



Tree ring data for the PNW

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A case for better reconstructions: developments

- Ecological/dendrochron.

- Locating sensitive trees:
 - Within landscapes
 - Within climate space
- Understanding limiting (and multiple limiting) factors
- History of sampling

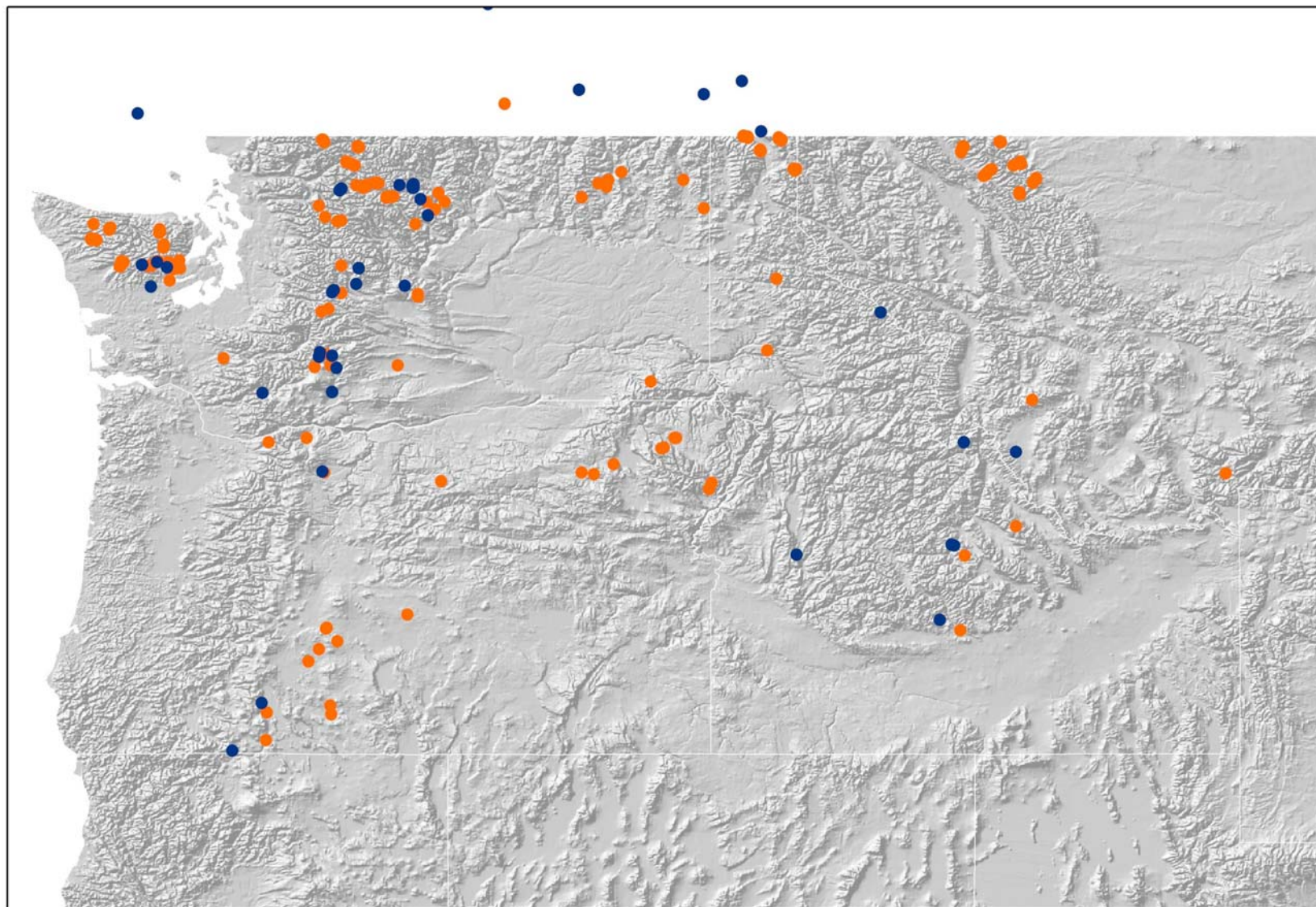
- Climatological

- Attributing variability in growth to climate
- Diagnosing statistical “error” vs. bias
- Targeting watersheds based on hydrograph
- Climate change and climate variability

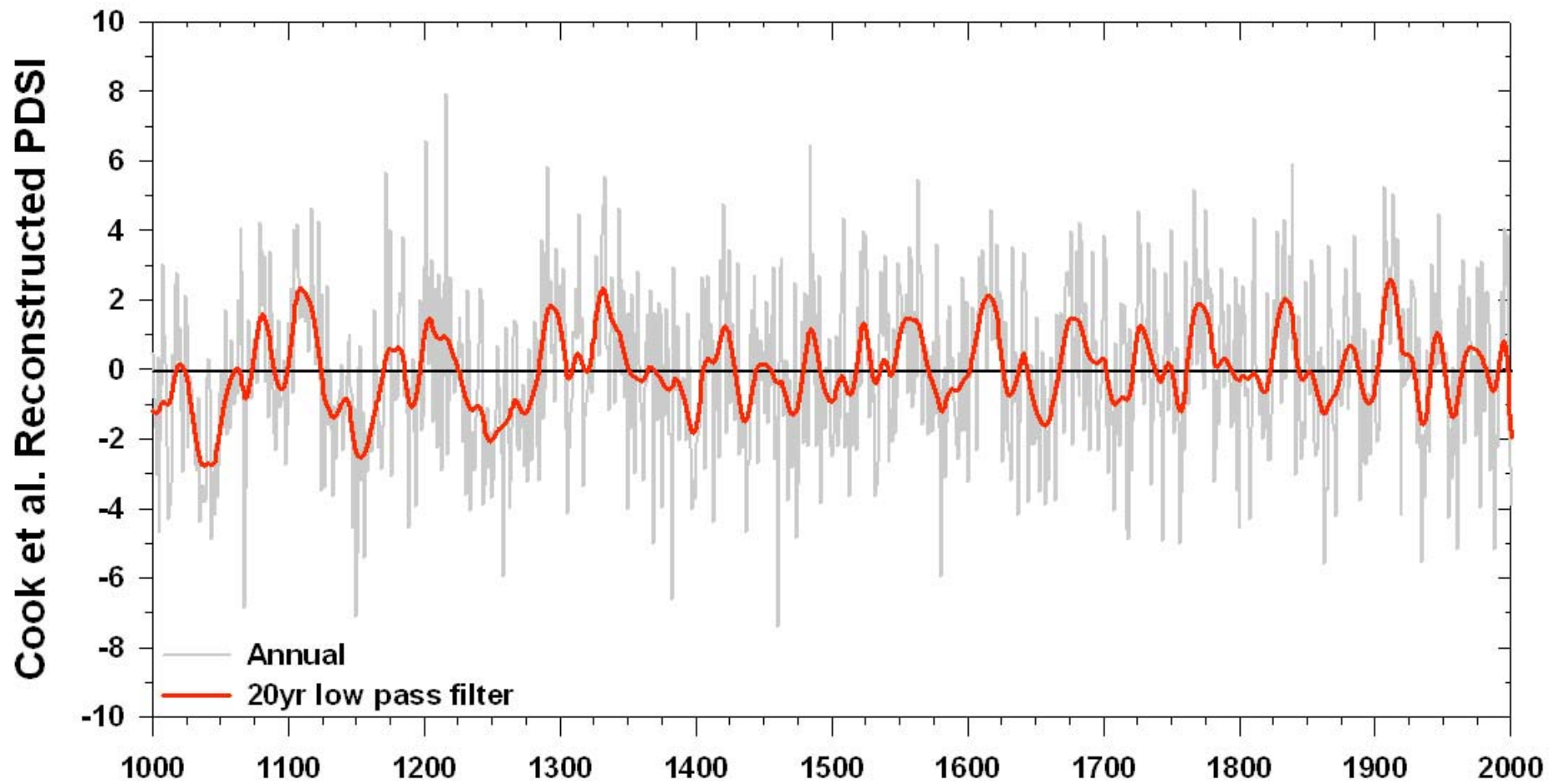
- Application: workshops, resource basis, manager input

- Nature of information needs and questions

International Tree Ring Databank and other data first cut



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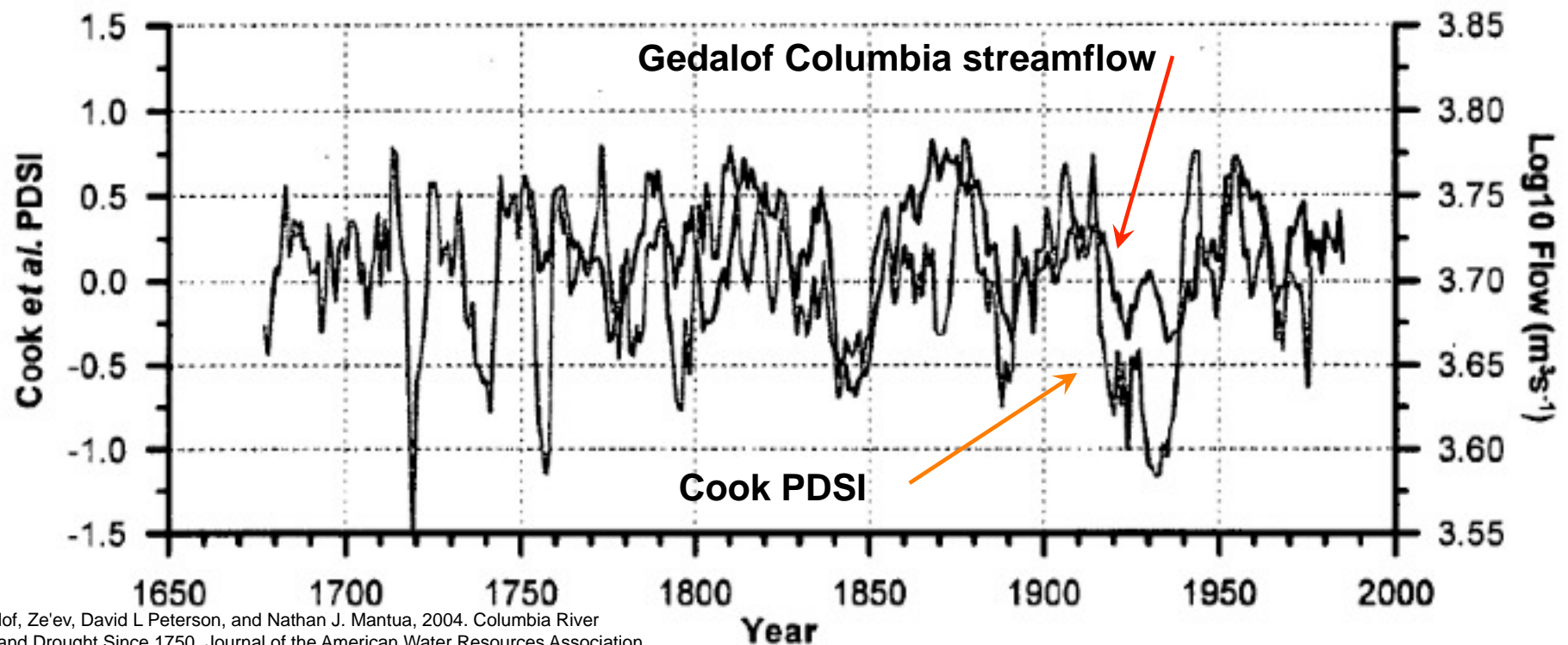




Figure 1. Map of the Columbia River basin showing the location of the study area. Copied and modified from the original analysis.

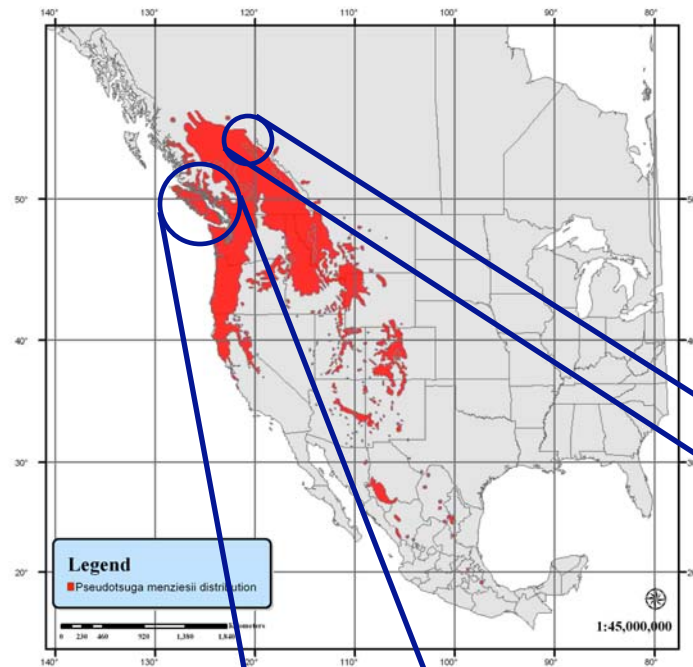
Gedalof et al. Columbia reconstruction

- Possible to do reconstruction in the PNW
- Low flows in 1840s less than 1930s
- Single to multi-year droughts earlier in record
- Contribution from high and low elevation trees
- Contribution from trees that “see” PDO
- Unsatisfying geographical representation
- Unsatisfying variance explained

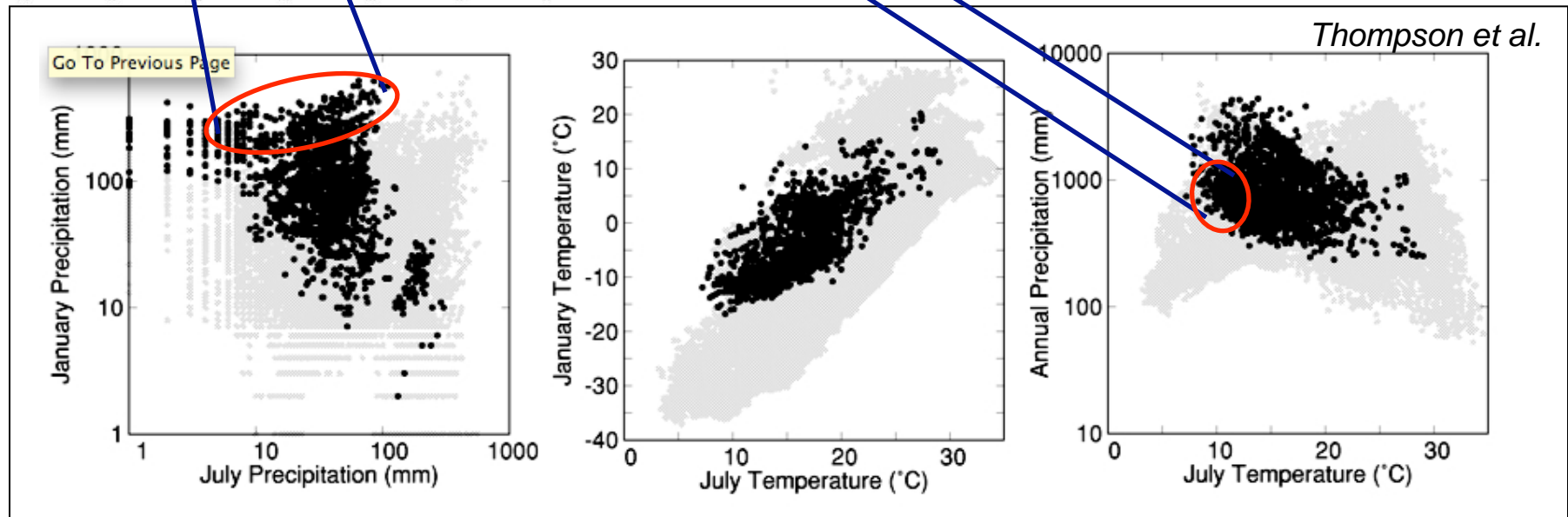


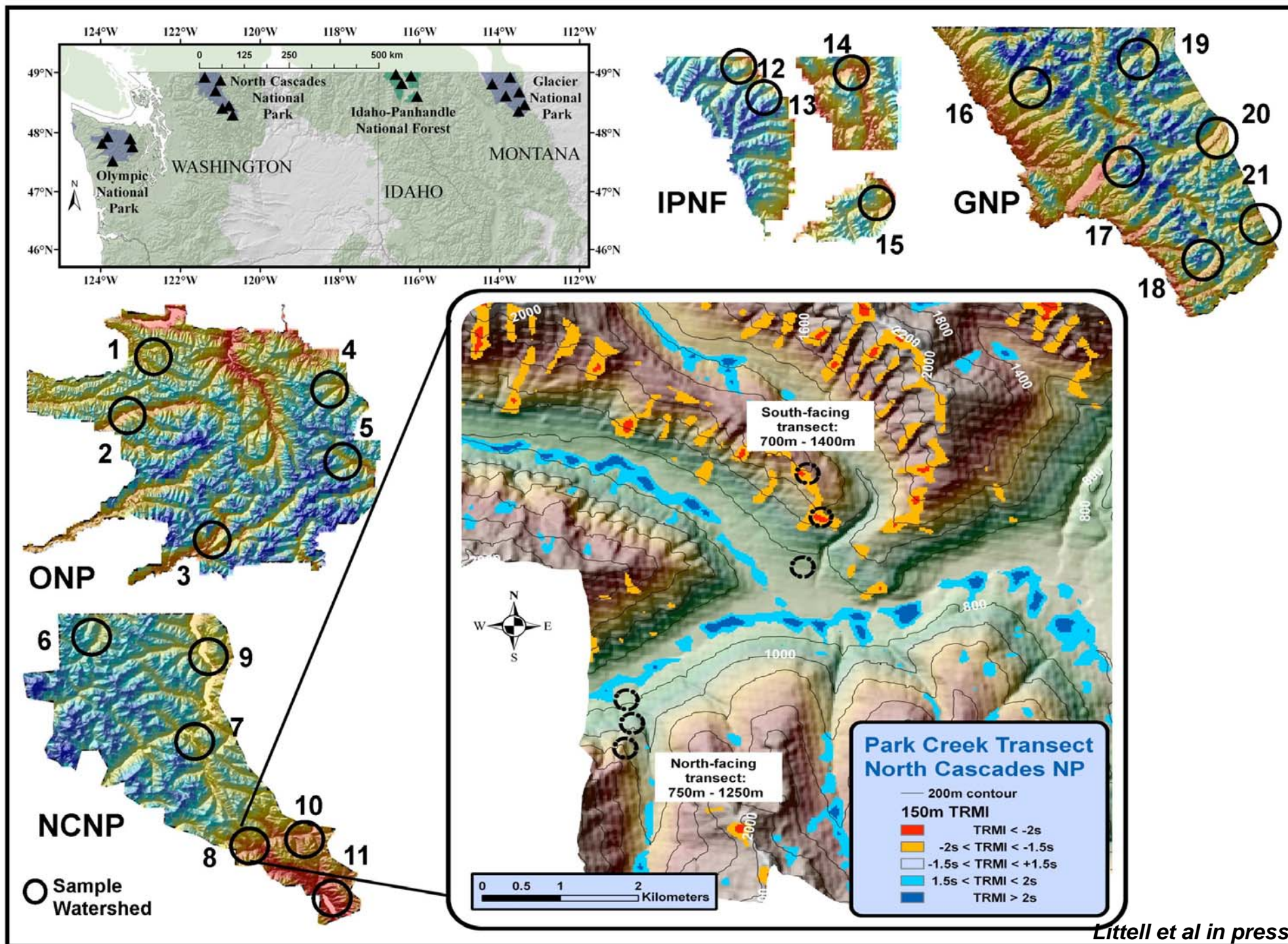
Gedalof, Ze'ev, David L Peterson, and Nathan J. Mantua, 2004. Columbia River Flow and Drought Since 1750. Journal of the American Water Resources Association (JAWRA) 40(6):1579-1592.

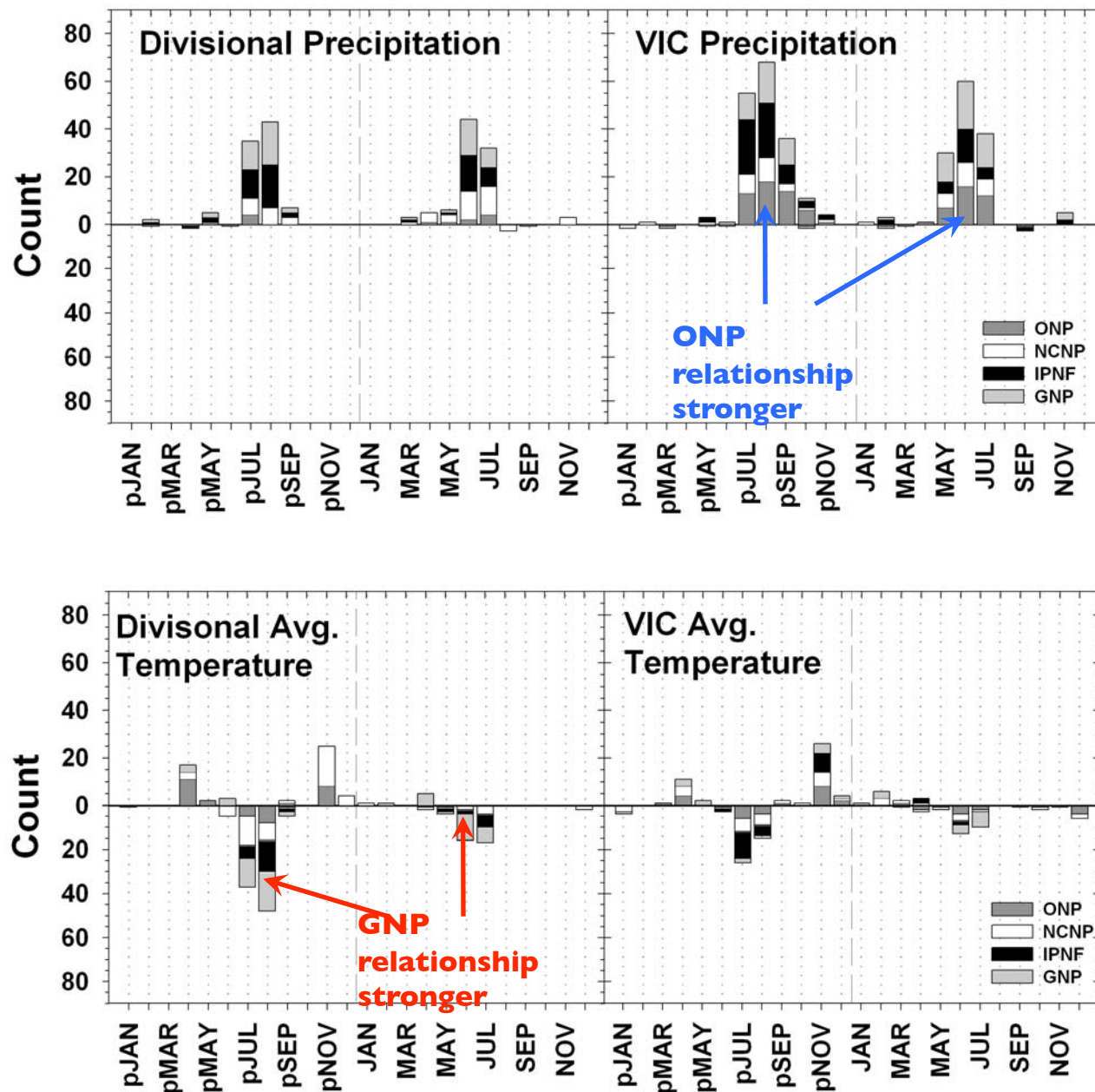
Douglas-fir and climate



- Bio-climatic range of Douglas-fir fairly well understood
- But presence/absence \neq life history - growth is also important
- Climatic limitations on growth should vary substantially across range







- PPT

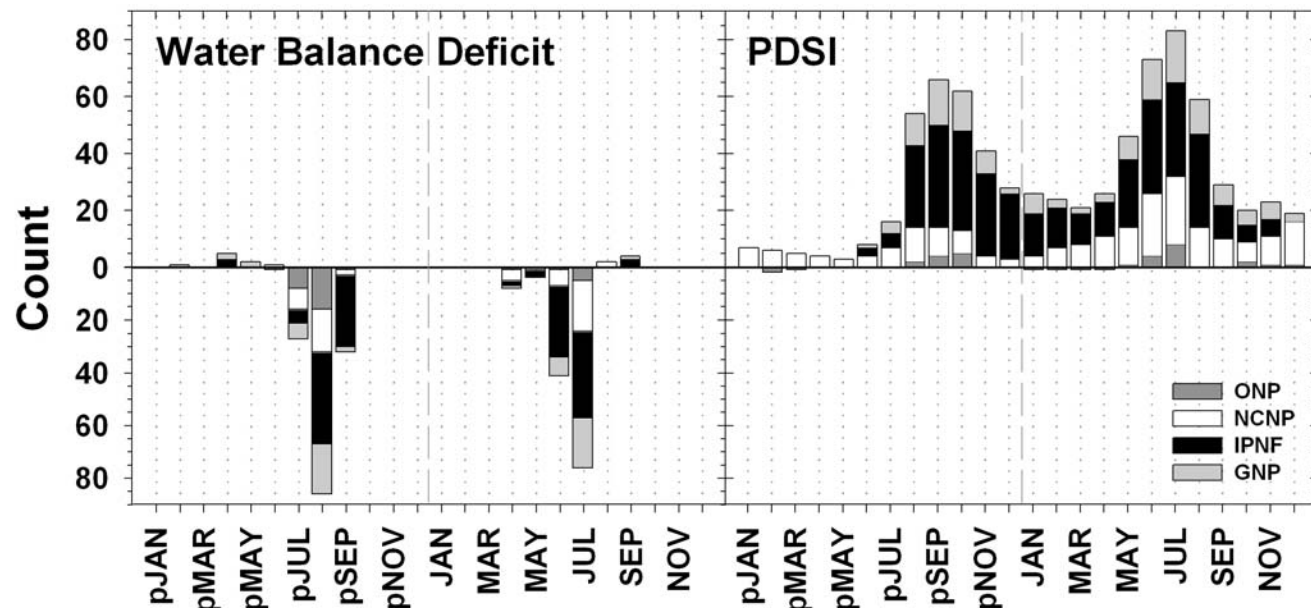
(M) JJ Year-of
JA (S) Year-prior

- Avg. T

-JJ Year of, JA prior
+ Apr and Nov prior

Important differences:

- VIC precipitation and divisional temperature are better correlates in most chronologies.
- Seasonality relationships different: VIC captures a longer season of sensitivity to precipitation.



Deficit (Div.)

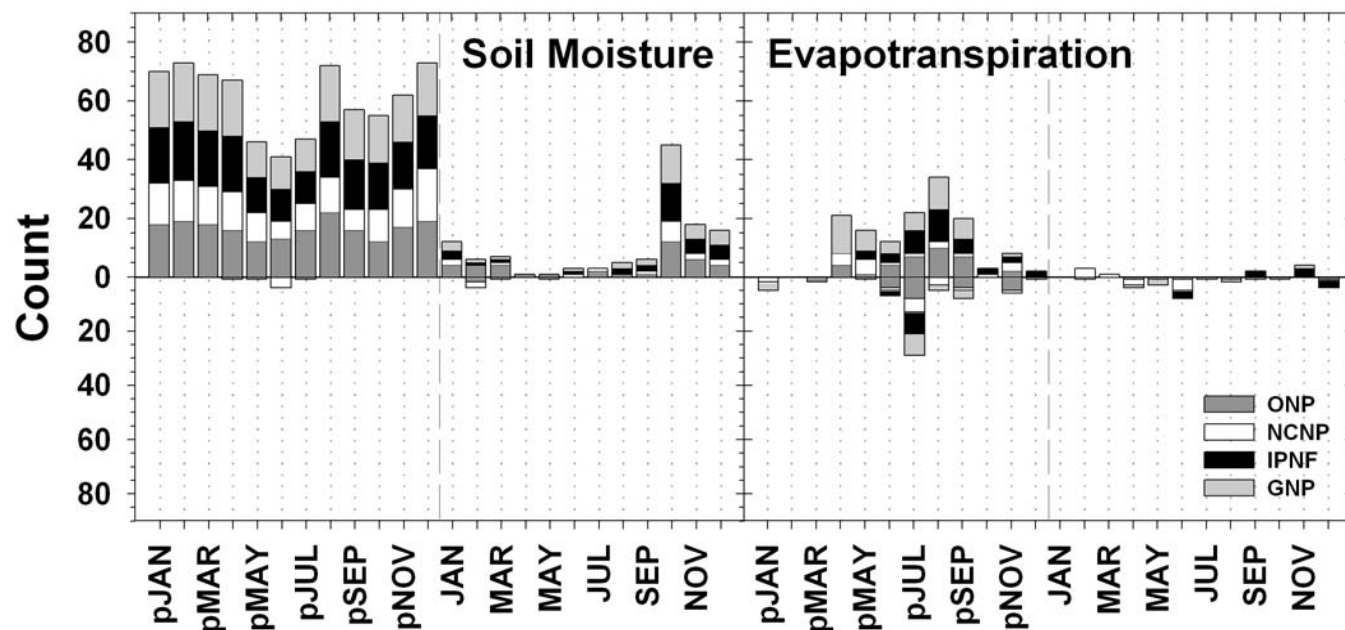
-JJ year of growth

-JAS year prior

PDSI (Div.)

+May.-Sep

+ASO year prior

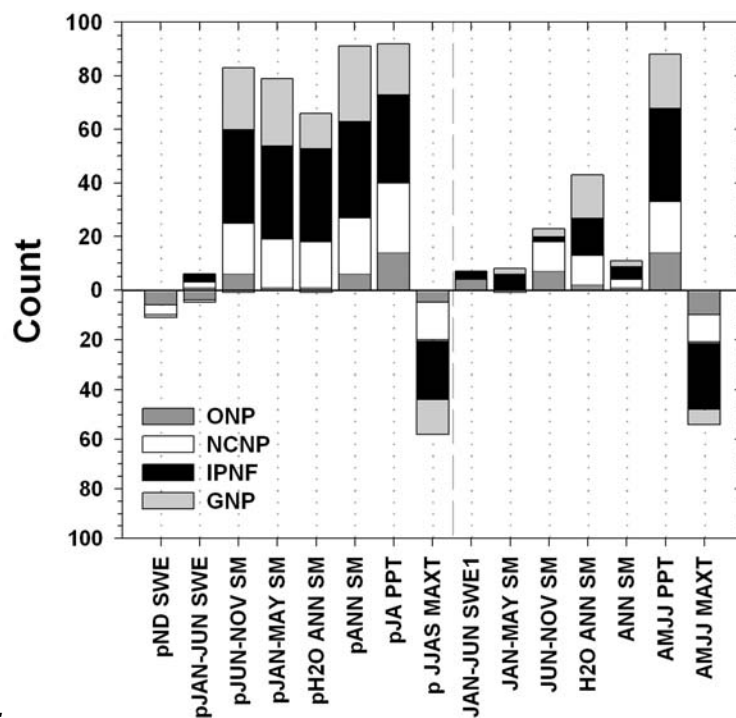
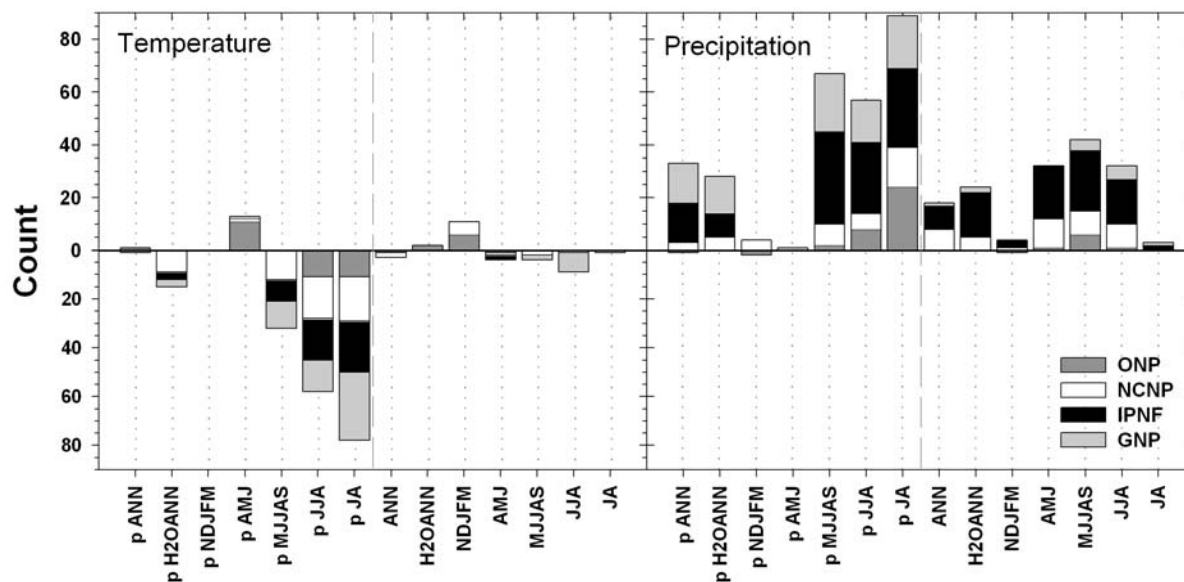


Soil Moisture (VIC)

Entire year prior

Evapotransp. (VIC)

Mixed (AET context varies with PET)



Seasonal Aggregation

Divisional Climate

- Prior JA temperature
- Prior JA precipitation

VIC Climate

- Prior JA precipitation
- Prior JJAS max. temp.
- current AMJJ precip.
- current AMJJ max. temp.
- Prior ANN. soil moisture

Strategies for using new information and techniques to improve reconstructions

- Target sensitive stands with landscape hydrology
- Tailor sampling to species and locations likely to produce information on summer drought, winter snowpack
- Target these within basins contributing different seasonal flows for big basins
- Finer resolution attribution of climate-growth relationships

For more information about the CIG SARP project, contact
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More information on Columbia basin and PNW climate
impacts and planning for climate change is available from:

The Climate Impacts Group
www.cses.washington.edu/cig



Mountain hemlock (Tsuga mertensiana) above the Chilliwack River, NCNP