Forest Structure Impacts on Snow and Water Resources

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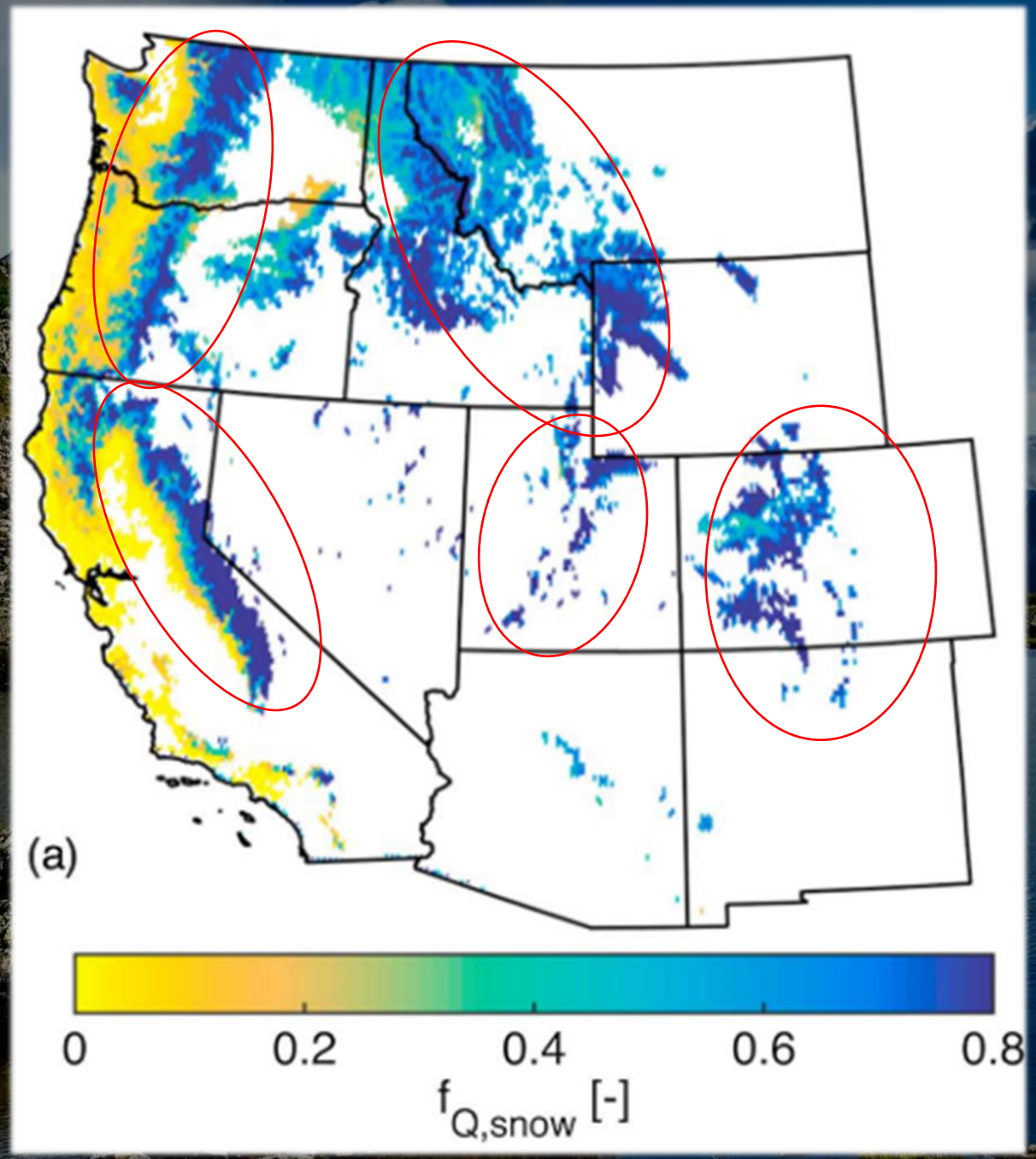
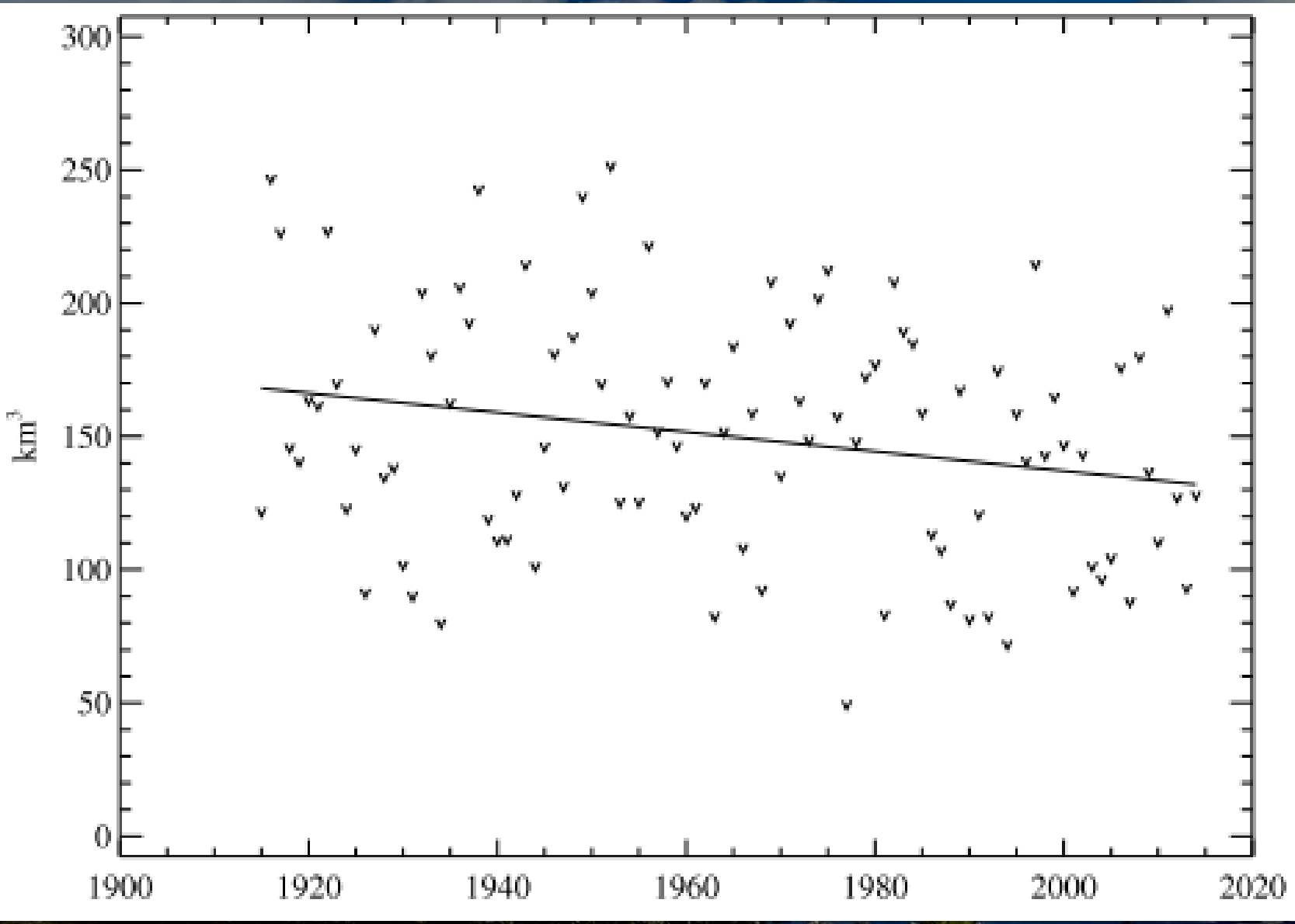
Two major interconnected issues in the Western U.S.



25% of the area in the Western us produces 90% of the total runoff.

Snow accounts for 50-99% of that runoff

Li, et al. (2017)

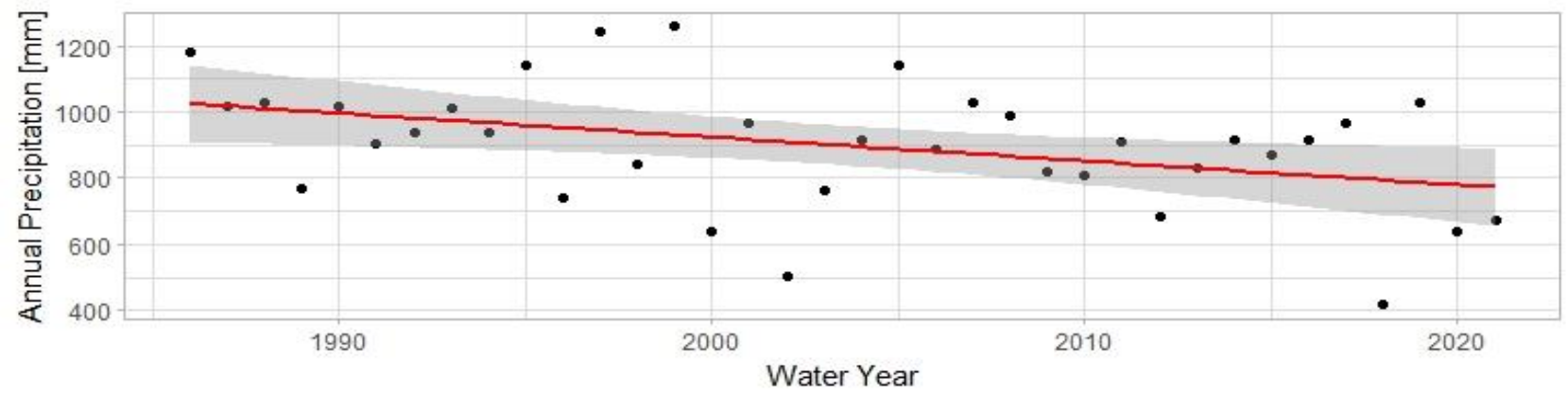


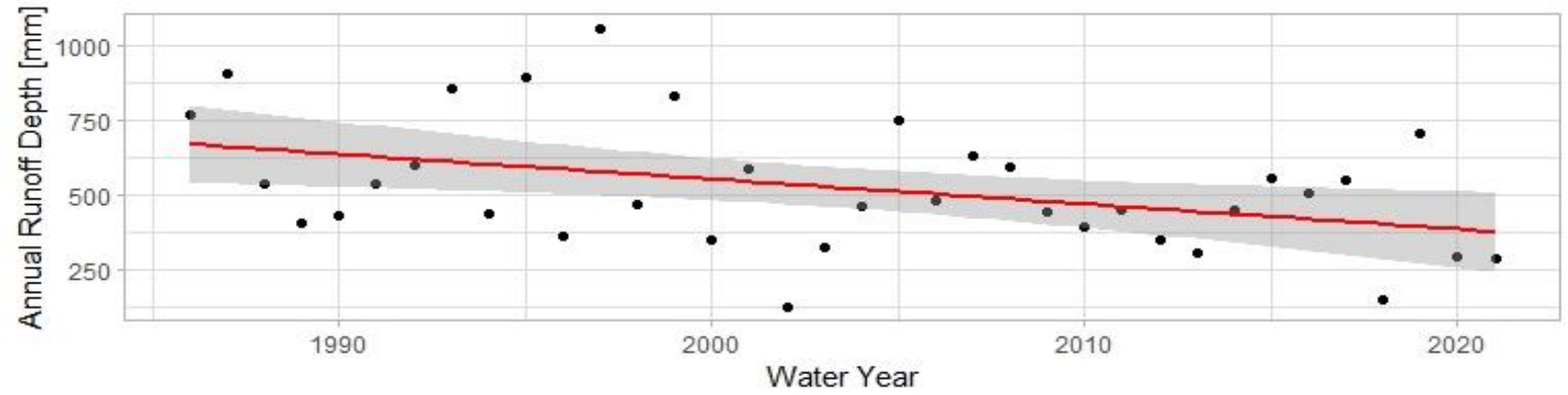
21% decline

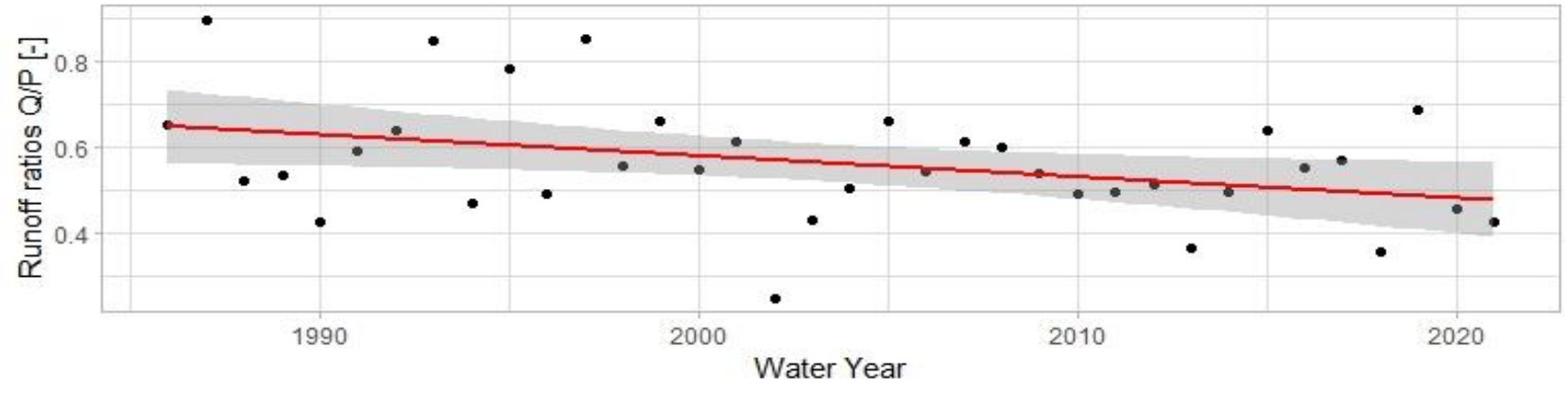
Decrease of 29,190,000 acre-feet

Mote, et al. (2018)

Changes in water supply - Florida River







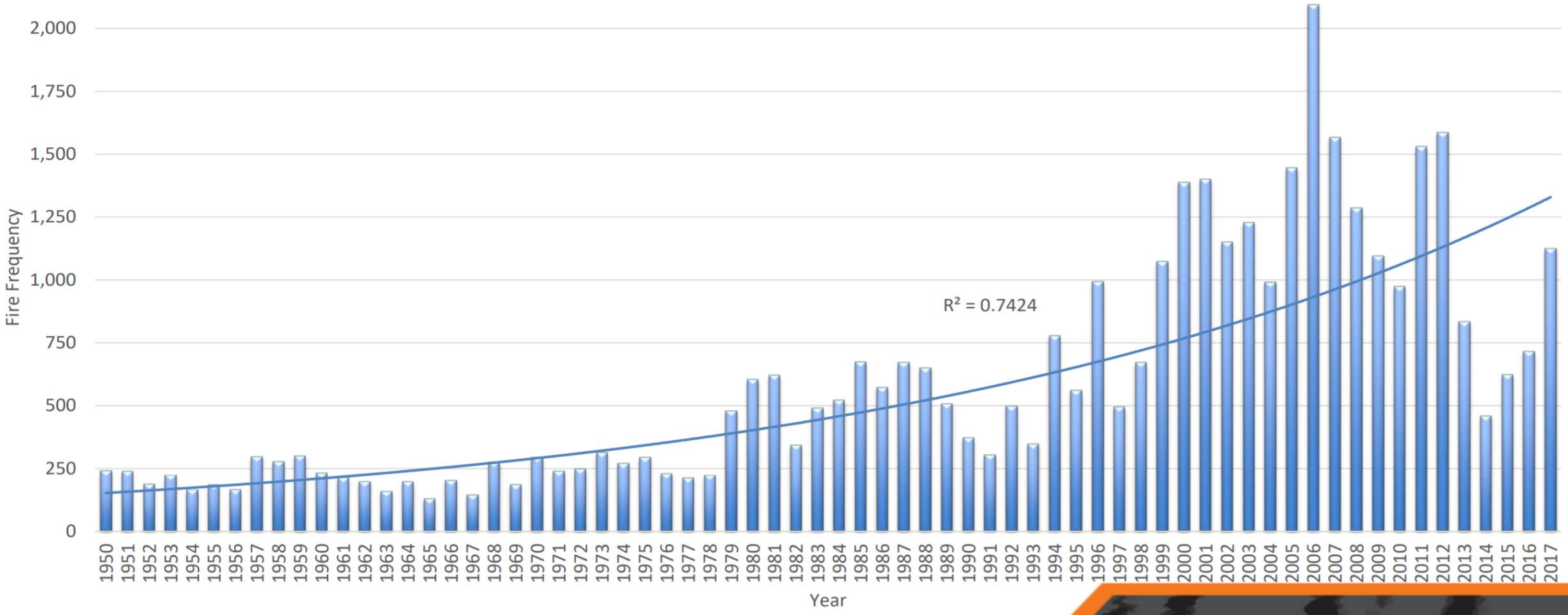
1986-1999 to 2000-2010 = a decline of 12.2%,

1985-1999 to 2010-2021 = a decline of 19.7%

1986-1999 to 2000-2010 = a decline of 27%,

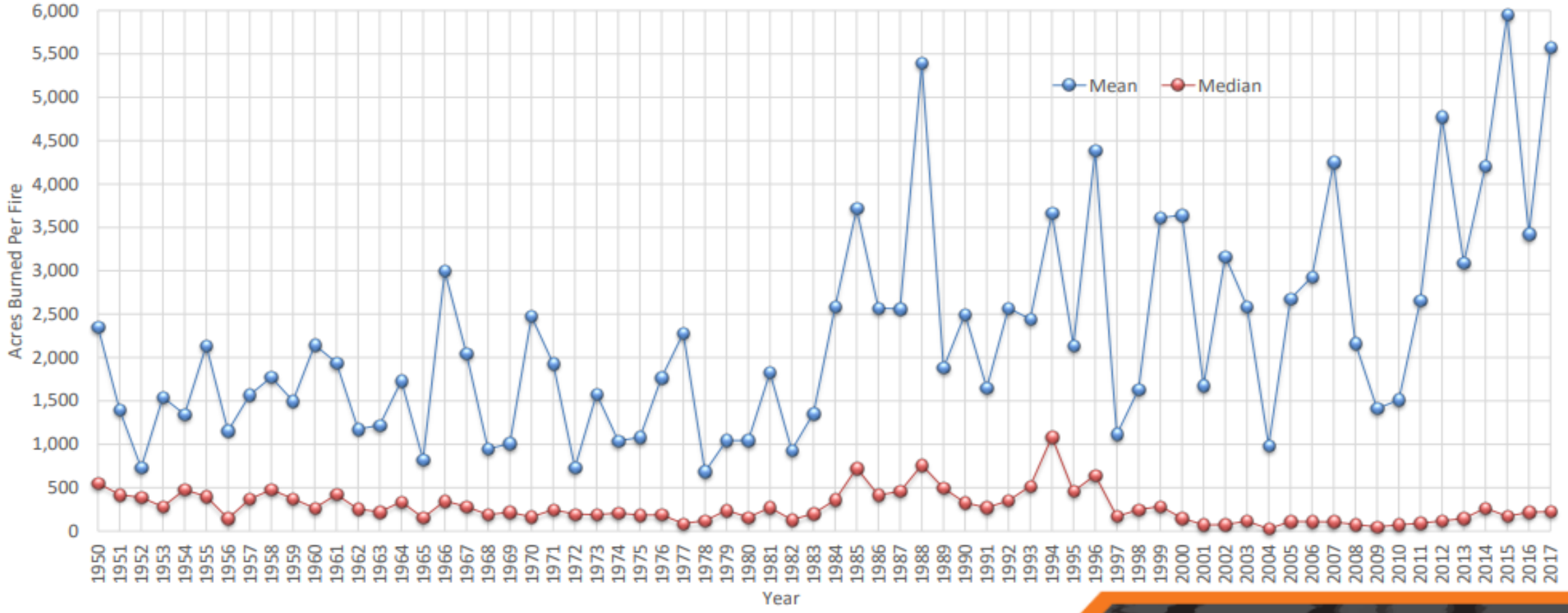
1985-1999 to 2010-2021 = a decline of 35.7%

Wildfires Across Time



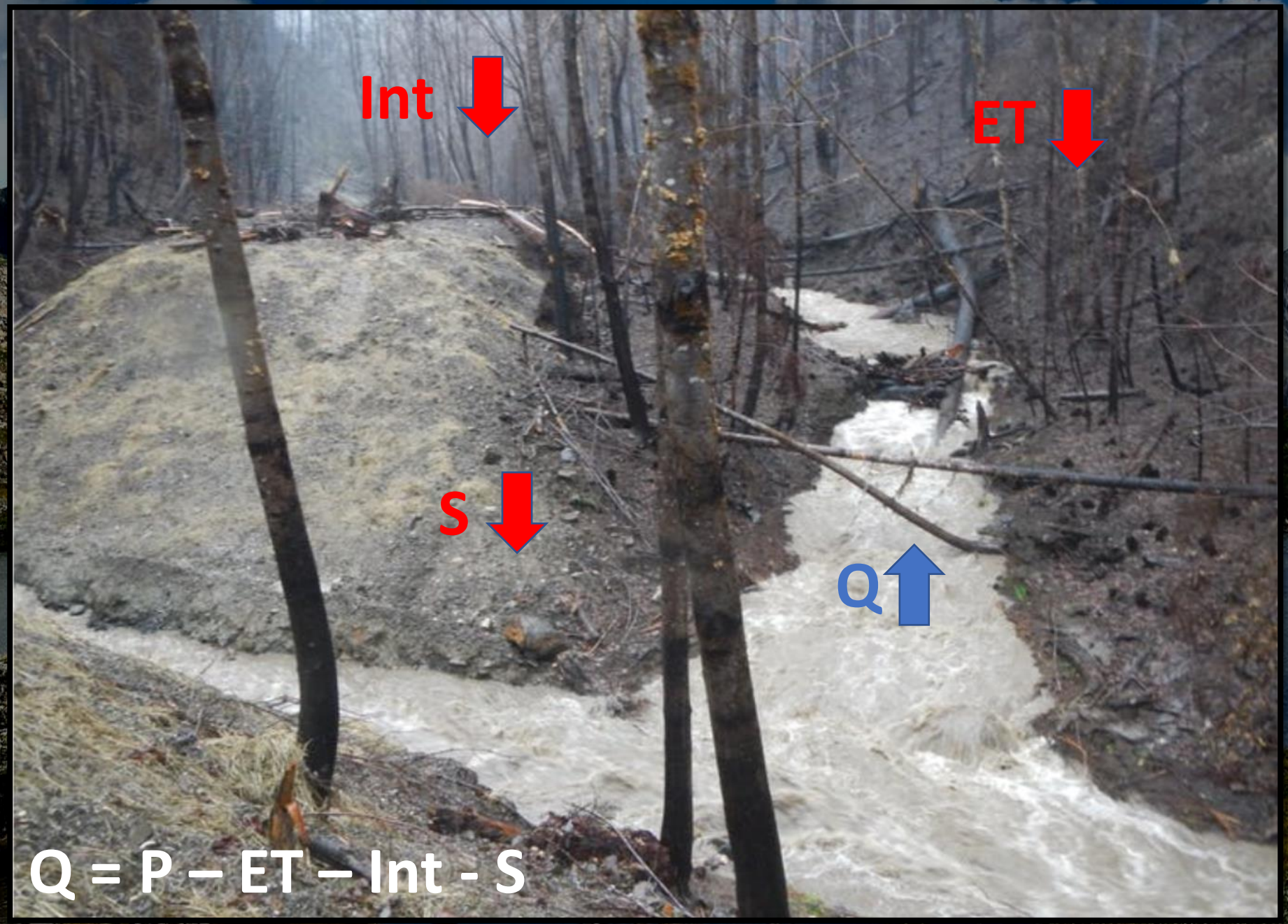
Geography of Wildfire Across the West. Weber et al. 2018

Wildfires Across Time (cont'd)



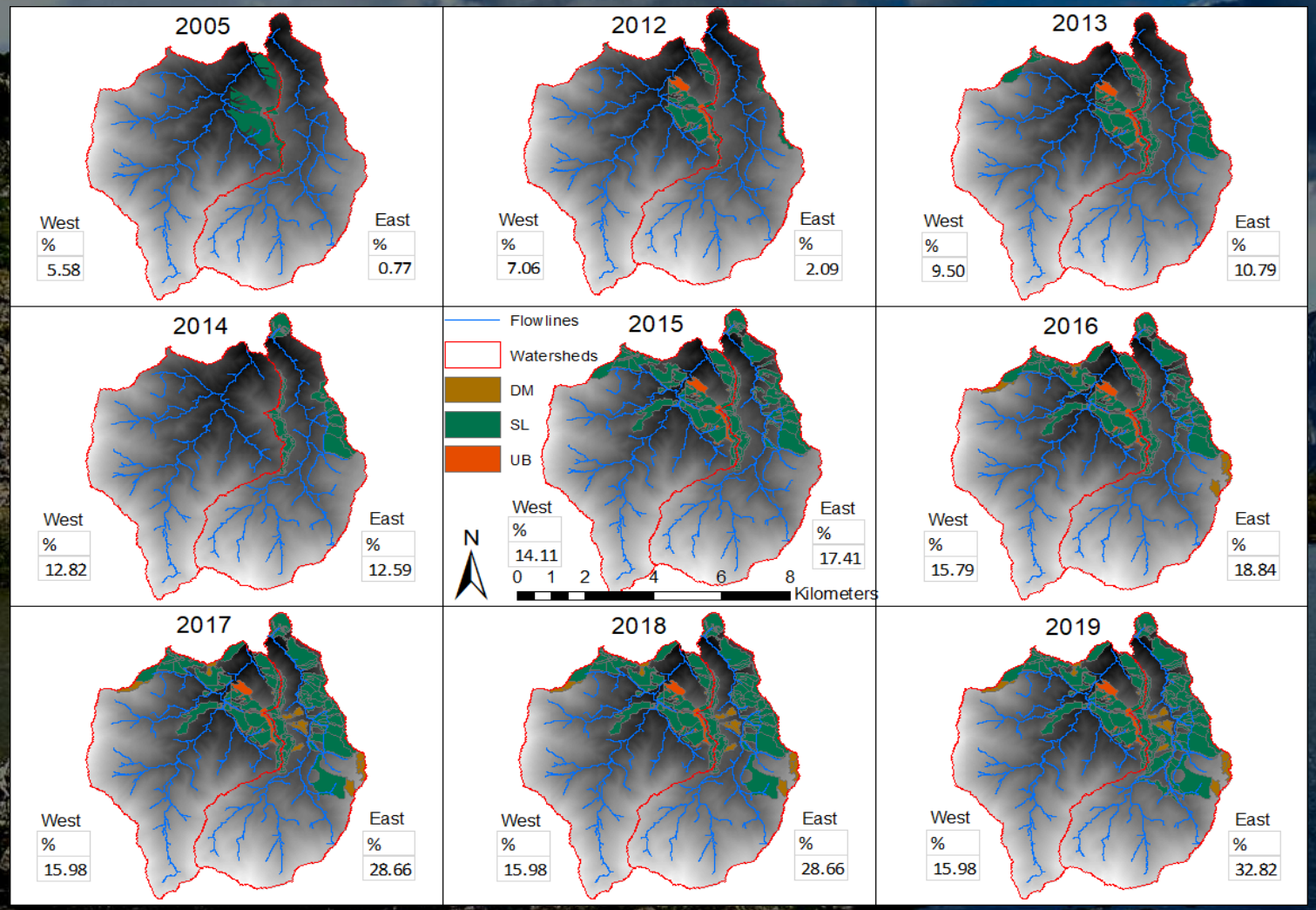
Geography of Wildfire Across the West. Weber et al. 2018

Josh Edelson



Kevin Bladon

What Happened in Ashland OR?



Watershed	Parameter	2013	2014	2016	2017
West basin	Basal area reduction [%]	0.23	0.20	0.43	0.22
	Canopy cover [%]	70	68	68	66
East basin	Basal area reduction [%]	0. 58	0. 50	0. 18	1.9
	Canopy cover [%]	64	62	61	59

Kurzweil, J., K. Metlen, R. Abdi, T.S. Hogue. (2021). Surface water runoff response to forest management: Low-intensity forest restoration does not increase surface water yields. *Forest Ecology and Management*

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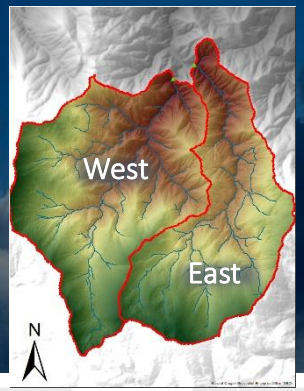
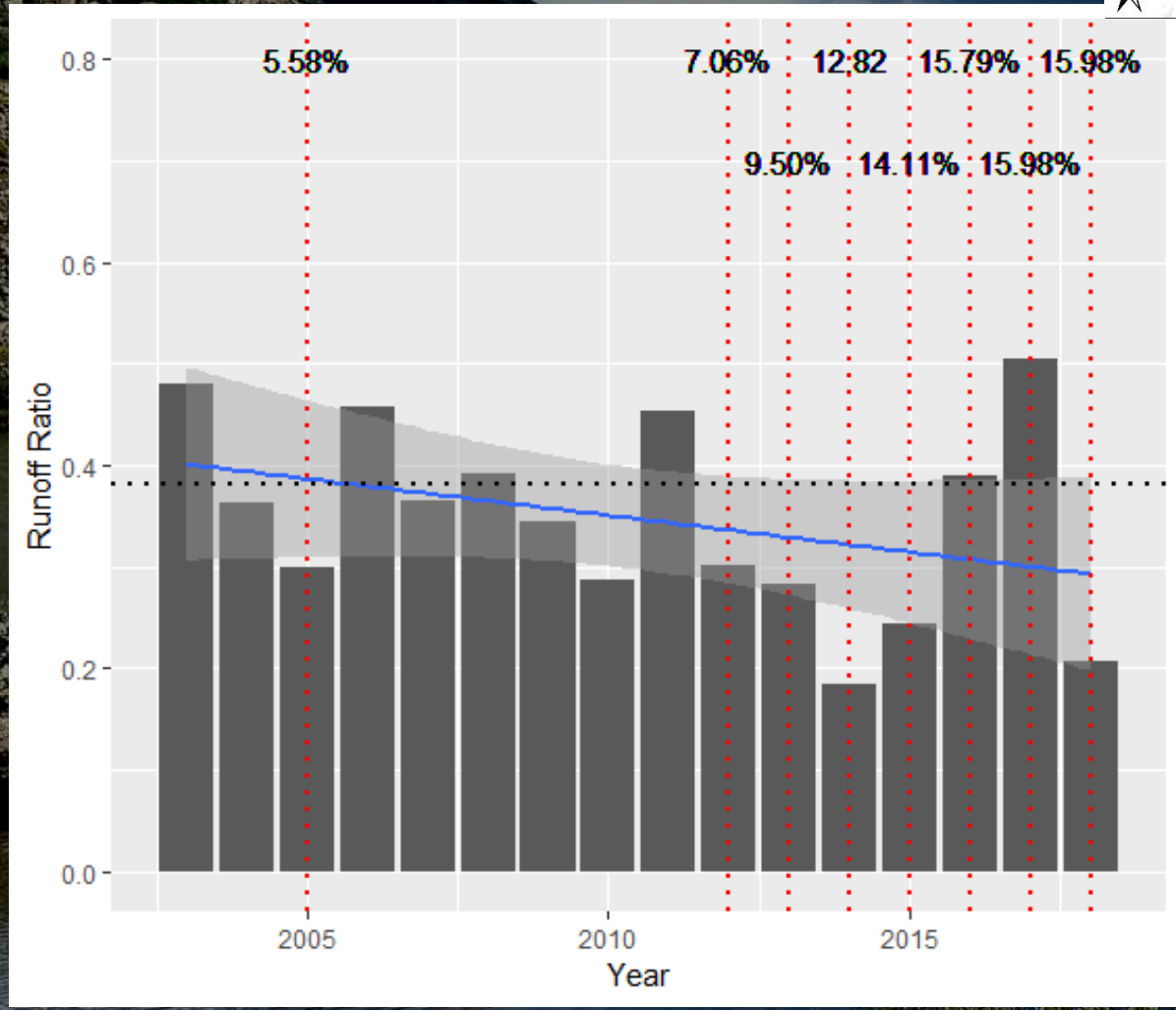
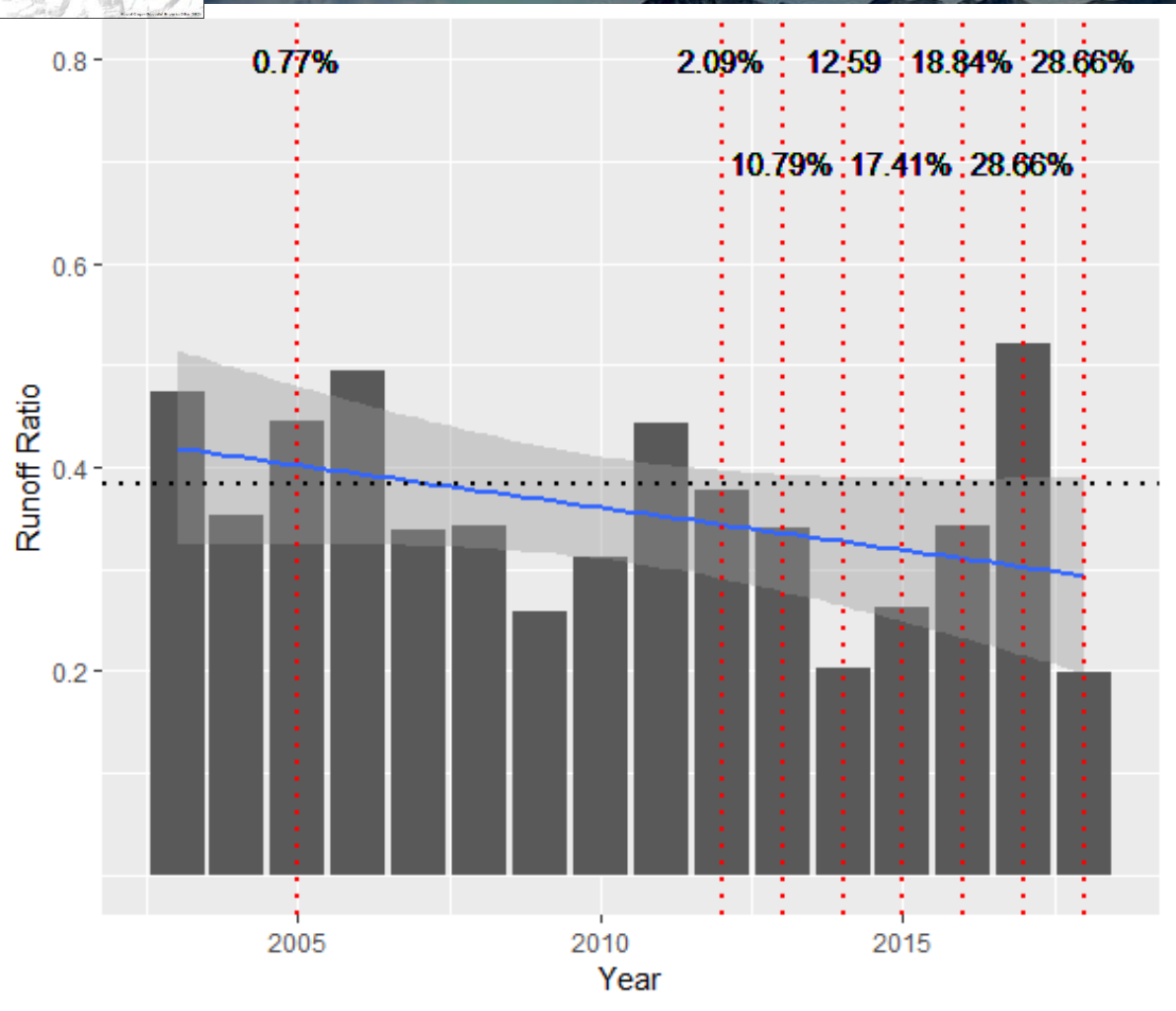
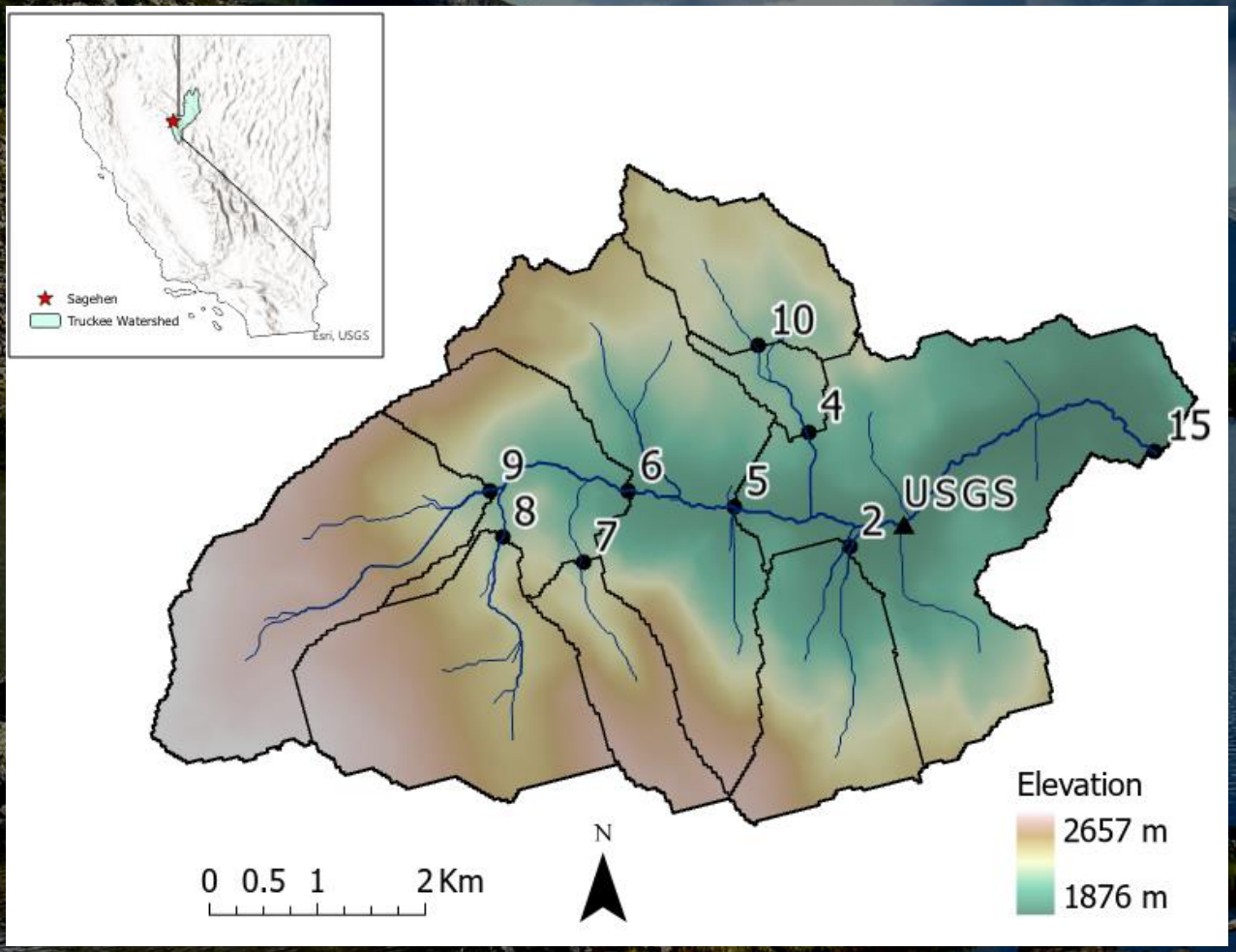
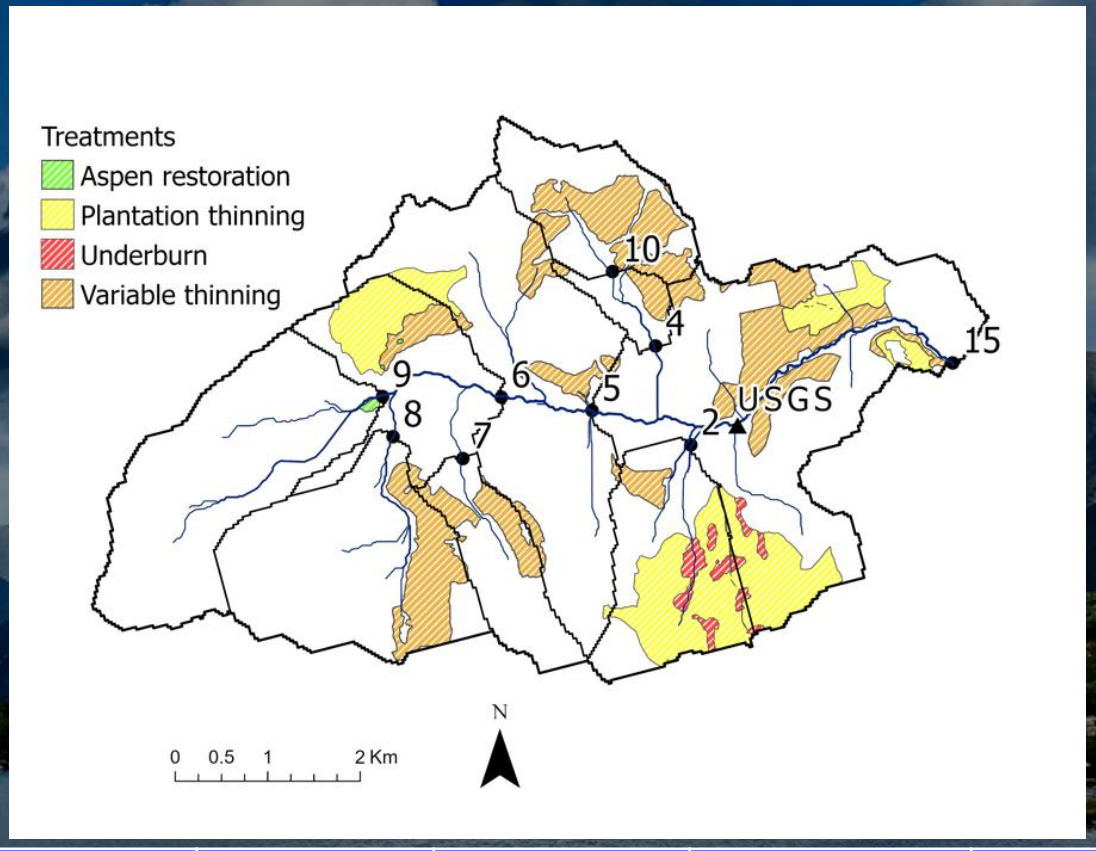






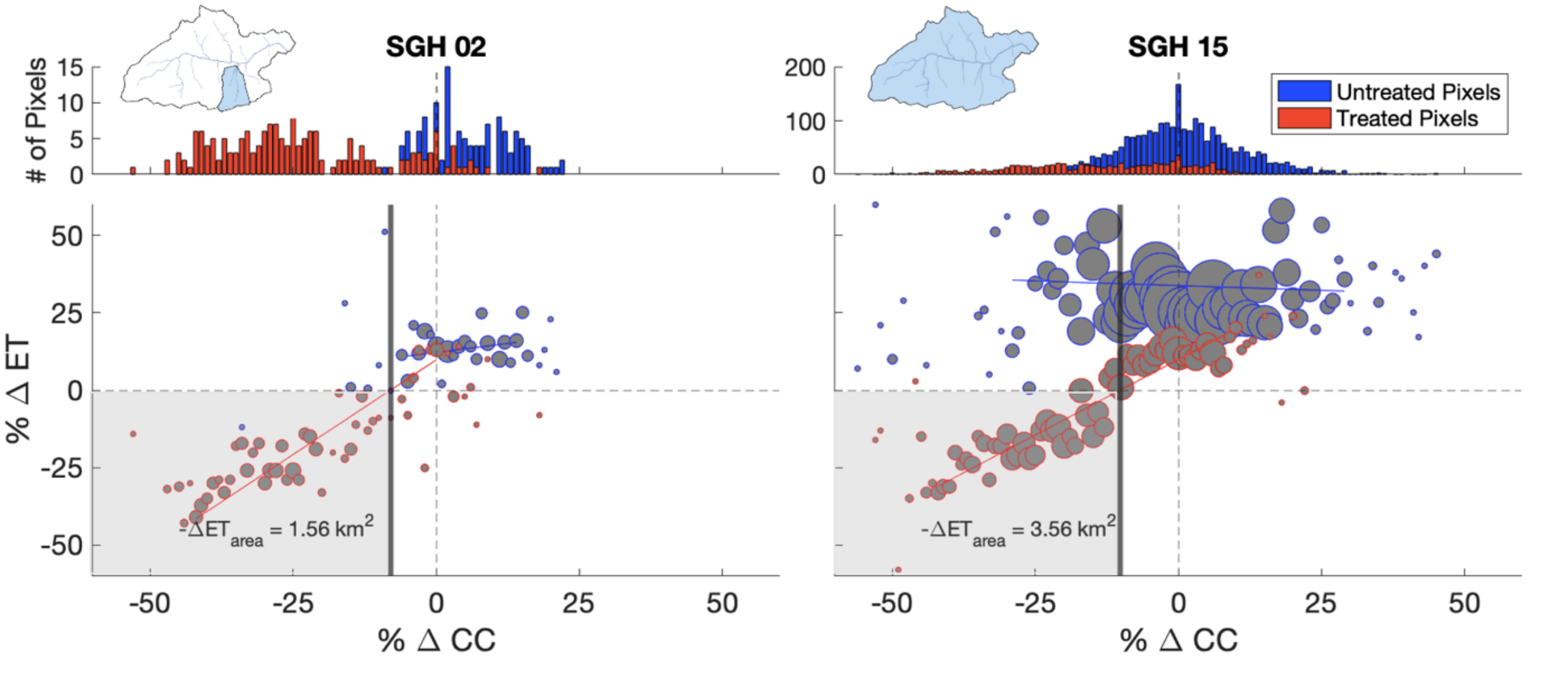
Another example





Gauge	Area (km²)	% Area Treated	Gauge elevation (m)	Slope (°)
SGH 02	3.02	56%	1,958	7.8
SGH 04	2.95	38%	2,035	4.6
SGH 05*	19.96	14%	1,972	9.2
SGH 06*	13.79	16%	1,995	9.7
SGH 07	1.71	24%	2,096	10.3
SGH 08	4.48	19%	2,098	8.7
SGH 09*	4.87	0.40%	2,066	11.3
SGH 10	2.36	41%	2,047	4.6
SGH 15*	34.22	34%	1,890	8.3

K. Boden, D, Philippus, A. Sytsma, **J. Kurzweil**, J. Randell, A, Kinoshita, T.S. Hogue. (2023) A Multi-Scale Assessment of Forest Treatment Impacts on Evapotranspiration and Water yield in the Sierra Nevada. *Ecohydrology*. In Review



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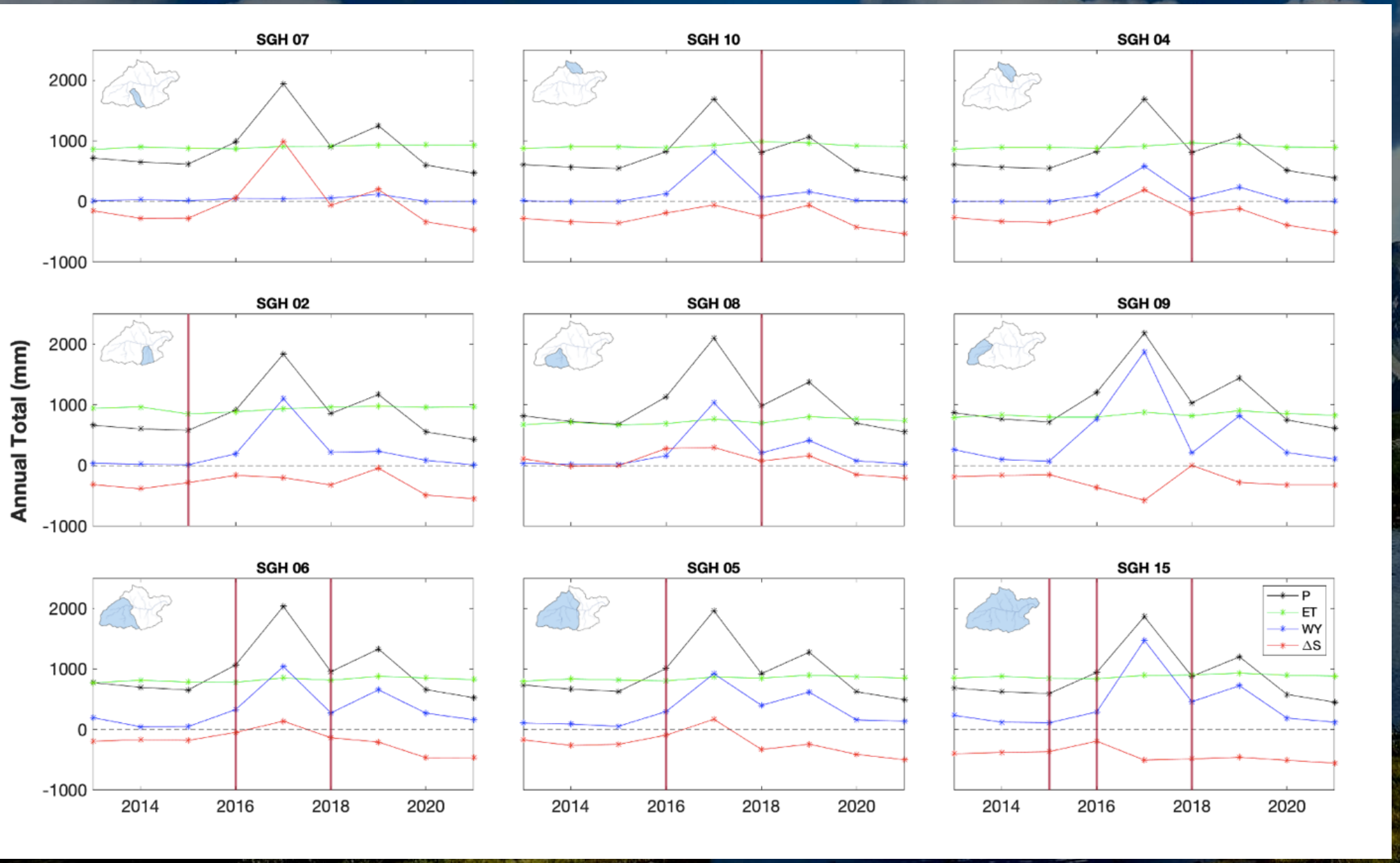

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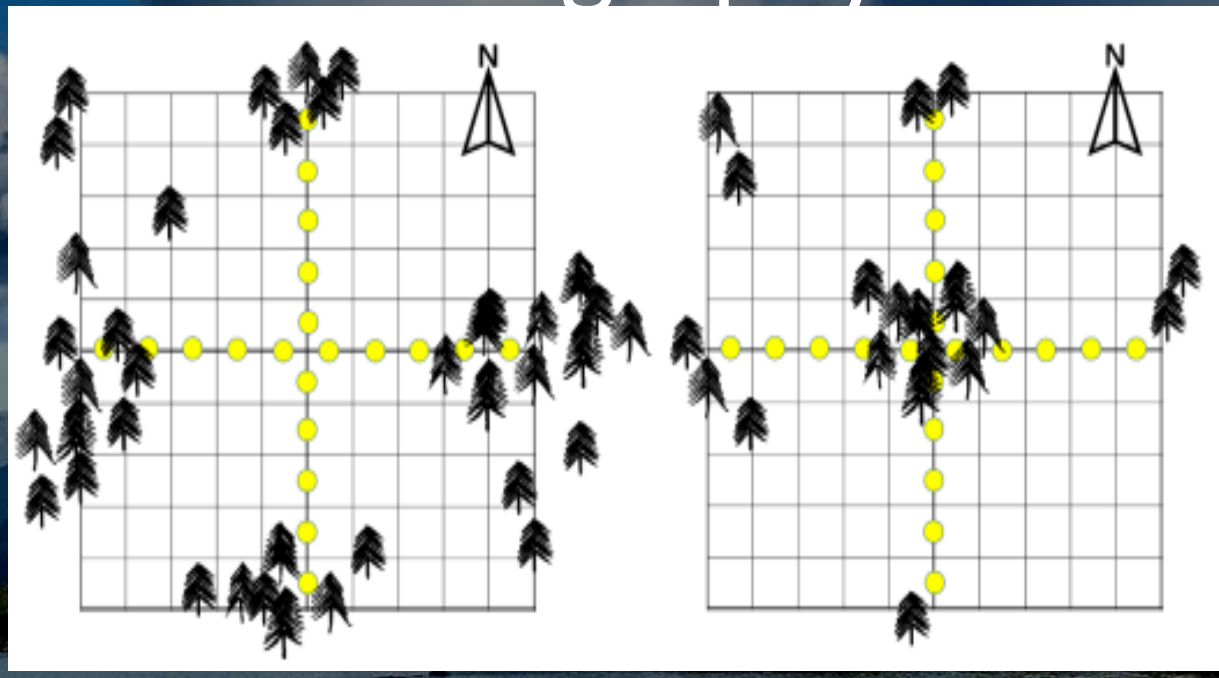
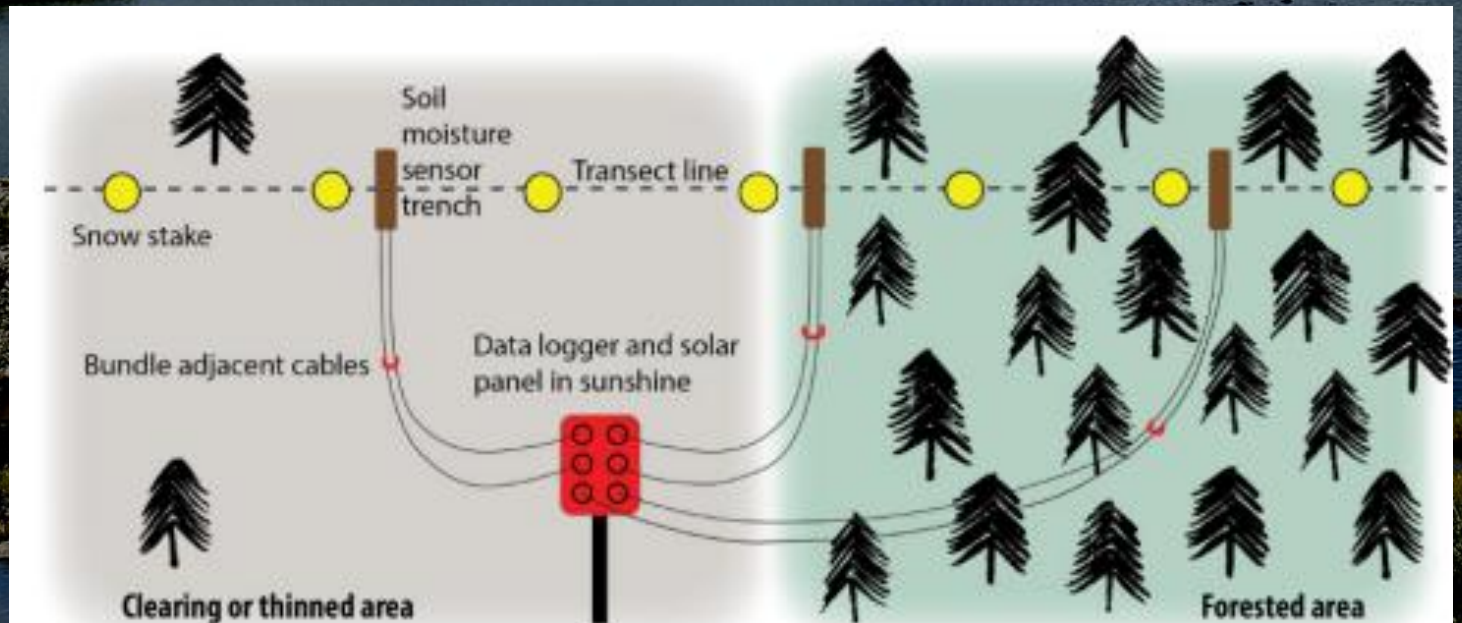
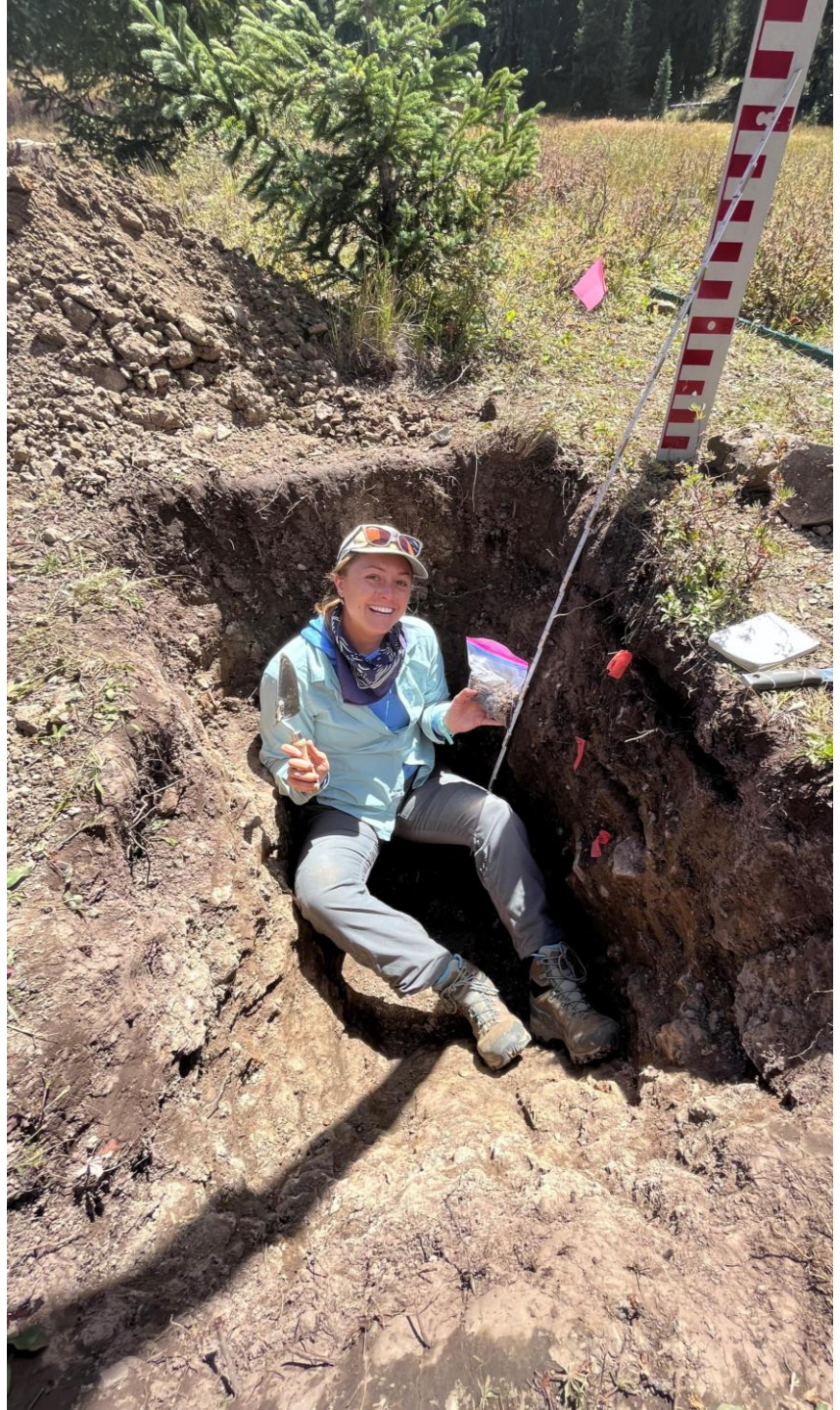
Back to the drawing board - Snowtography





TNC Snowtography Handbook (2021)



Questions?
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https://earthobservatory.nasa.gov/world-of-change/LakePowellWater

www.earthobservatory.nasa.gov

Nation Atlas, Modified by K. Canter, AGI

https://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/west_swepctnormal_update.pdf

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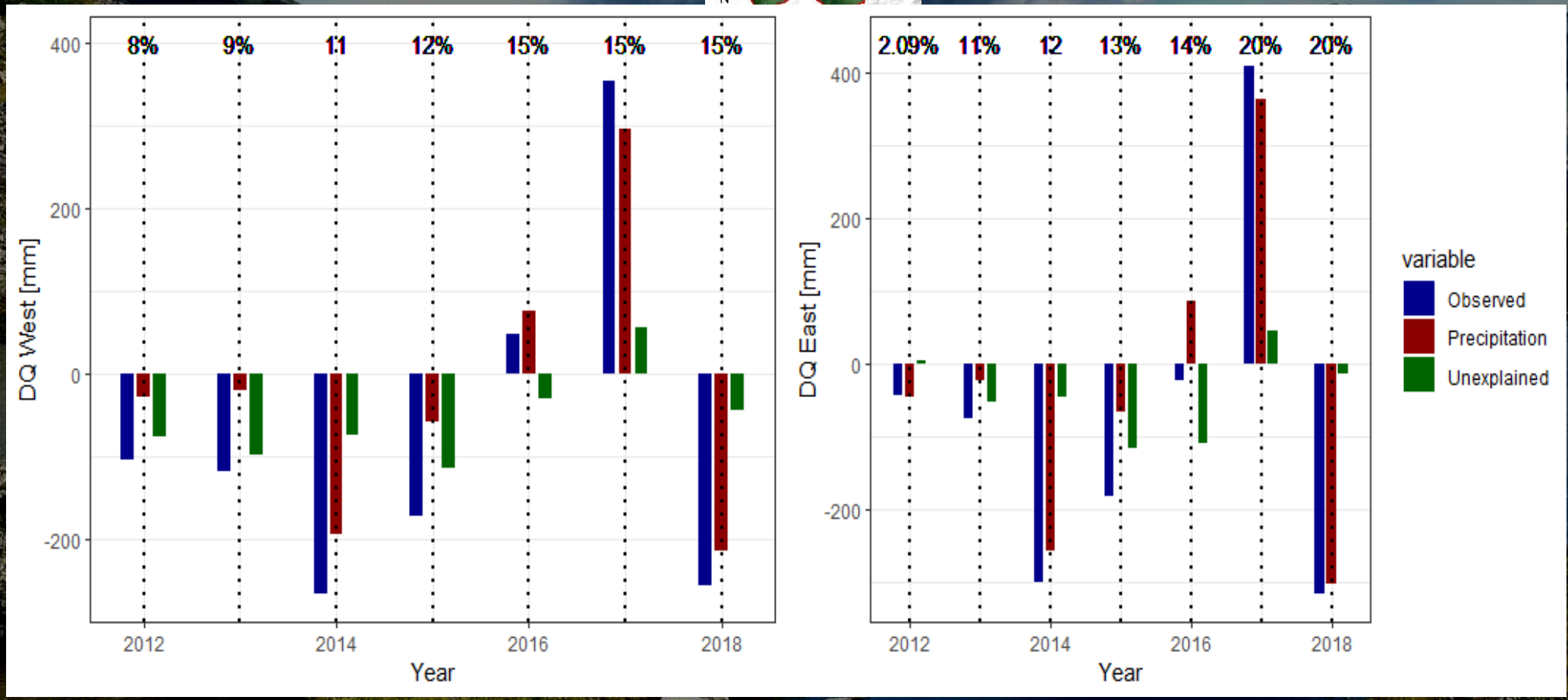
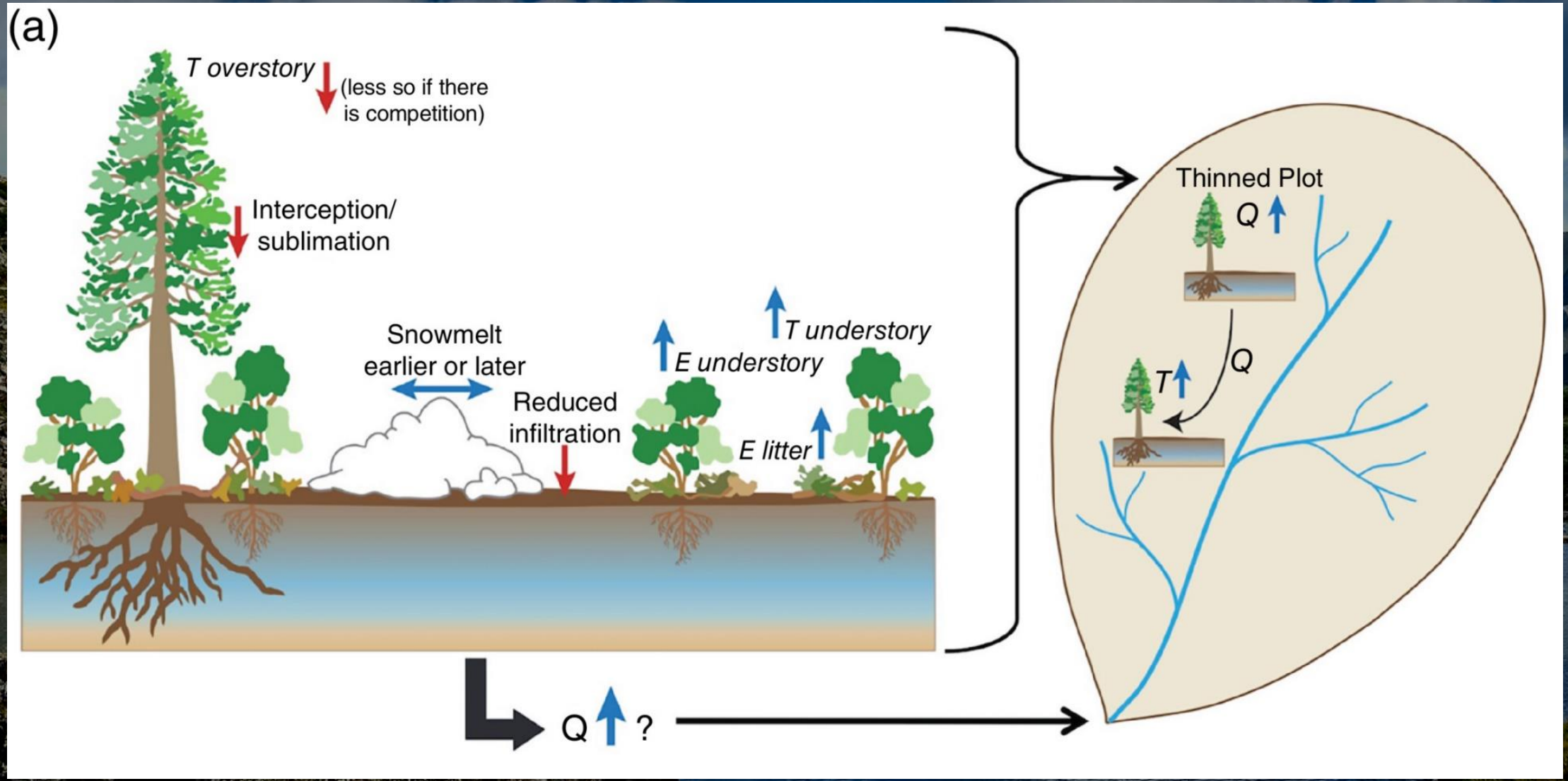


conclusions

1. Climate plays a larger role than forest treatments
2. Not seeing expected response in hydrologic parameters
3. Change in canopy not great enough to overcome climate



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