



Thermal Tolerance of Coastal Cutthroat Trout

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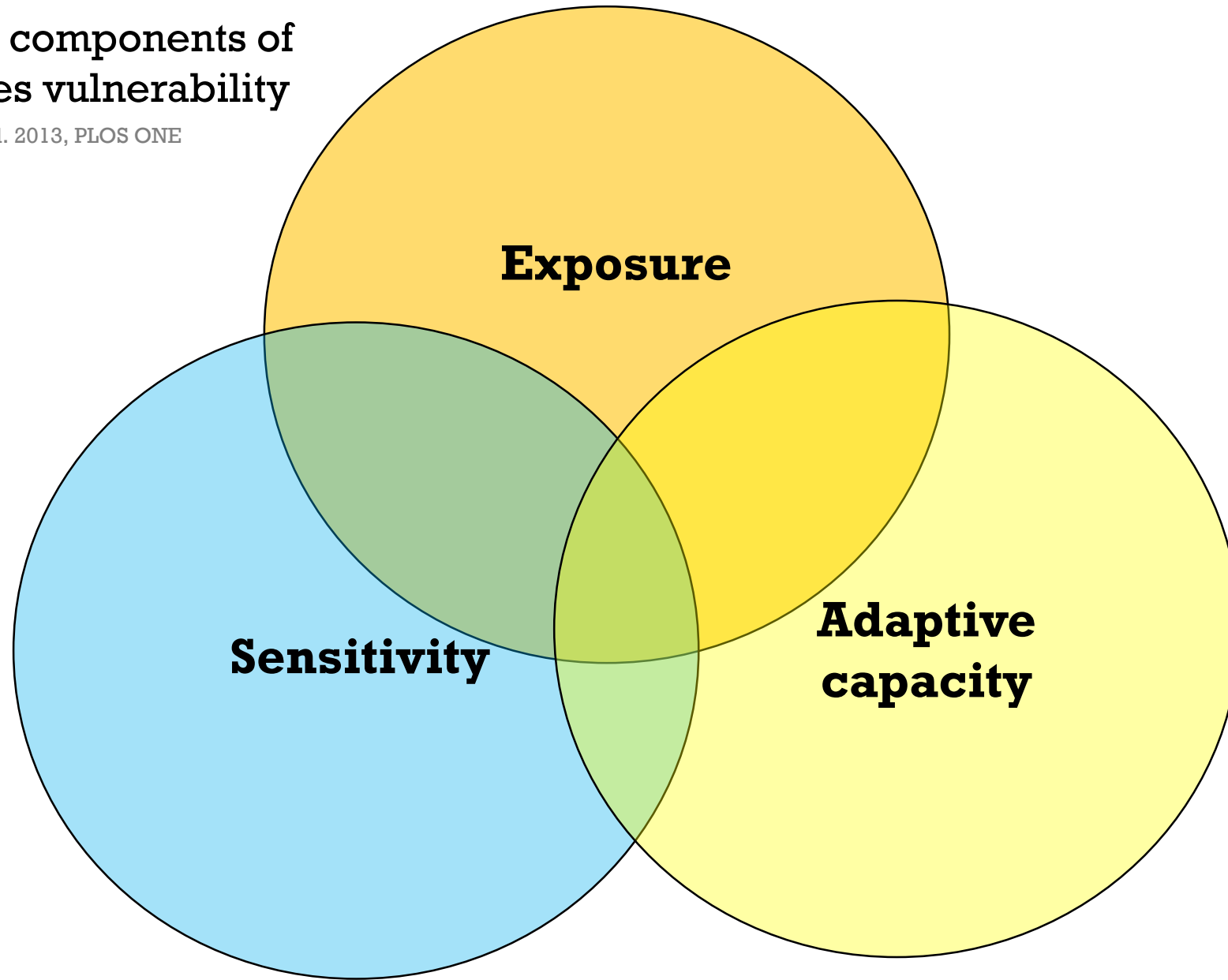


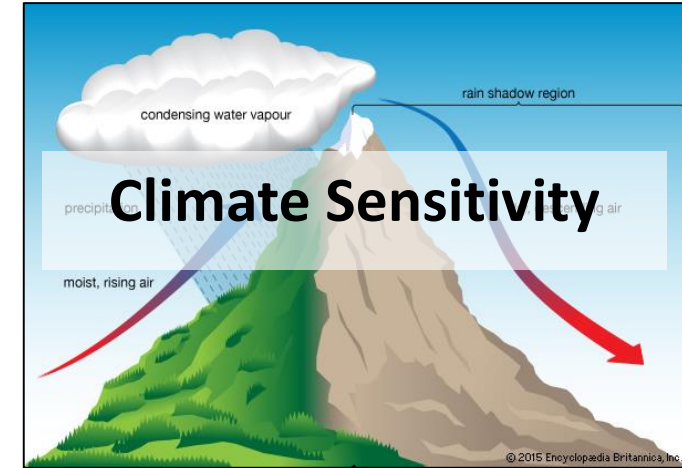
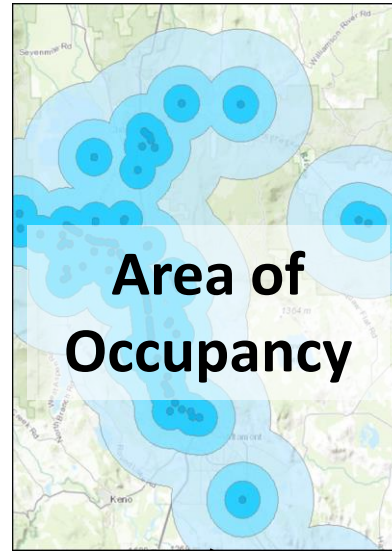
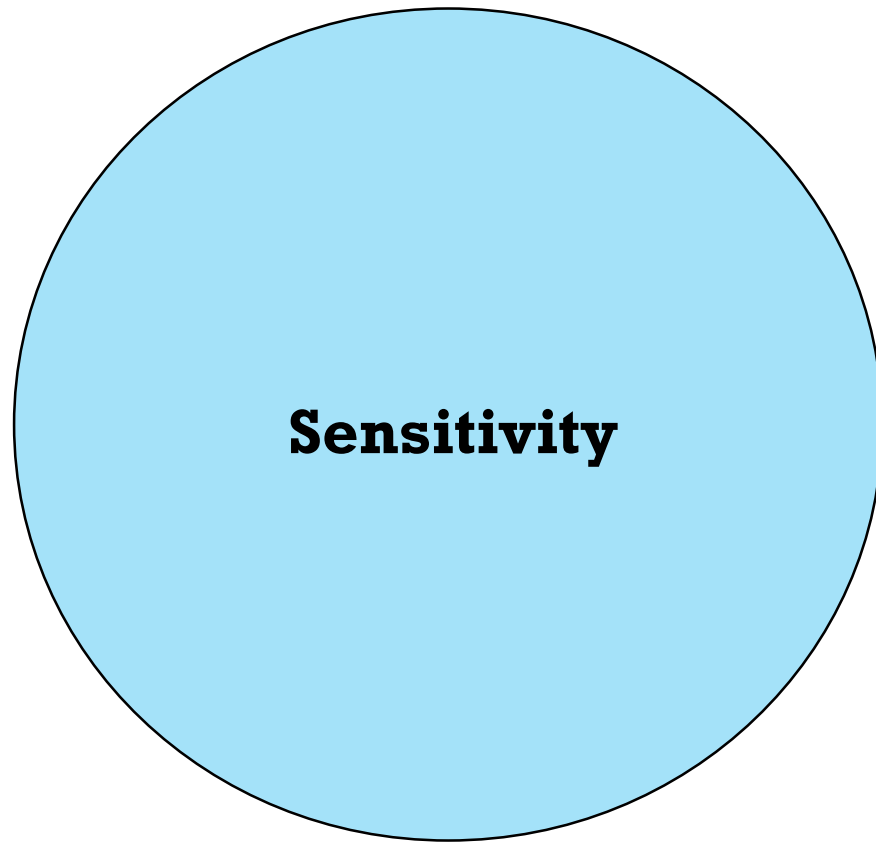
Artwork: Jill Pelto



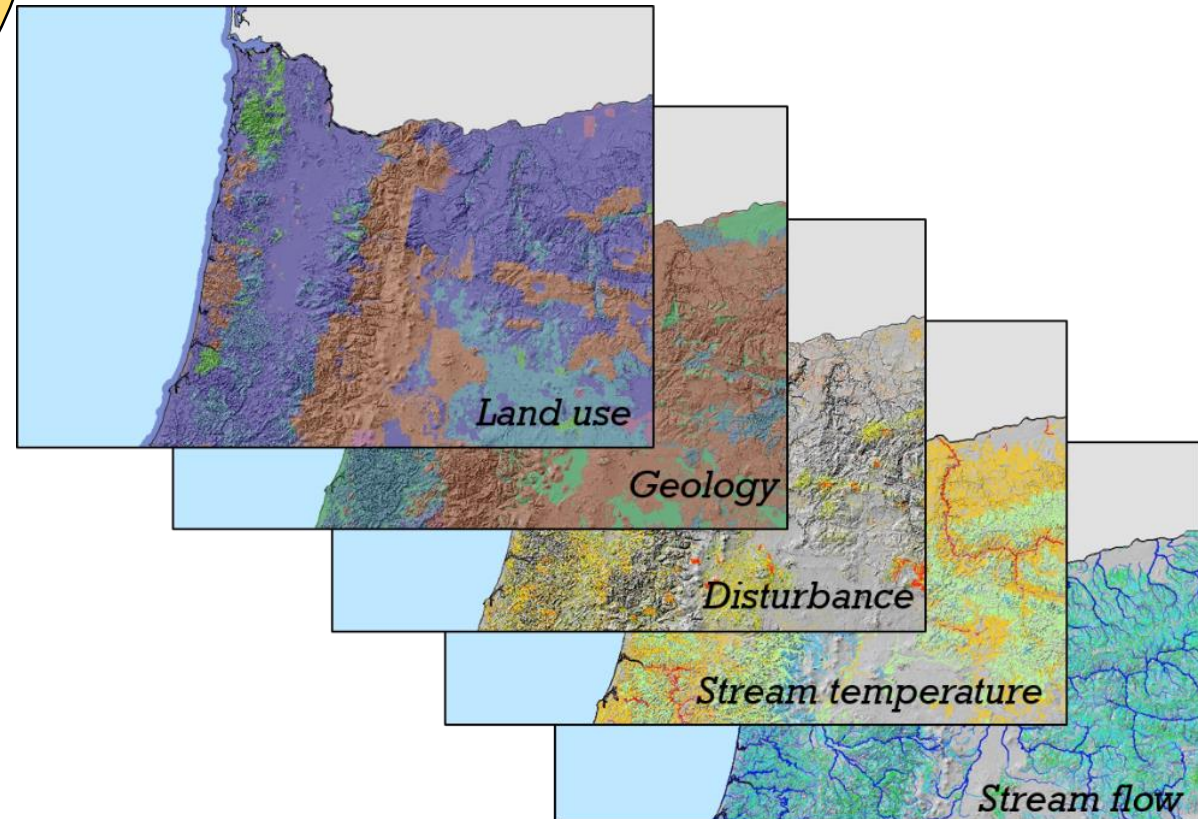
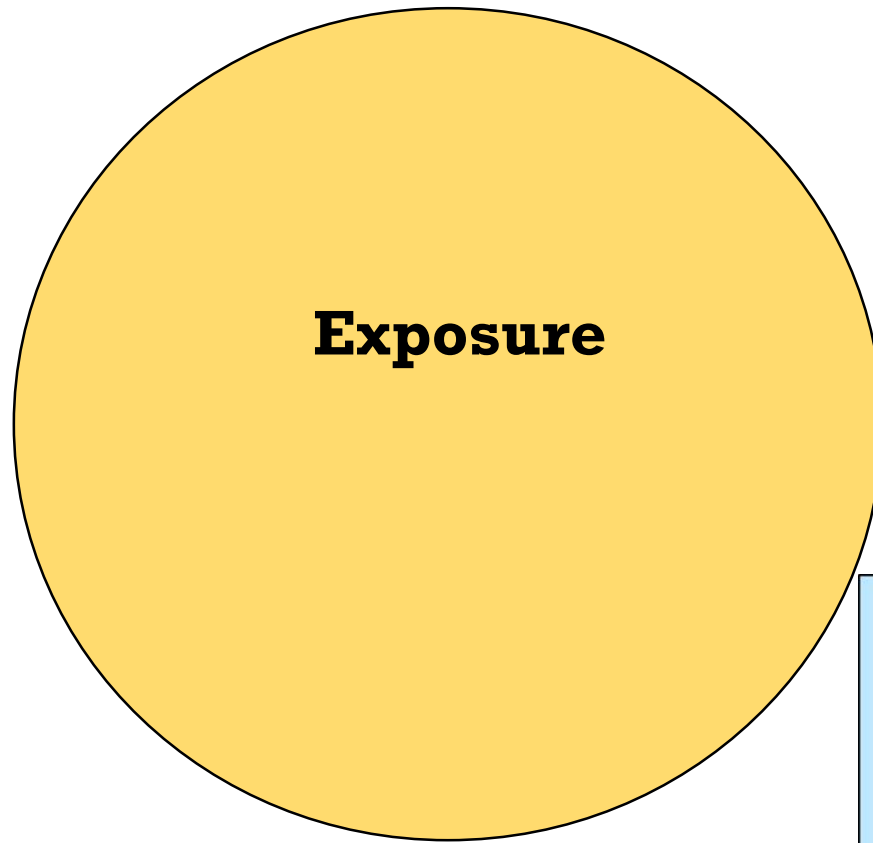
Major components of species vulnerability

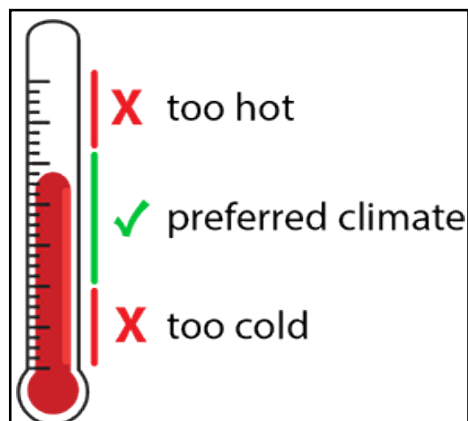
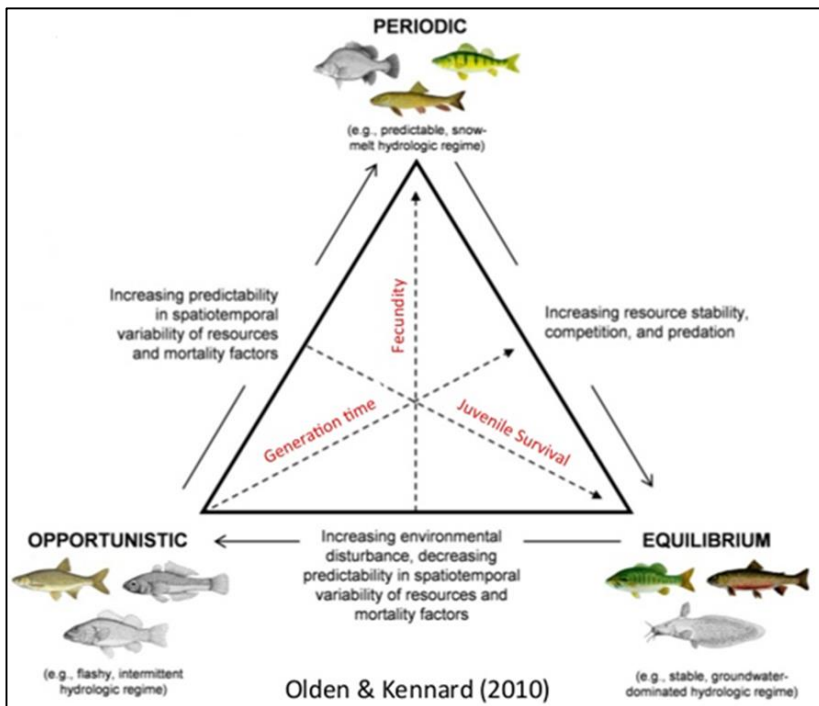
Foden et al. 2013, PLOS ONE





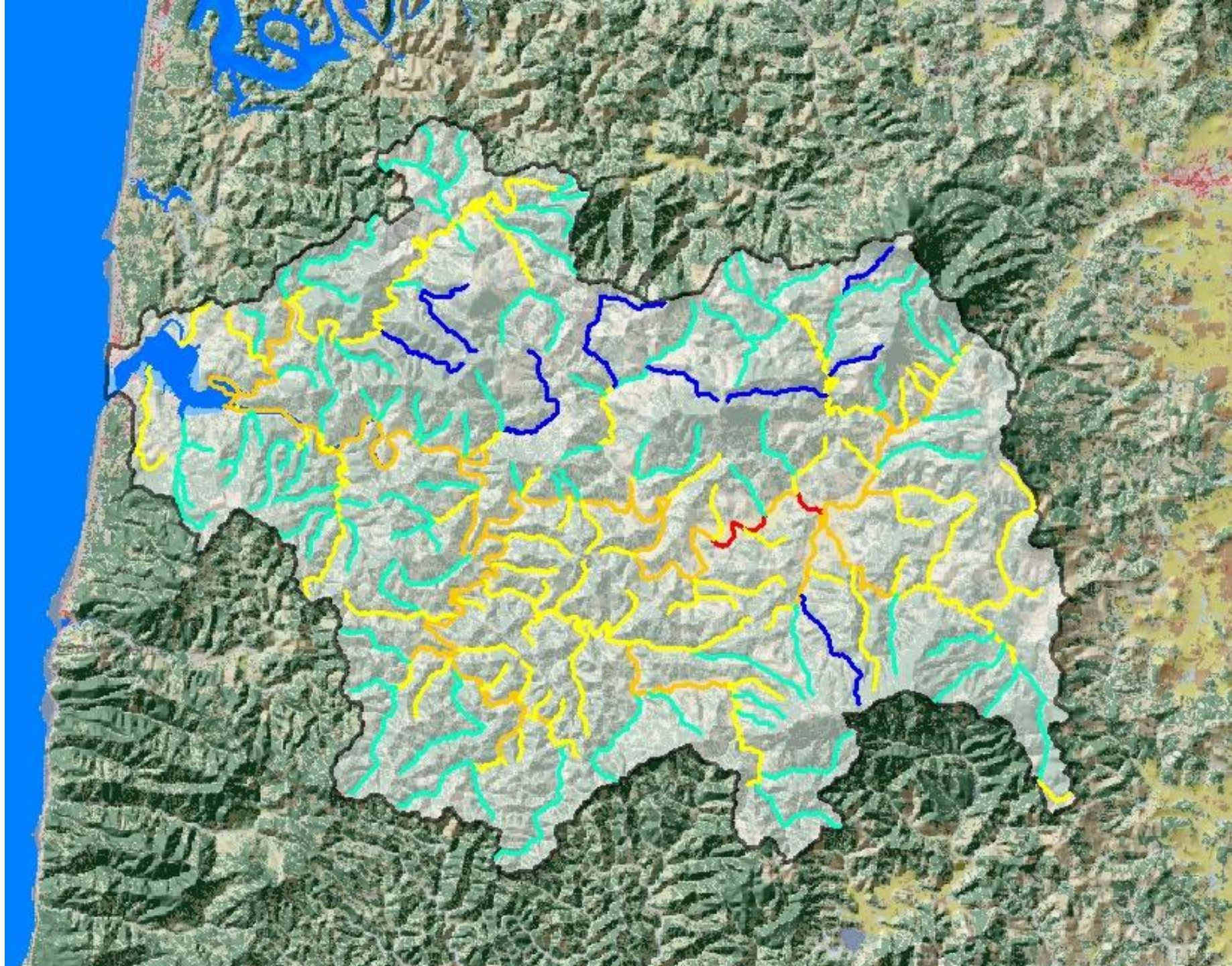
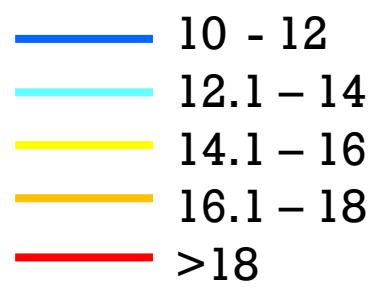
Geographic Rarity Index
*Rare = smallest AOO,
highest climate sensitivity*

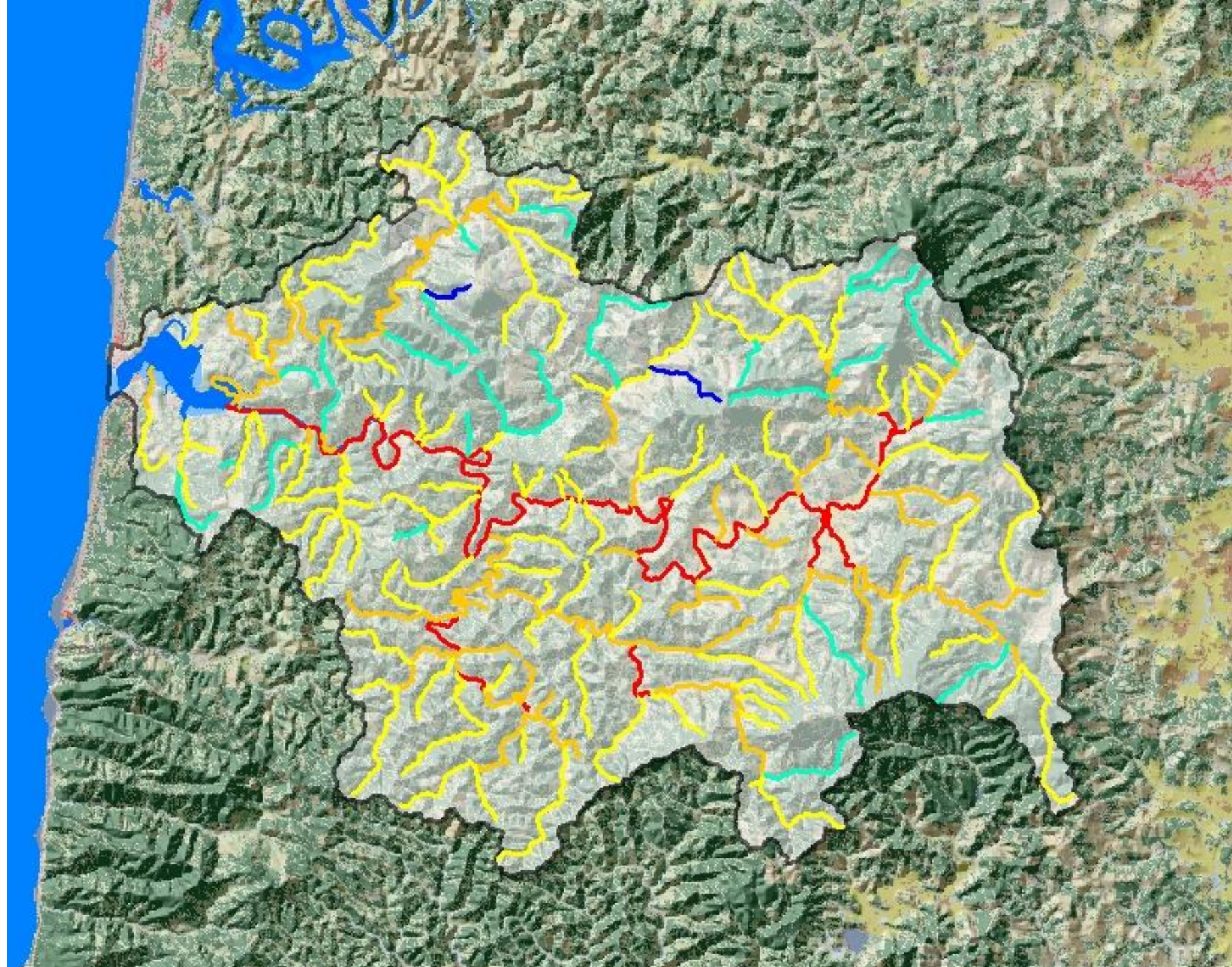
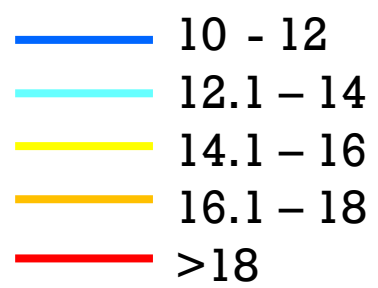




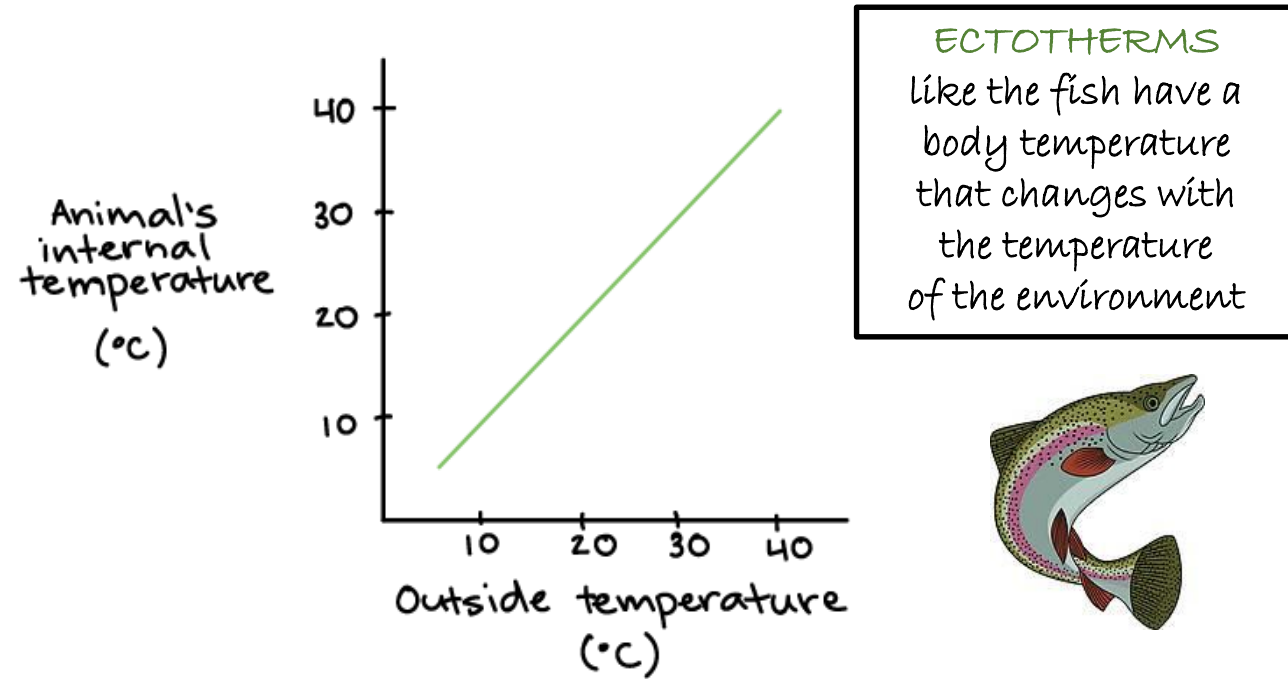
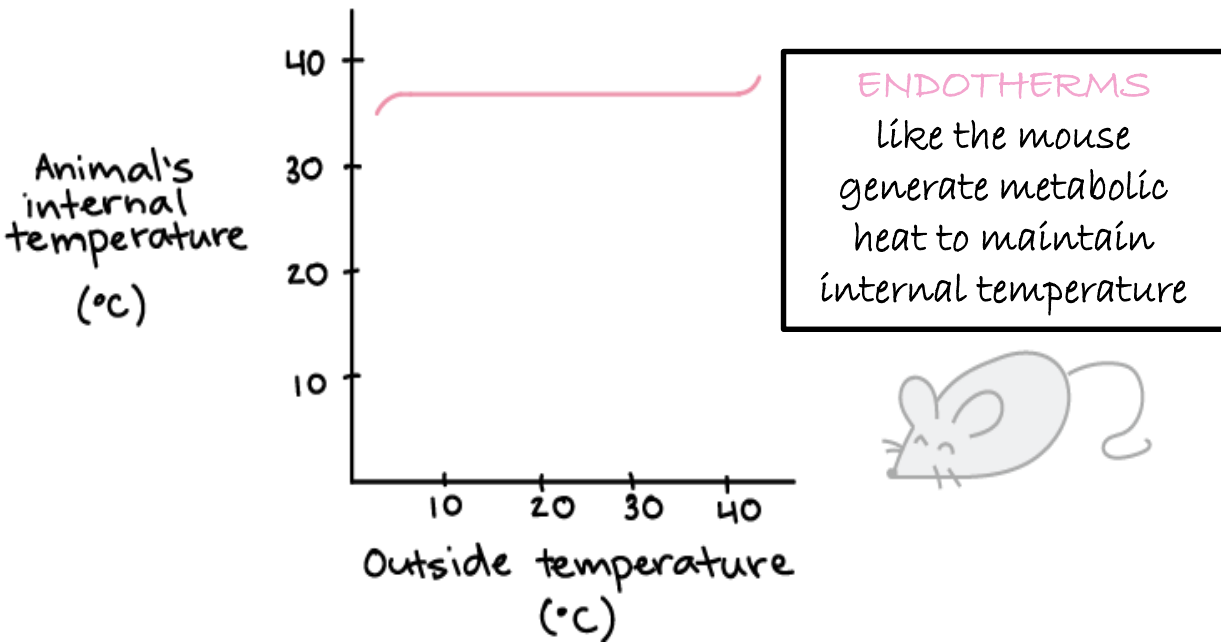
Adaptive capacity

Genetic diversity
Traits and life history
Thermal tolerance





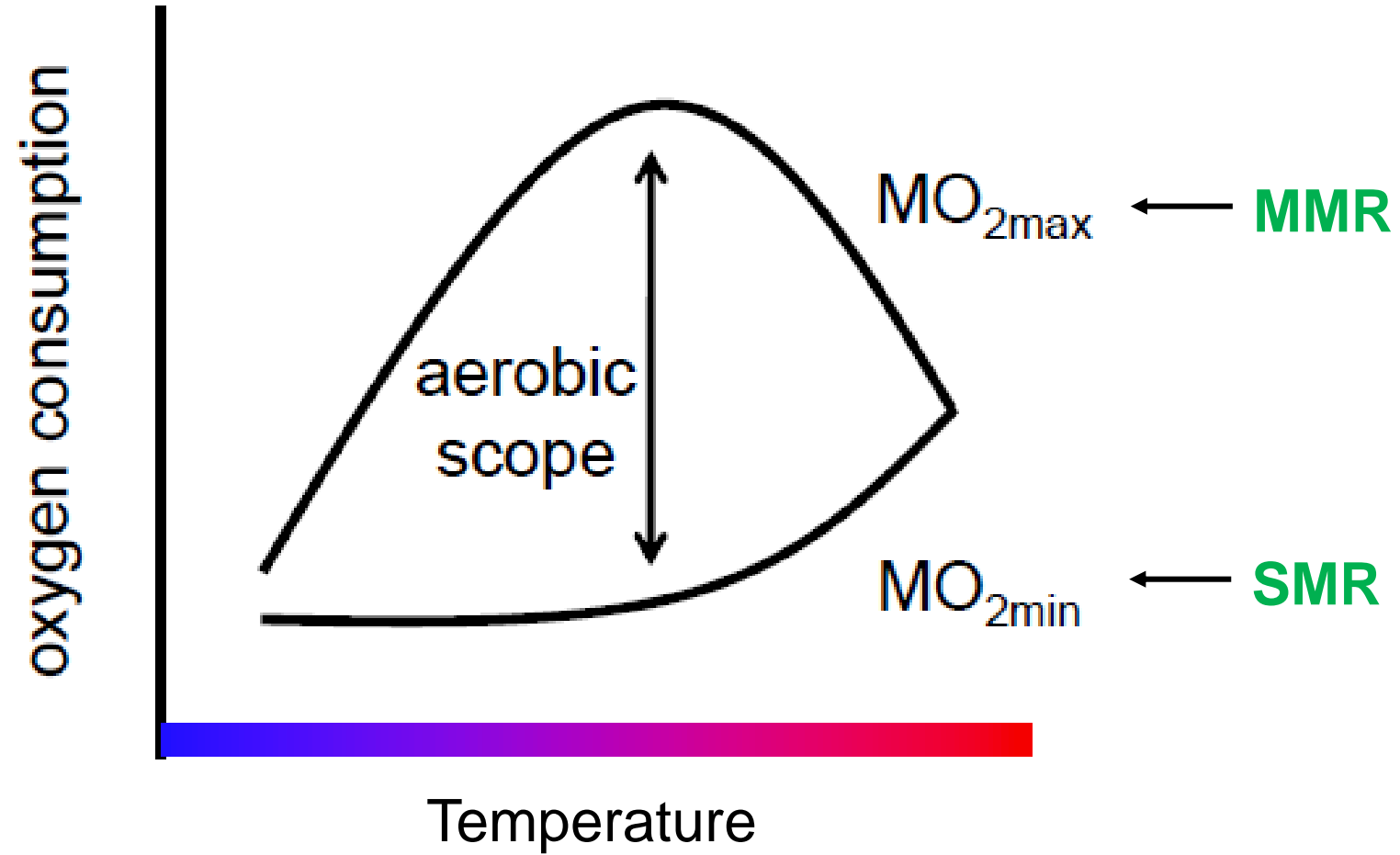
Endotherm vs. Ectotherm



Metabolic Rate: The amount of energy used by an animal per unit time.

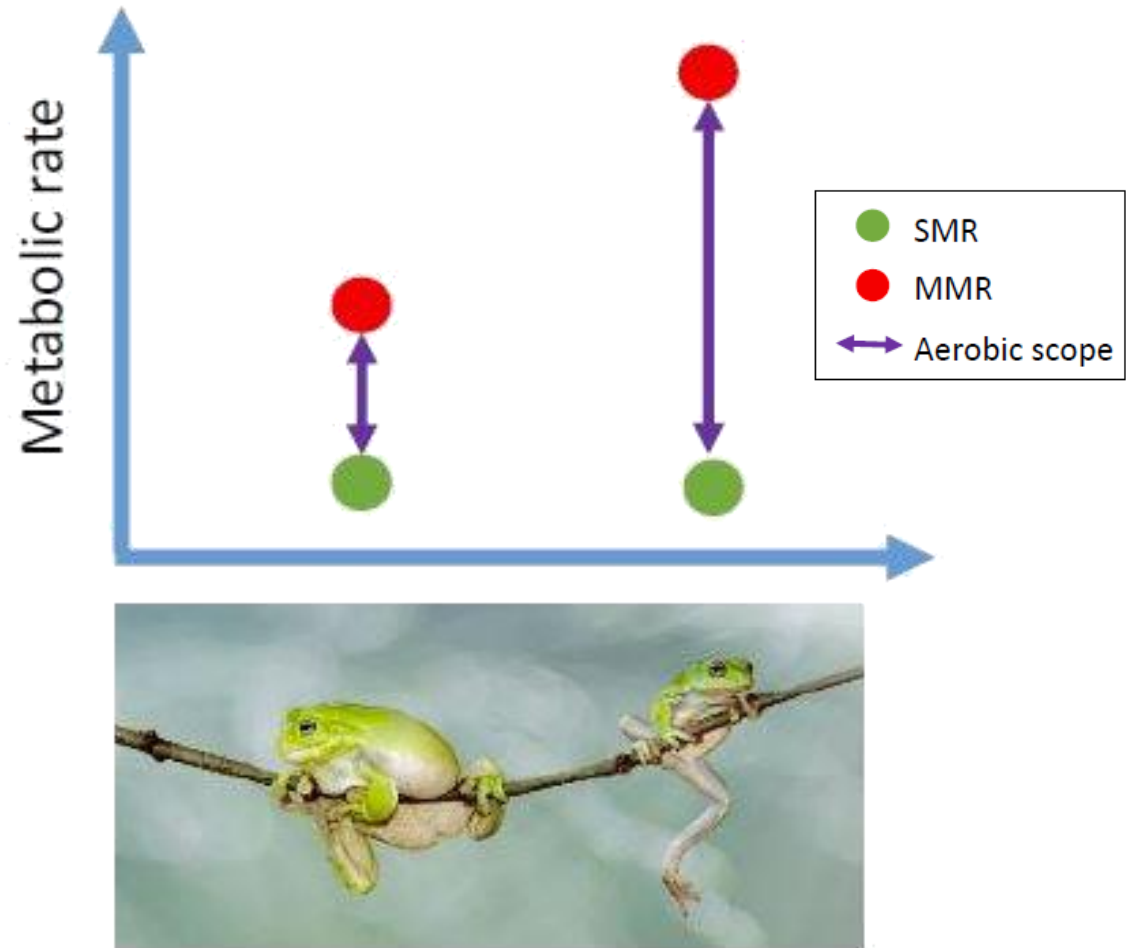
- Standard metabolic rate (SMR)
- Maximum metabolic rate (MMR)
 - Aerobic scope (AS)
- Critical Thermal Maxima (CT_{max})

We measured the rate of O₂ consumption



As Temperature Changes....

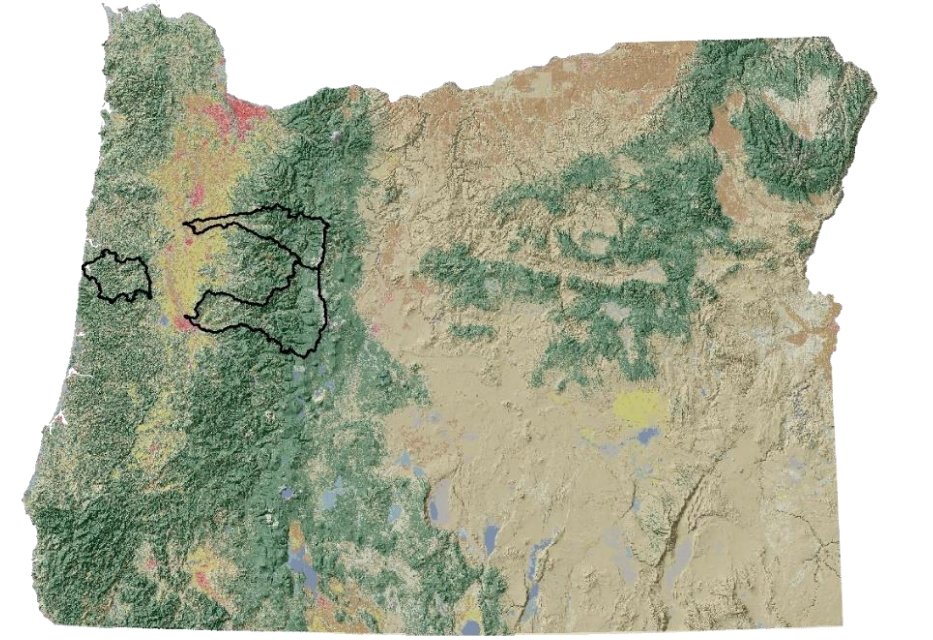
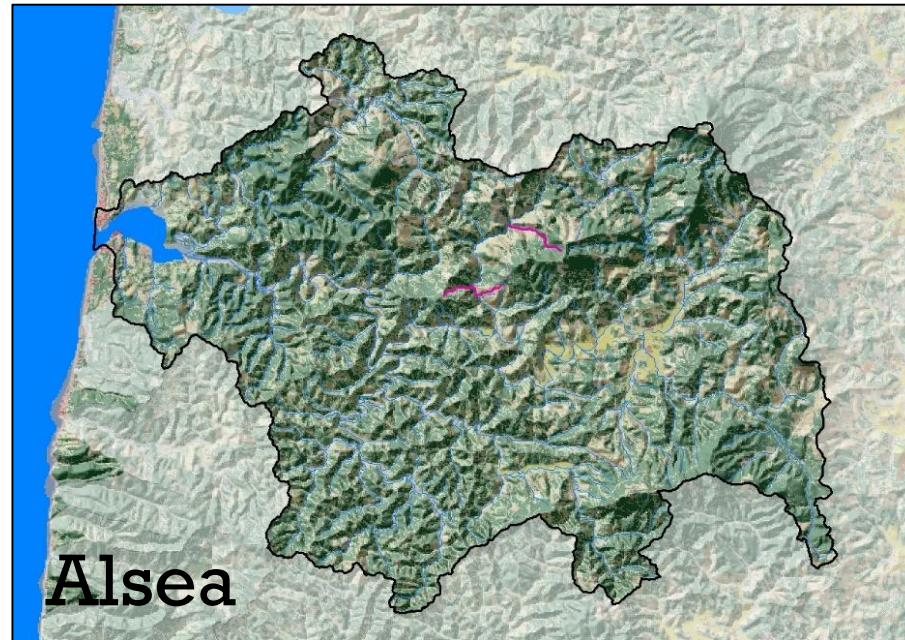
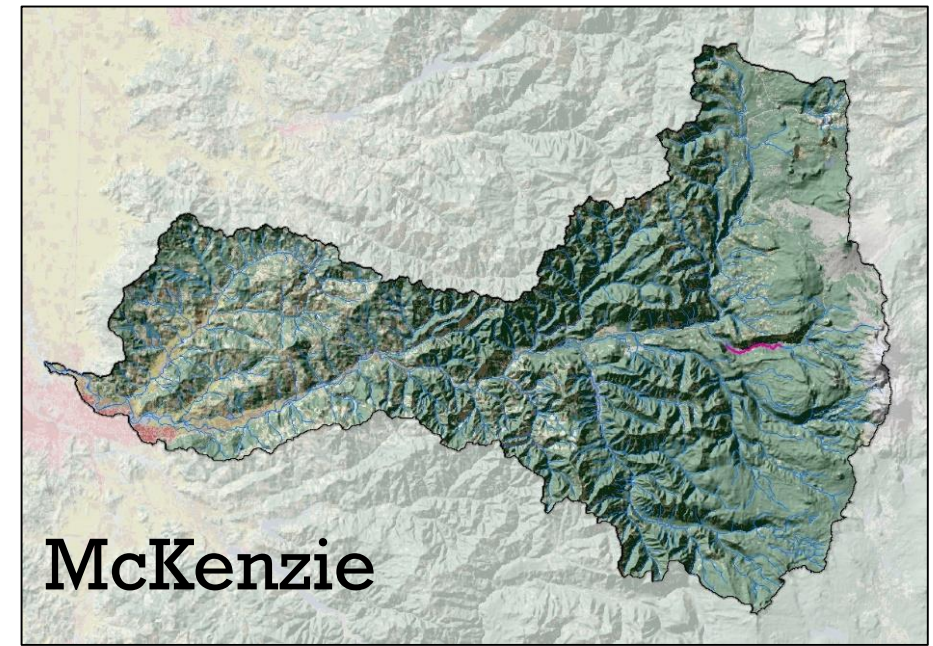
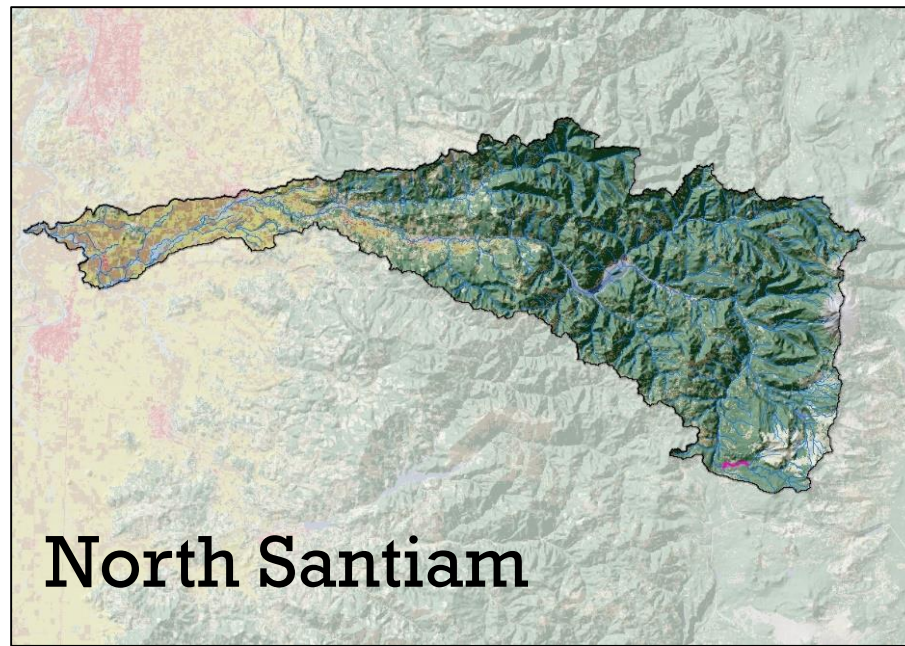
...how does metabolic rate vary between individuals, across populations?



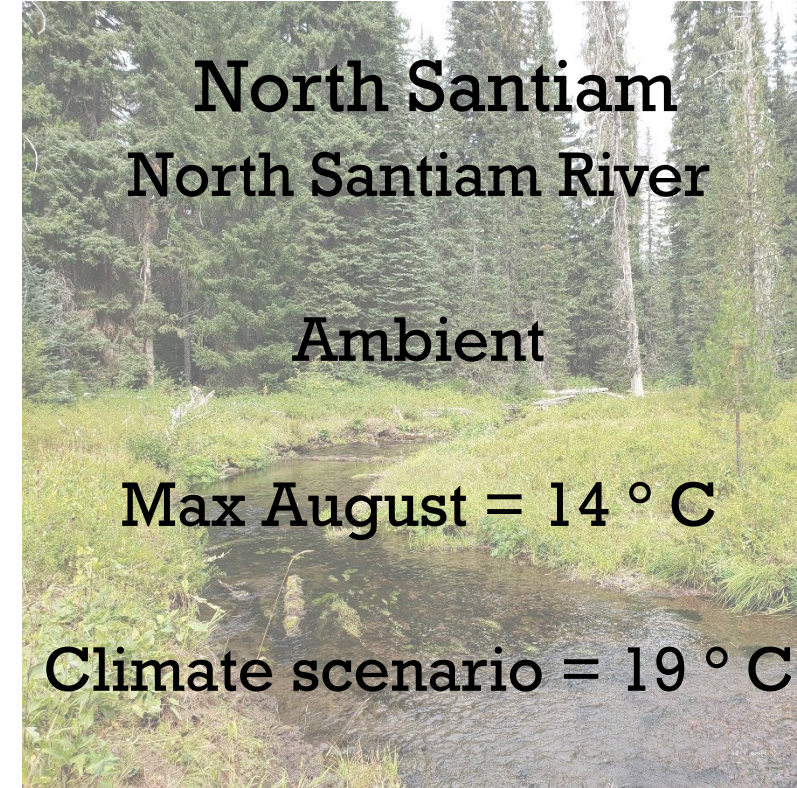
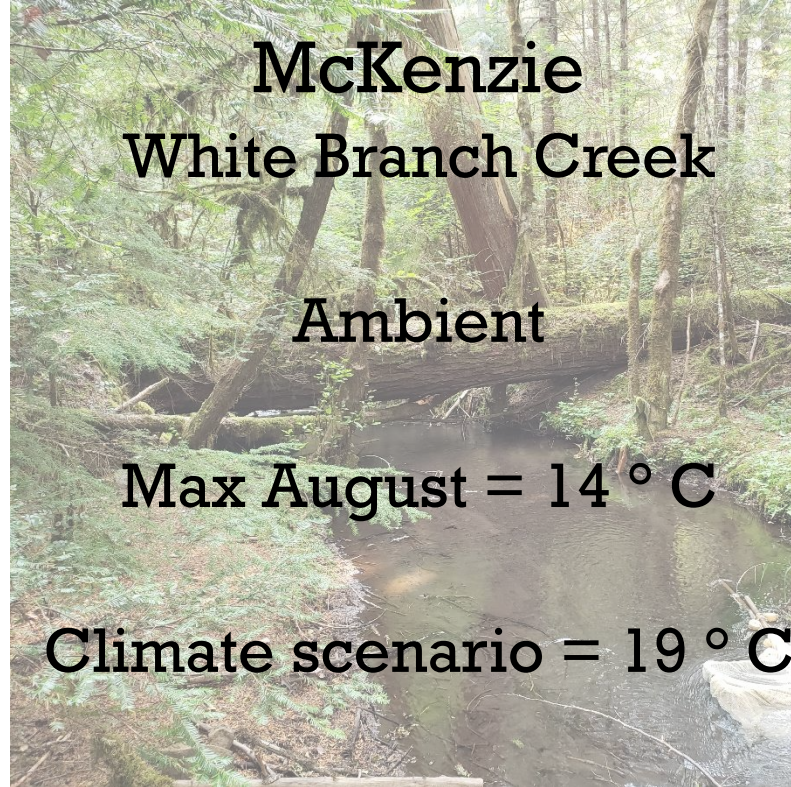
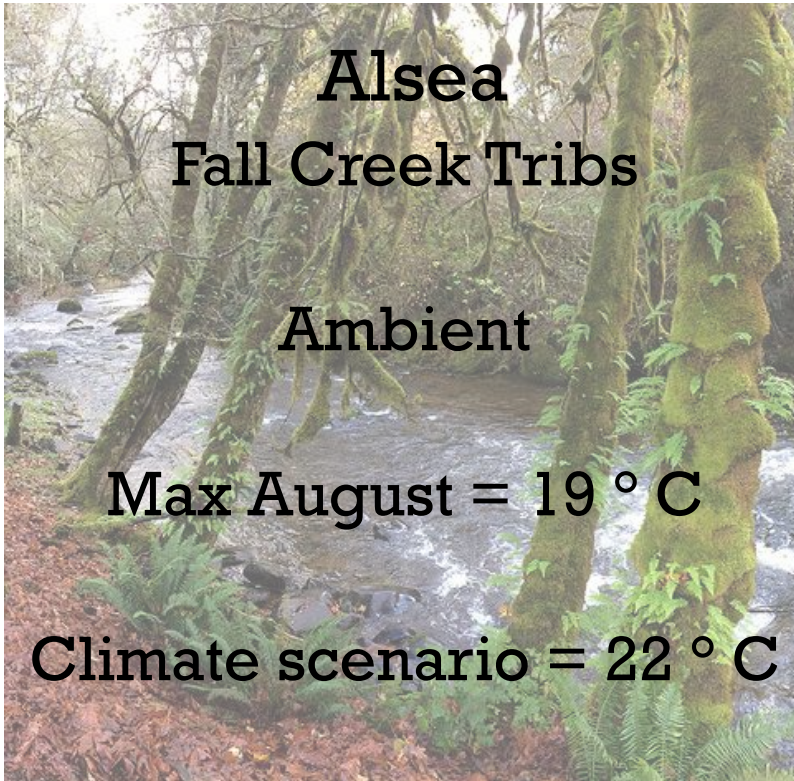
Stream-side Respirometry Experiments



Study Areas

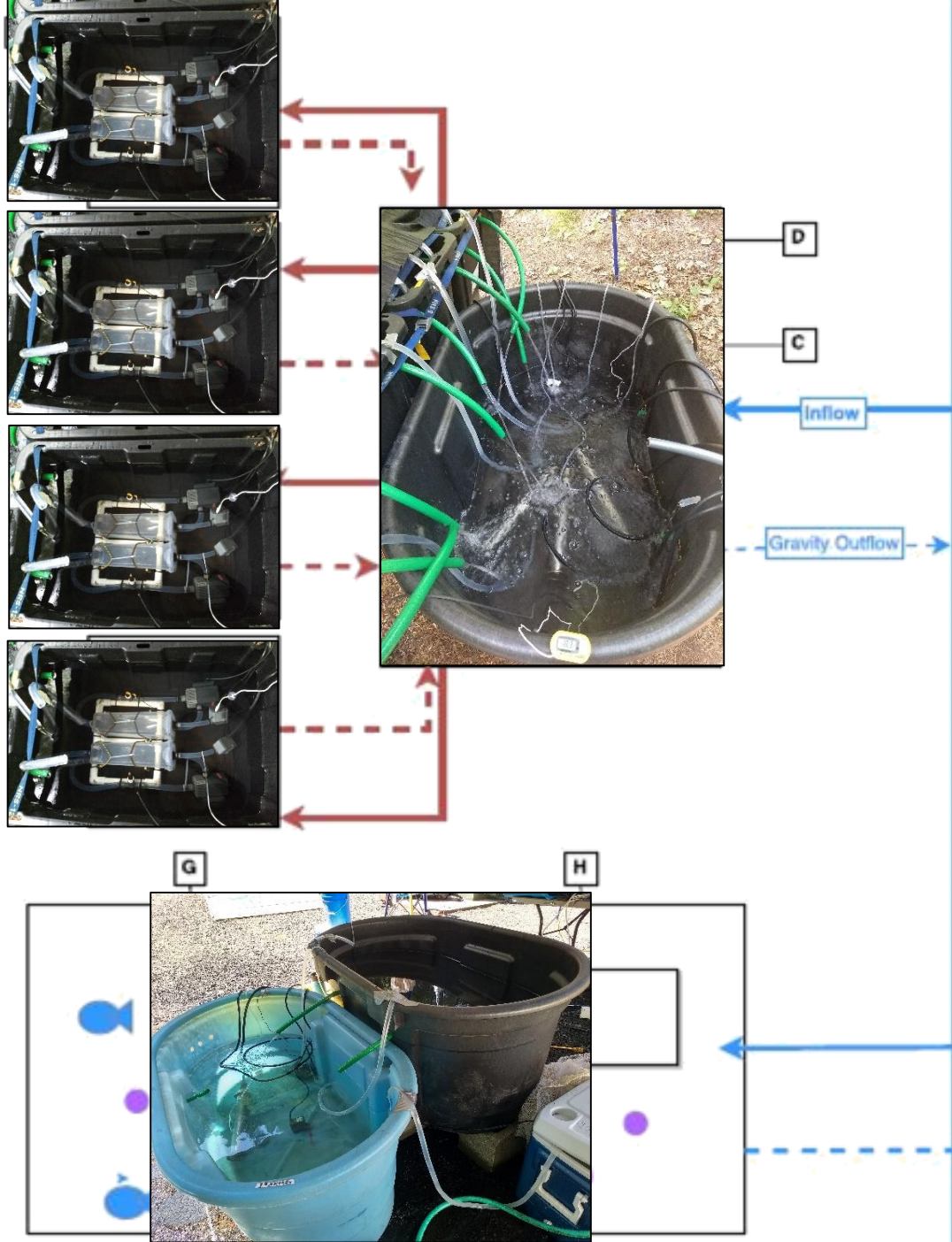


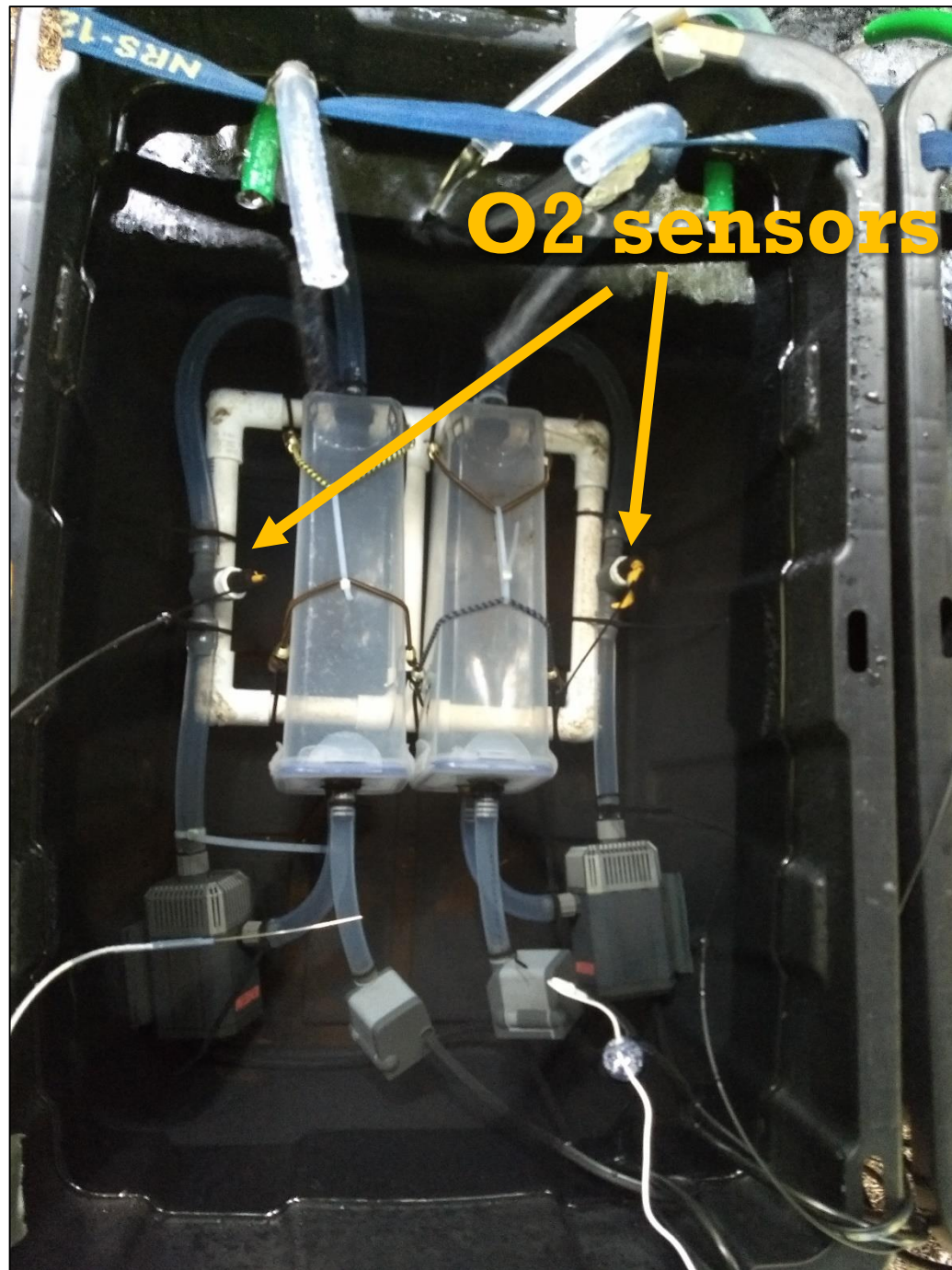
Temperature Treatments



Location, location, location!









Coastal Cutthroat Trout

Alsea
Fall Creek Tribs

	Mean	SD	Min	Max
BW (g)	23.6	0.096	12.8	44.9
Len (mm)	129.6	17.591	101	165

McKenzie
White Branch Creek

	Mean	SD	Min	Max
BW (g)	23.4	0.083	12.9	45.5
Len (mm)	131.3	15.586	106	167

North Santiam
Upper North Santiam River

	Mean	SD	Min	Max
BW (g)	26.1	0.107	9.6	58.6
Len (mm)	136.8	19.450	116	181

Acclimation



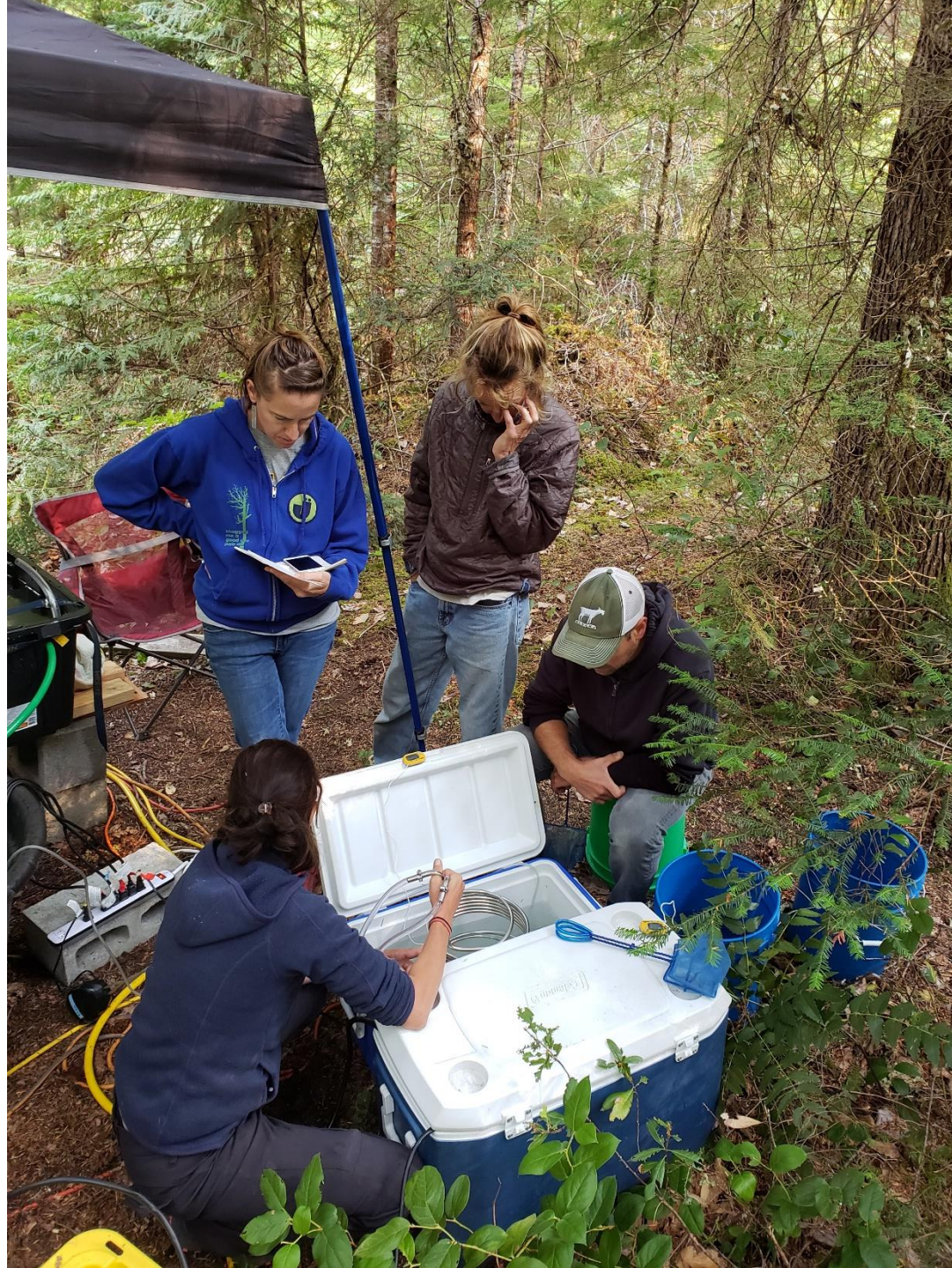
Acclimation tank





Measurement



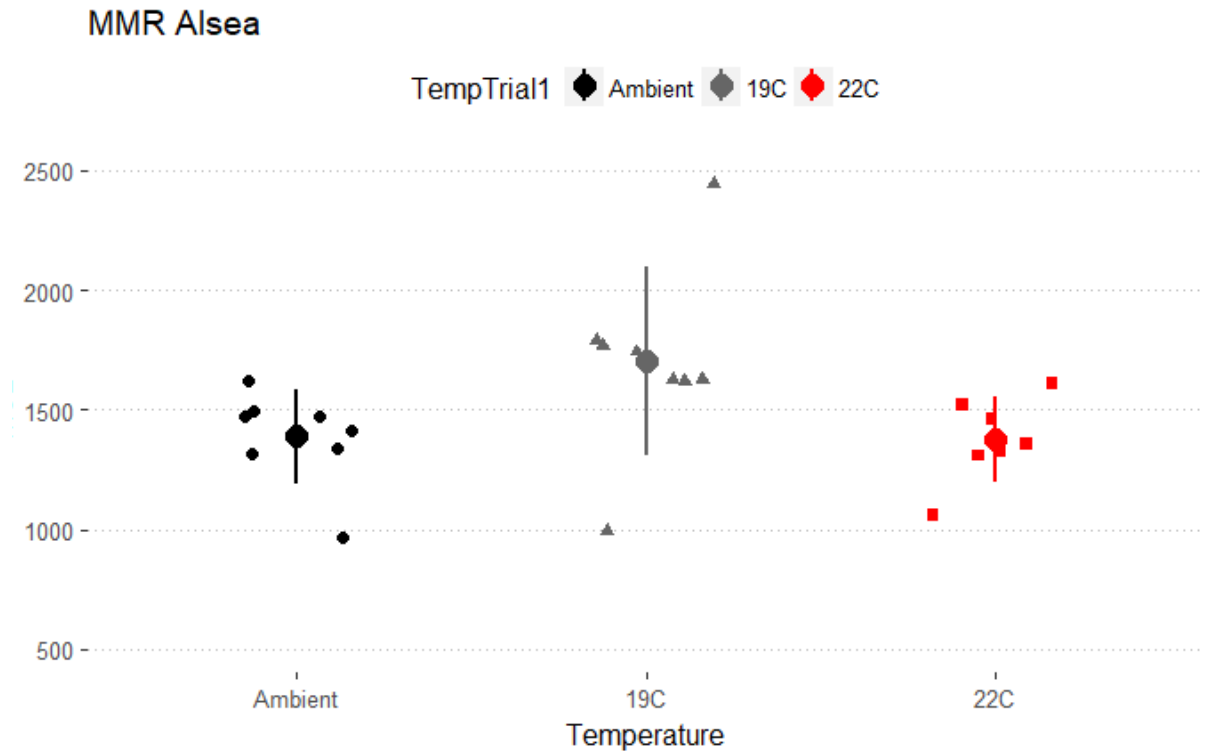
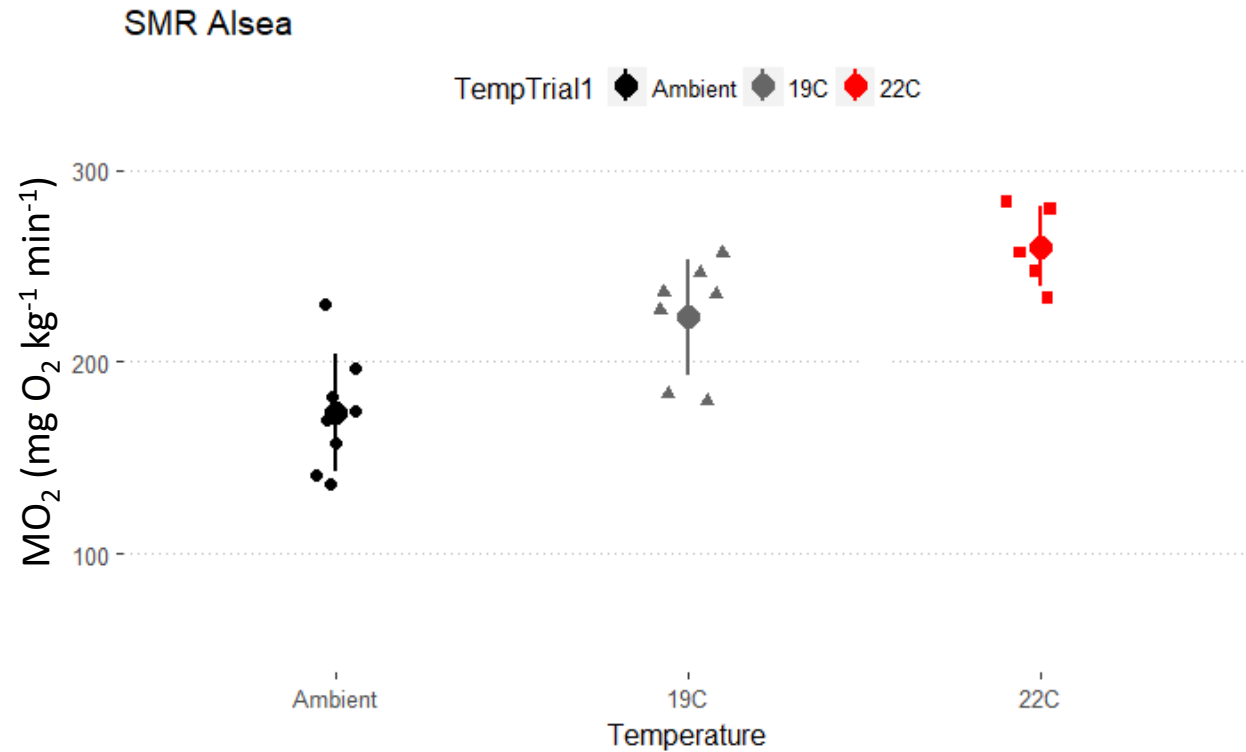


CT Max

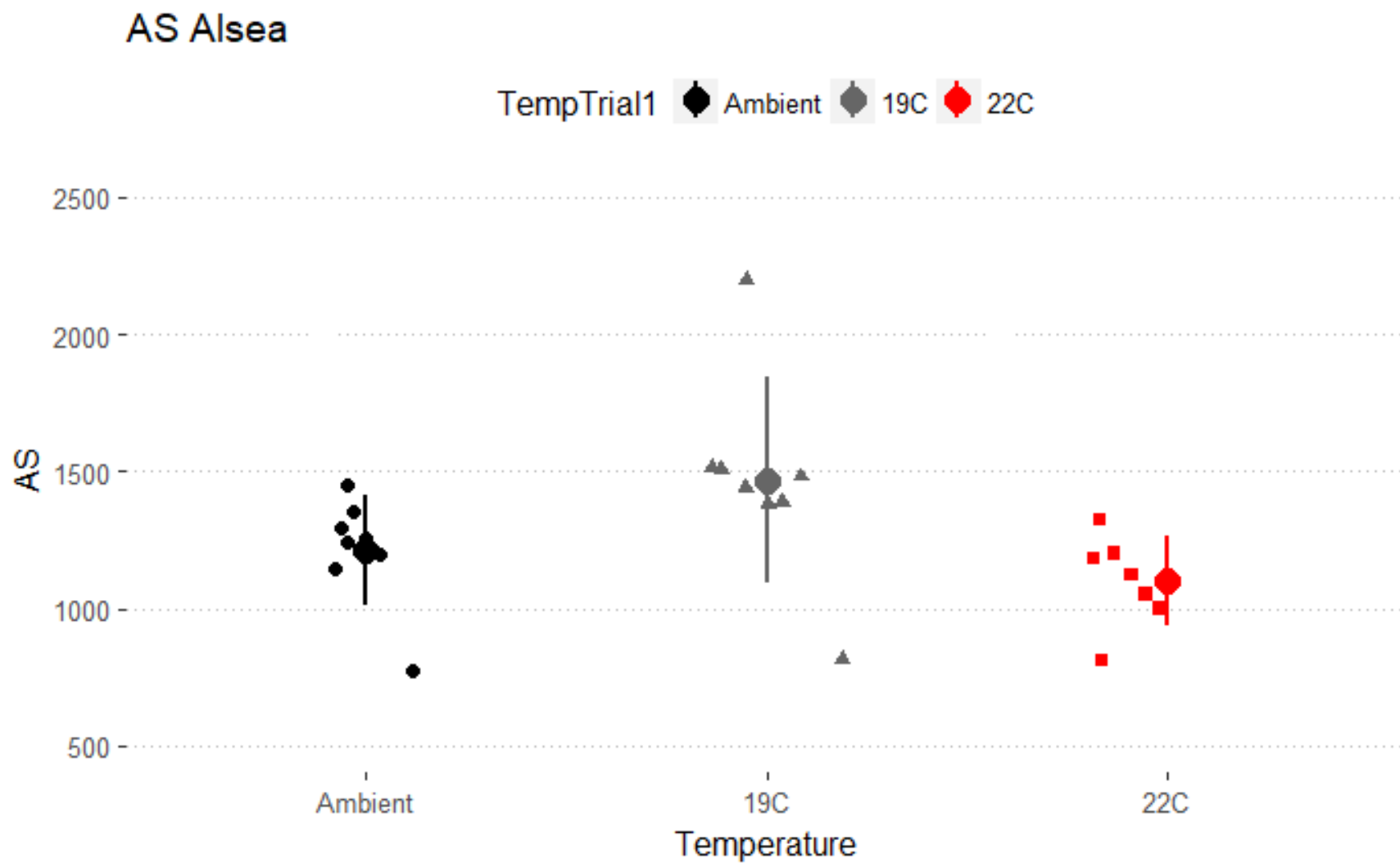
An underwater photograph of a fish, possibly a trout, swimming over a rocky riverbed. The fish is positioned in the lower center of the frame, facing right. The water is clear, and sunlight filters through, creating dappled light patterns on the rocks and the fish's scales. A speech bubble is overlaid on the right side of the image, containing the text "We have results!".

We have results!

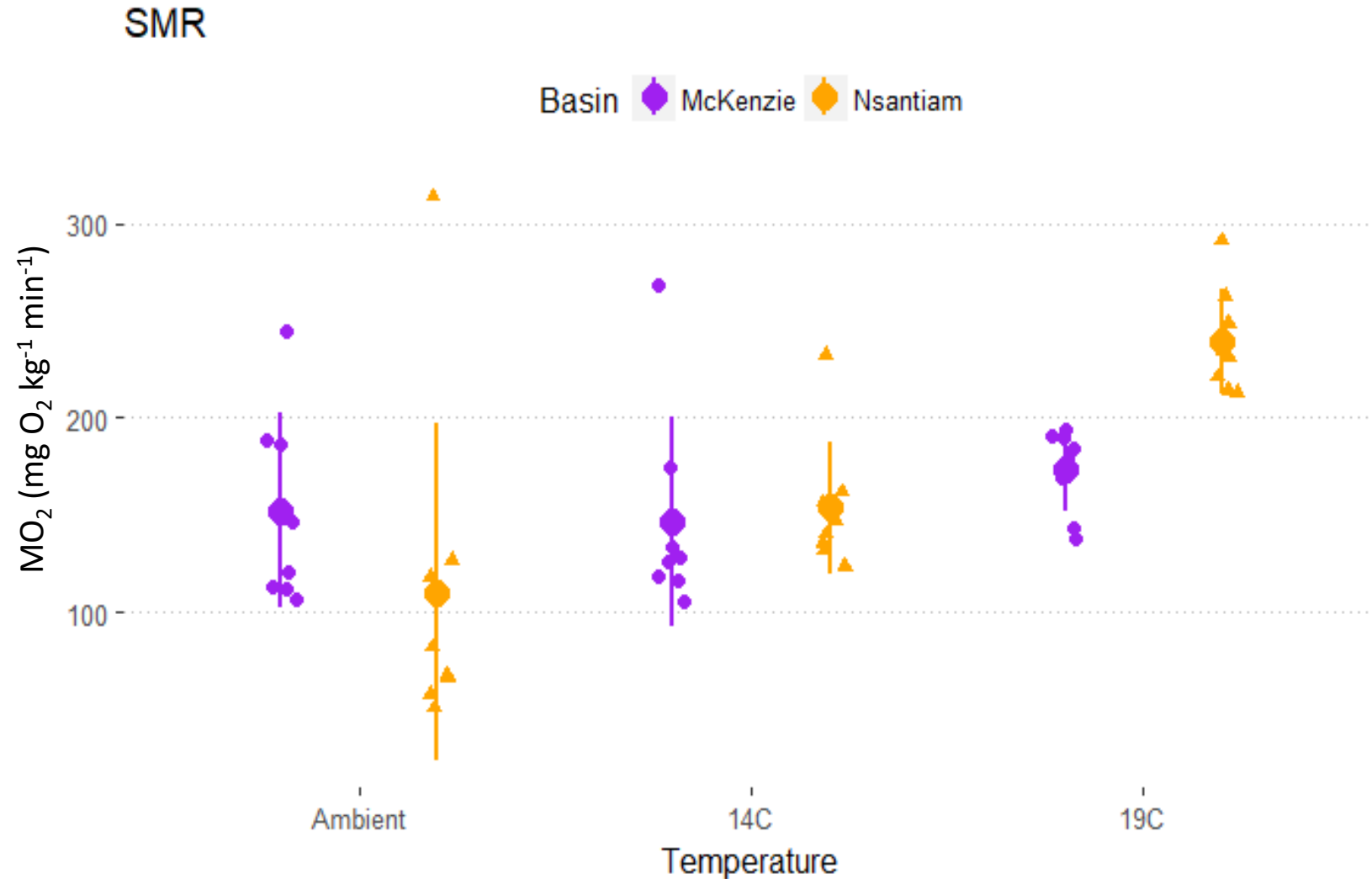
Standard Metabolic Rate



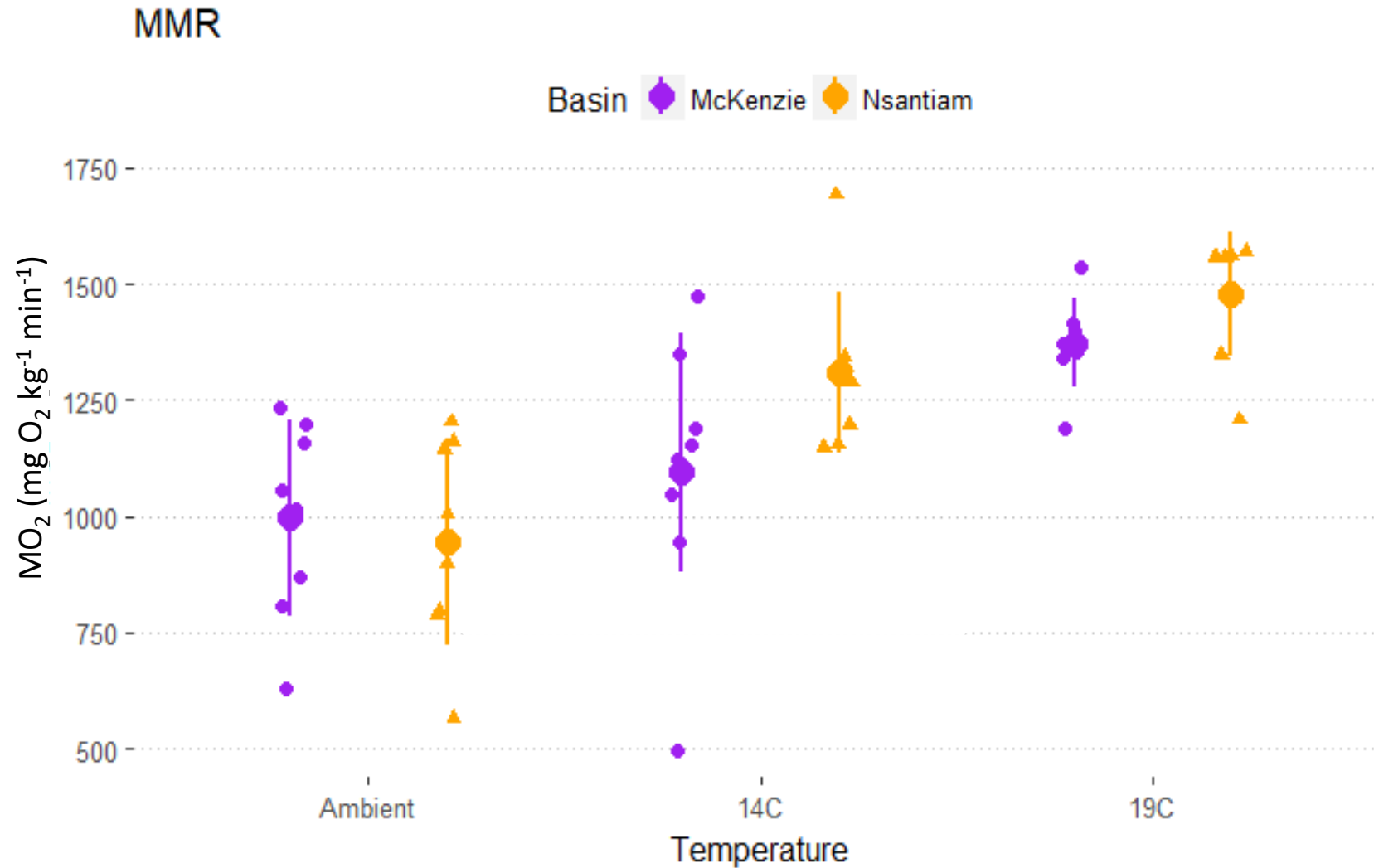
Aerobic Scope MMR - SMR



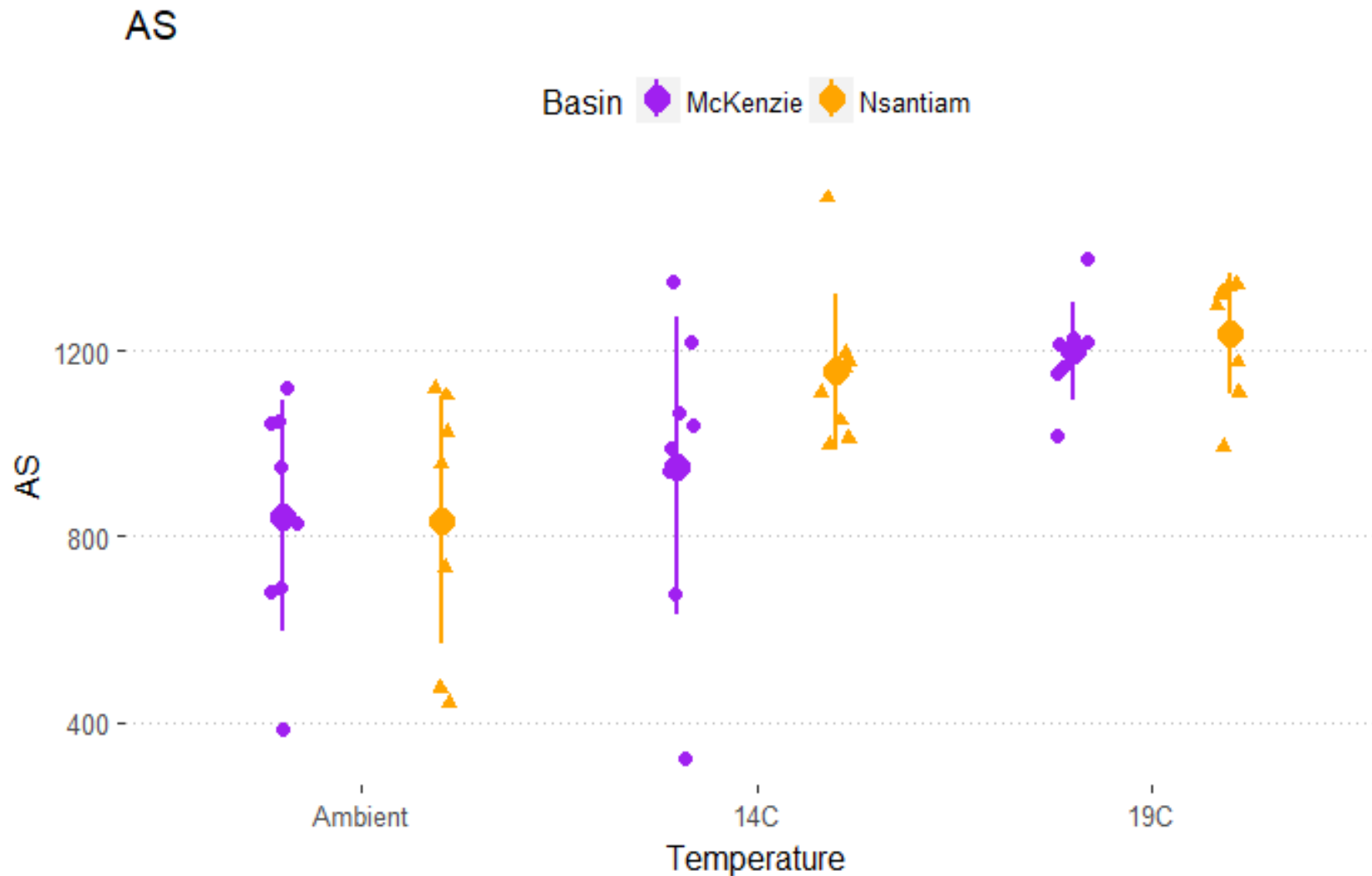
Comparisons – Willamette Basins



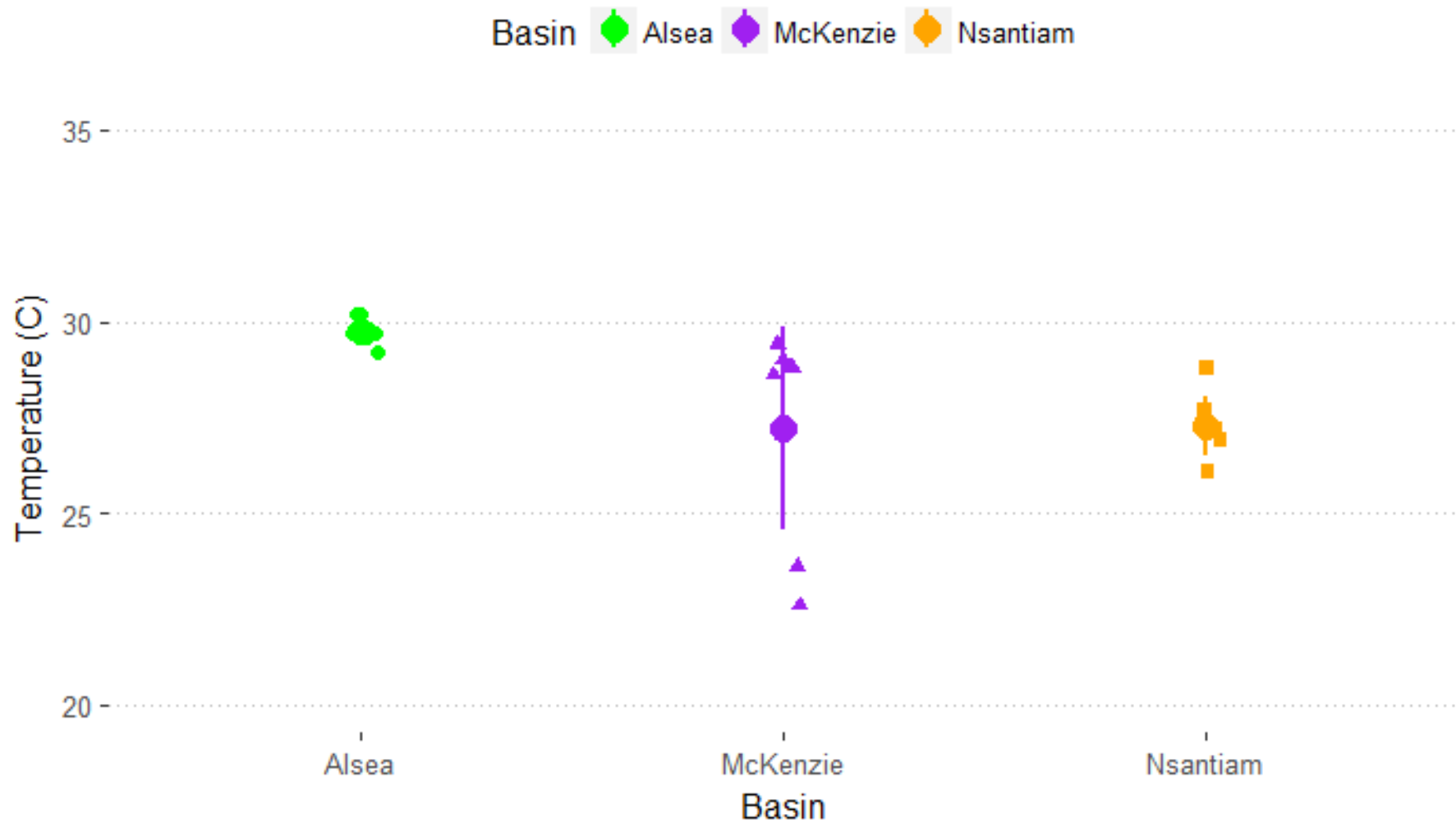
Comparisons – Willamette Basins



Comparisons – Willamette Basins

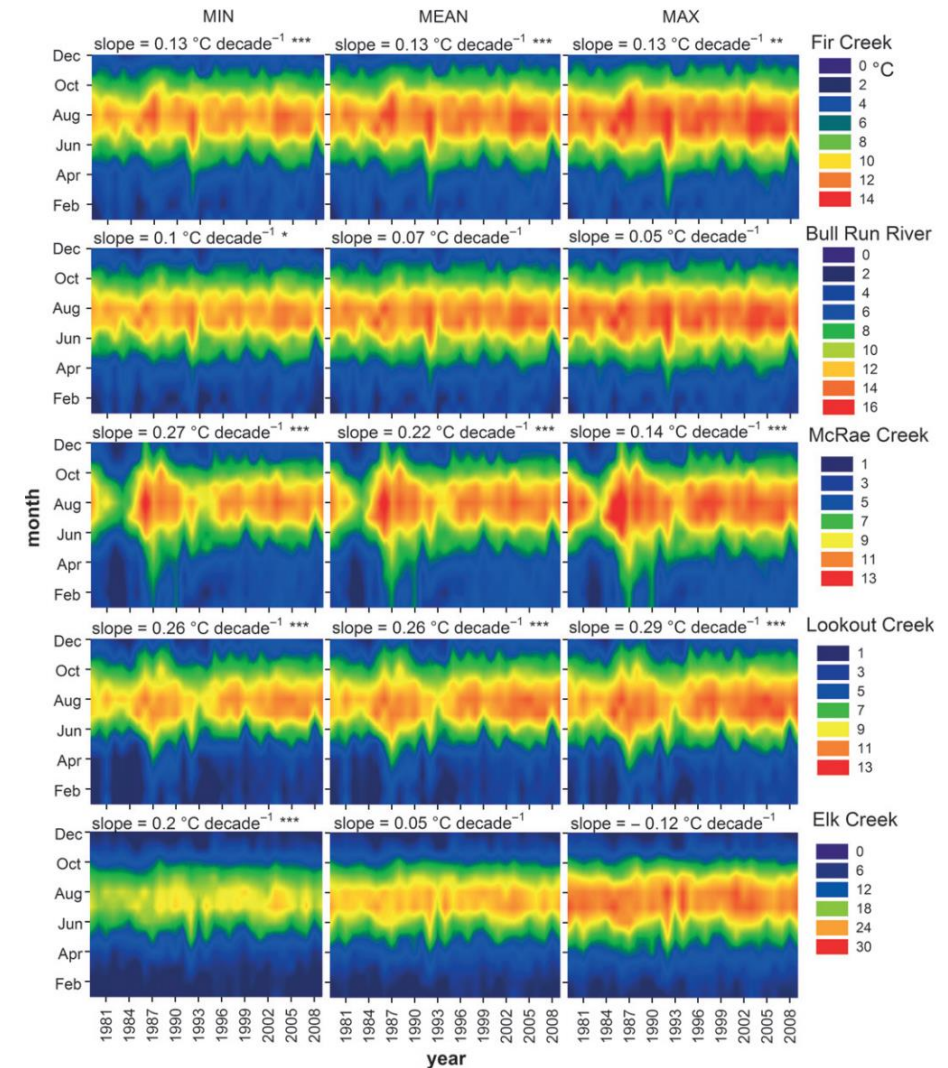


Critical Thermal Maxima (CT max)



Thinking about...

- Thermal history
- Representative responses
- Life history influences



Arismendi et al. 2013

Acknowledgments

Eliason Lab – University of California, Santa Barbara



REDD Group, Oregon Department of Fish and Wildlife

