



Water Quality Results from the Research Coop. Studies

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Questions about the Effectiveness of the Forest Practice Rules

- CZMA review by federal agencies with focus on the effectiveness of OR FPA rules
 - Buffers for small and medium streams including N
 - Legacy roads
 - Landslides
 - Controlling herbicides near streams
- Initial results from the RipStream Study of temperature and large wood recruitment response to current rules and BOF rule making activities
- Proposals to revise O&C lands management with increased timber harvest

Rules inadequate to protect WQ

Not achieving PCW

Return to unrestricted logging of 1950's

Oregon Watersheds Research Cooperative

Goal: Quantify effects of contemporary forest practices on the physical, chemical and biological characteristics of streams at multiple spatial scales.

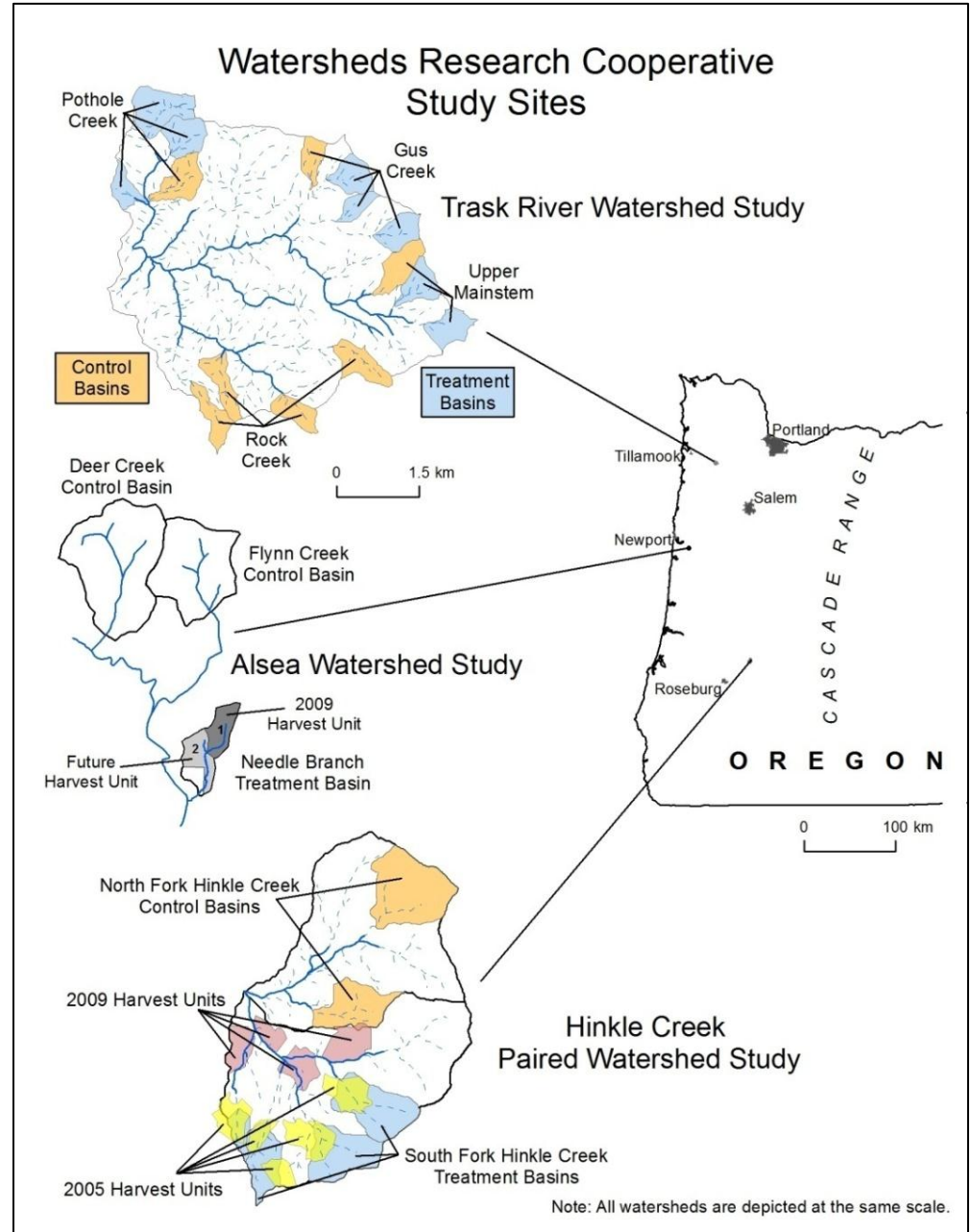
Approach: Research is cooperative, multi-disciplinary and long-term. Each watershed study (Hinkle, Alsea, Trask) has a slightly different in focus.

Replication: 3 paired watershed studies

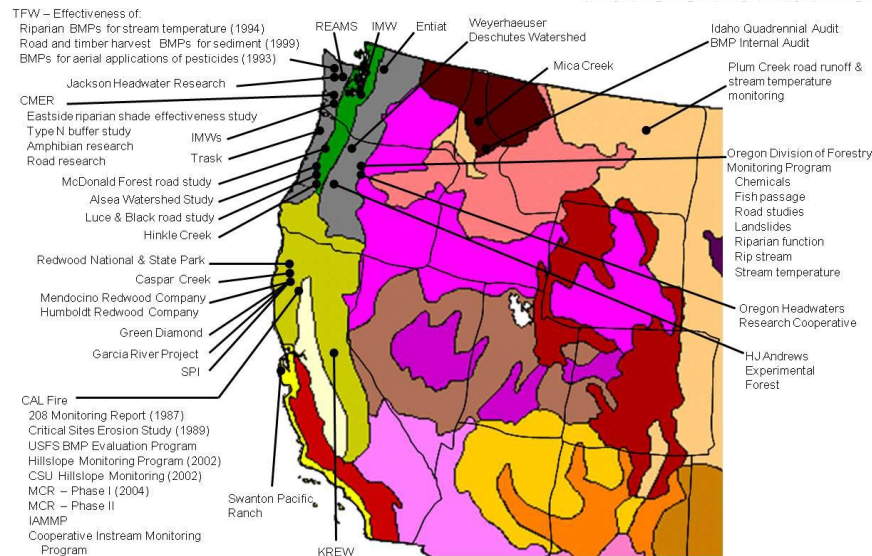
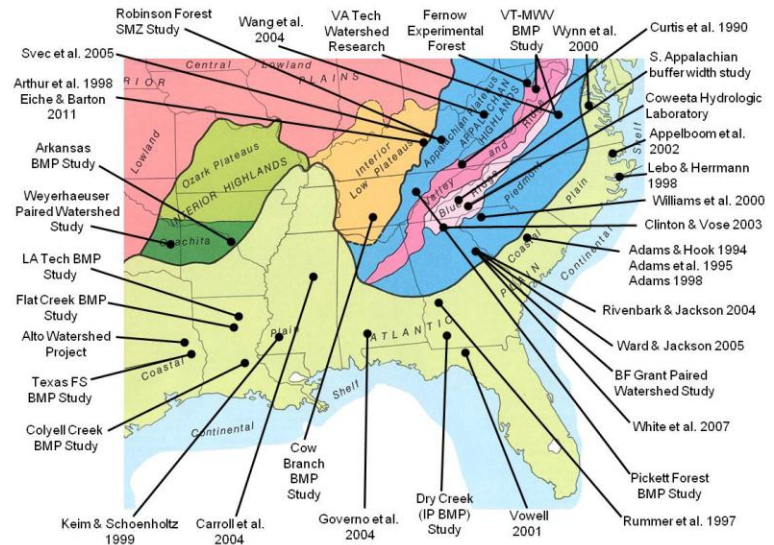
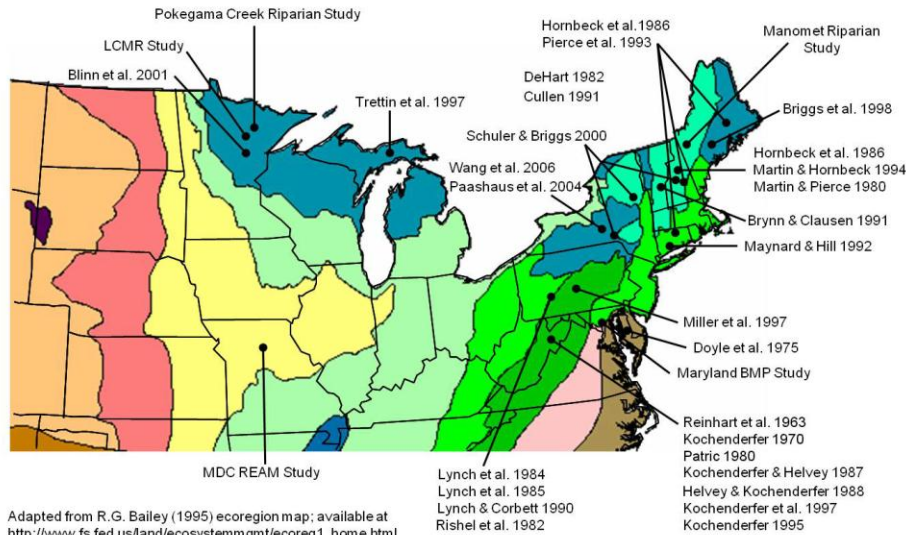
-Hinkle Creek replicates headwater and fish-reach treatments under current rules

-Alsea WSR replicates in time (before and after rules)

- Trask Watershed replicates alternative headwater treatments



100 Years of BMP Effectiveness Research (from Ice and Schilling 2012)



Distorted Perspective of Forest Watershed Results

Past Practices



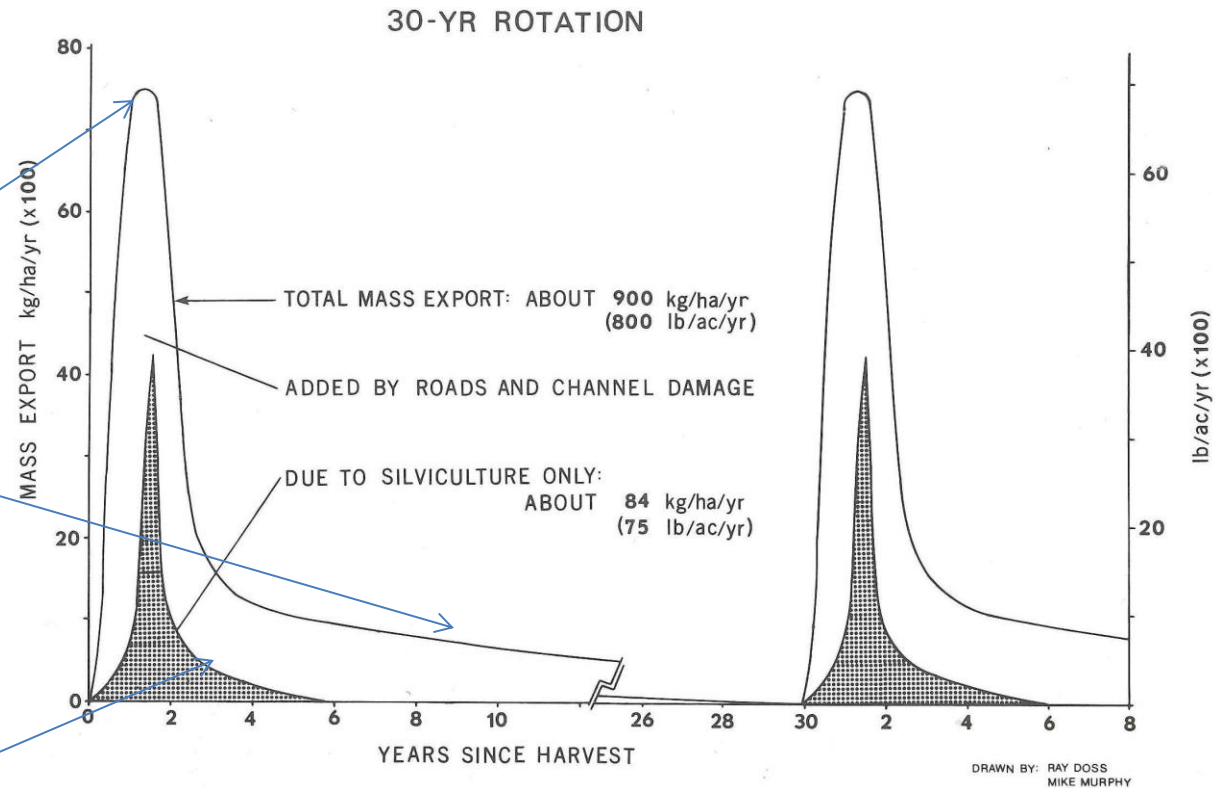
Contemporary Practices



Distorted View – Focus on Immediate Impacts

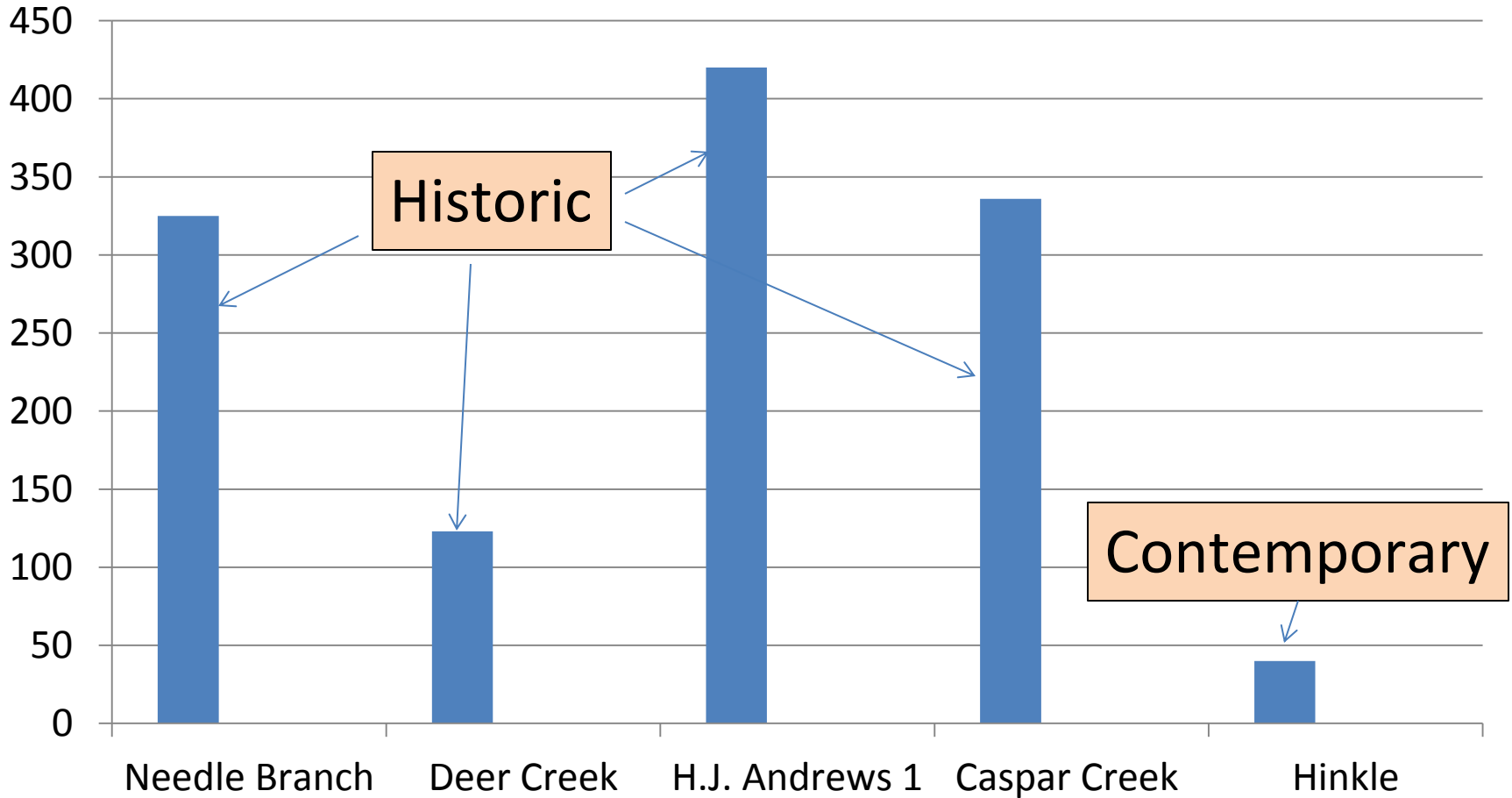
(From Hewlett 1979)

- Focus on immediate impacts – increase of 3.3 tons/acre for first year
- 0.4 tons/acre/yr averaged over a 30 yr rotation
- 0.04 tons/acre/yr with BMPs



Oregon's Forest Practice Rules Effective

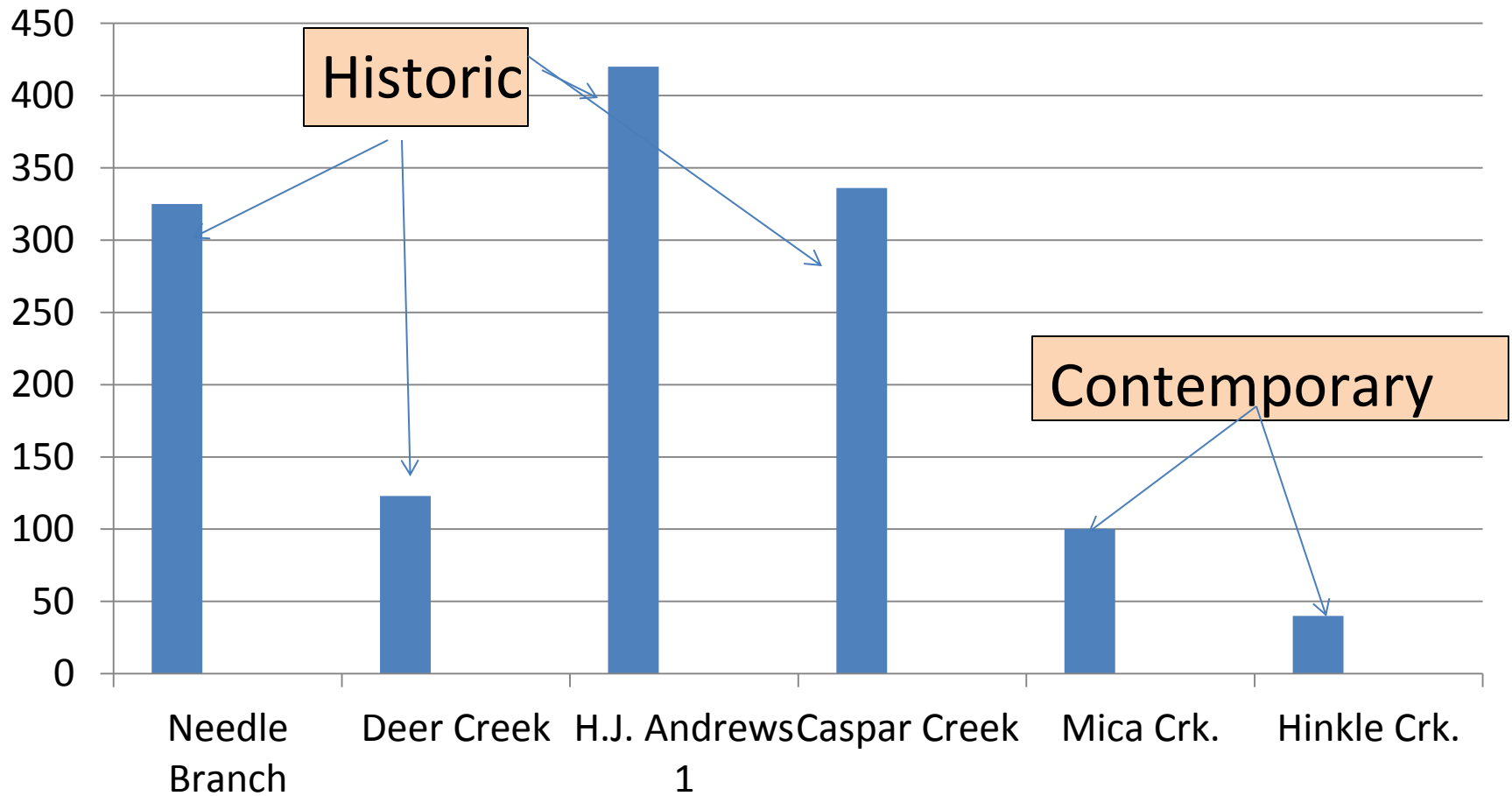
- Water Quality Impacts Reduced -



Percent Increase in suspended sediment compared to expected sediment load

Forest Practice Rules Effective (Mica)

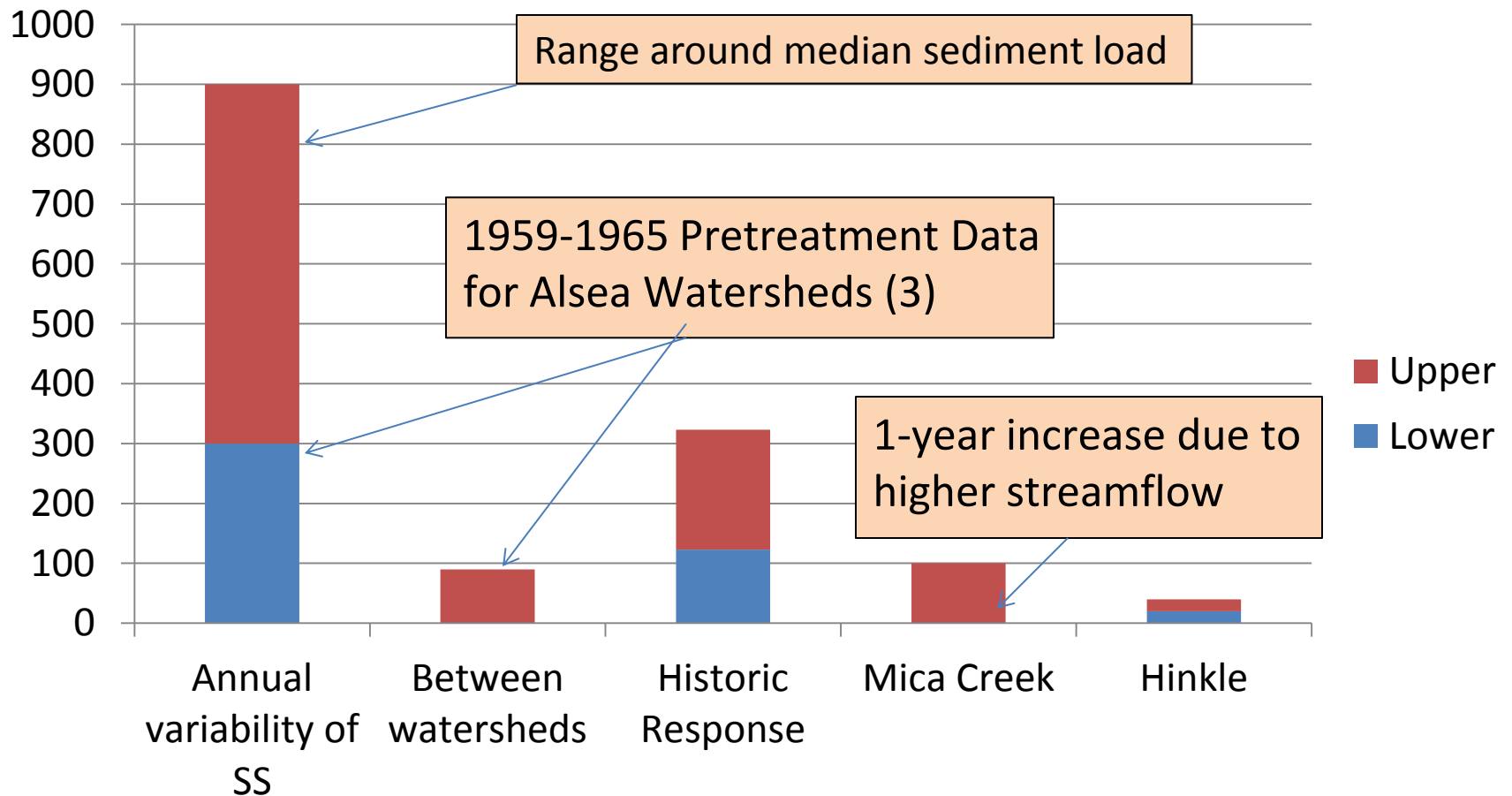
- Water Quality Impacts Reduced -



Percent Increase in suspended sediment compared to expected sediment load

Comparing Natural Variations to Historic and Contemporary Impacts (area adjusted)

Percent Difference for Suspended Sediment



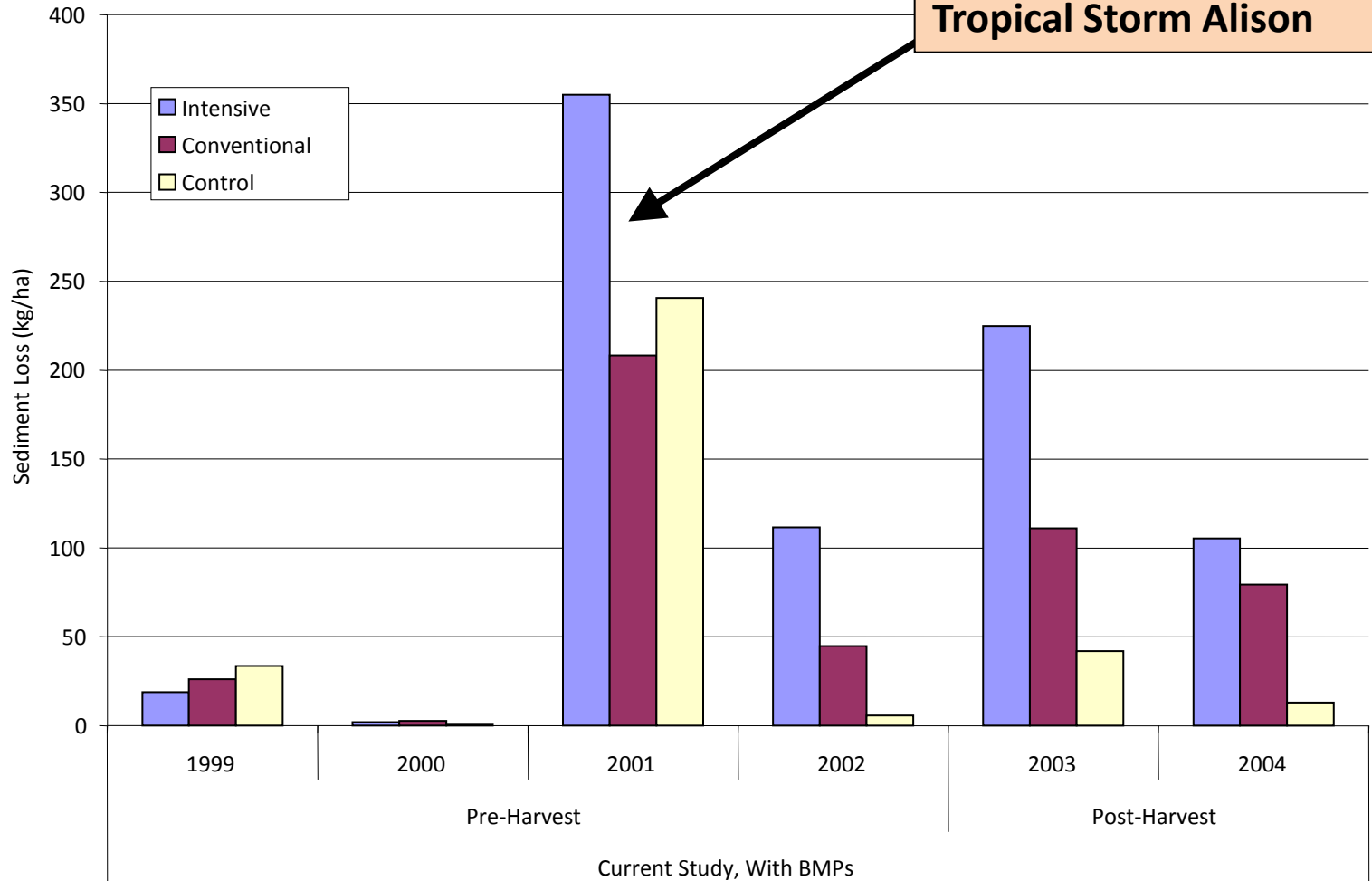
Sediment Loss 1999-2004

(McBroom et al. 2008)

25,000 kg/ha
cropland rate
x SDR

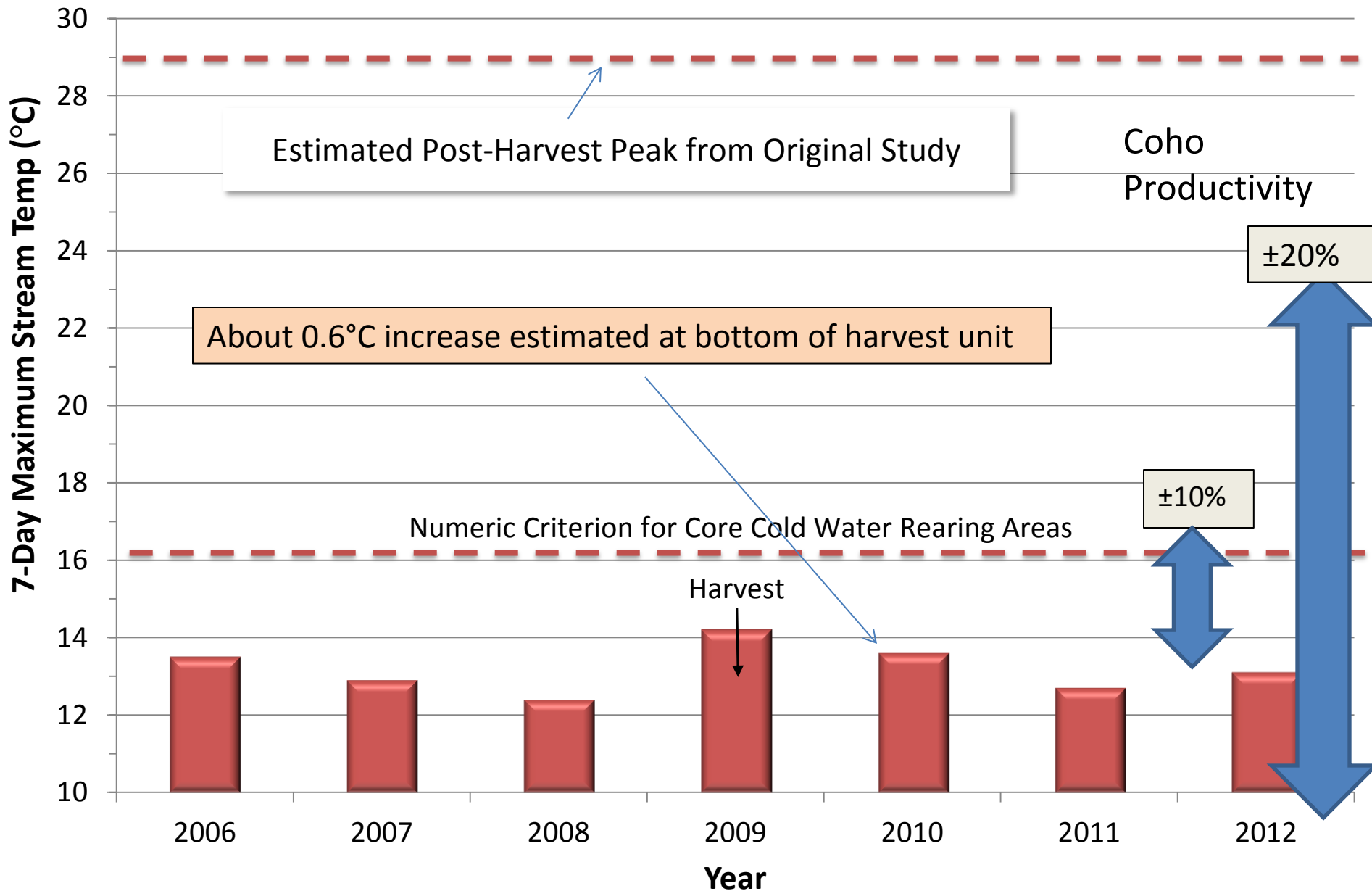
3000 kg/ha

Tropical Storm Alison



1981 SW

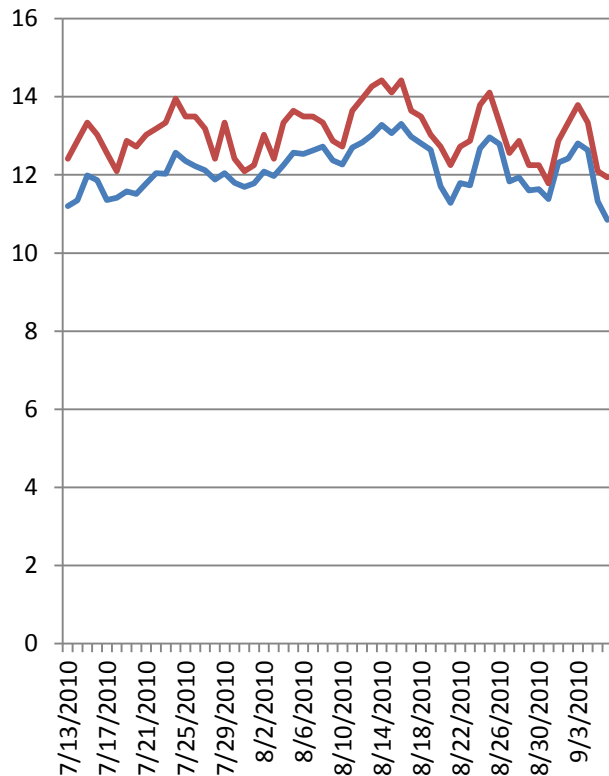
Comparison of 7-day Maximum Stream Temperatures After Harvest in the Original and Current Alsea Watershed Studies



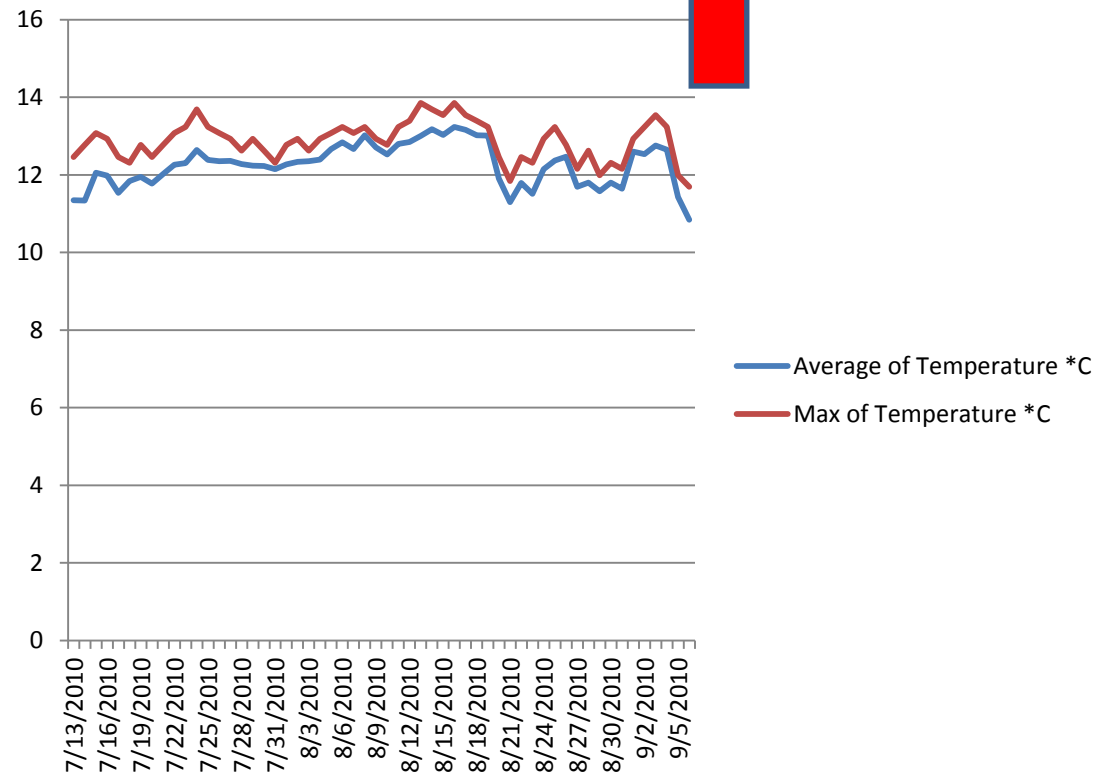
Alsea – First Summer after 2009 Harvest

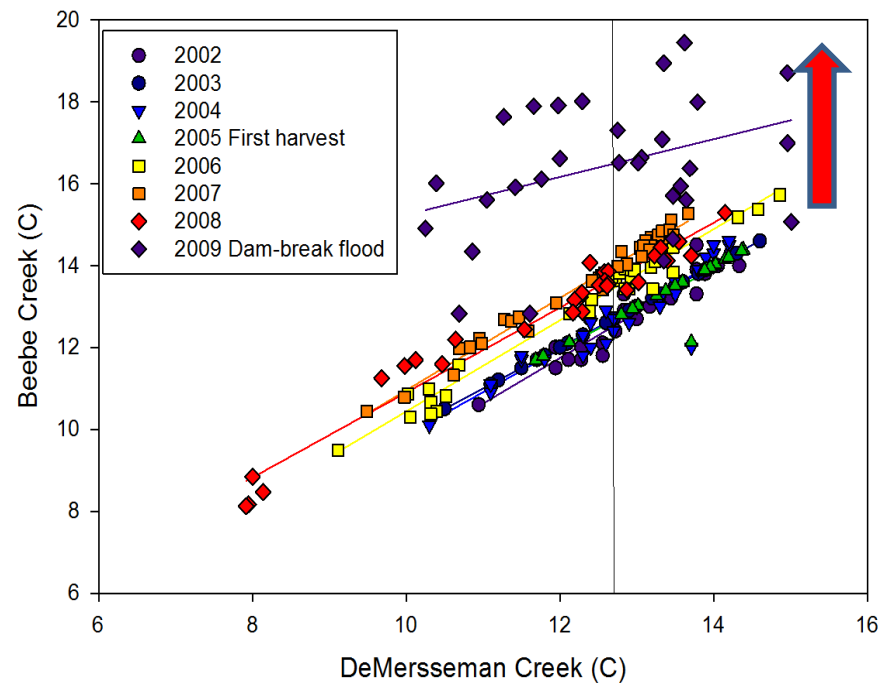
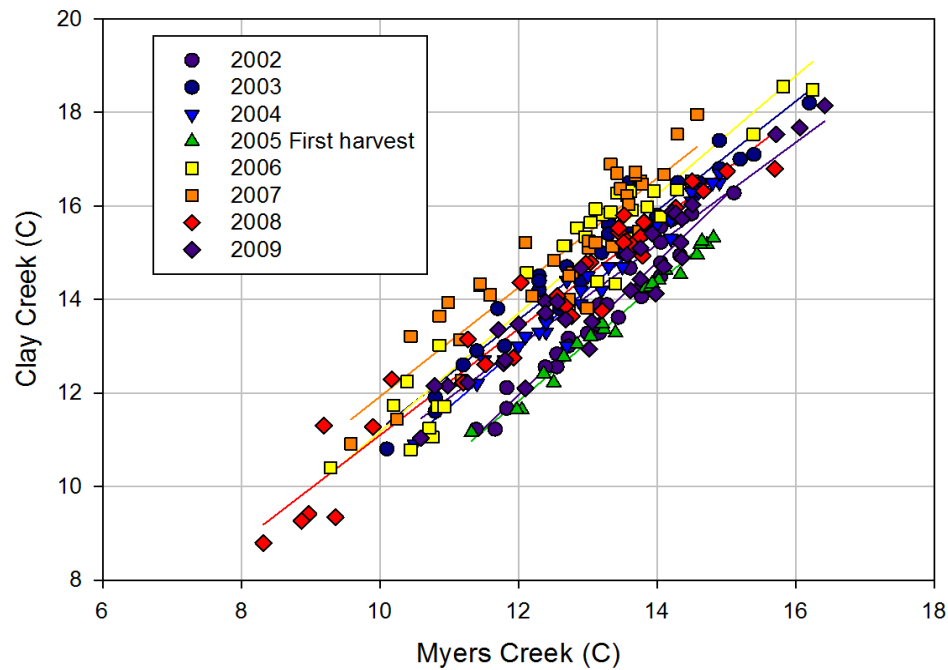
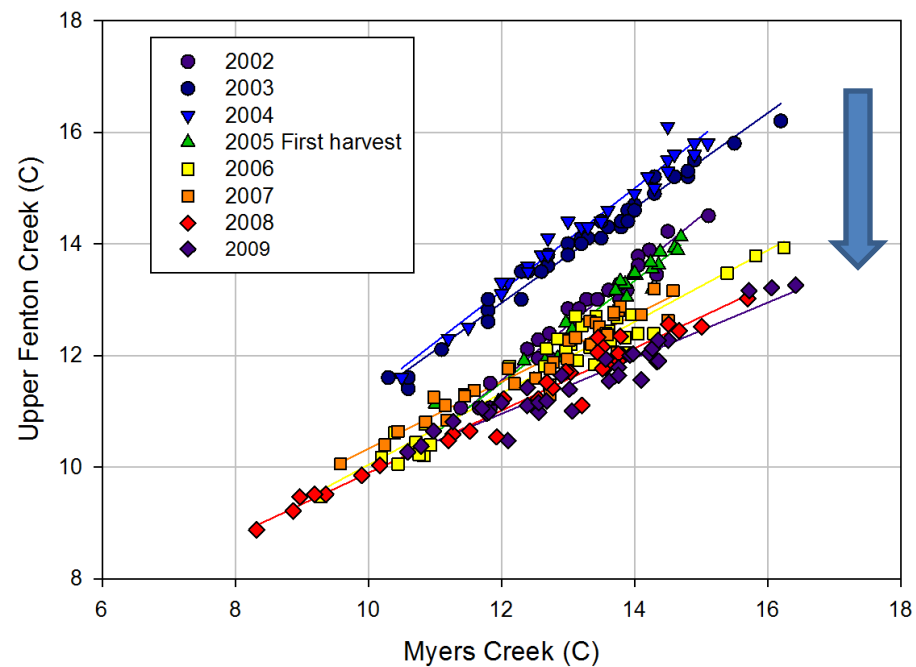
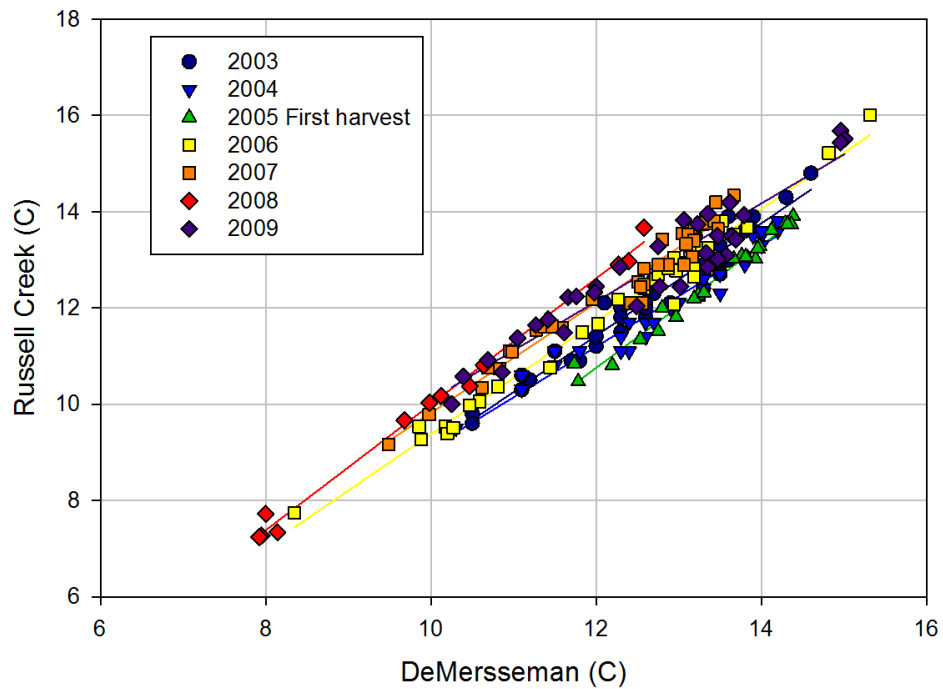
Water Temperature in °C

Control WS

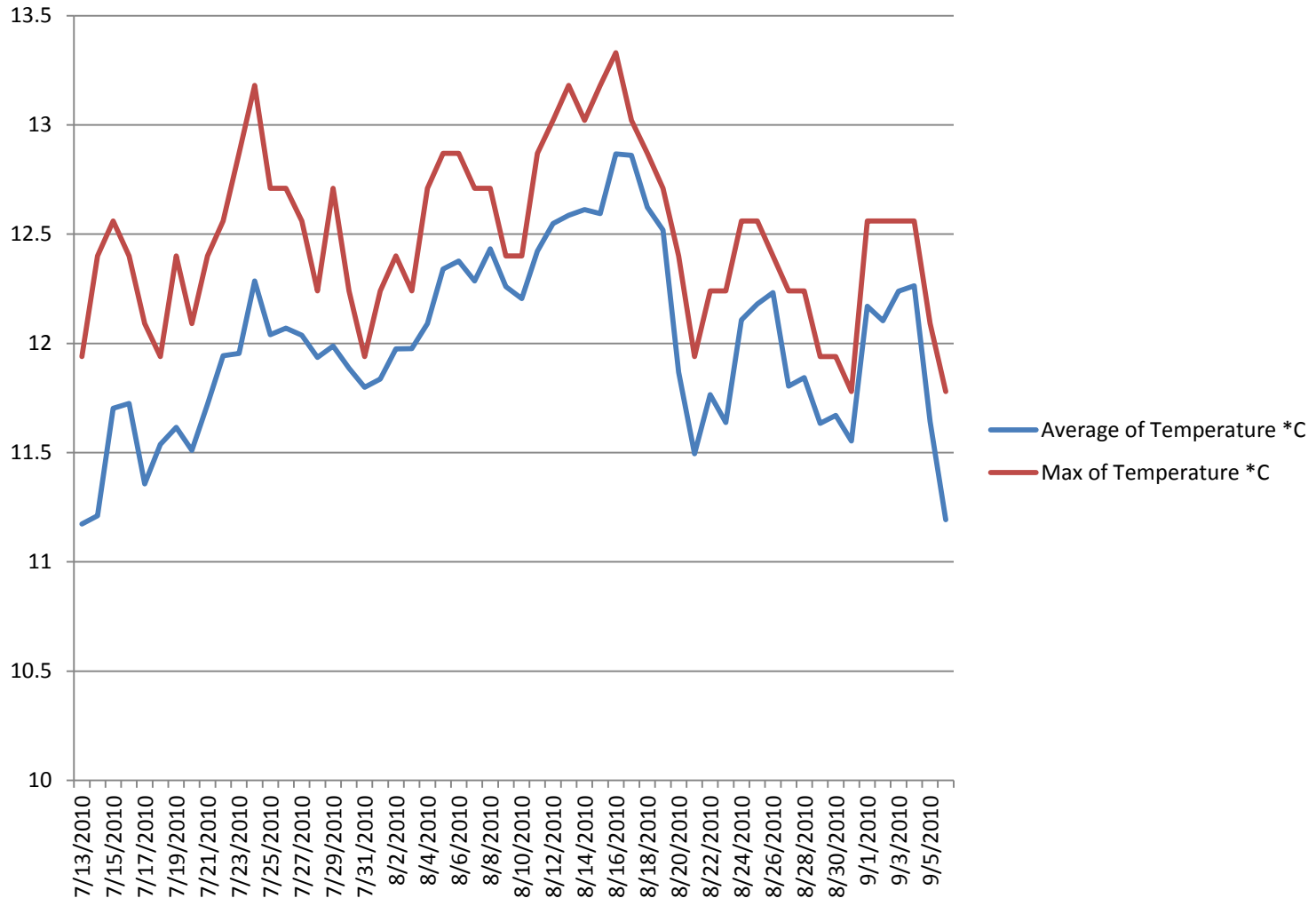


Treatment WS

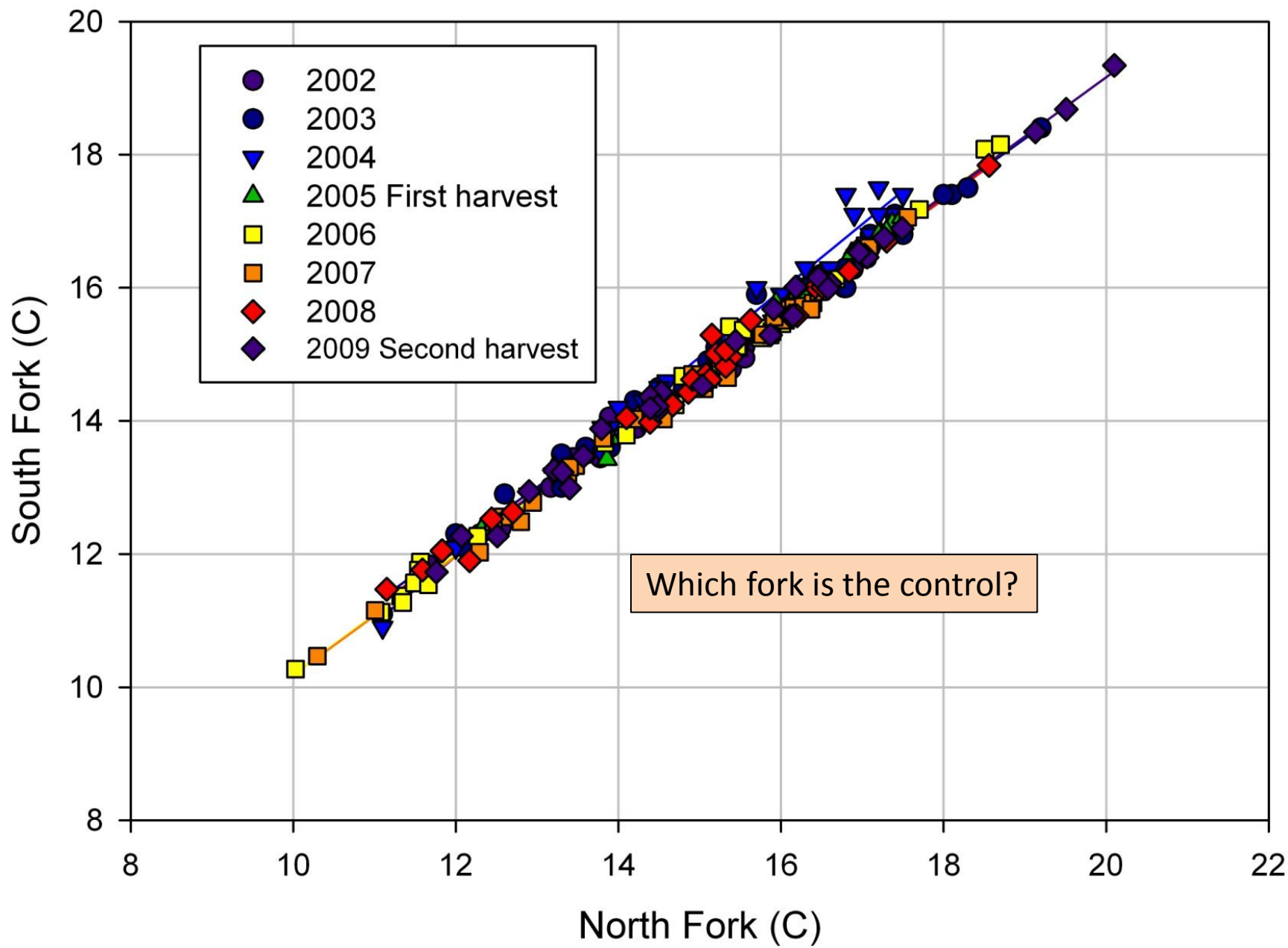




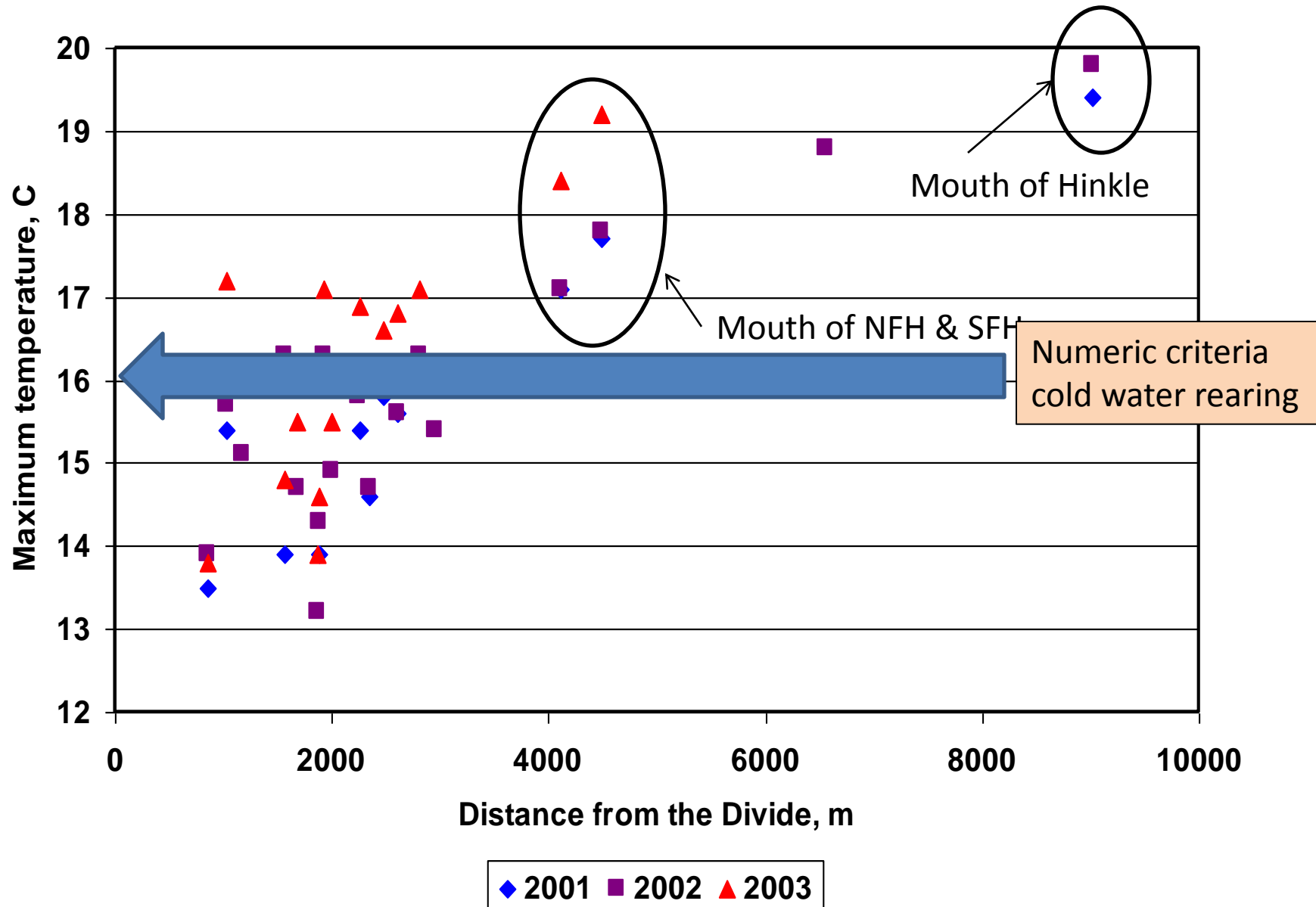
Station at Bottom of No-Fish Reach Year after 2009 Harvest in Alsea WS Study Revisited



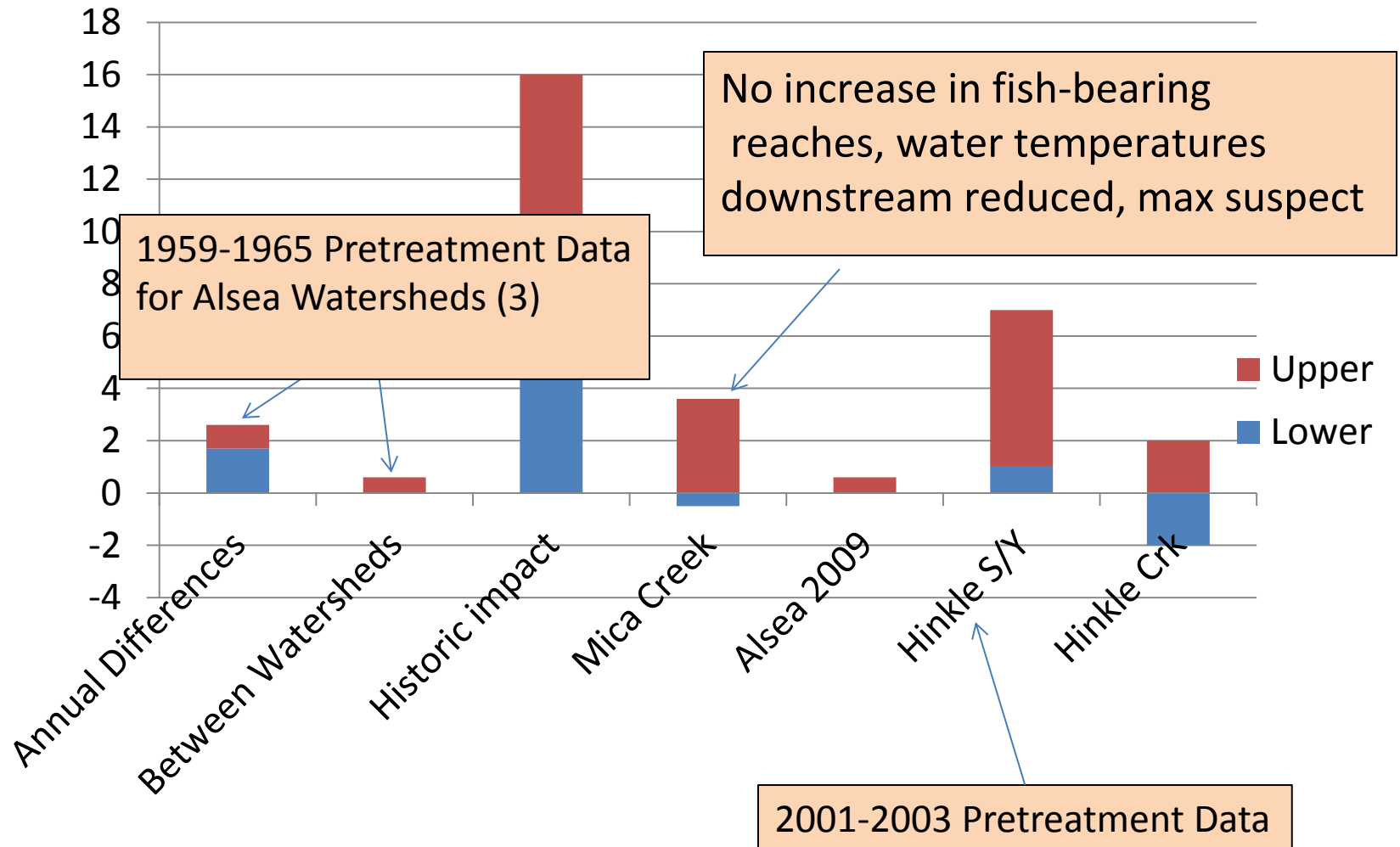
Maximum Daily Temperature



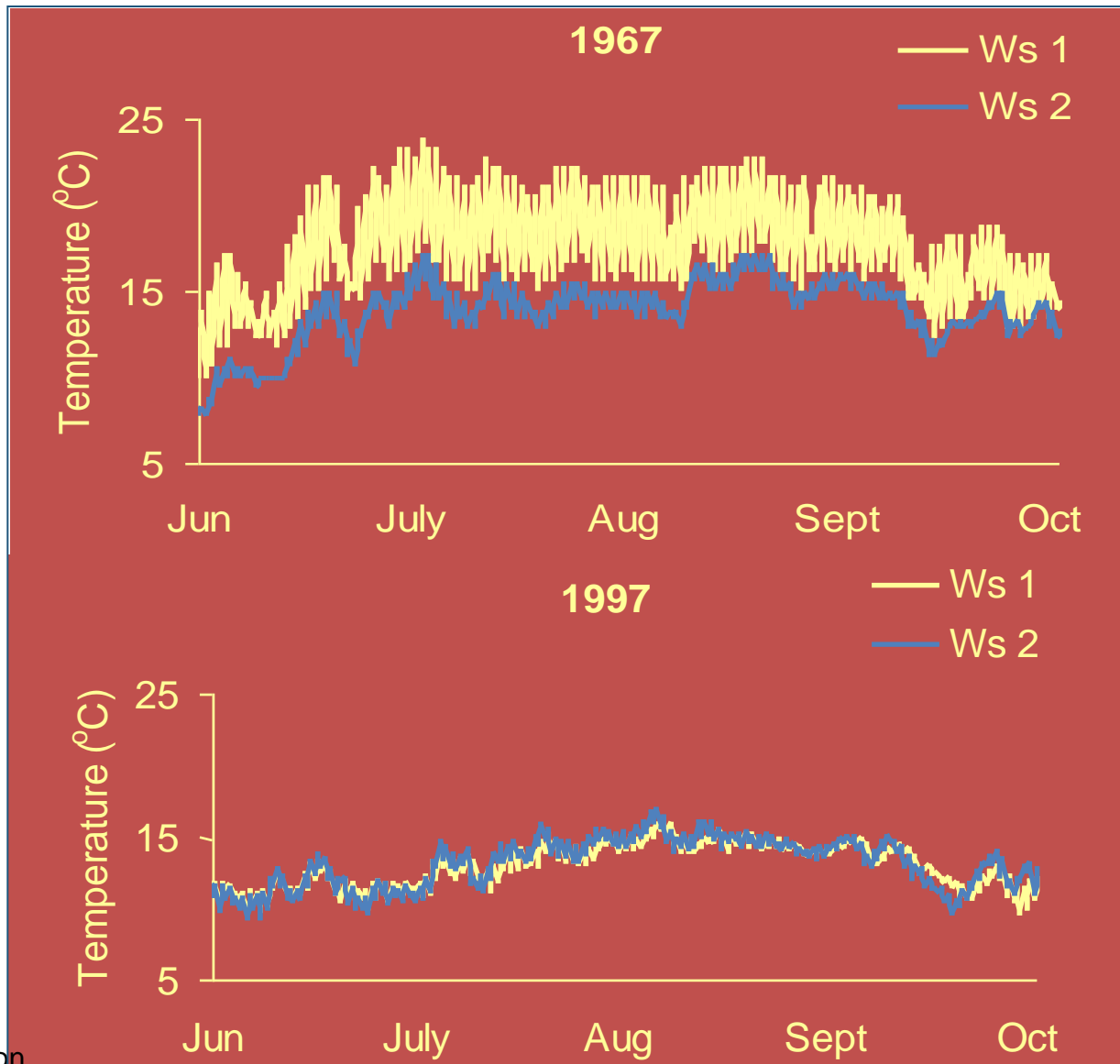
Water Quality Criteria Sometimes Unattainable for Forest Watersheds



Natural Variations and Historic and Contemporary Management Impacts (Maximum temperature in °C)

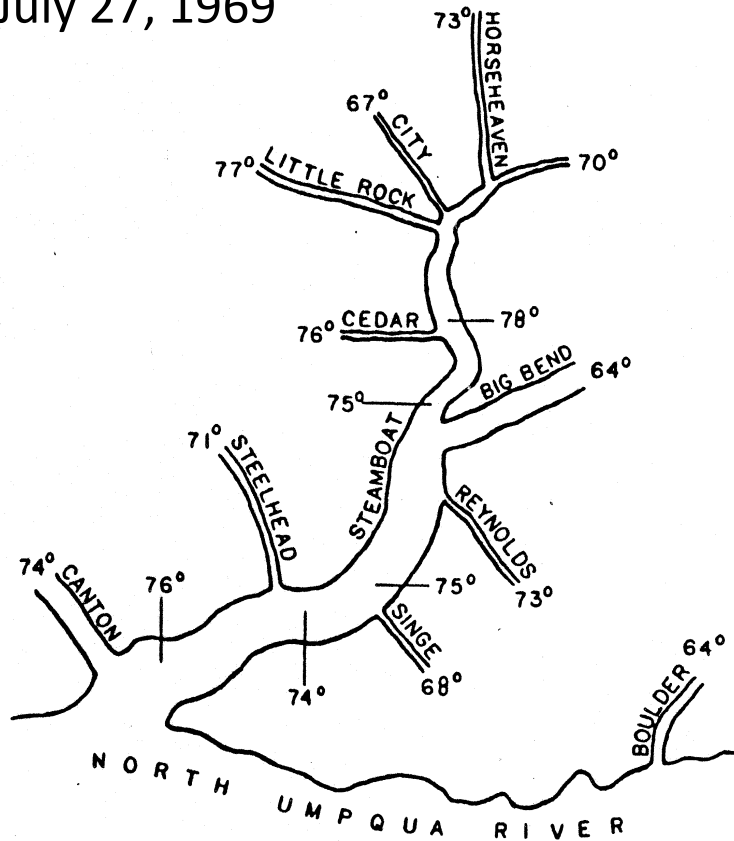


Recovery of HJ Andrews Watershed 1

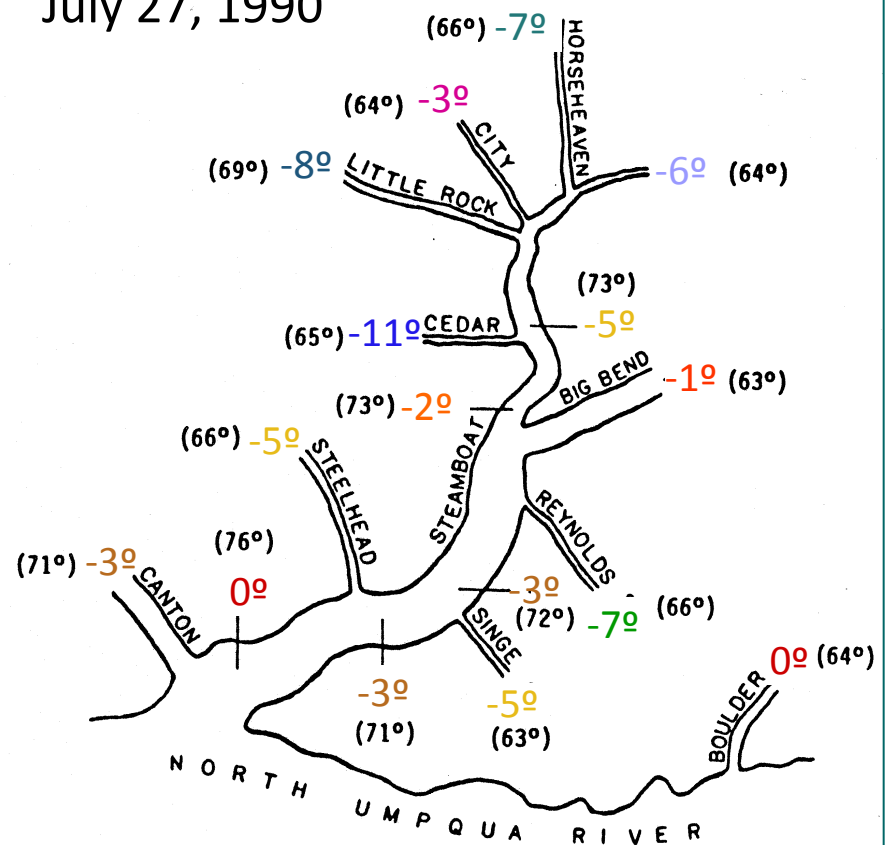


Mixing Ratio and Downstream Effects (Holaday 1992)

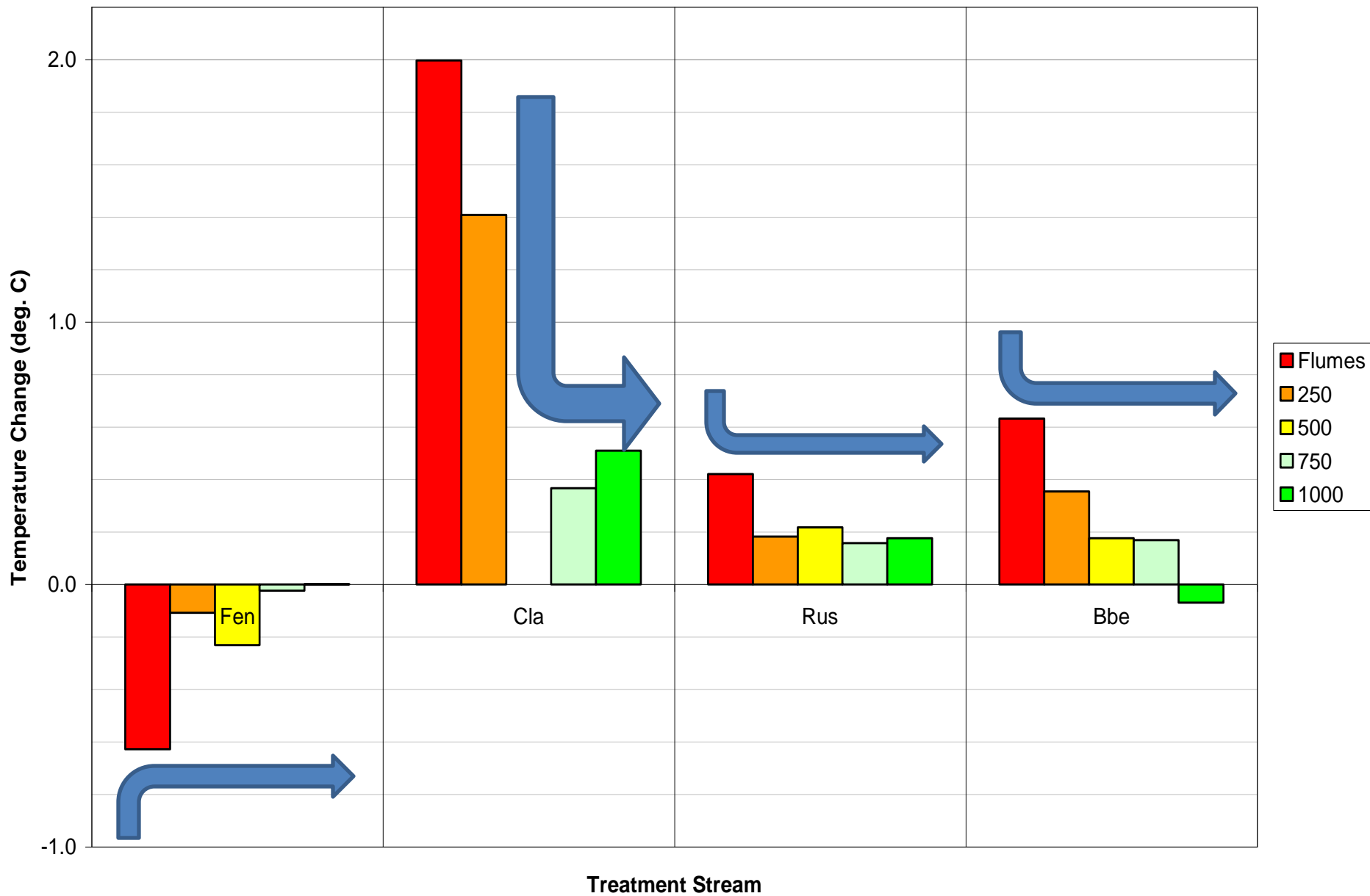
July 27, 1969



July 27, 1990



Mean Maximum Daily Temp. Change - 2005 to 2006, Myers control



FPA Riparian Management Areas are Effectively Reducing WQ Impacts

- Sediment and temperature changes small compared to natural variations
- No evidence of large negative biological impacts and some evidence of positive response
- Impact diminish over time and downstream

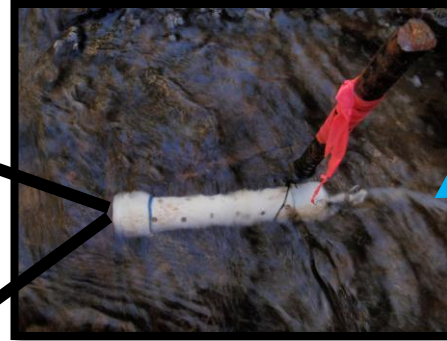


Study design

above

streamflow

below



Slide courtesy of Dr. Ivan Arismendi



turbidity at GUS3 – new road

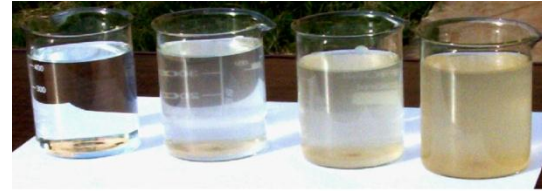
clearcut – no buffer

Is the median of [below – above $\leq C$]?

yes

No

e.g.



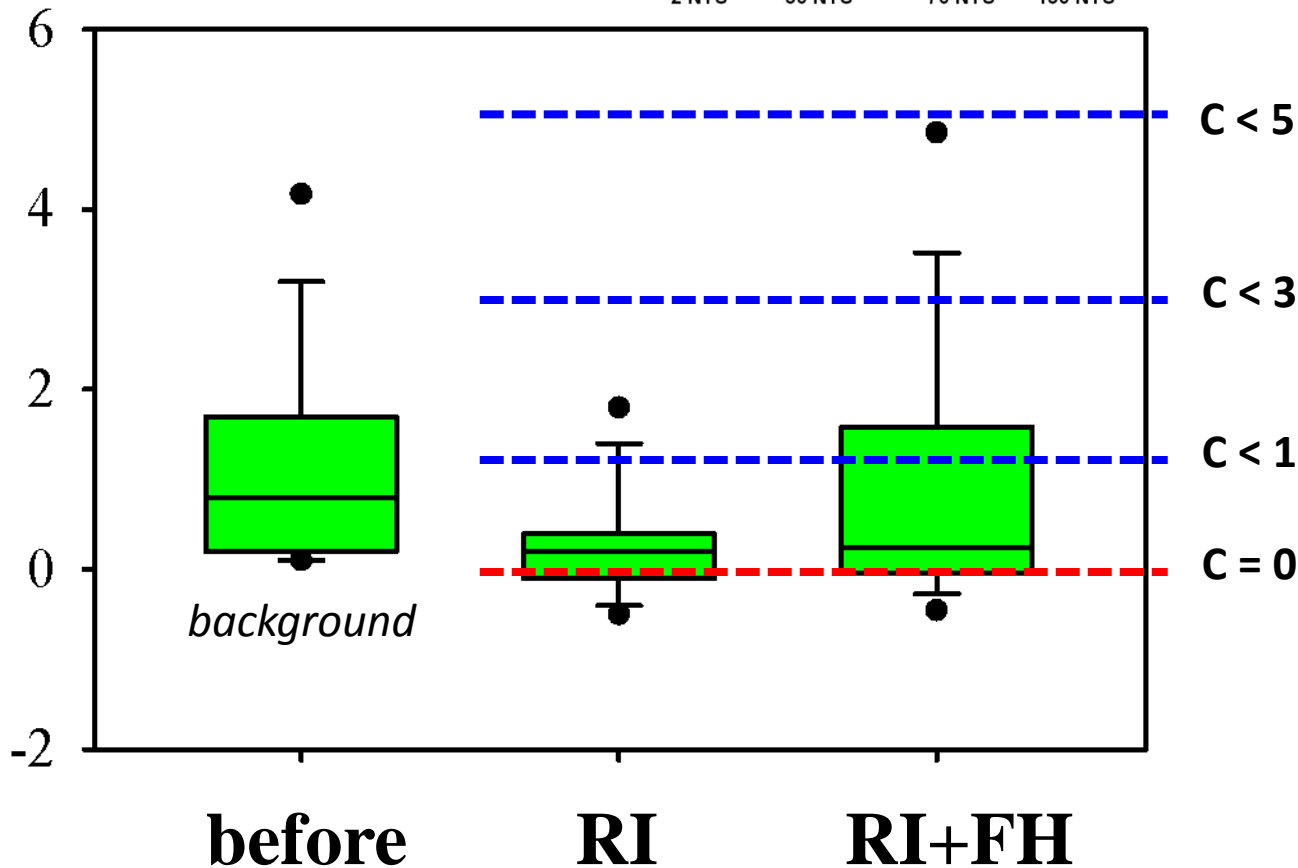
2 NTU

30 NTU

70 NTU

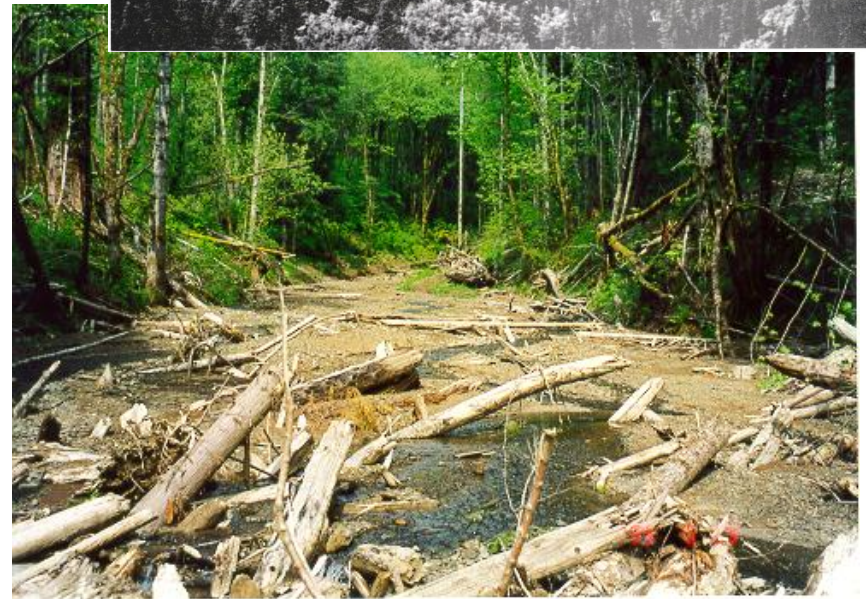
130 NTU

Difference in turbidity (NTU)



Landslide Inventory Following 1996 Floods Showed Improvements

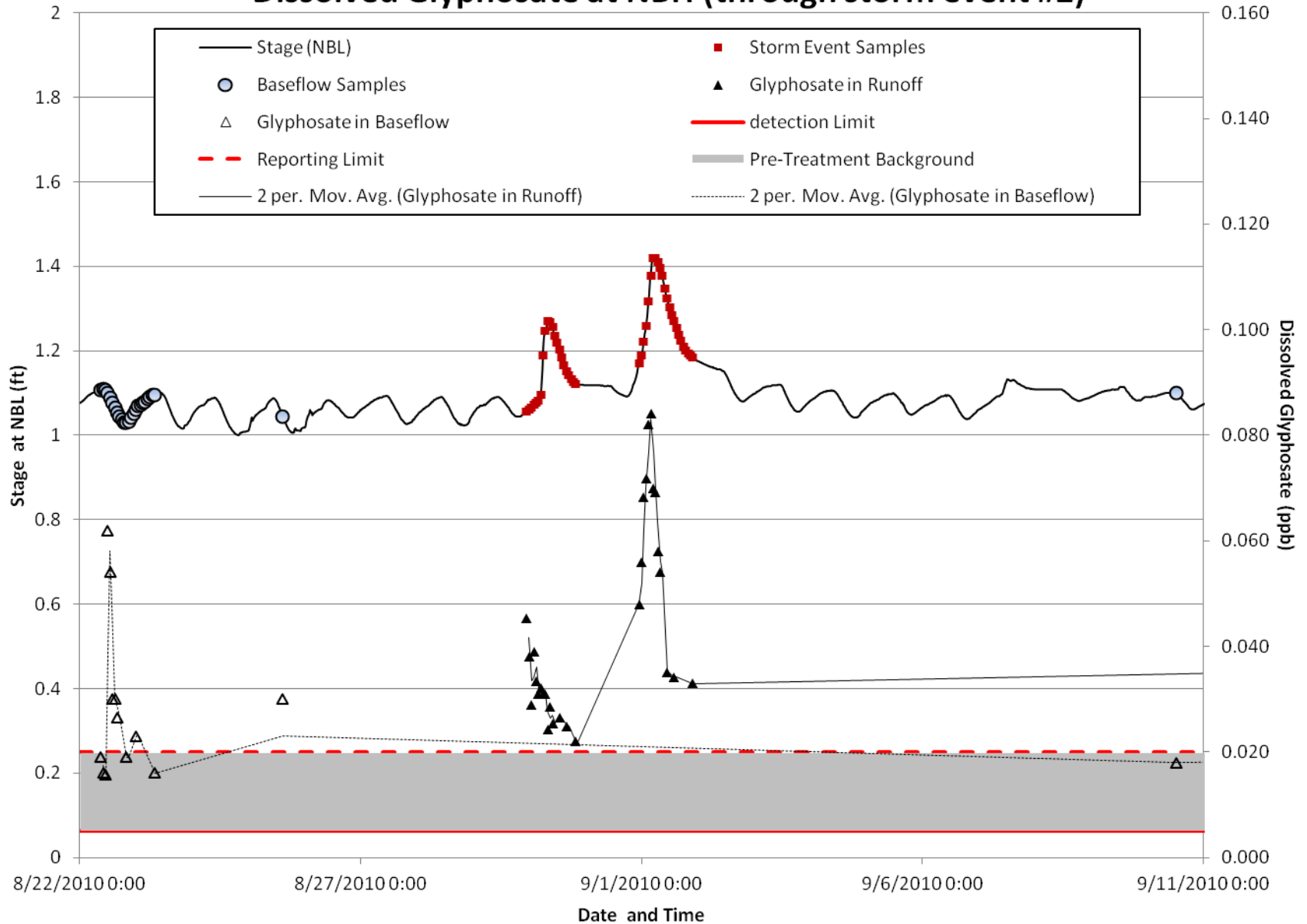
- Reduced contributions from forest roads compared to historic levels
- Ketcheson and Froehlich found higher failure rates in clear cut areas with headwall leave areas than complete clearcuts
- Need for more research
- Difficult to conduct manipulative studies



Intensive Study of Herbicide Spray Operation and WQ Response - Alsea

- Fish-bearing streams are protected; yeah but what about non-fish reaches?
- Excessive drift is controlled; yeah but what about stormwater runoff of herbicides?
- Glyphosate levels are low; yeah but probably because it's attached to solids?
- Herbicide concentrations are low; yeah but aren't fish populations still being negatively impacted?
- Monitoring below no-fish reach, first harvest unit, and bottom of watershed
- Monitoring focused on stormwater runoff, with flow data to allow characterization of exposure regimes
- Analyzing solid fraction
- Fish and macroinvertebrate populations are being monitoring

Dissolved Glyphosate at NBH (through storm event #2)



Best Available Science Shows Herbicide Applications Not Causing Biological Problem

- Before buffers and drift controls maximum concentrations of herbicides in streams were frequently greater than 100 µg/L and could reach as high as 7800 µg/L
- Buffers were found to be an effective practice to reduce delivery of aerially applied chemicals to streams
- Chemical and forest communities developed models to test methods for further reducing drift and delivery to streams
- Contemporary monitoring shows dramatically reduced exposures – orders of magnitude below those considered biologically significant
- Research to address additional questions about forest herbicide use such as stormwater runoff and tank mix synergism show little evidence of problem

Forest Practice Rules Working

- So far the Watersheds Research Cooperative water quality results support the conclusion that the current rules are effectively reducing impacts
- Road practices have improvement in OR
- Landslide information show improvements but...
- Chemical applications not detected at concentrations or durations considered harmful to aquatic organisms