Potential Effects of Climate Change on Small Central Washington Streams

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Upper Columbia Science Seminar

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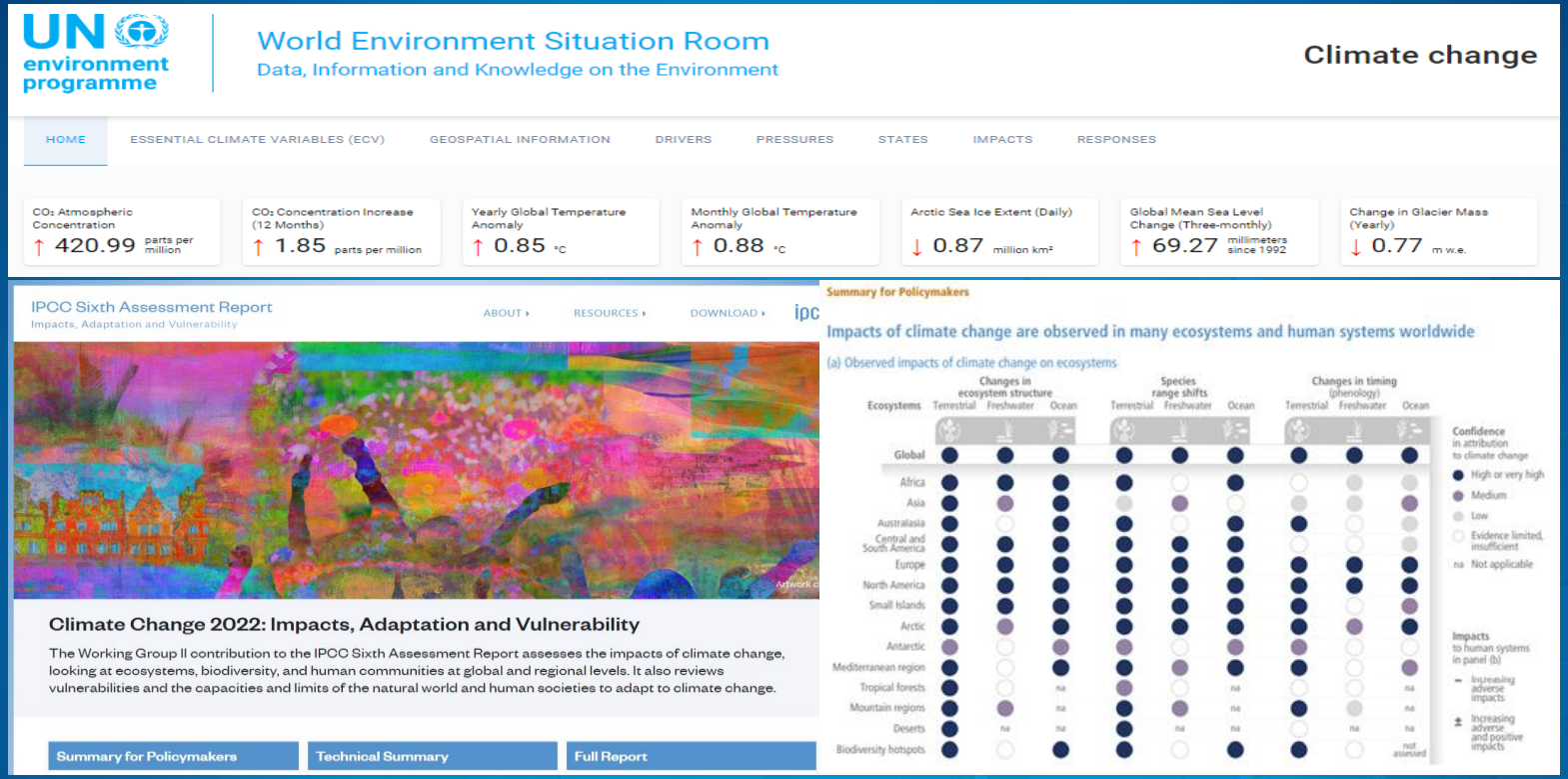
Powering our way of life.

- Photo: Spokesman Review



Projections for Snow Dominated Systems in Northern Latitudes

- Increased summer air temperatures
- Transition from snow to rain during winter
- Earlier and more variable winter/spring runoff
- Longer, hotter, lower summer stream discharge

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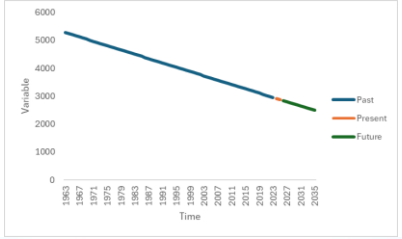
Trends in indicator variables



- Moisture in snowpack
- Timing of spring runoff
- Timing of fall runoff
- Duration of summer baseflows
- Summer stream discharge levels
- Summer water temperatures

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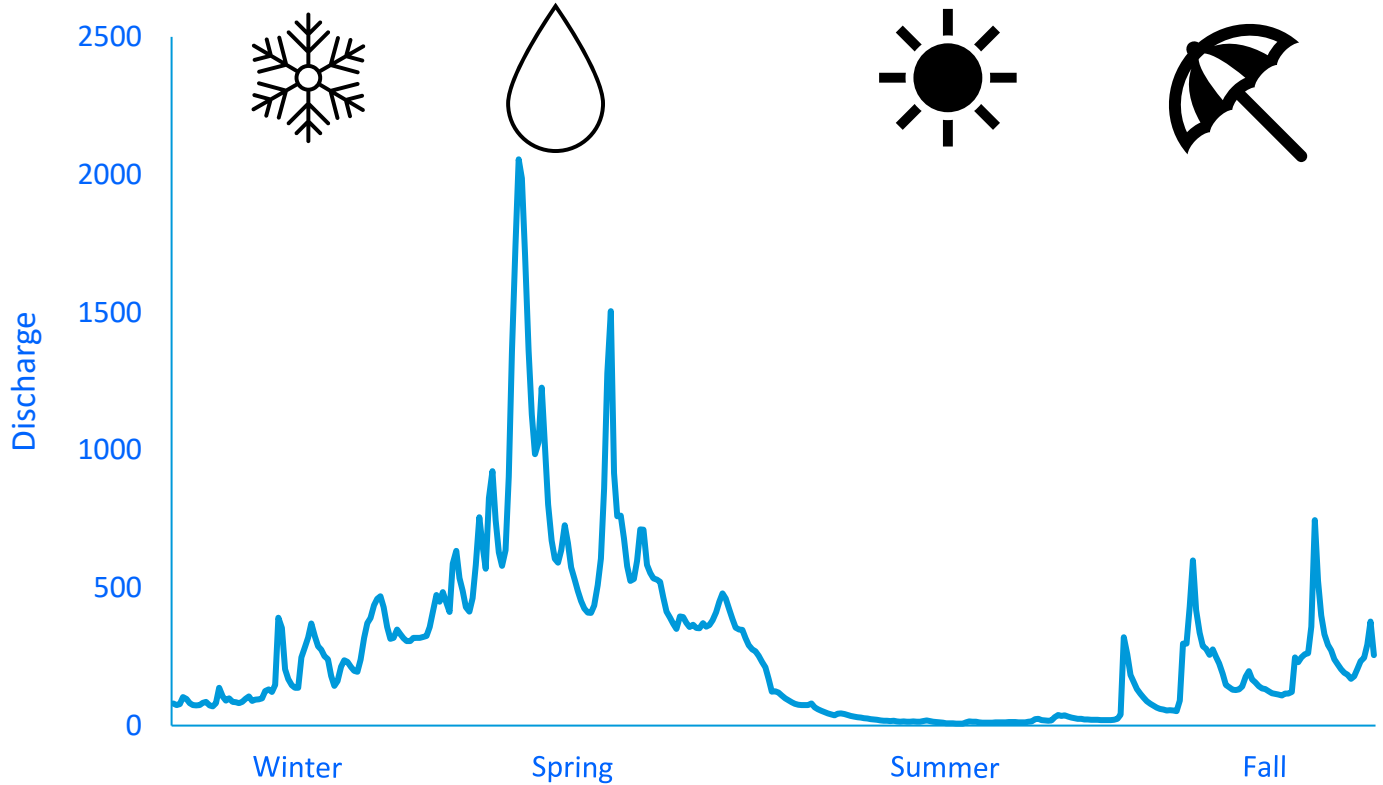
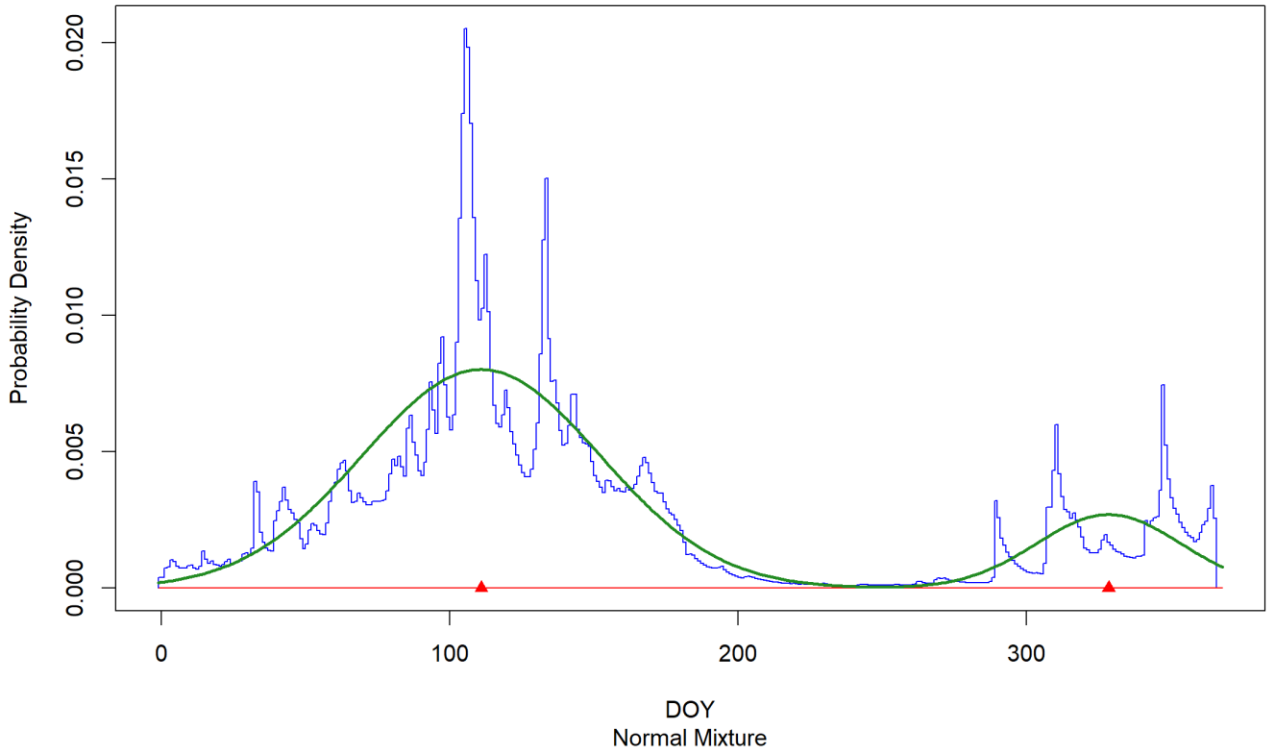
Typical snow dominated hydrograph

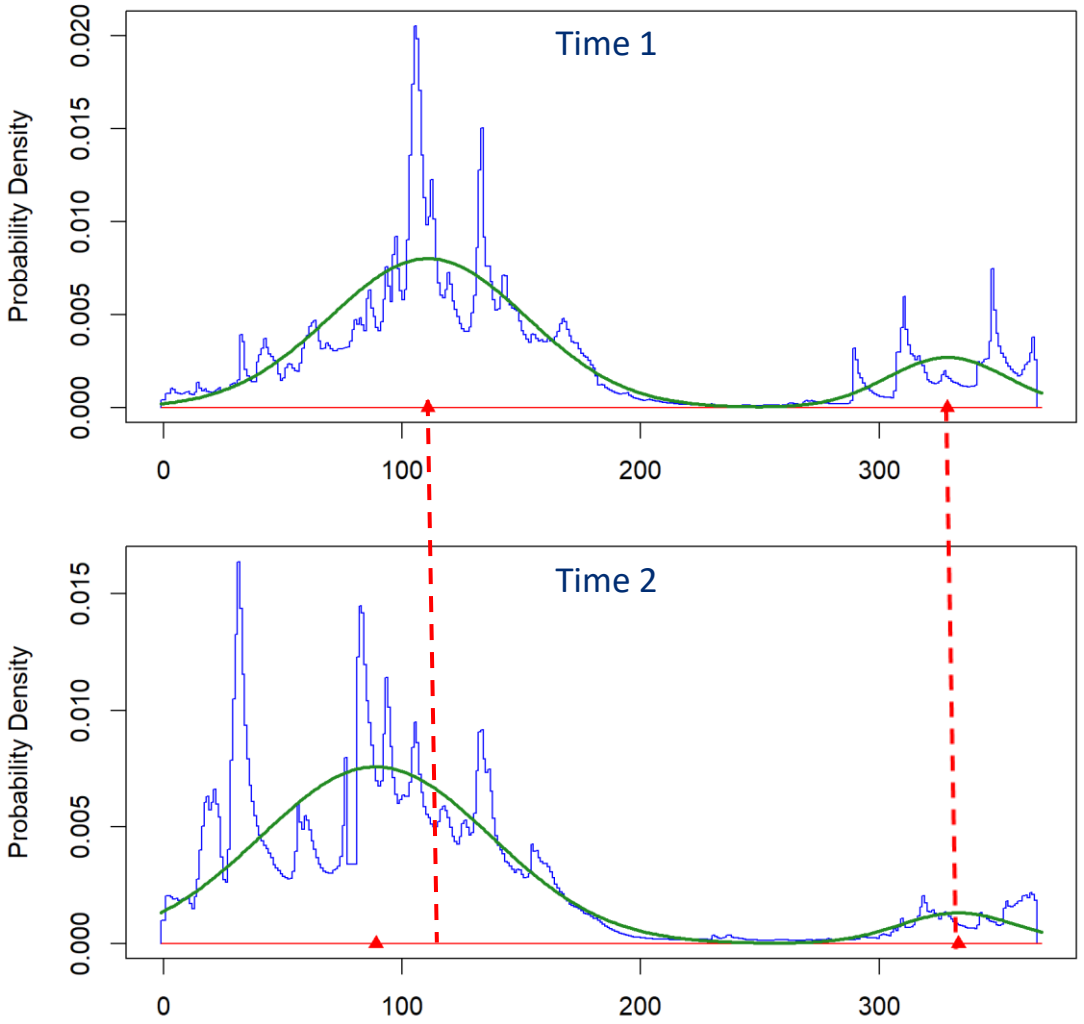


Timing of annual discharge events

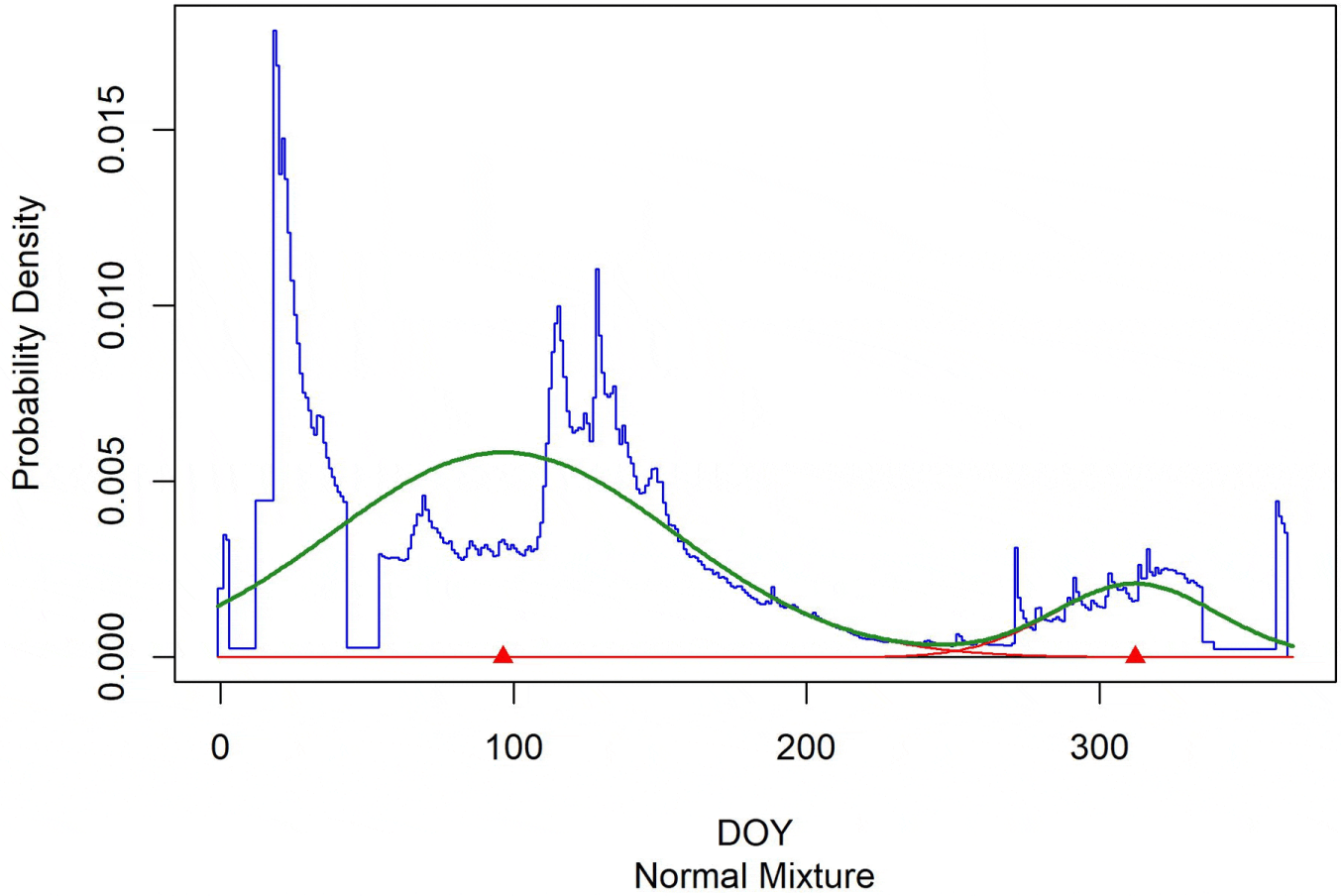


Juan Du, 2002

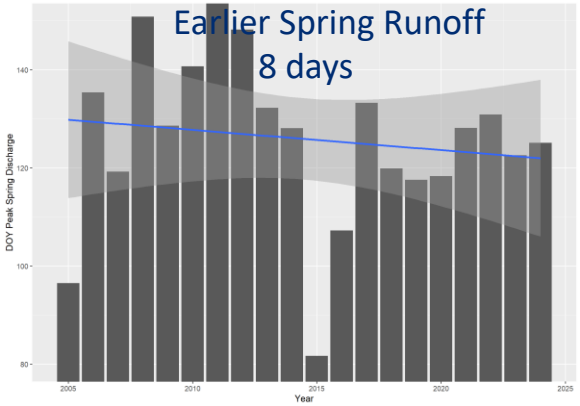
Compare trends in the timing of seasonal runoff patterns across years

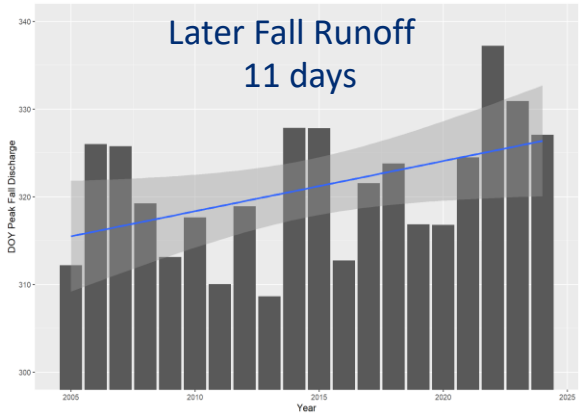


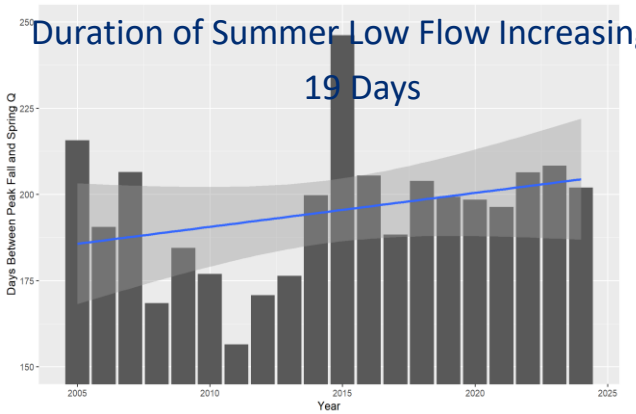
Case Study: Nason Creek (2005-2025)

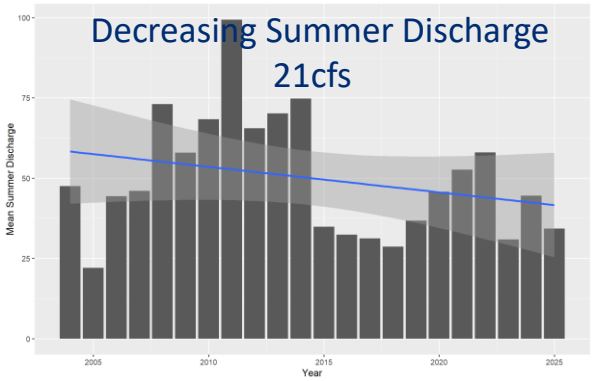


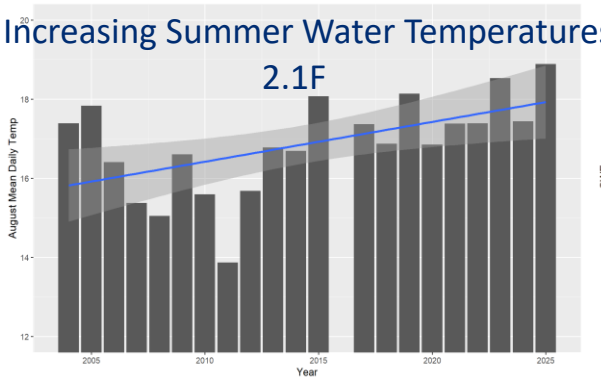
Nason Creek - results

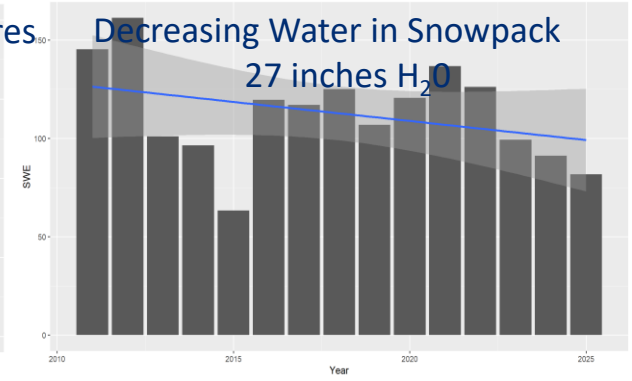






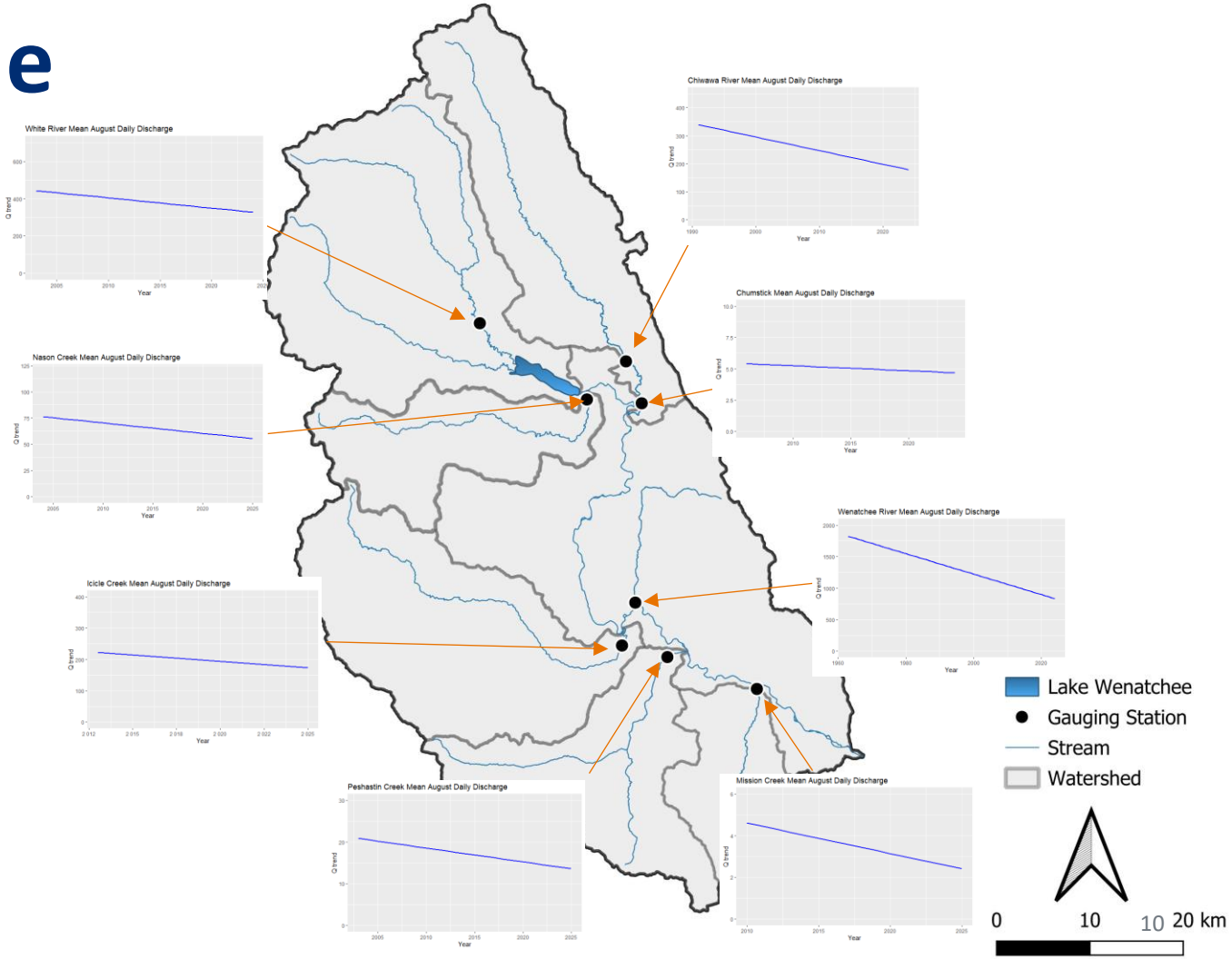




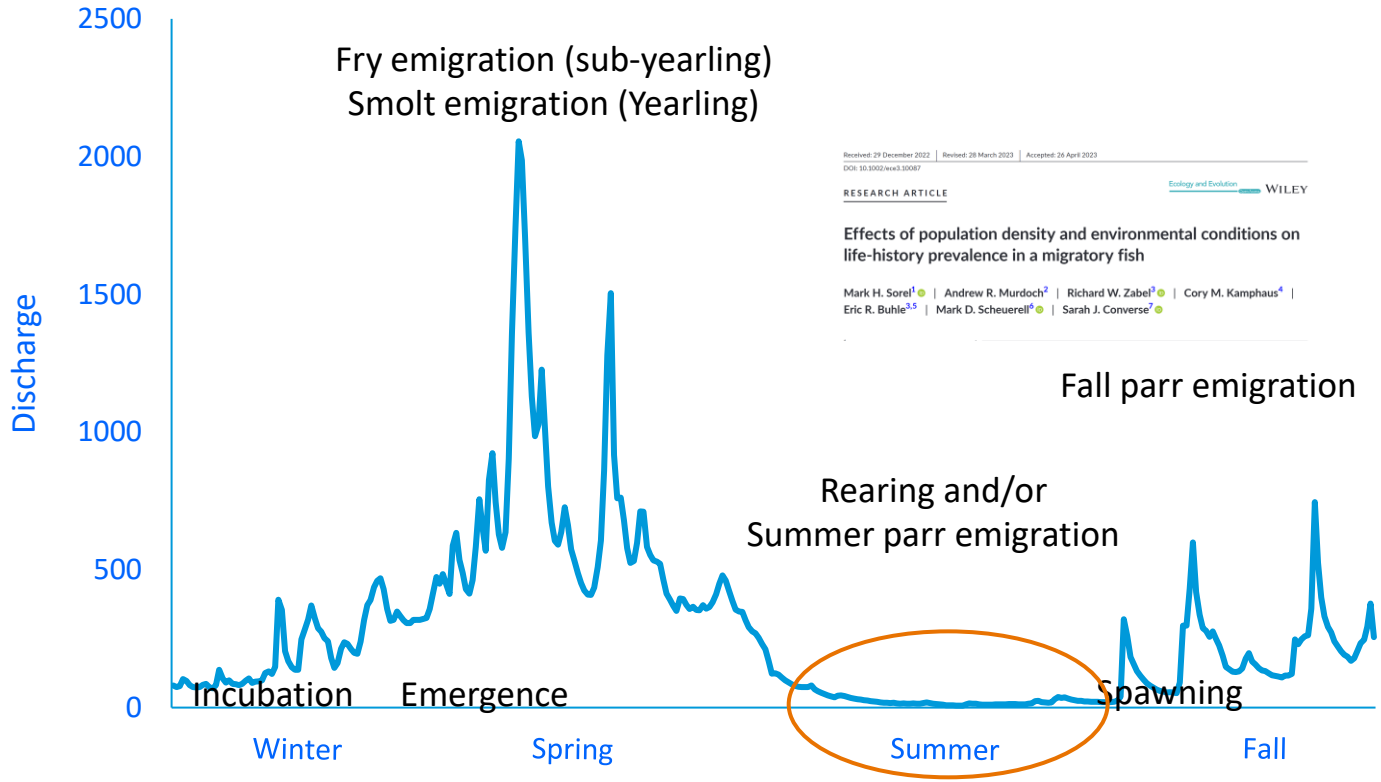


Basin-wide trends in mean August discharge

Stream	Slope
Chiwawa River	-4.86
Chumstick Creek	-0.05
White River	-3.40
Nason Creek	-1.00
Icicle Creek	-4.04
Peshastin Creek	-0.33
Mission Creek	-0.15
Wenatchee River	-16.23



Spring Chinook life stage interactions with the hydrograph



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Effects of population density and environmental conditions on life-history prevalence in a migratory fish

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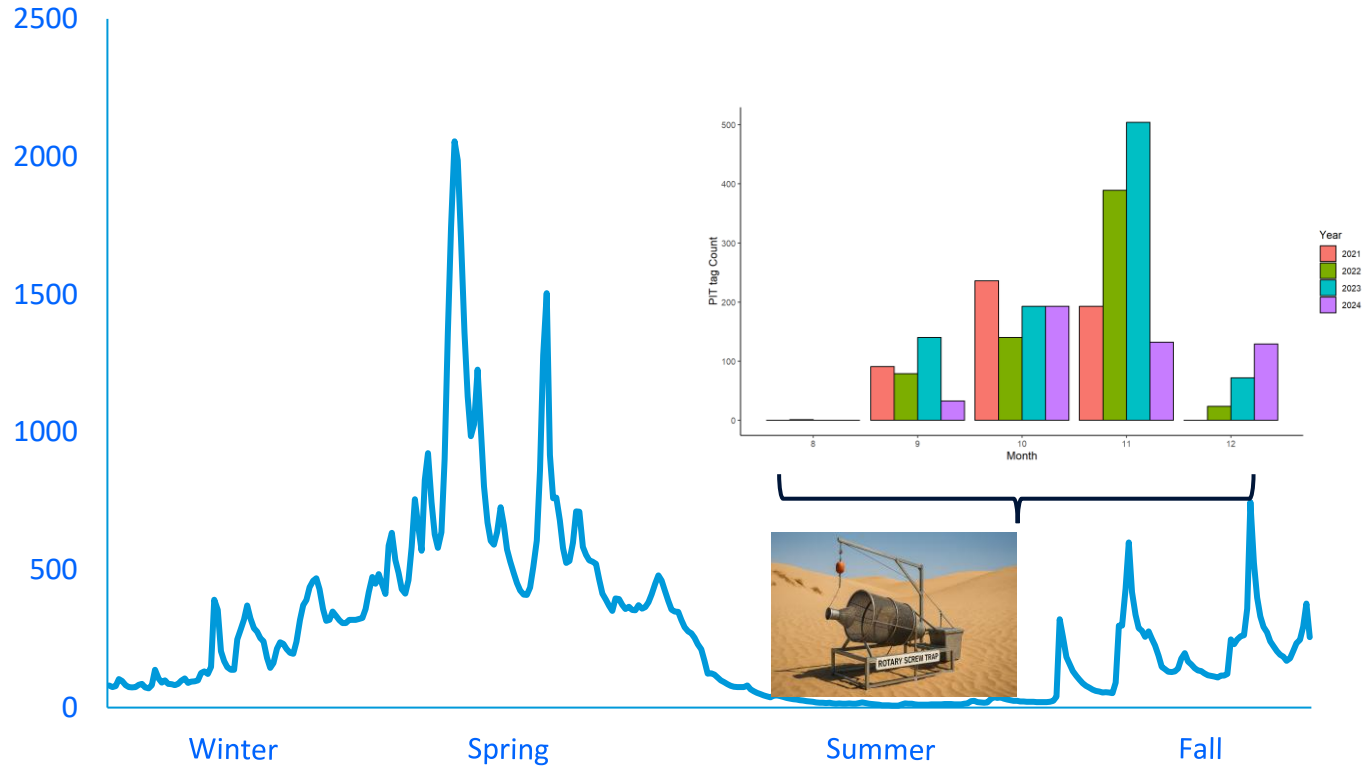
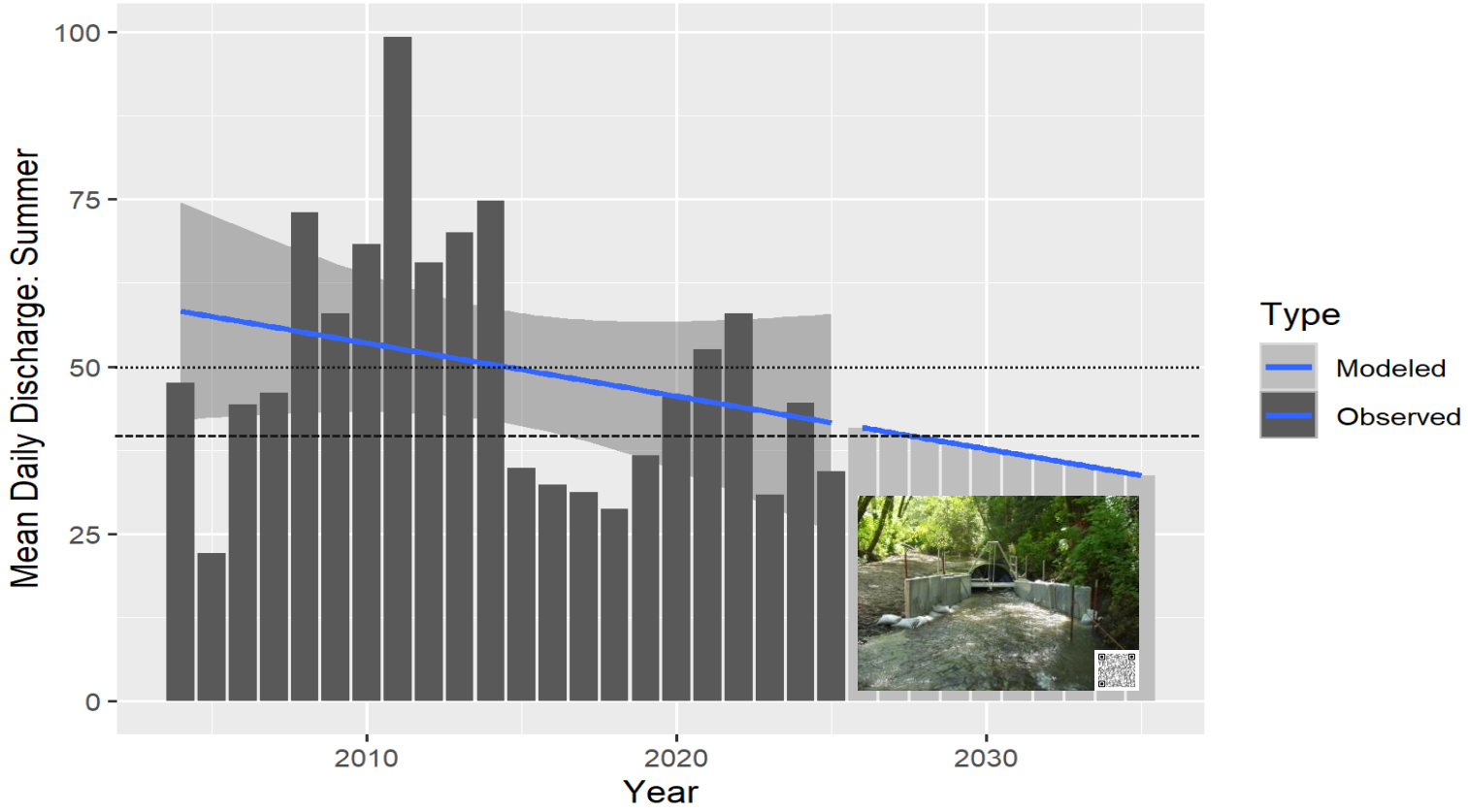
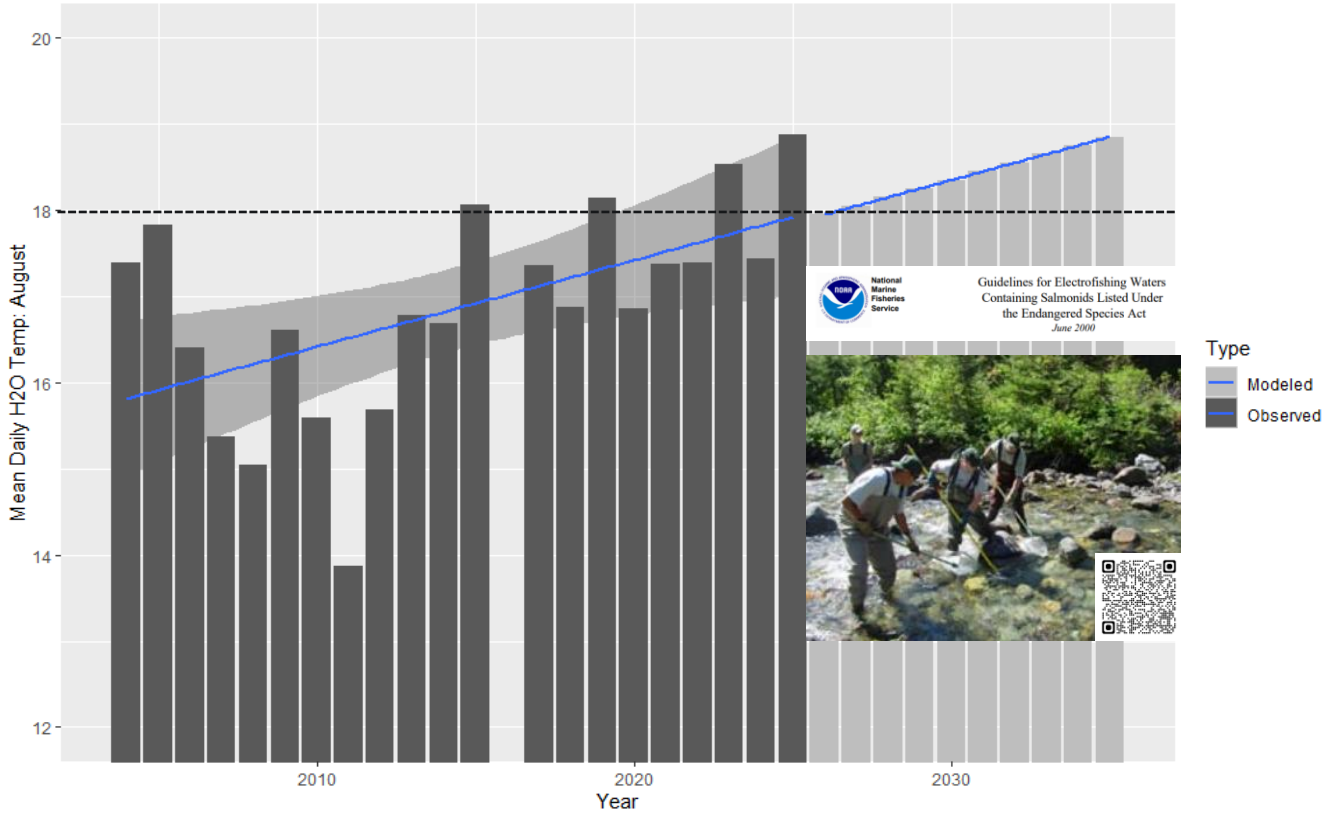
Chinook Salmon summer/fall emigration



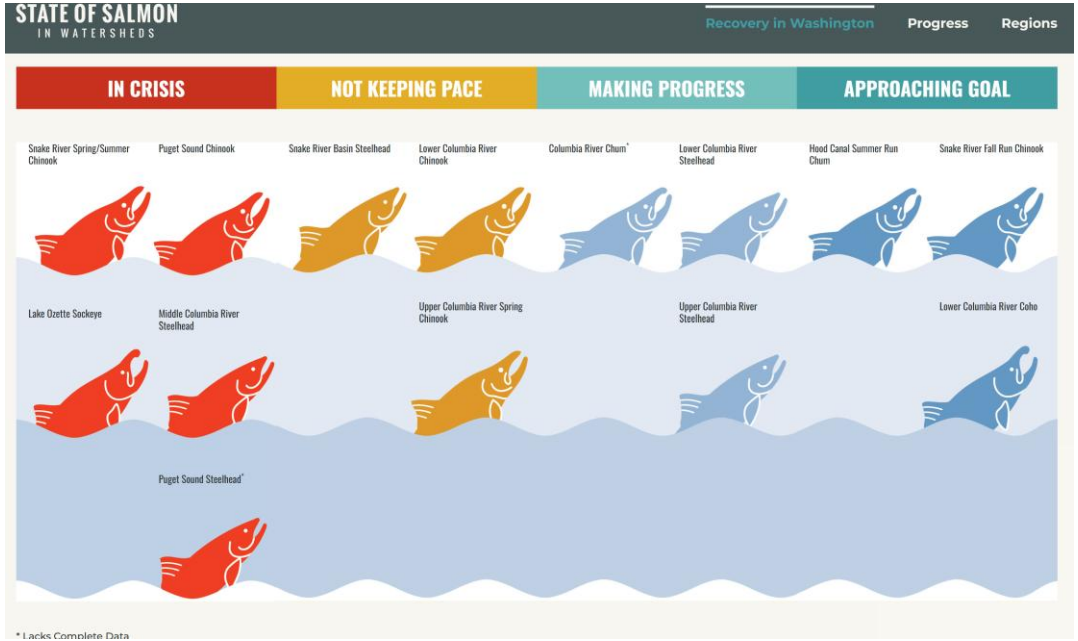
Flow dependent sampling

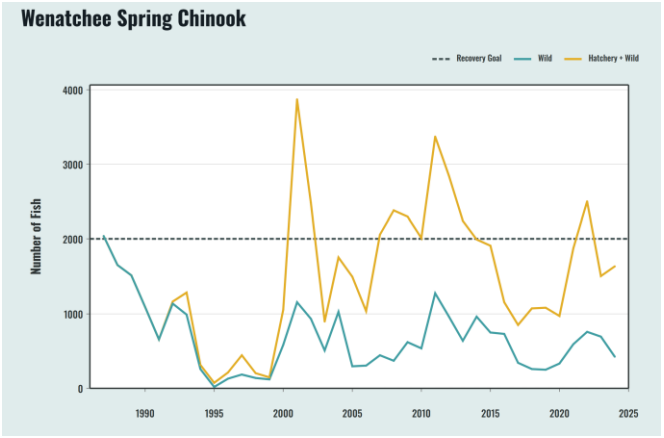


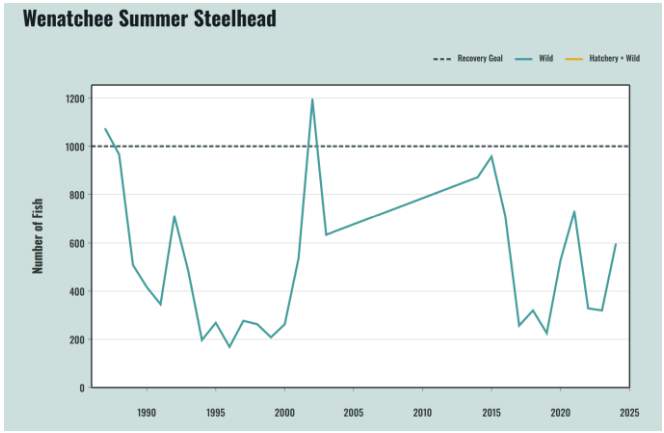
Temperature constraints on sampling



State of the salmon







Summary

- Spring runoff trending earlier in central Washington streams
- Fall rains occurring later each year leading to later fall runoff
- Summer baseflow conditions becoming longer each year
- Mean August discharge is generally decreasing
- Simple linear models suggest longer, lower, and warmer, baseflow stream conditions likely throughout the region (consistent with IPCC predictions)
- Climate change is likely to impact both fish and fisheries practitioners
- Common fish sampling methods will likely be impacted by the shifting hydrograph and increased temperatures
- Start thinking now about creative solutions for climate related sampling challenges ahead