# Oregon Forests and Water Quality: What Are We Learning?

Oregon Society of American Foresters
2012 Annual Meeting

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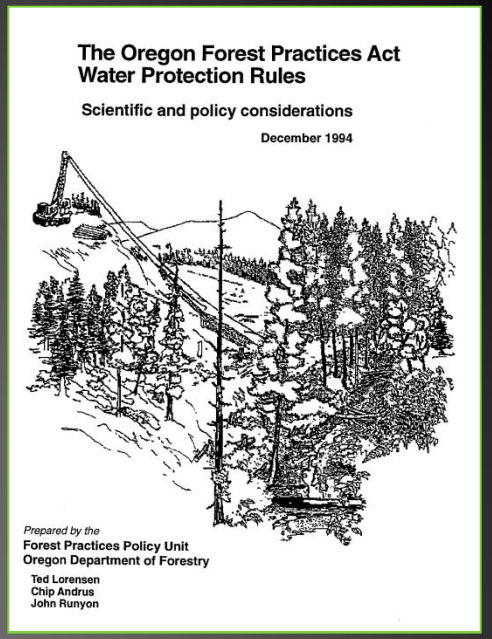
# Clean Water and Oregon Forest Practices Act

- Most of the FPA Divisions are dedicated to protecting and maintaining clean water
- FPA establishes a commitment to research and monitoring




*Lorensen et al. 1994 (ODF Technical Report #1)*

# Oregon Department of Forestry: Research and Monitoring

- **2002 Herbicide Study**: Found FPA rules were effective in preventing drift contamination to streams

- **2002 BMP Compliance**: High level of compliance with Water Quality Forest Practice Rule

*Robben and Dent 2002 (ODF Technical Reports #7), Robben and Dent 2002 (#15)*

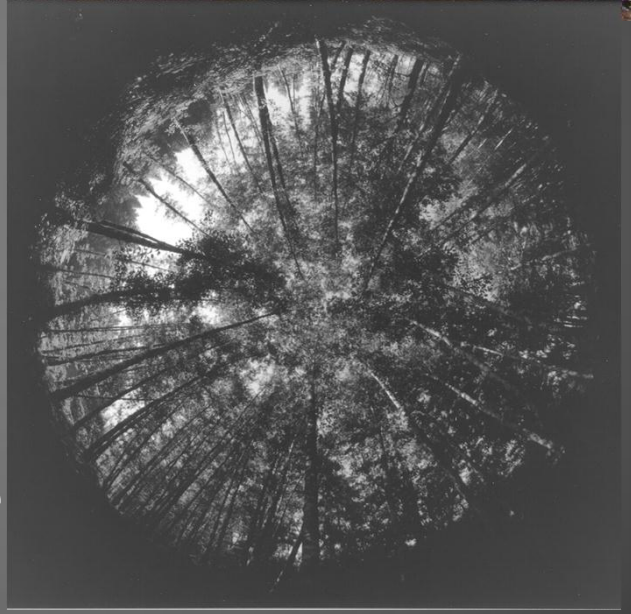
# Oregon Department of Forestry: Research and Monitoring

- **1996 Landslide Study:**
  - Only ground-based study of it's kind
  - Young Stands
  - Road Landslides
  - Basis for new Rules and Strategies dealing with landslides, public safety, and wood recruitment to fish streams.

*Robison et al. 1999 (ODF Technical Report #4)*

# Stream Temperature Ripstream Objectives

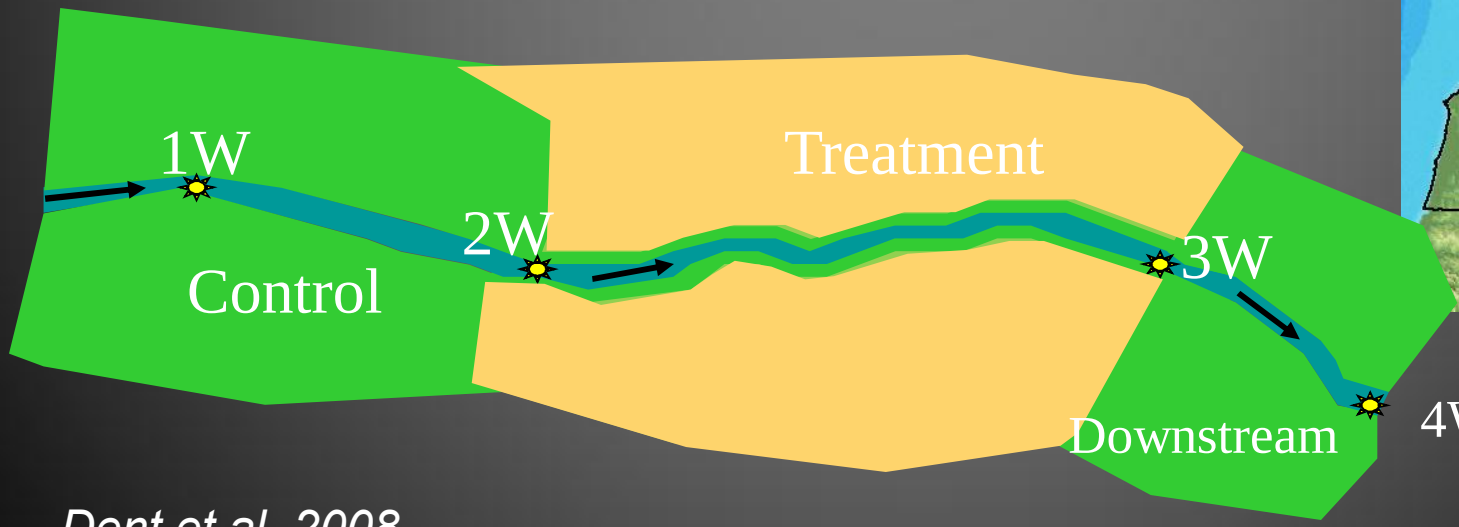
- ODF initiated long term collaborative study
  - Effectiveness of practices and strategies in maintaining cold water environment and other riparian functions.
- Recognized by OSAF with the Science Award

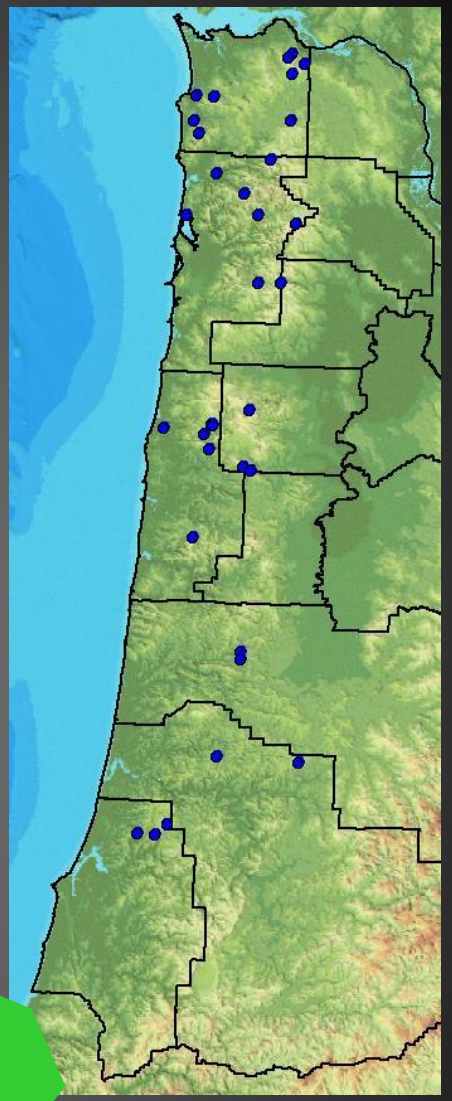


Plum Creek,
OFIC, ODFW

# Ripstream Study Design

- 33 Sites in the Oregon Coast Range
- State (FMP) and Private (FPA)
- “BACI” = Before-After-Control-Impact
- 2 years pre-harvest and 5 years post-harvest data collection



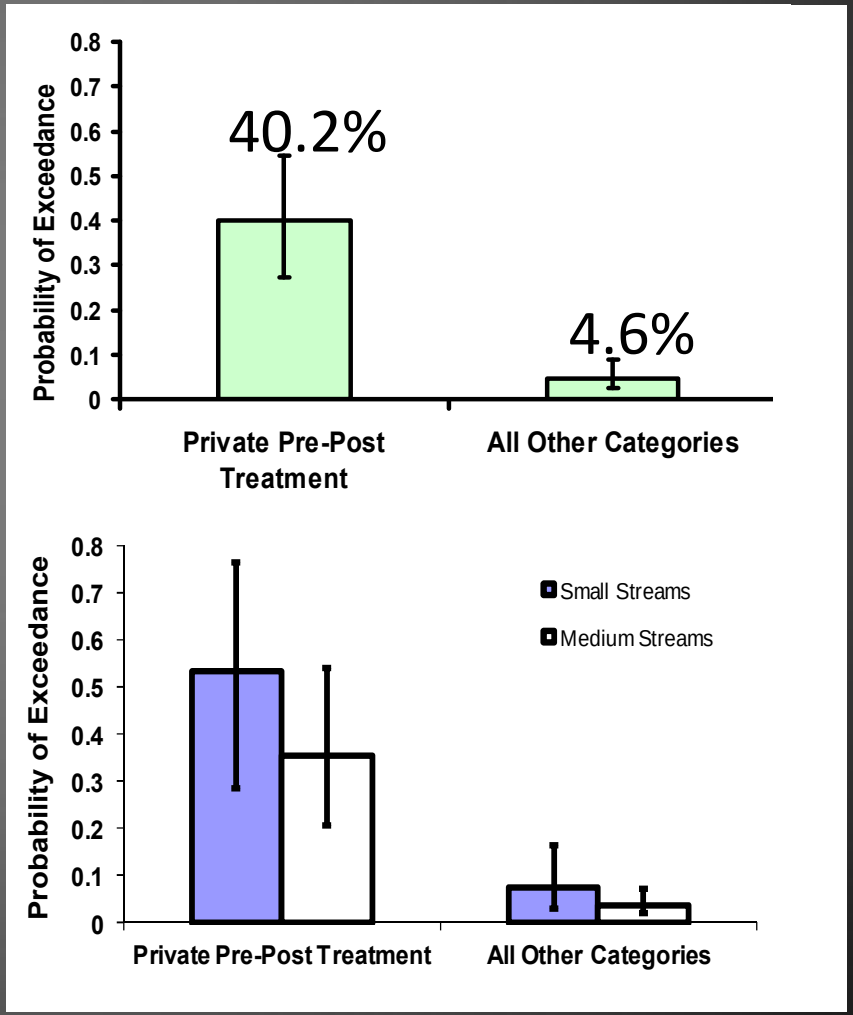



*Dent et al. 2008*

# Result: Meeting DEQ Stream Temperature Water Quality Standards- Mixed Story

- Numeric Standard
  - Yes on State
  - Yes on Private
- Protecting Cold Water Standard
  - Yes on State
  - 40% probably of not meeting PCW on Private

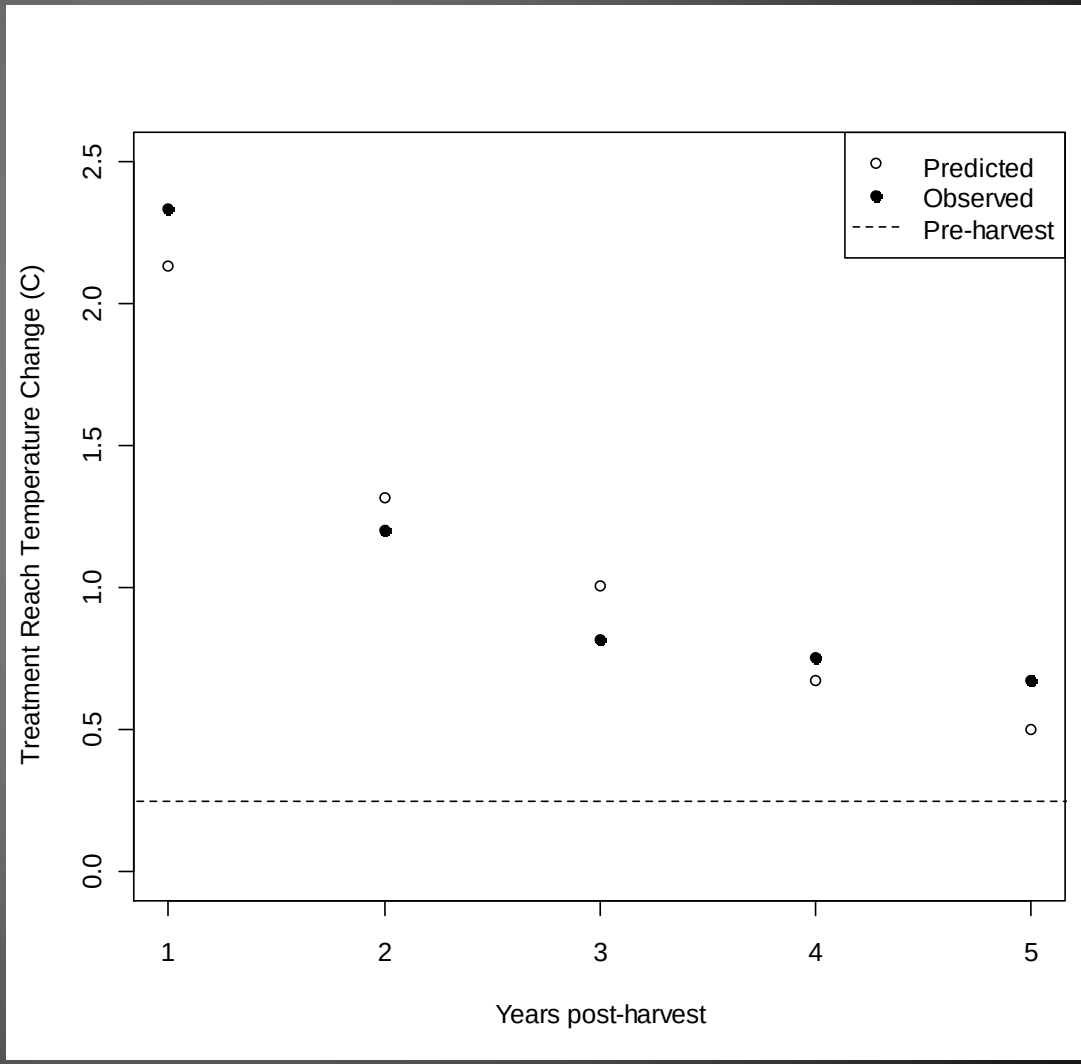
*Groom et al. 2011a*



# Results: Changes in Stream Temperature

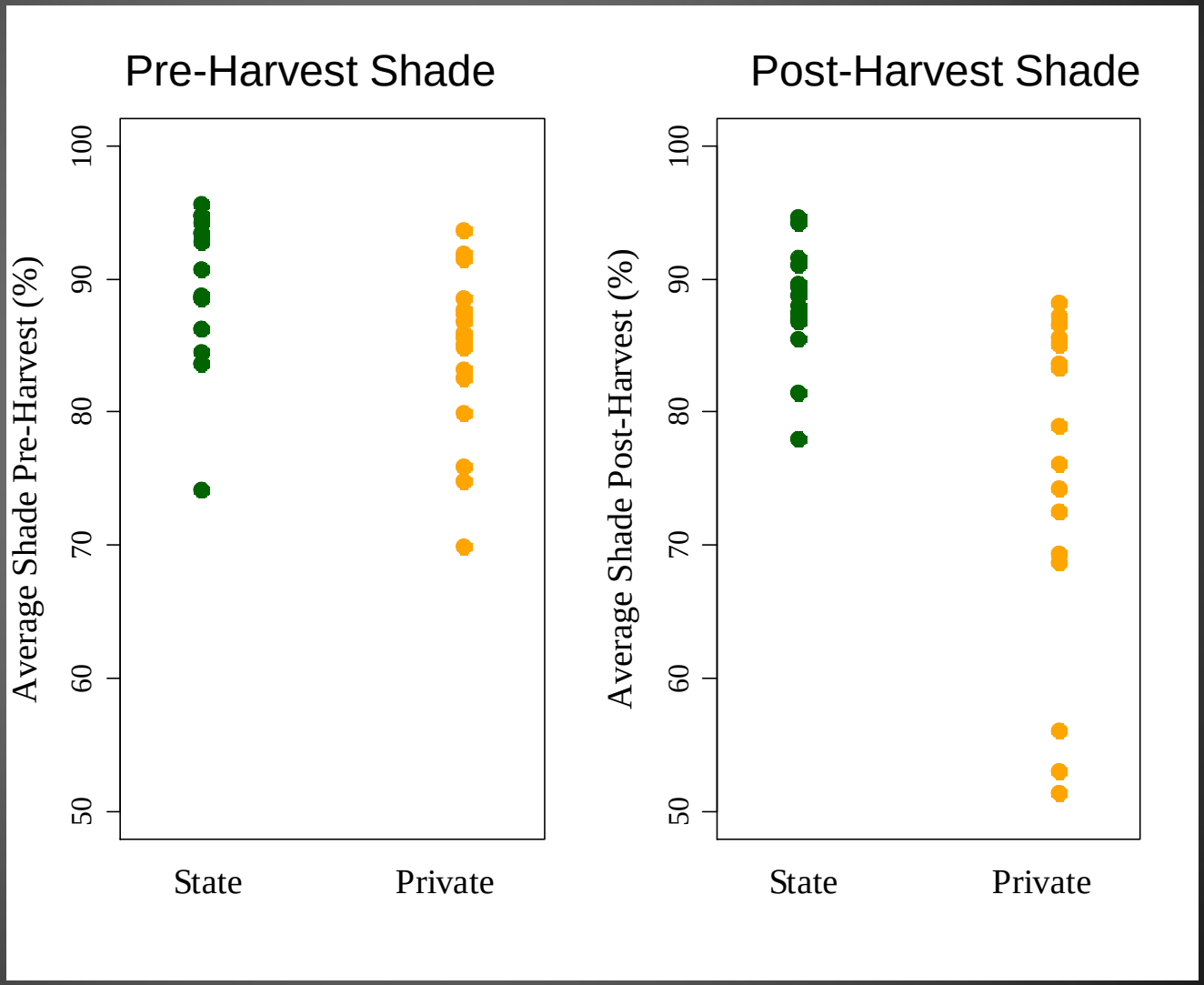
- Temperature change is relatively small
  - Zero for State
  - 0.7°C for Private
- DRAFT results suggest improving trend over 5 years after harvest
- Temperature change downstream of harvest units?

*Groom et al. 2011b*



# Results: Changes in Shade

- Shade decreased on Private Sites
- Temperature increases related to decreases in shade
- Shade related to basal area

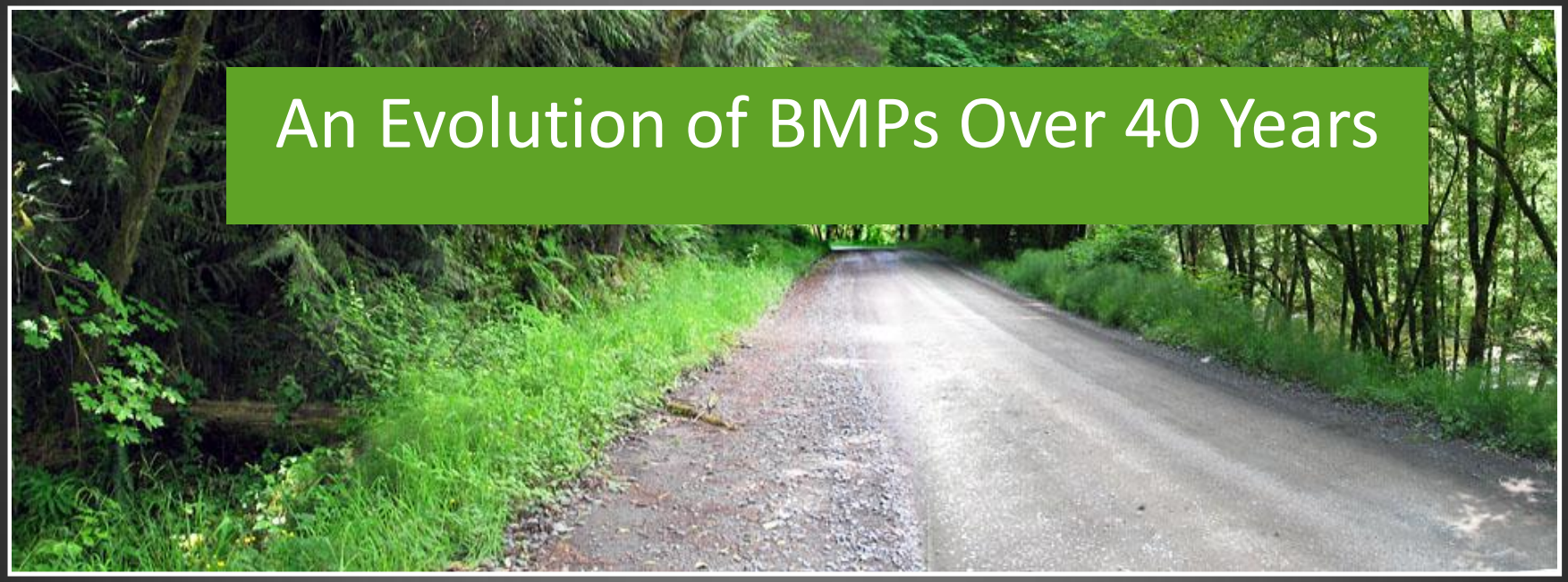



*Groom et al. 2011b*

# Stream Temperature: What Are We Learning?

- Stream temperature under State FMP applications
  - ✓ Meets DEQ standards
  - ✓ No detectable change due to harvest
- Stream temperature under FPA:
  - ✓ Meet Numeric Standard
  - ï Doesn't meet Protecting Cold Water Standard
  - ✓ Small magnitude of change
  - ✓ Shade matters
  - ✓ Improving trend 5-years after harvest
  - ? Downstream propagation of temperature change.

# Roads and Sediment



# Road research made significant contributions to BMP modifications in the 1980s and 1990s.

- ✓ Durable Surfacing
- ✓ Vegetated ditches
- ✓ Traffic control practices
- ✓ Road location
- ✓ Direct drainage away from streams

*Reid and Dunne 1984, Bilby et al 1985, Duncan and Ward 1985, Bilby 1985, Sullivan 1985, Skaugset and Allen 1998, Megahan and Ketcheson 1996*

# Reducing Hydrologic Connectivity

Direct drainage away from streams, cross drains, water bars, filtering around stream crossings

- Reduce sediment delivery to streams
- Reduce potential for road system to act as a part of the channel network potentially influencing peak flows

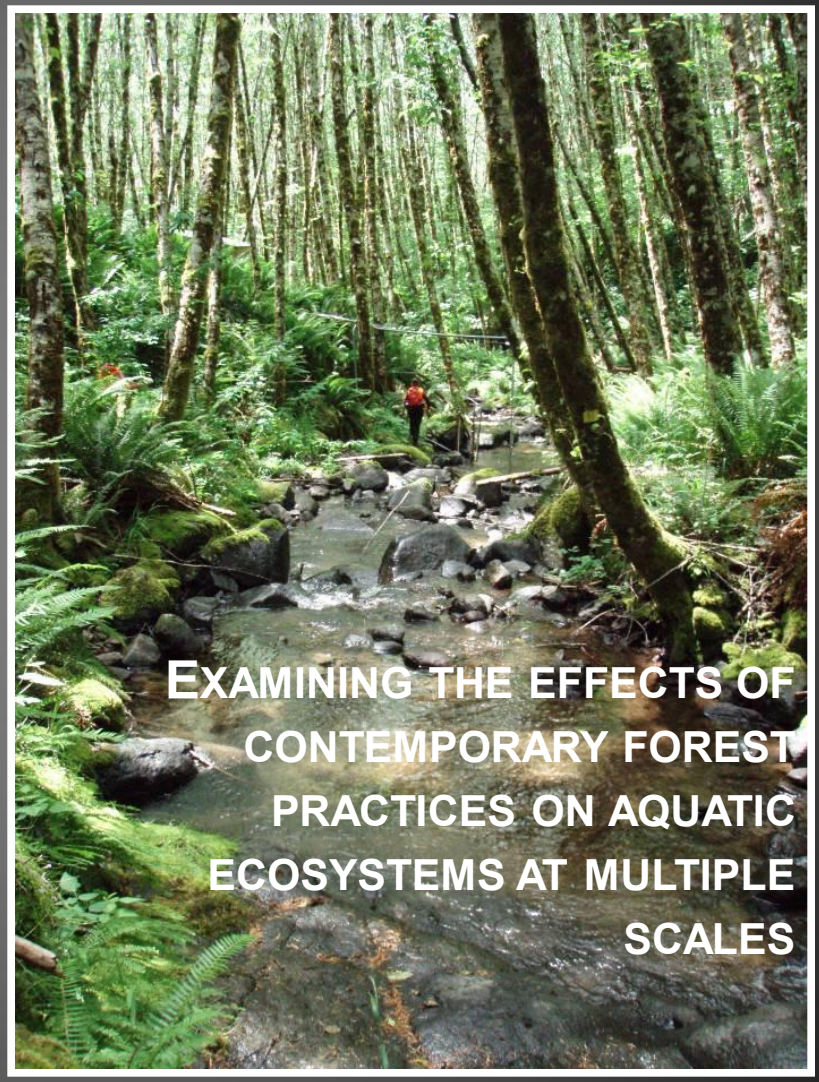
*ODF 1996, Skaugset and Allen 1998, Mills et al. 2007*

# Watershed Road Sediment Studies

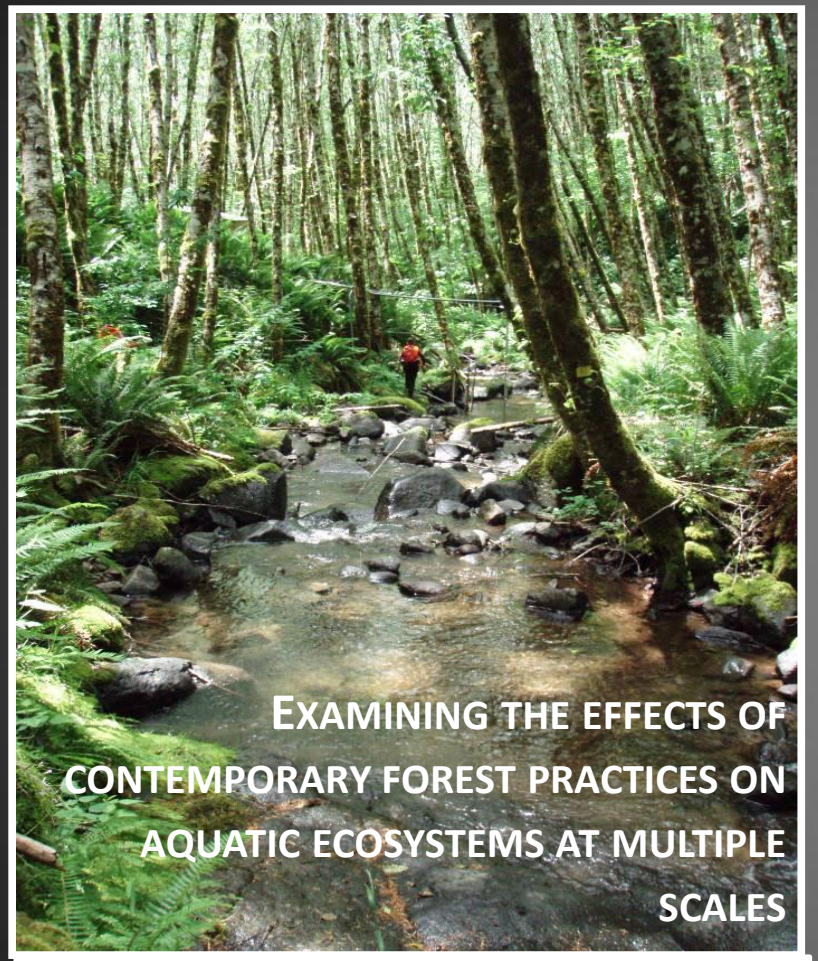
In Trask Watershed Context:

- Does road construction increase sediment delivery to streams?
- Relate to other metrics (ppt, road conditions, traffic, surfacing, stream flow etc.)
- How is it propagated downstream?
- Examine biologic linkages

Hinkle Creek: Sediment routing and haul



# Trask River Watershed Study

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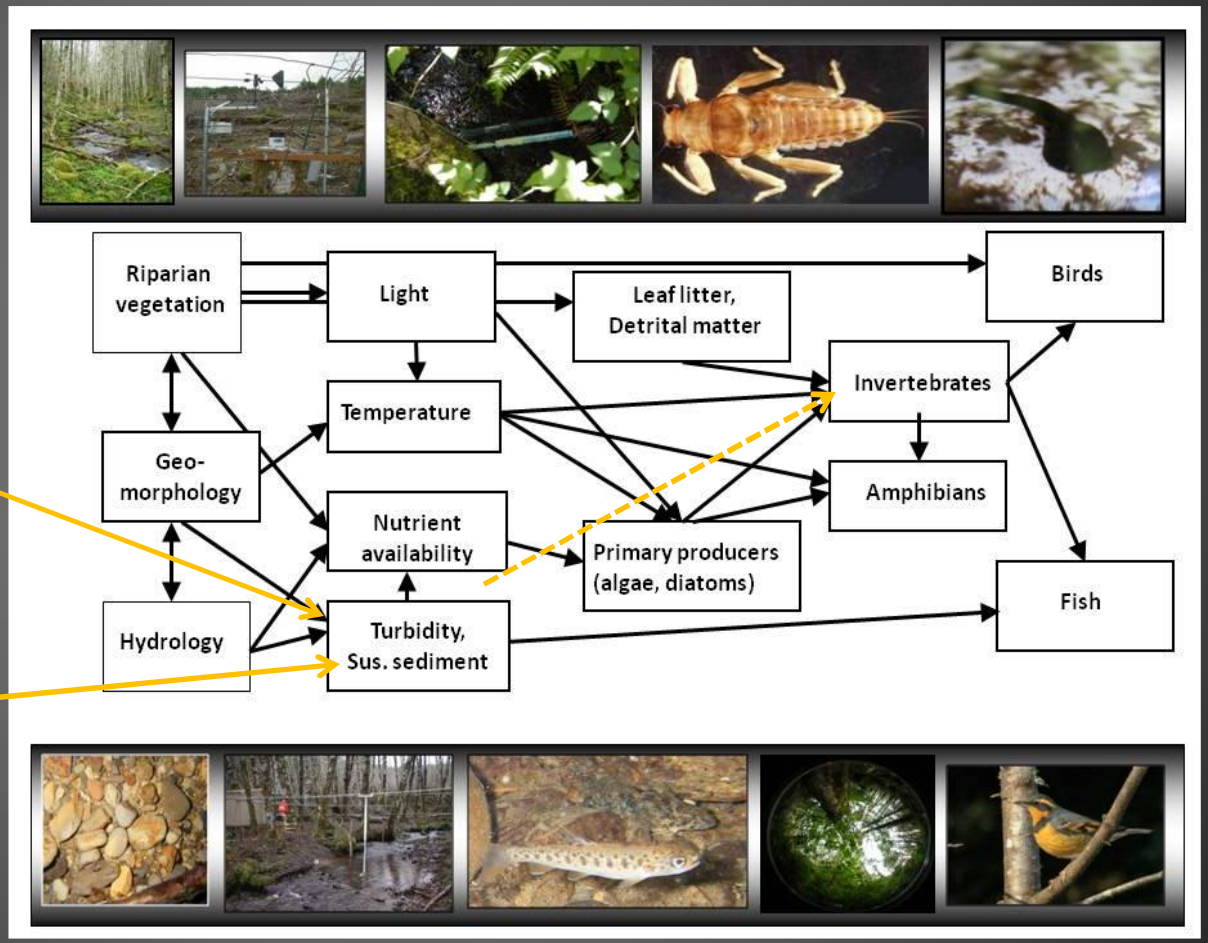
Prevailing questions:

- What are the effects of forest management around very small streams?
- What is the biological significance of effects from forest management?
- What are the cumulative effects of forest management?
- Paired watershed studies most suitable to address these questions

# Trask Conceptual Model

Year 1: Pre-road work and Pre-harvest

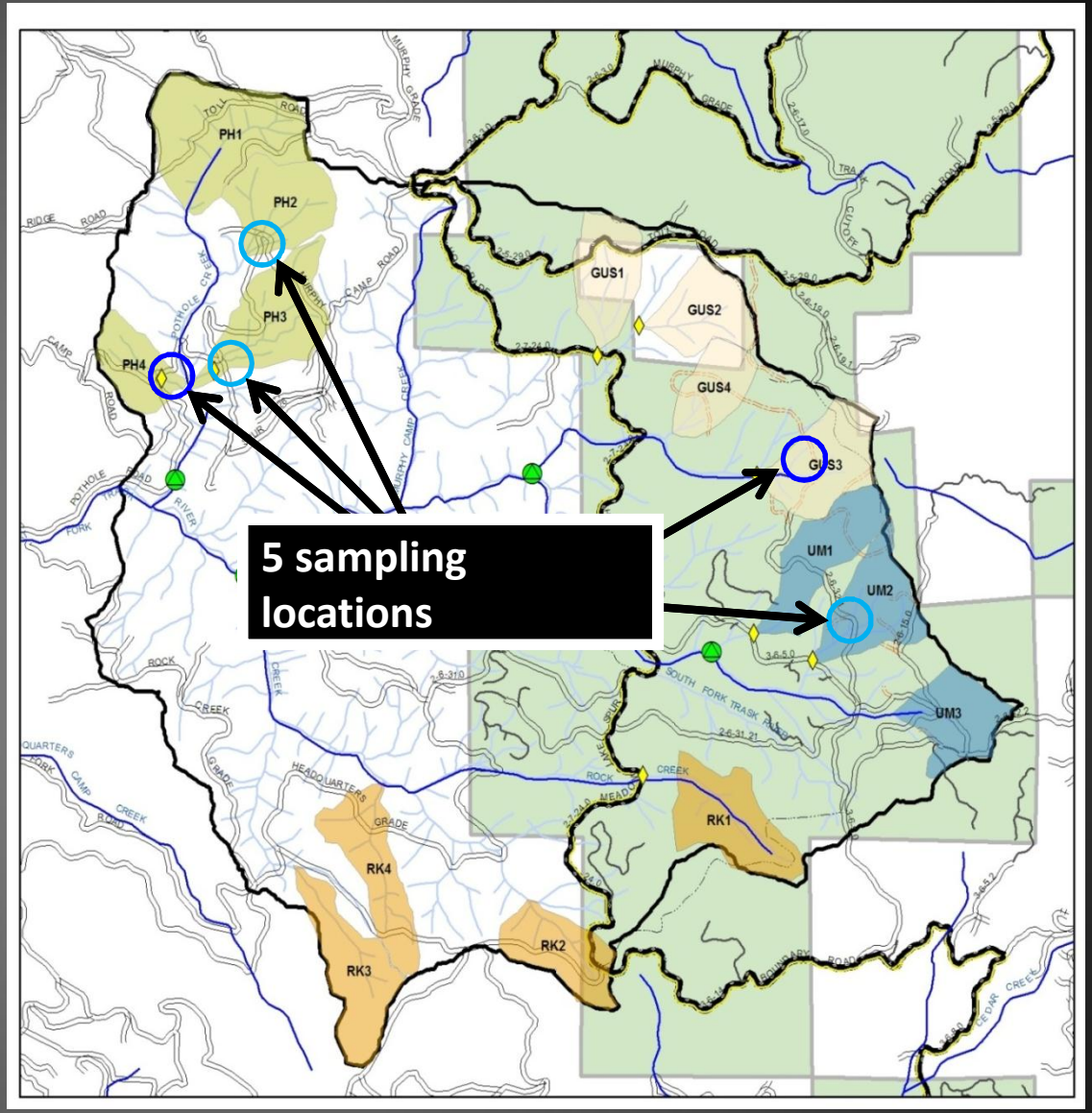

Year 2: Post-roads

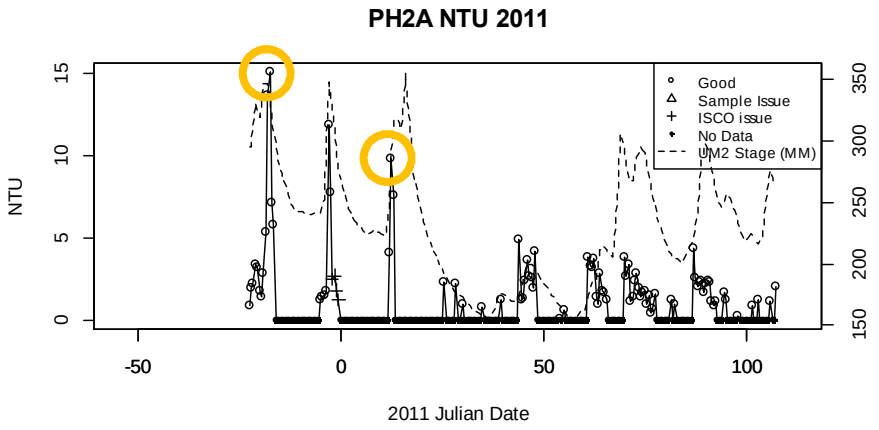

Year 3: Post-Road/Post Harvest with Haul

# Trask Road Sediment Study Design

- In 5 headwaters streams where biological data are being collected
- Three years of data collection:
  - ✓ Pre- road construction
  - ✓ Post- road construction & maintenance
  - ✓ Post-Haul & Harvest




Dr. Ivan Arismendi, Dr. Jeremy Groom, Maryanne Reiter, Liz Dent, Dr. Sherri Johnson, Dr. Bob Bilby, Dr. George Ice, and Janel Banks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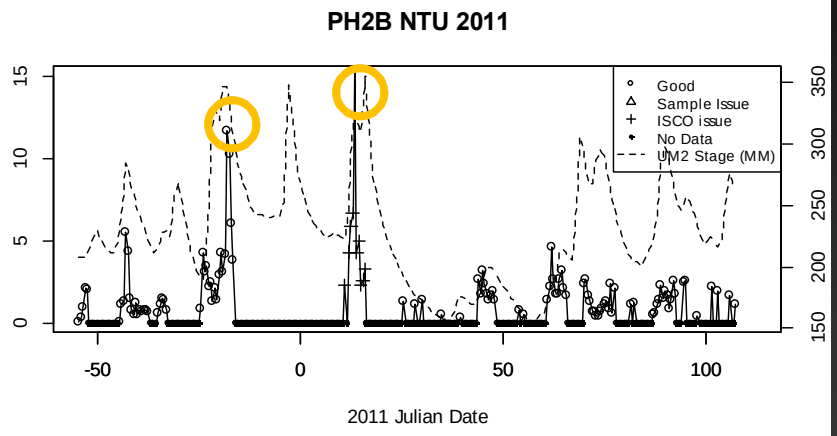
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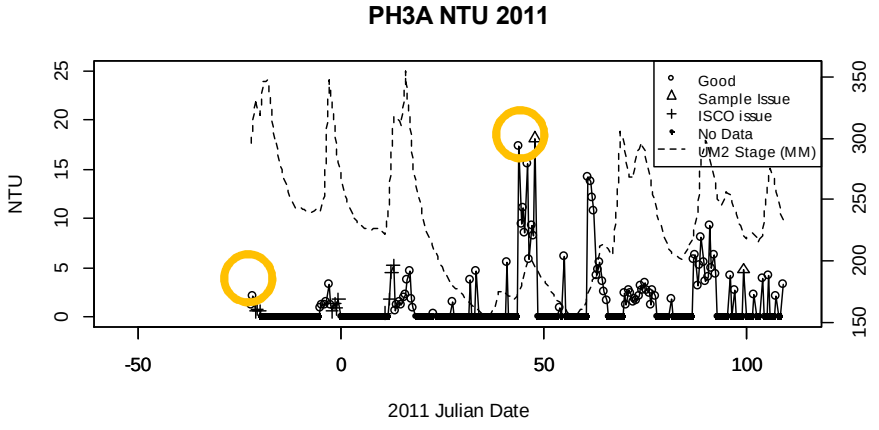
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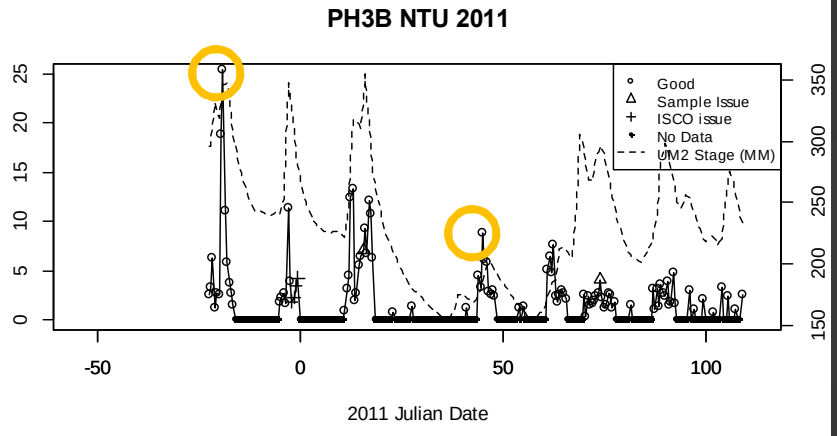
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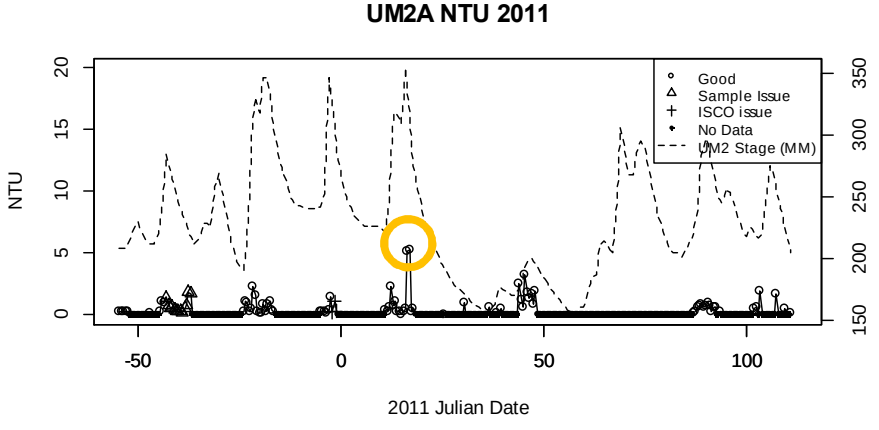
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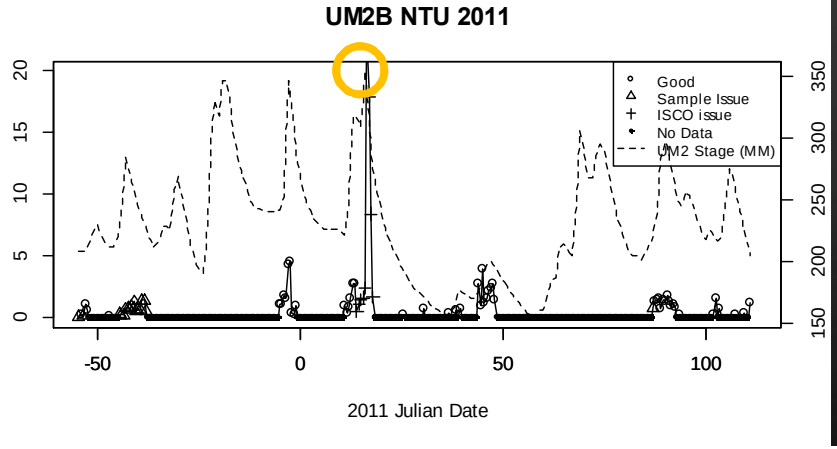
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# Next Steps

- 2013 Manuscript: Pre-road and post-road construction patterns
- Effects of haul and harvest on sediment
- Potential biological responses.


# Roads and Turbidity in Forested Streams: What are We Learning?

- Have adapted BMPs to reflect research over several decades
- Trask Pre-road Work: Highly Variable
  - Above and Below Roads
  - Between Storms
  - Between Streams

# Oregon Forestry and Clean Water

Current Challenge:

- How to detect slight forest management effects within highly variable systems.
- Are slight forest management effects biologically relevant?
- Goals need to reflect that water quality is naturally variable over time and across the landscape.

# Conclusion

- Forested streams provide high water quality
- Oregon Forestry has a rich history of testing effectiveness & adapting BMPs to reflect findings.
- As long as the forestry community maintains commitment to adaptive management we maintain social license to manage.