

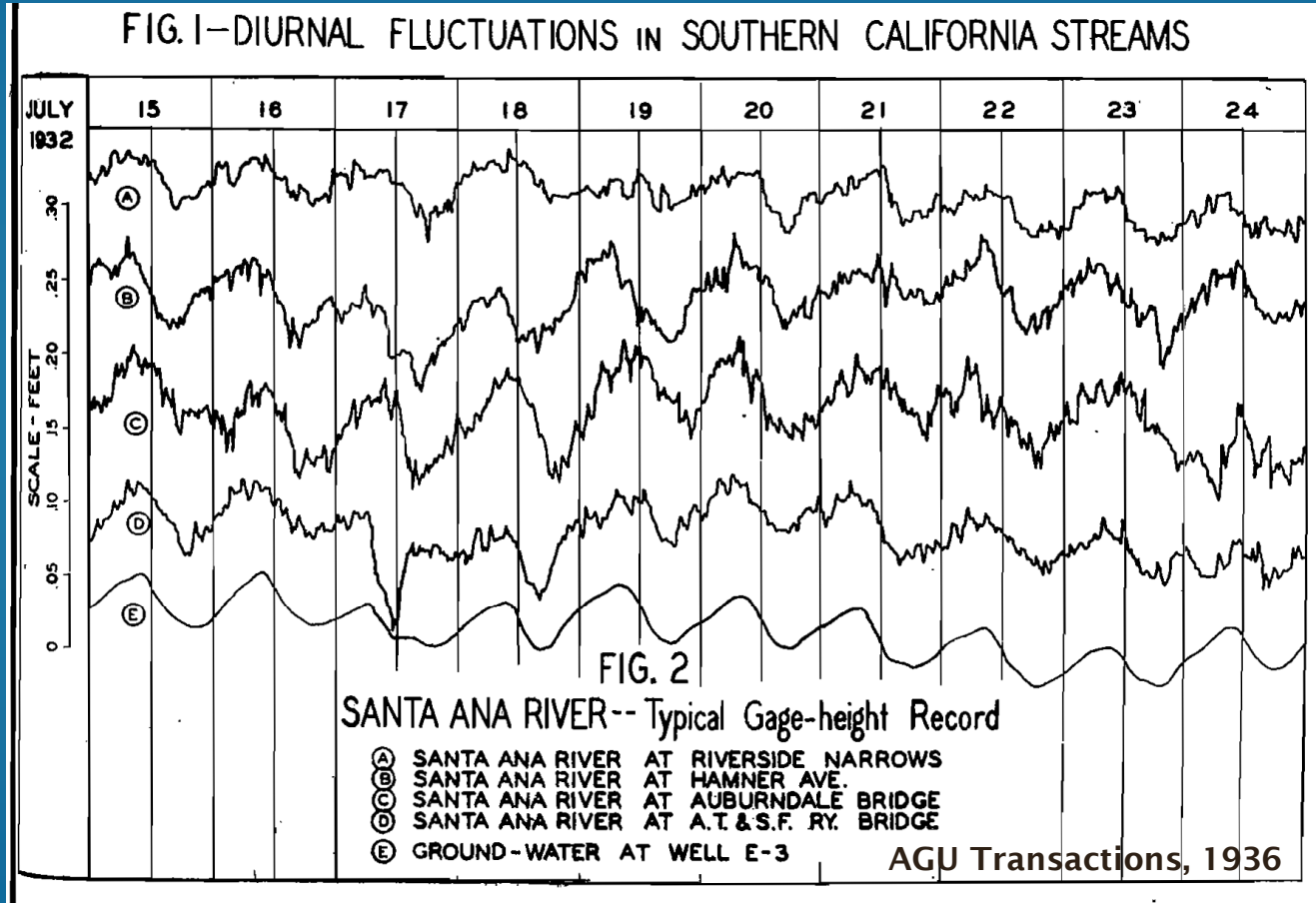
Dry season forest-stream connections in Pacific Northwest headwater catchments

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Forest-Stream Connection



Harold Troxell, USGS
1930's

Forest-Stream Connection

HYDROLOGICAL PROCESSES

Hydrol. Process. 16, 1671–1677 (2002)

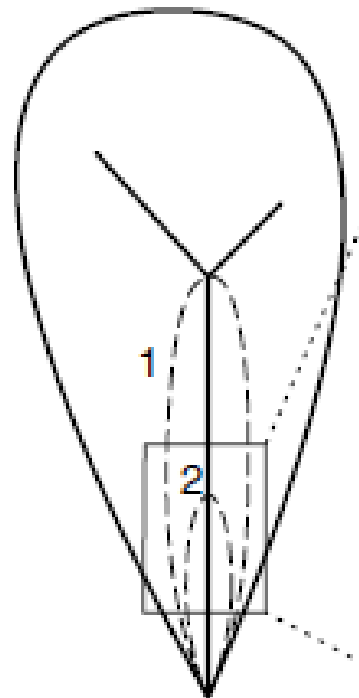
Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/hyp.5022

SCIENTIFIC BRIEFING



The zone of vegetation influence on baseflow revealed by diel patterns of streamflow and vegetation water use in a headwater basin

Bond et al., 2002



Hypotheses

- 1) Riparian vegetation responsible for diurnal suppression of baseflow
- 2) Non-riparian groundwater should have no diurnal signal
- 3) Near-stream trees use stream water and/or surficial groundwater
- 4) Hillslope trees have no effect on diurnal streamflow suppression

2009 Harvest Unit
~35 ha

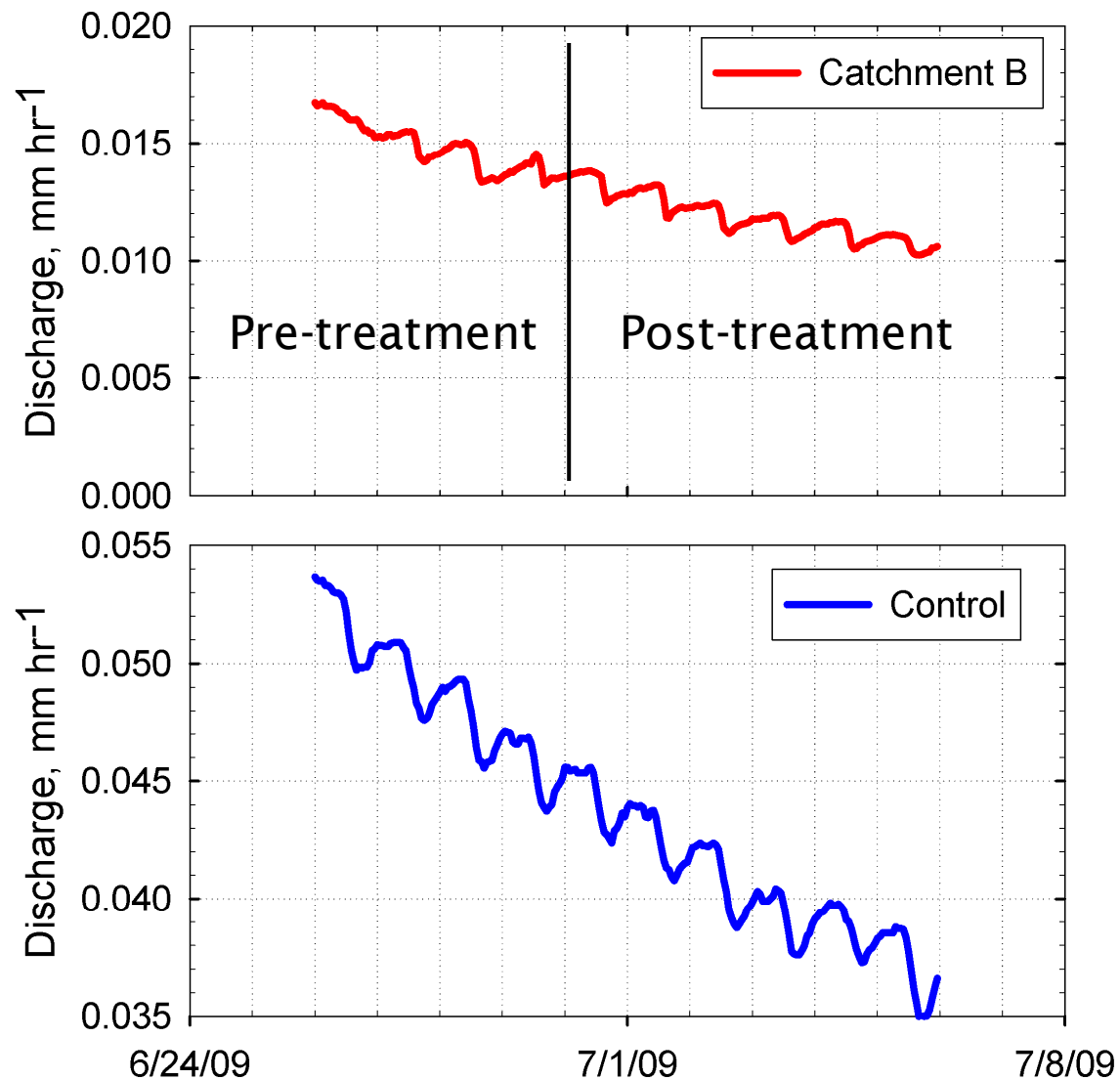


Harvest Boundary
Vegetated Buffer

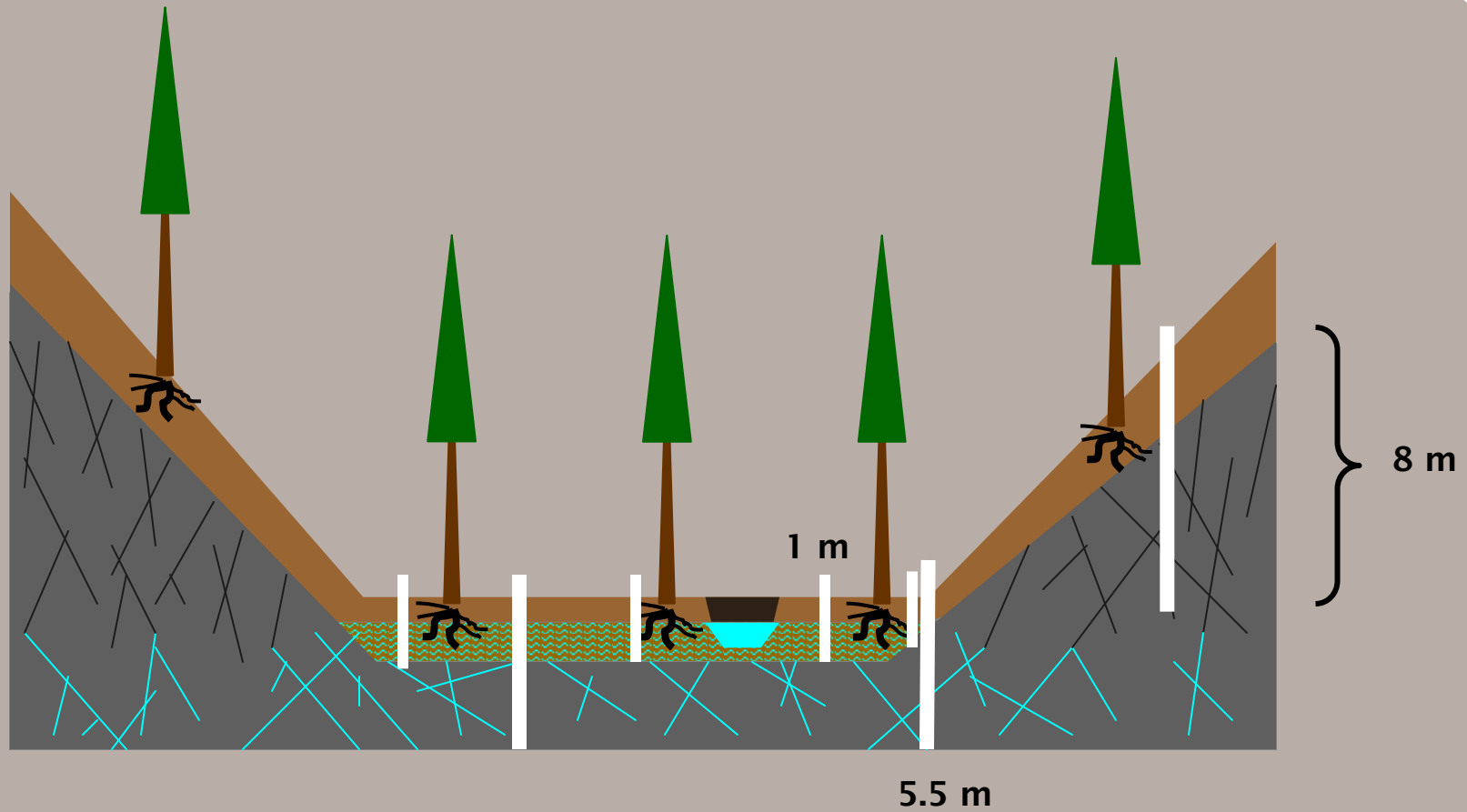
The map displays a topographic background with a yellow boundary line defining a harvest unit. A portion of this unit is shaded with a brown cross-hatch pattern, representing the harvest boundary. A green shaded area along a stream within the unit represents the vegetated buffer. A legend in the bottom right corner identifies these features with corresponding colored boxes: a brown cross-hatch box for 'Harvest Boundary' and a green cross-hatch box for 'Vegetated Buffer'.



Riparian vegetation responsible for diurnal suppression of baseflow

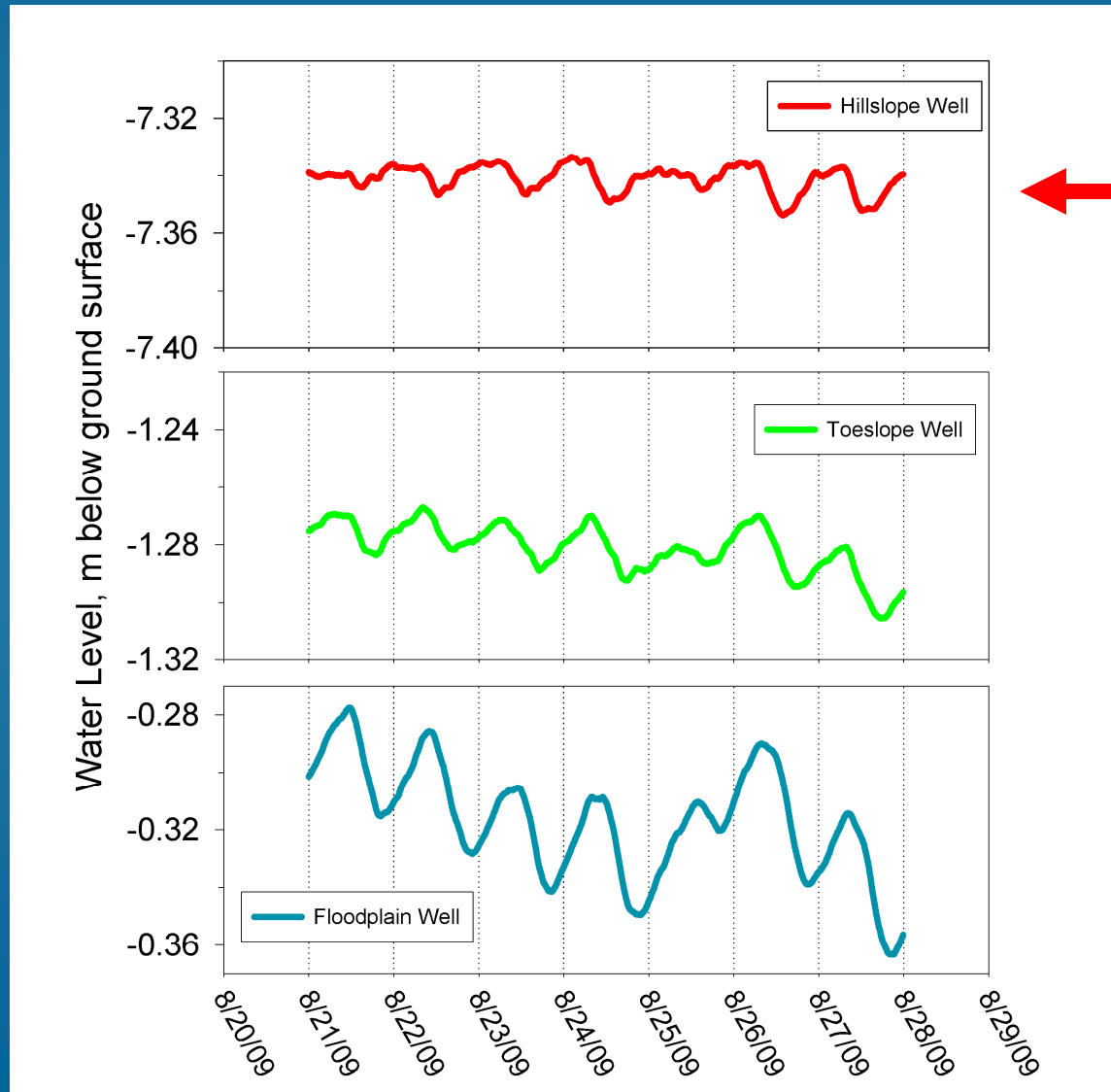


A look to groundwater...

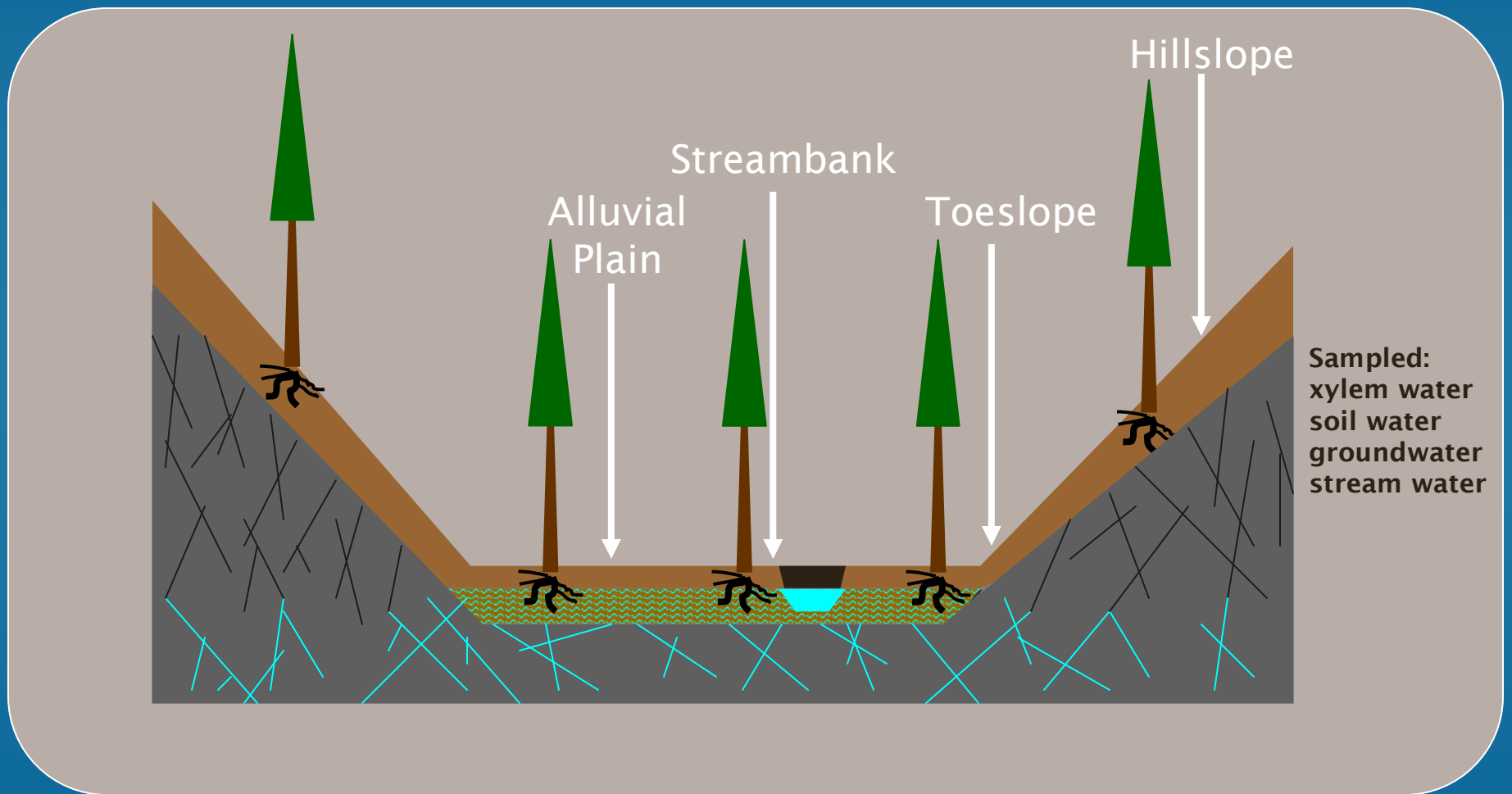


Well Locations

Non-riparian groundwater should have no diurnal signal

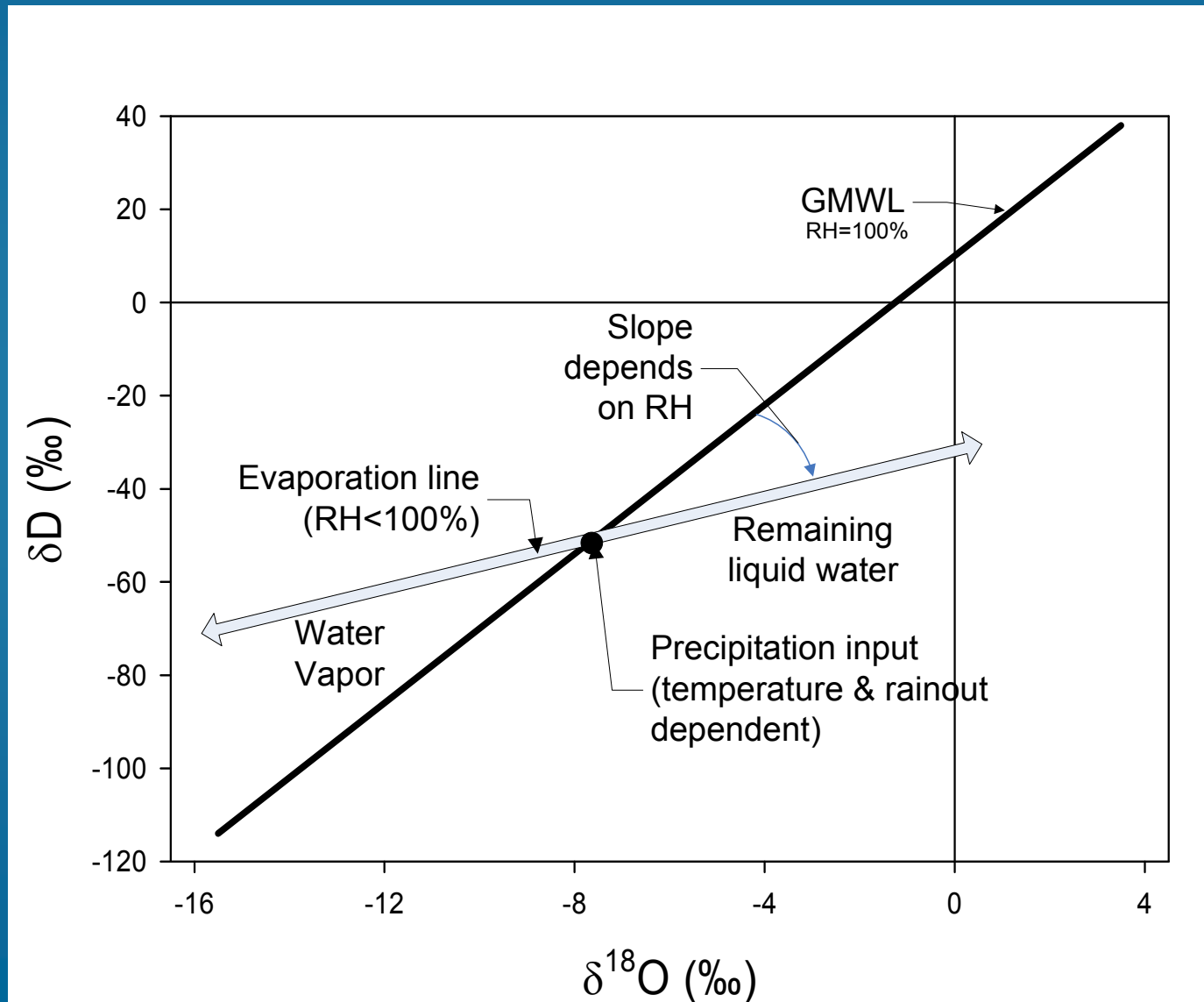


Where are our trees getting their water?

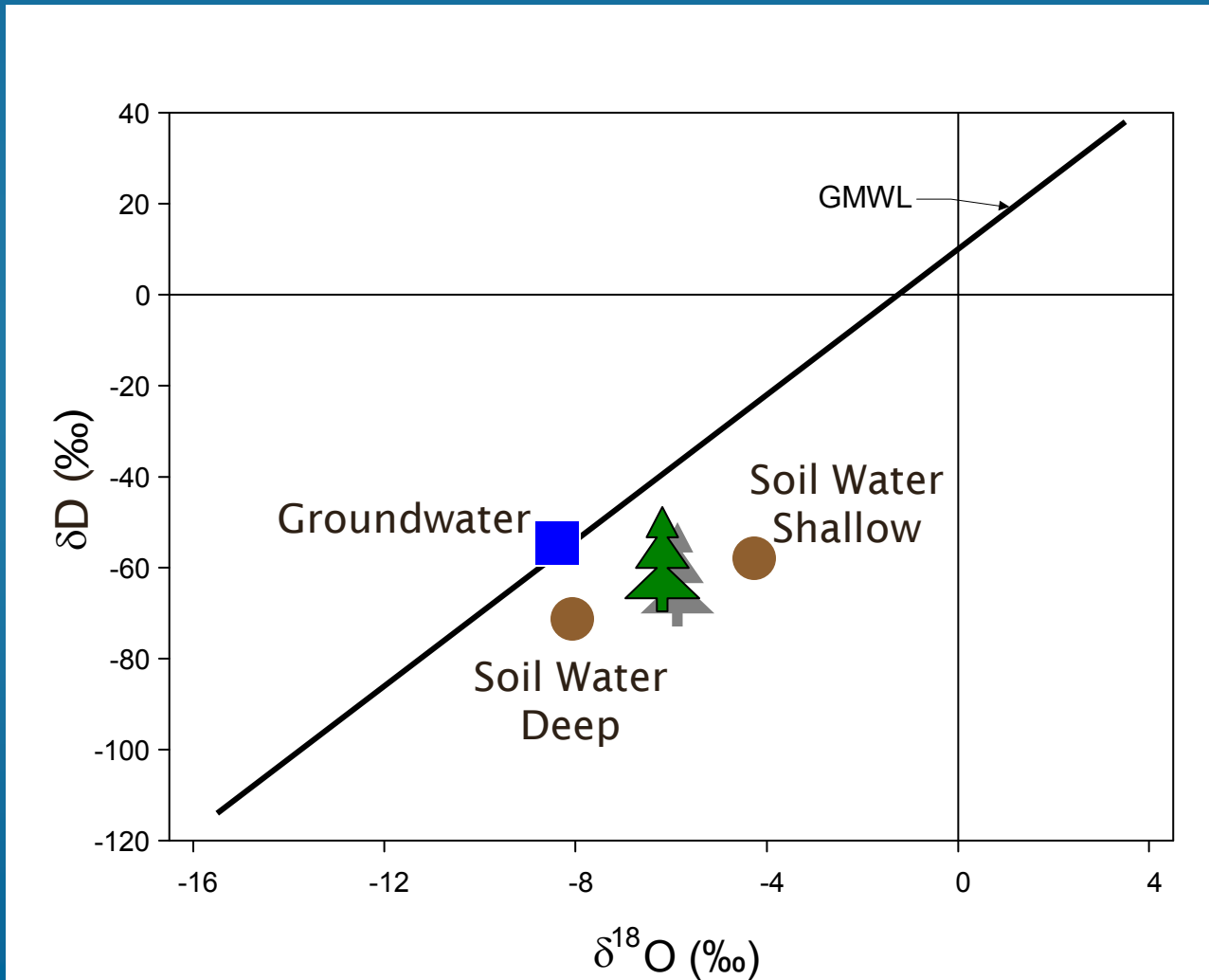


Sampling Locations

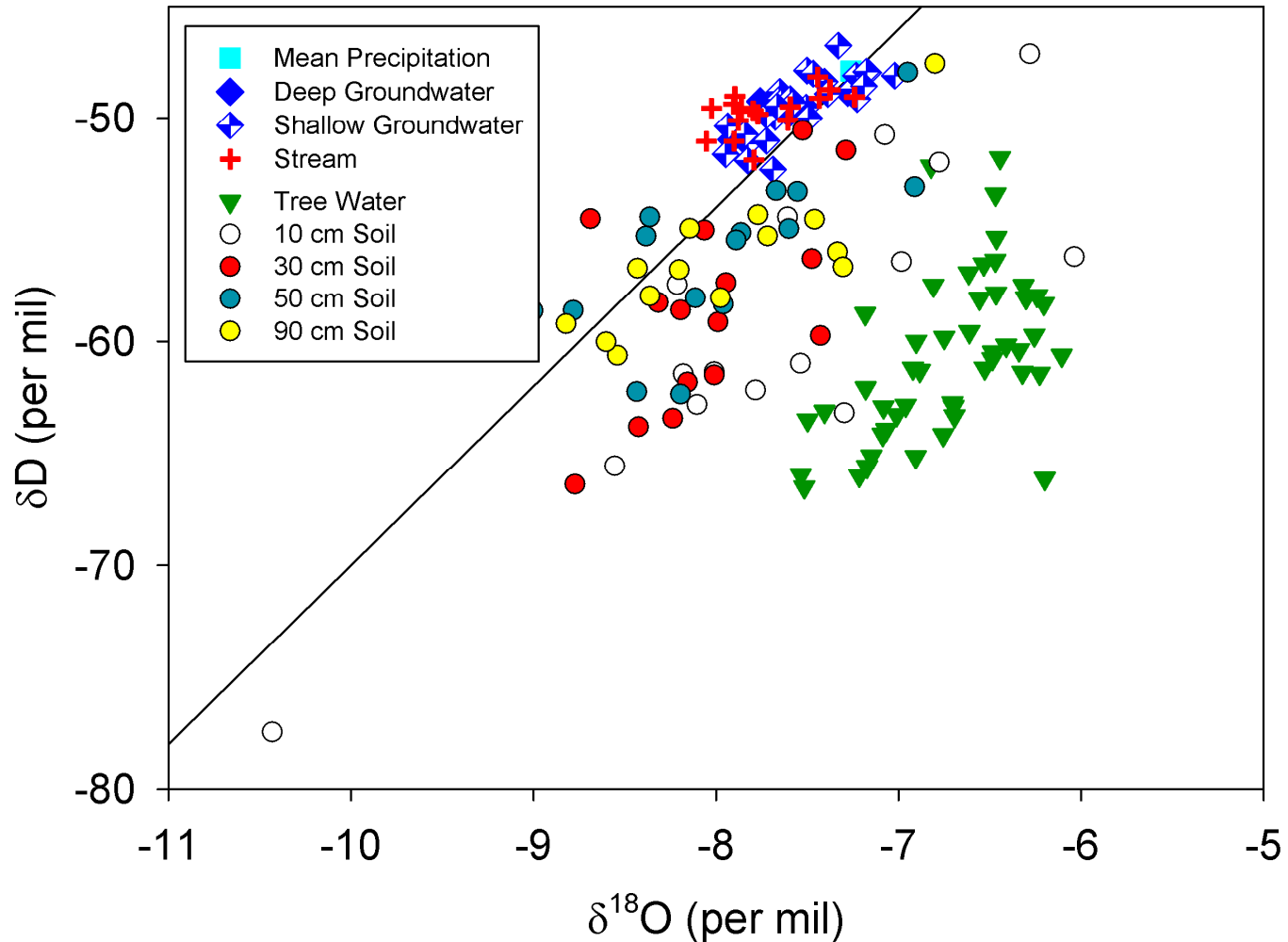
Water Isotope Primer



Water Isotope Primer



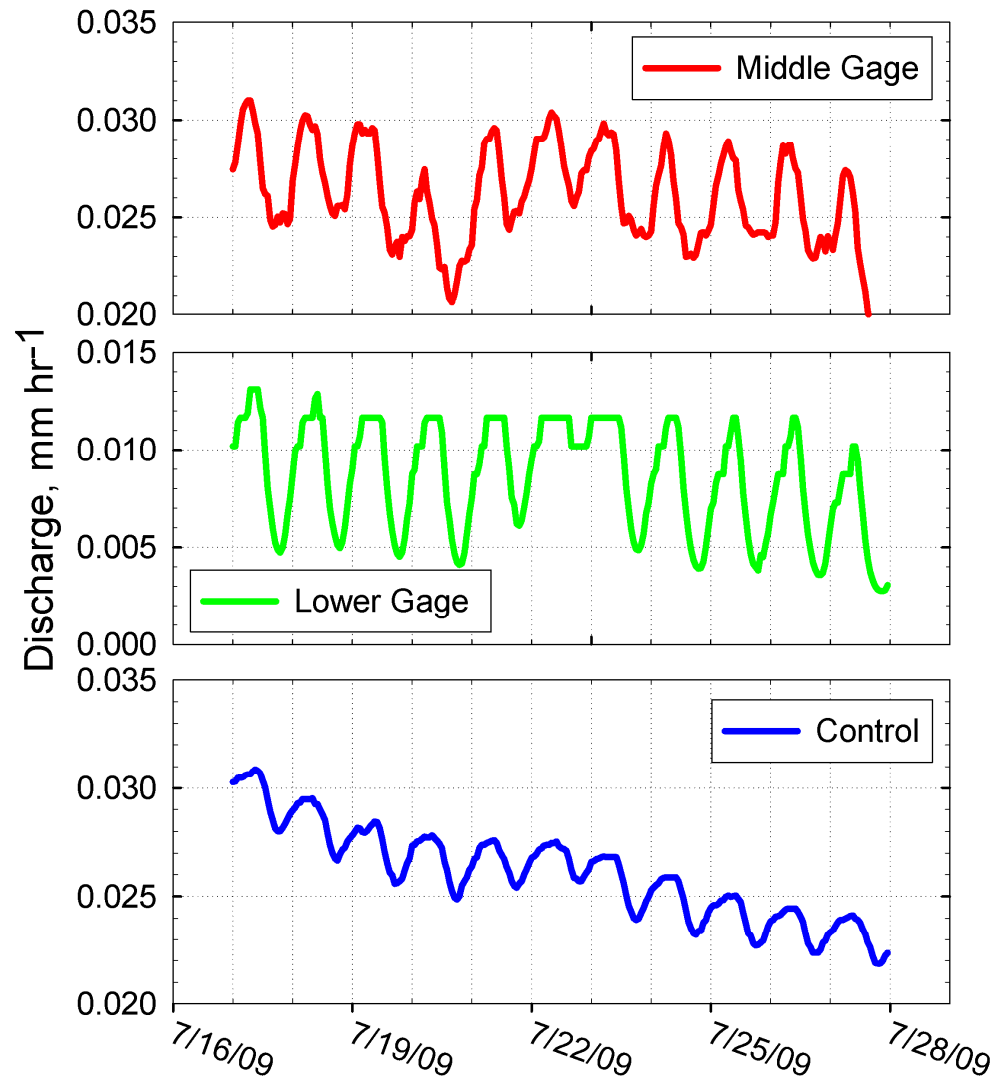
Near-stream trees use stream water and/or surficial groundwater



The “Inverse” Experiment



Hillslope trees have no effect...



Summary

- Riparian trees not fully responsible for diurnal streamflow suppression
- Non-riparian bedrock groundwater is connected to forest transpiration
- Trees do not use groundwater or stream water for transpiration
- Hillslope plus complete subbasin tree removal has no effect

Acknowledgements

- Jeff McDonnell: Co-author
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- Oregon Department of Forestry
- Plum Creek Timber Company
- US EPA

Questions

Central Oregon Coast Range & Alsea Bay