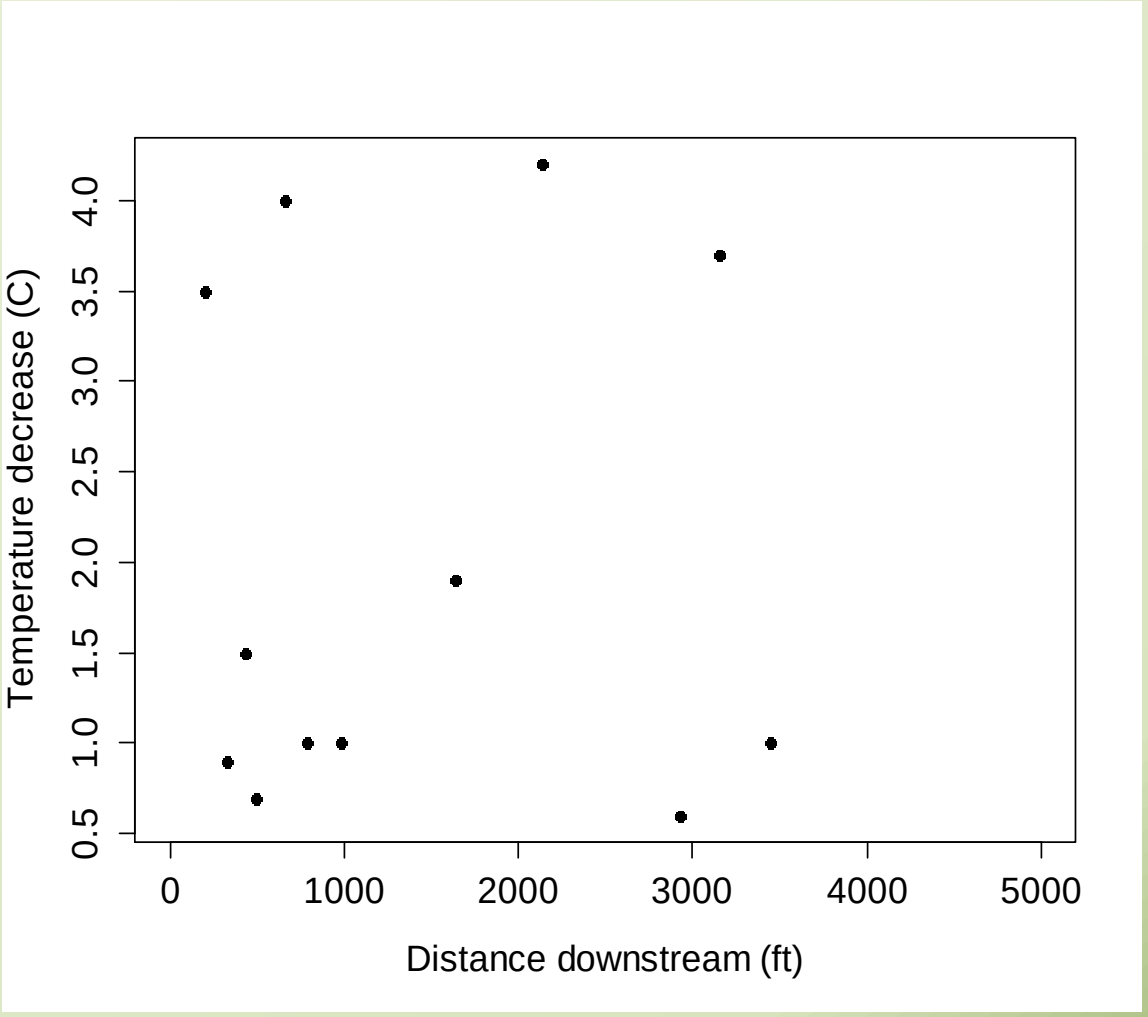
Prescription Package	Prescriptions	Temperature, LW response	Geographic Regions	Stream Extent
1. Minimize Temp. Concerns	NC: 90 feet VR: 275 ft.2/1,000 ft.	ΔT: ~0.3 °C LW: 89-91%	All W. Oregon	SSBT + 1,000 ft. Upstream
2. Mitigate Temp. Concerns	NC: 70 feet VR: 225 ft.2/1,000 ft.	ΔT: ~0.6 °C LW: 76-81%	All W. Oregon	SSBT
3. Balance Temp. with avoidance of Unintended Consequences	NC: 85 ft., 75 ft. with LW placement VR: lower, with distributional requirement	ΔT: ~0.3-0.4 °C	??	SSBT + 100s-1,000s ft. Upstream

Recommendations

- The Department recommends that the Board discuss the policy issues, using the above framework and all the information it has received to develop a set of prescription components that meet the PCW criterion to the maximum extent practicable, consistent with the ORS 527.765 factors and required ORS 527.714 findings.

- The Department also recommends that the Board include more than one prescription choice, e.g., a no-cut prescription, a variable retention prescription, and/or alternate prescription approach to increase forestland owner flexibility and minimize unintended consequences.

Downstream temperature response from multiple studies



Model Results: As harvested

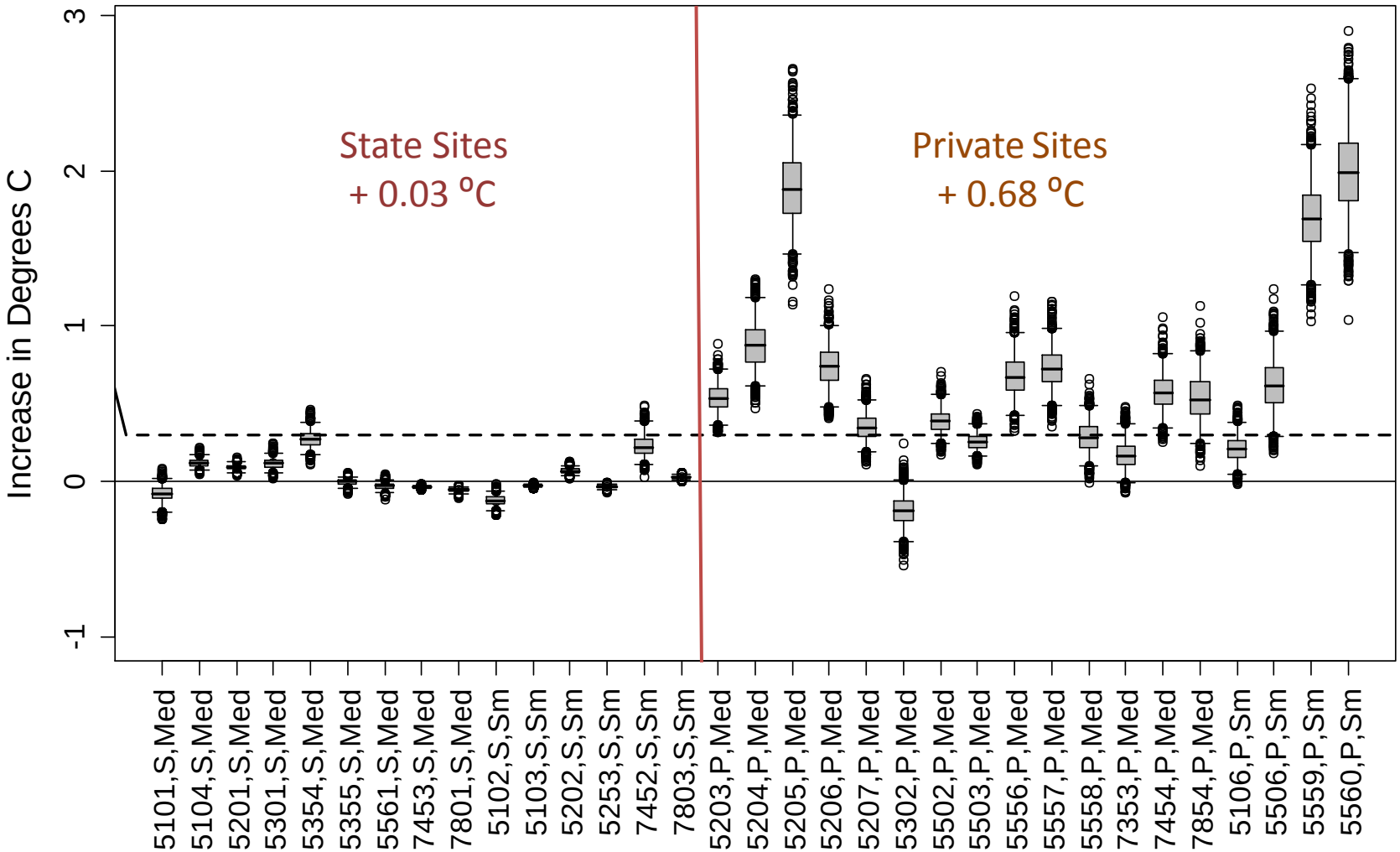


Figure 4 from Attachment 3

Model Results: FMP Harvest

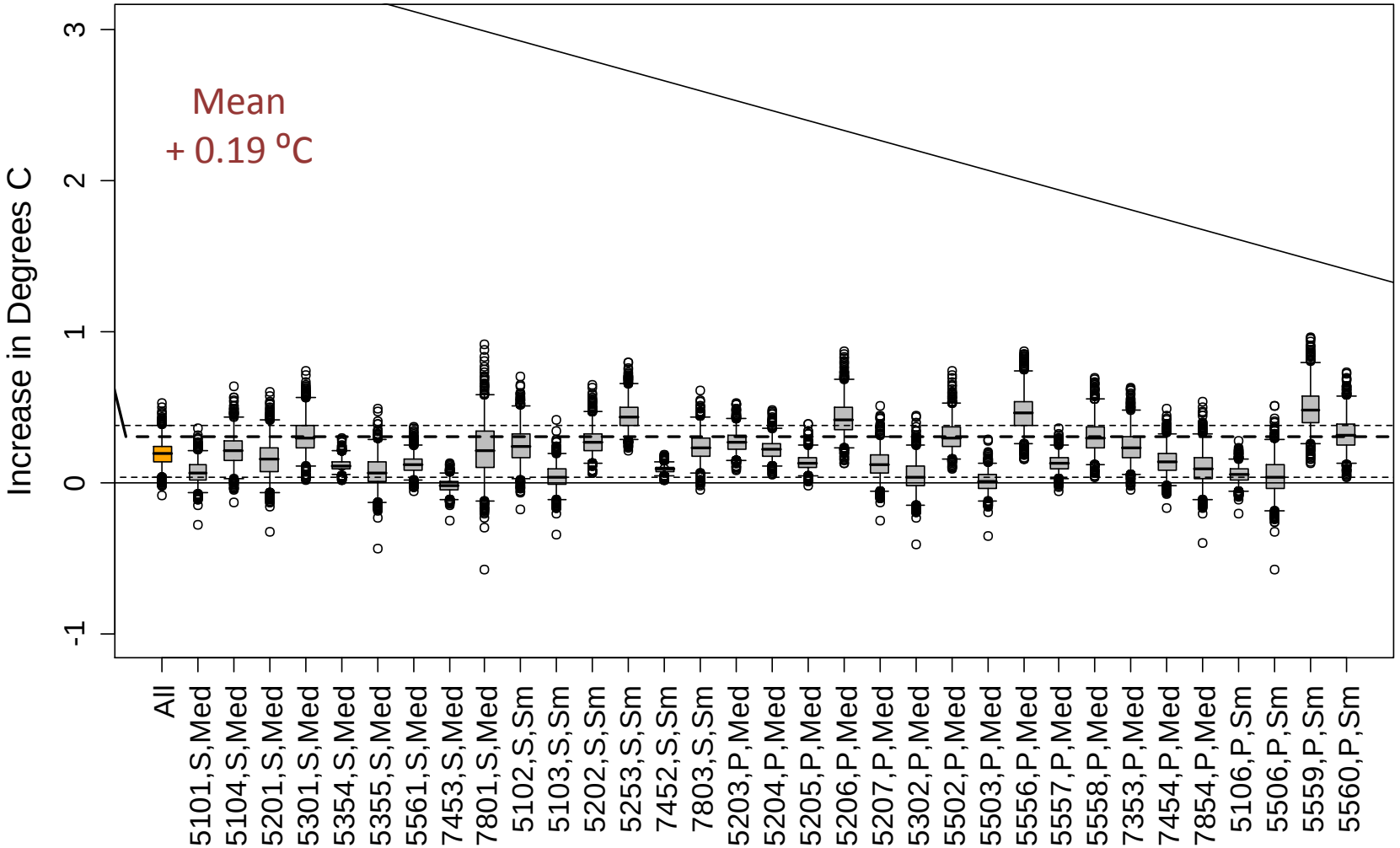


Figure 5 from Attachment 3

Model Results: FPA harvest

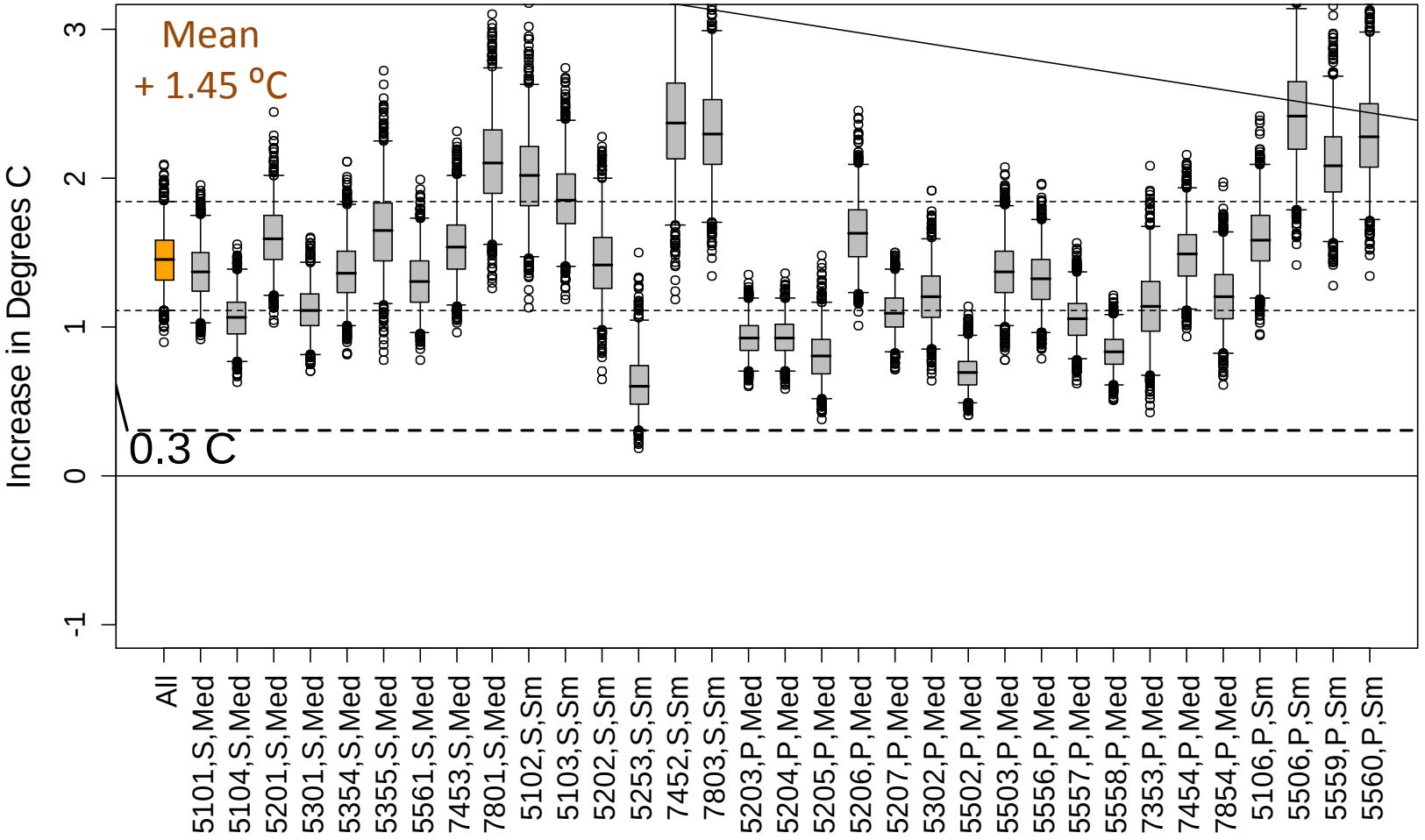


Figure 6 from Attachment 3

Comparison of Simulated Harvest to as Harvested