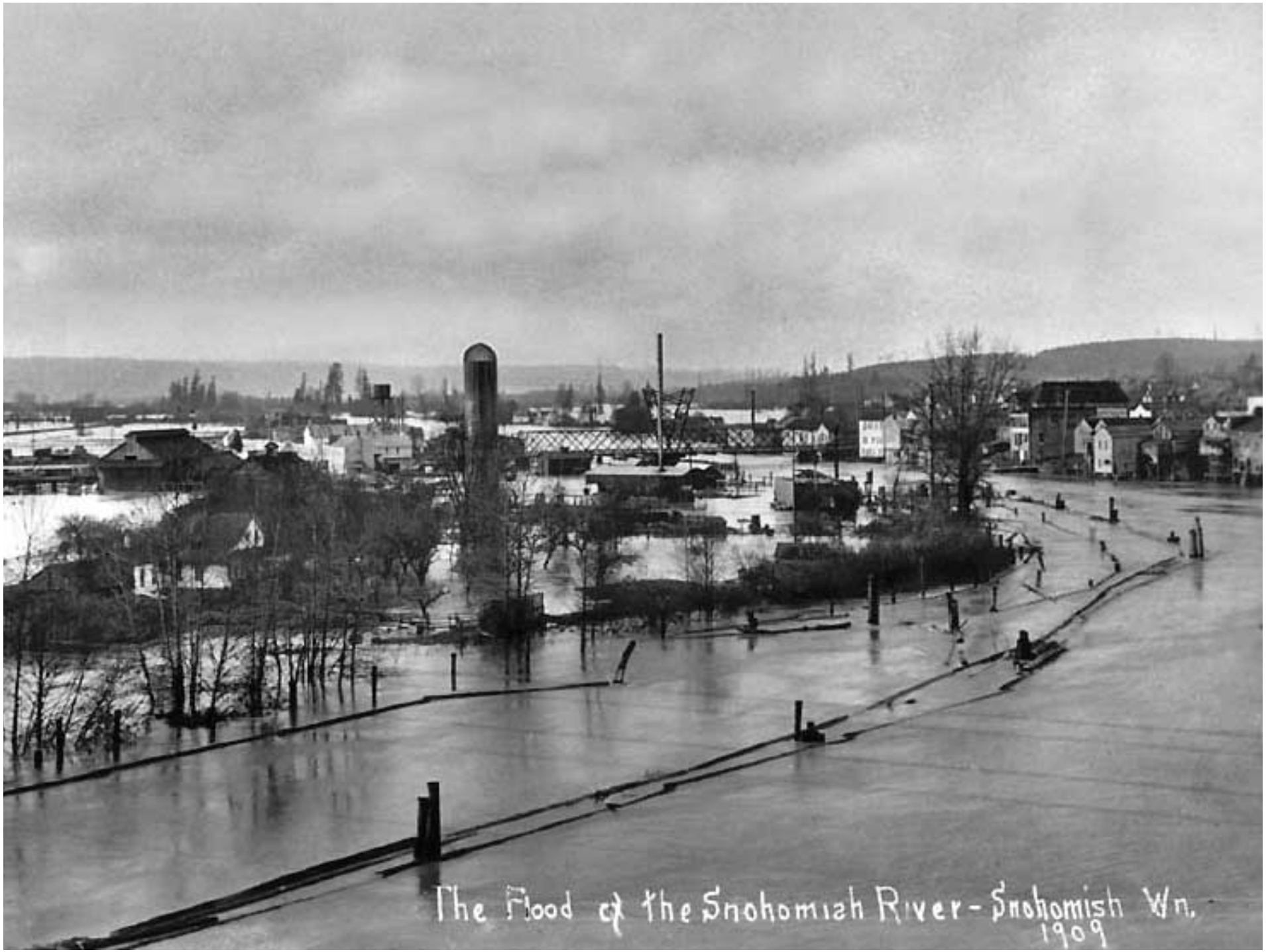
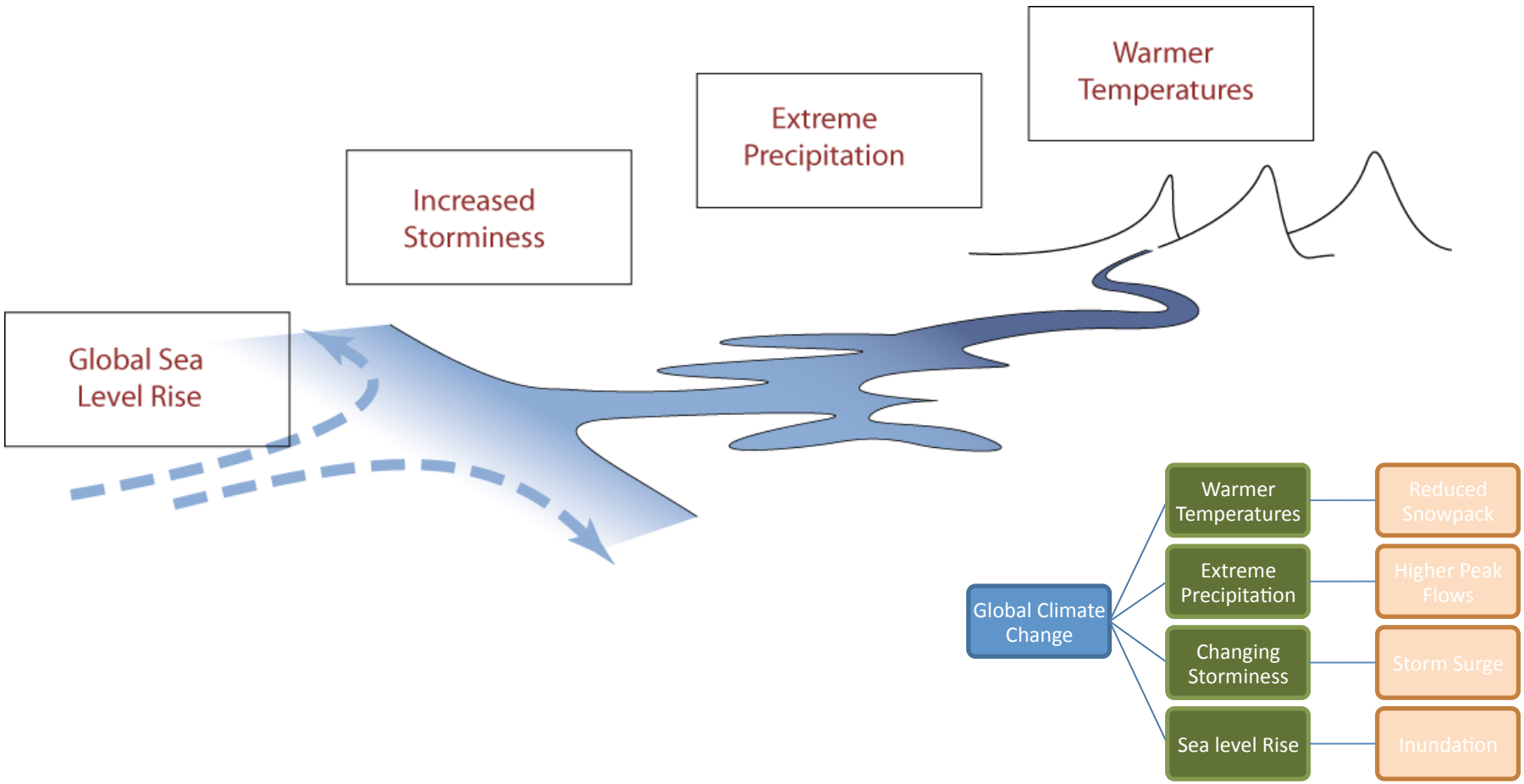
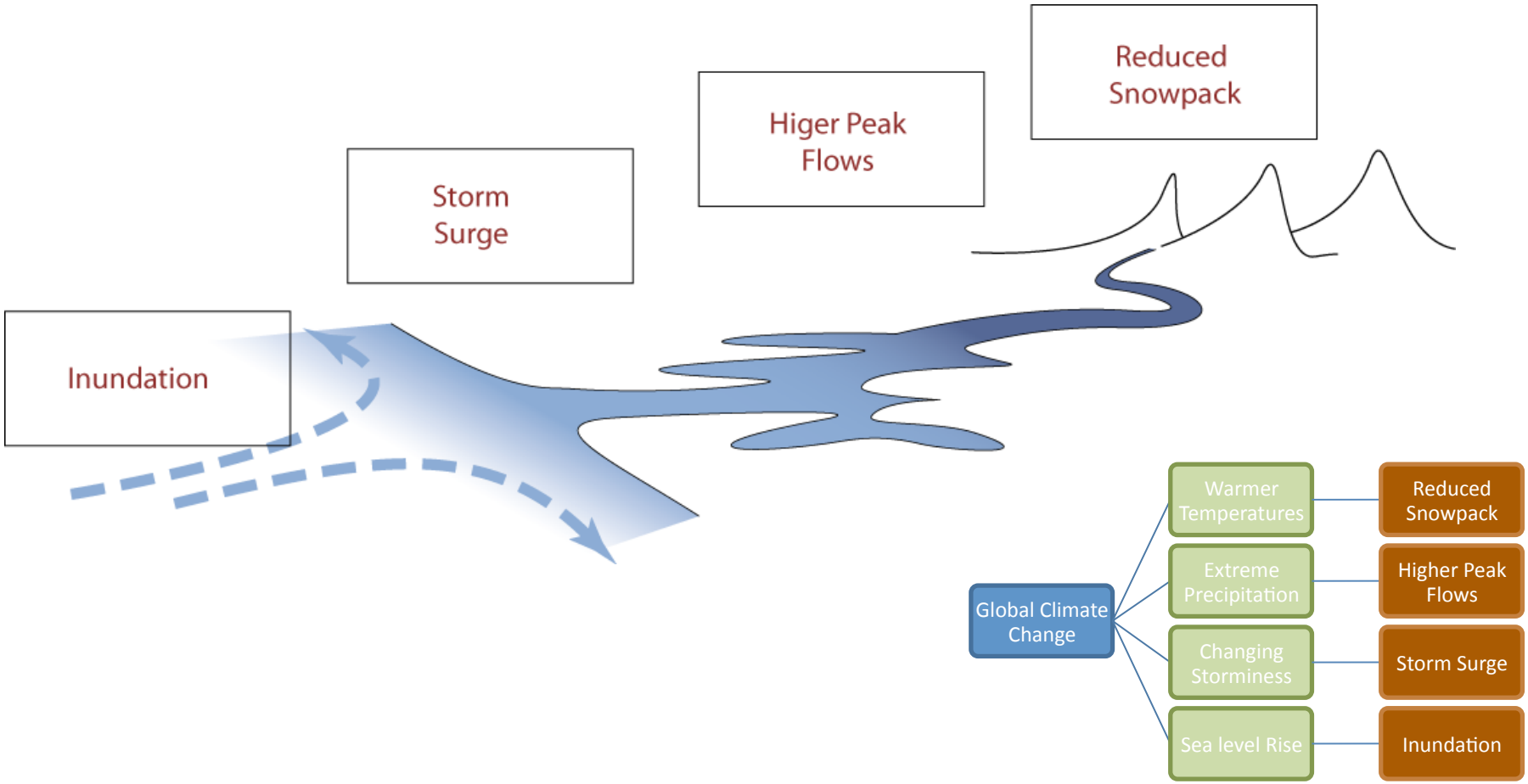

The Flood of the Snohomish River - Snohomish Wn.
1909

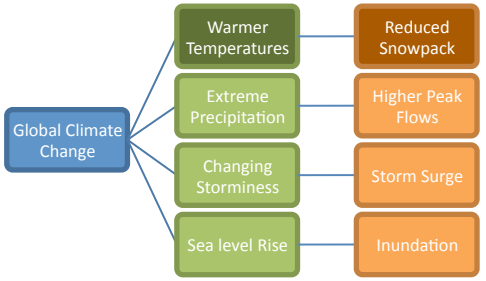
Climate Change Pathways: Physical Drivers



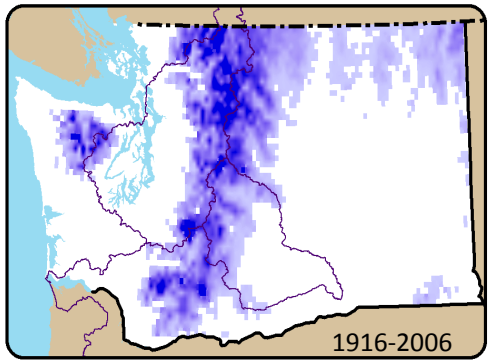
Climate Change Pathways: Climate Impacts

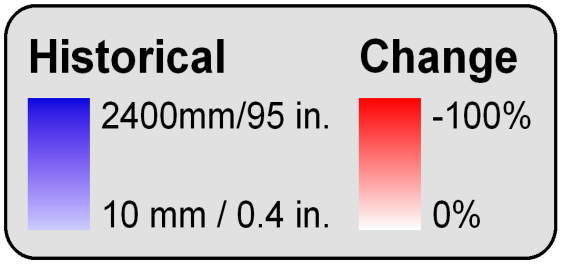


Warming and Less Snow



Historical



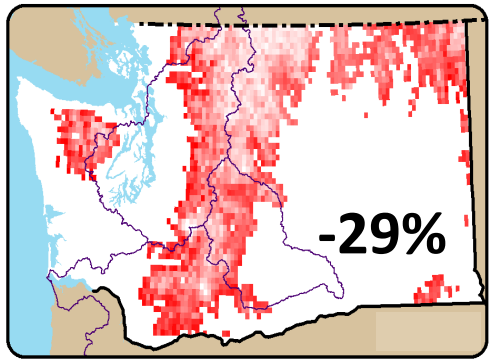


Apr. 1 Snow Water Equivalent

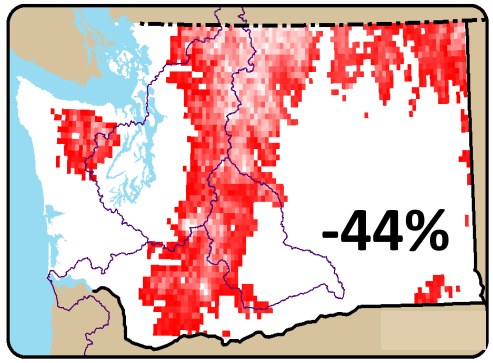
Medium Emissions Scenario

A1B

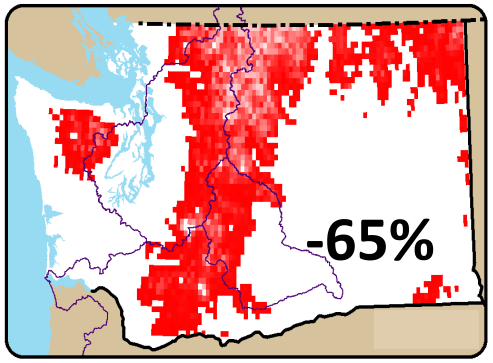
2020s



2040s



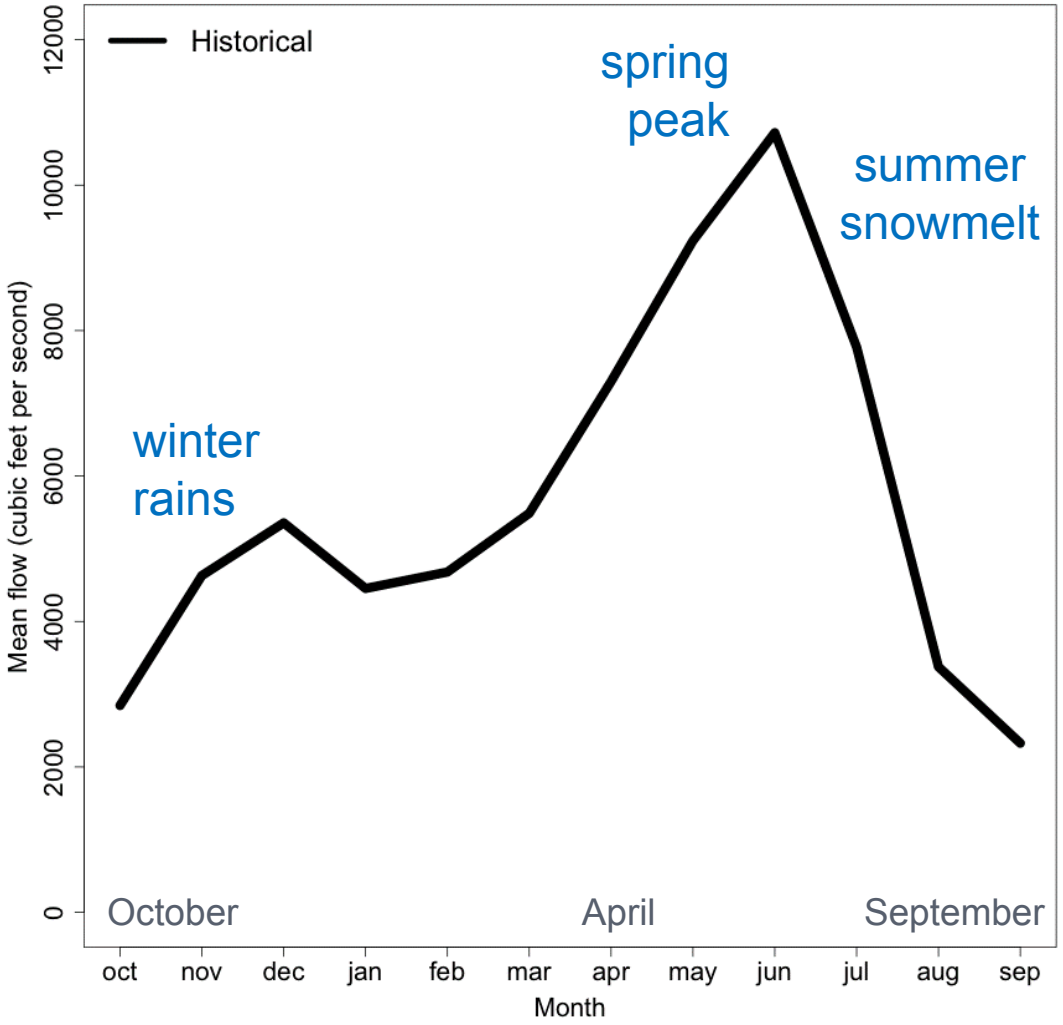
2080s



Elsner et al. 2010

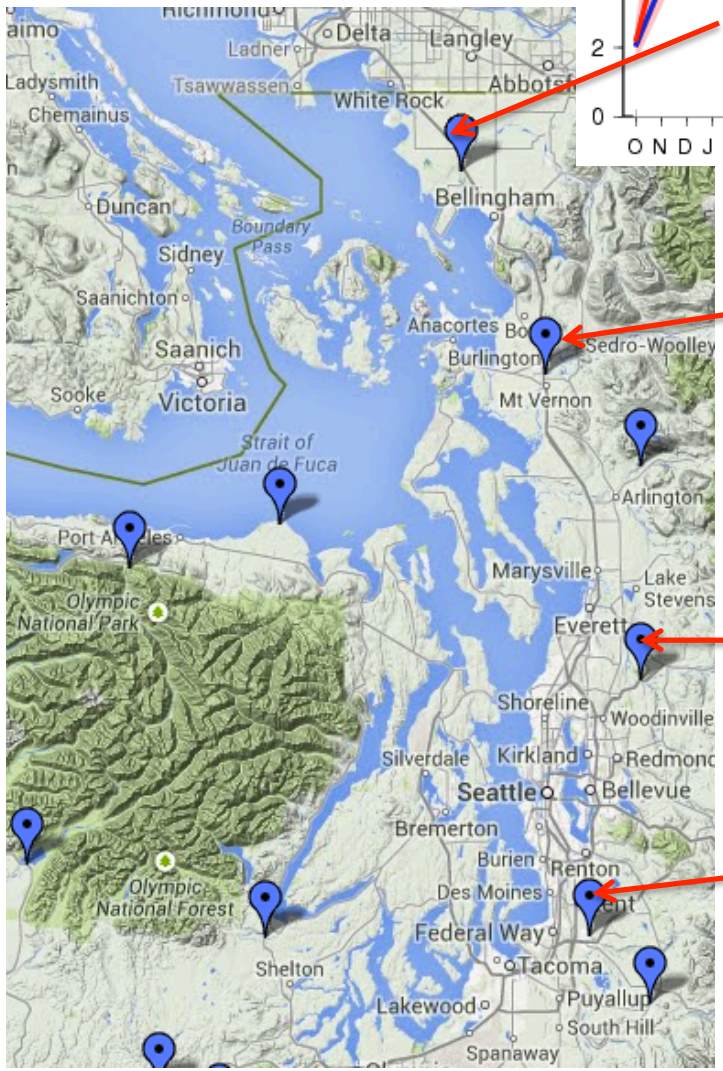
Why? Spring snowpack is projected to decline as more winter precipitation falls as rain rather than snow, especially in warmer mid-elevation basins. Also, snowpack will melt earlier with warmer spring temperatures.

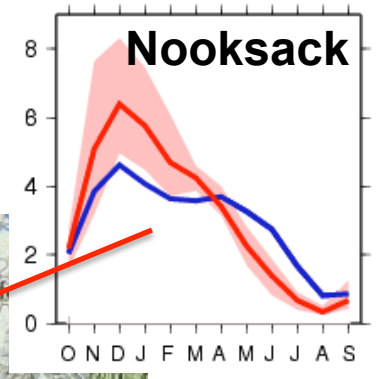
Shifting Streamflows

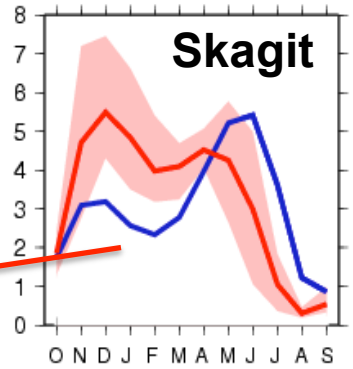


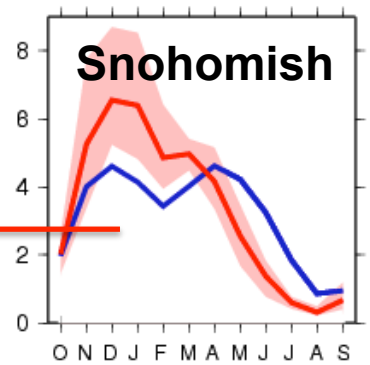
Naturalized flows (without the influence of dams); Elsner et al. 2010

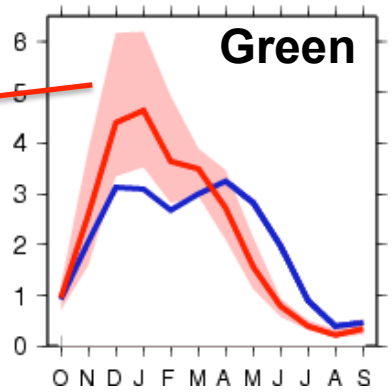
2080s Streamflow



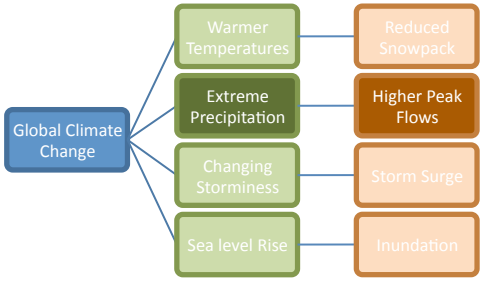


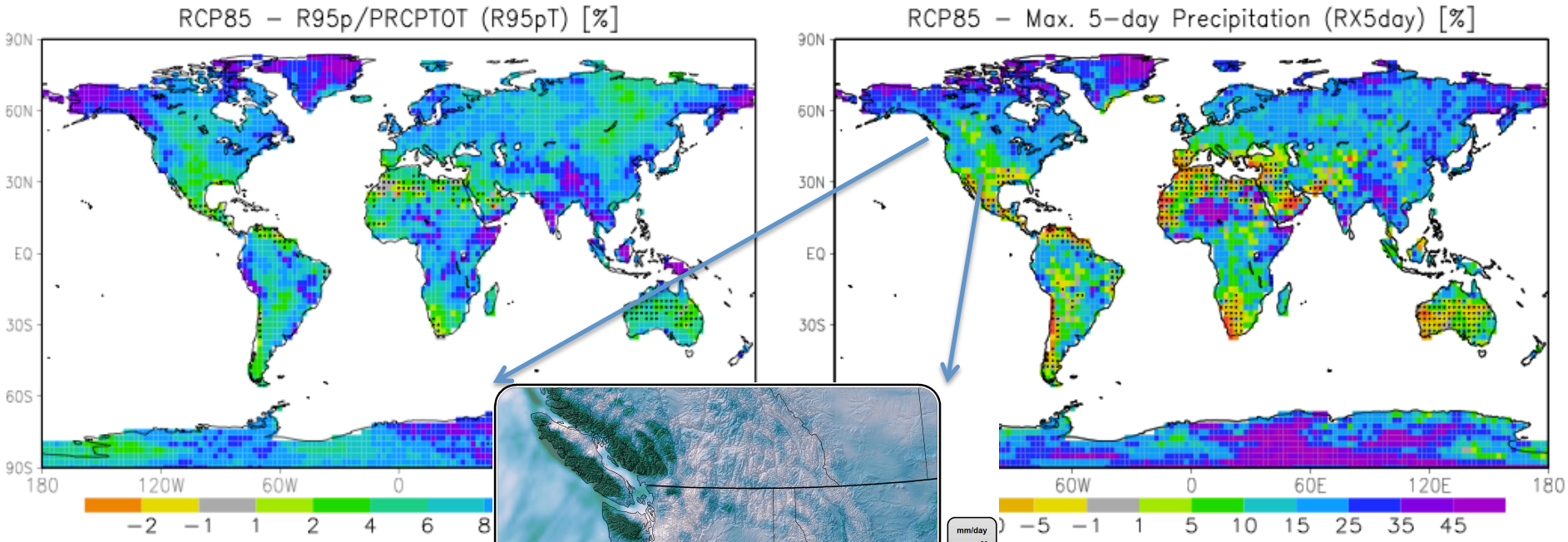






More Heavy Precipitation

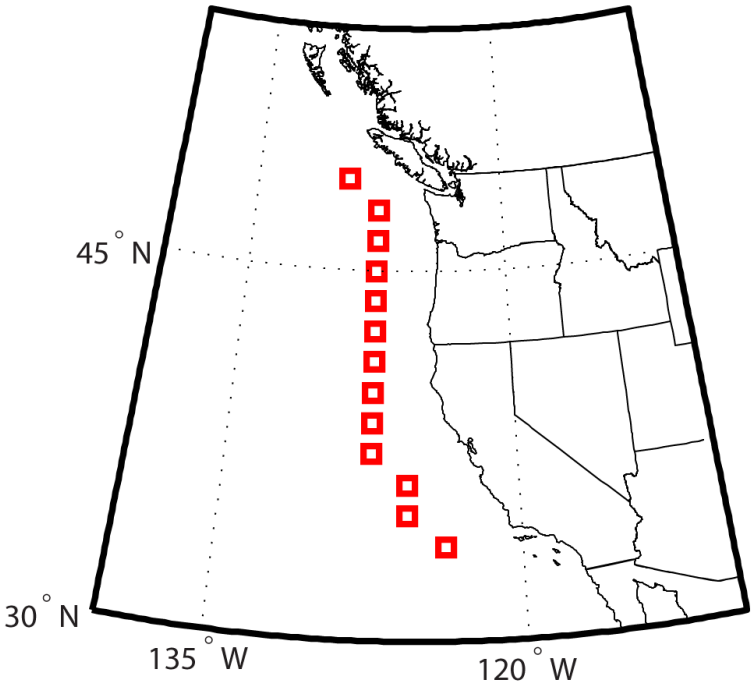




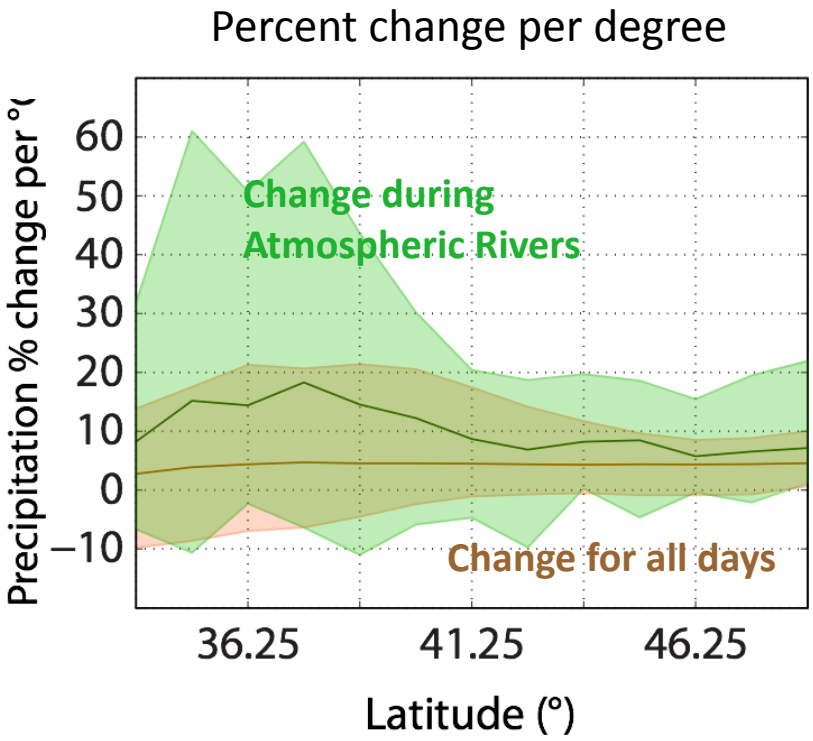
Small Change in total pr… Change in total precipitation
(1981-2000 to 2081-210…

Tebaldi et al 2006

Atmospheric rivers have a strong response to warming



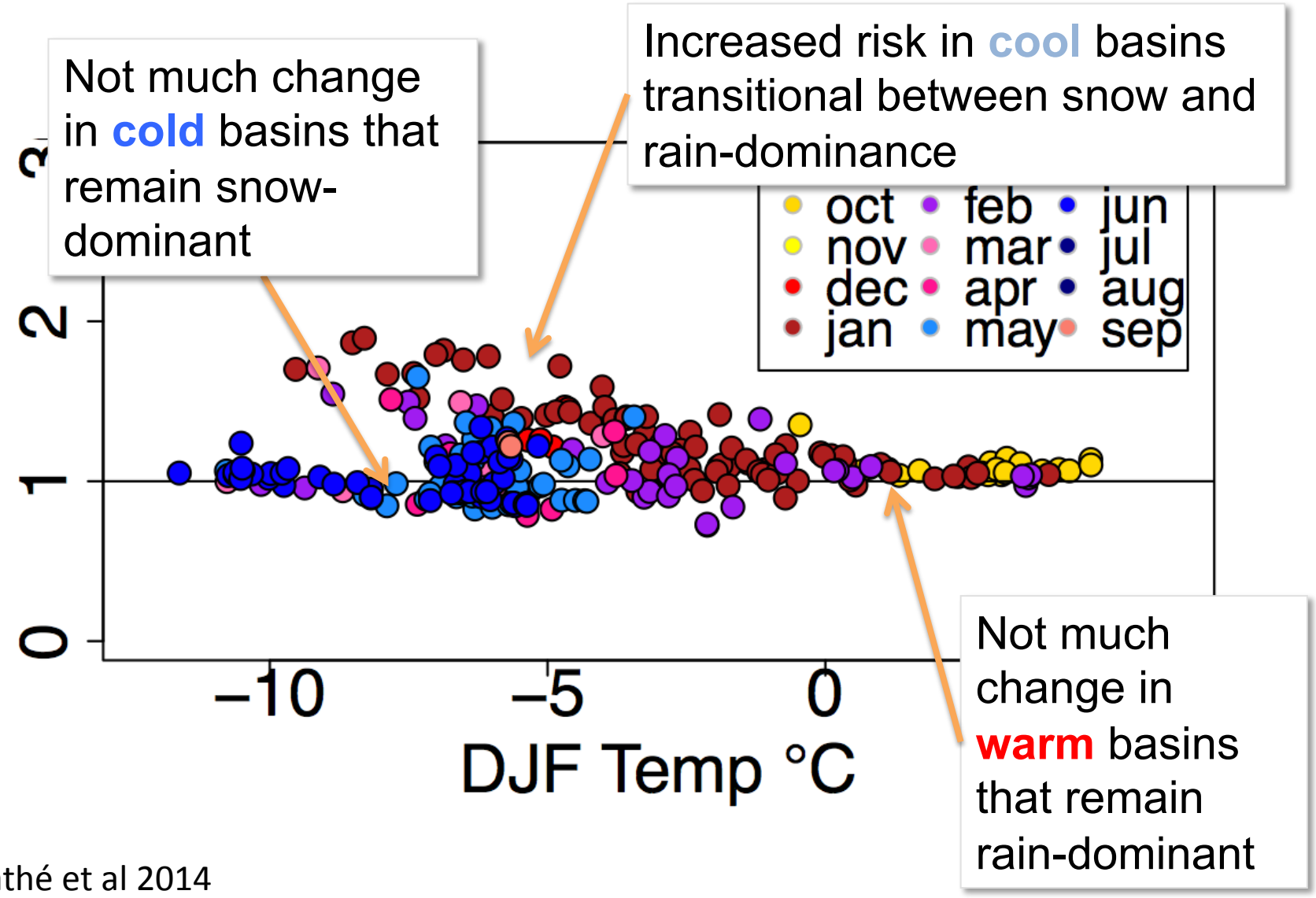
CMIP5 Multi Model Ensemble



- Changes in normal precipitation: 1.5-3.5% per degree
- Changes in extreme: 5-12% per degree

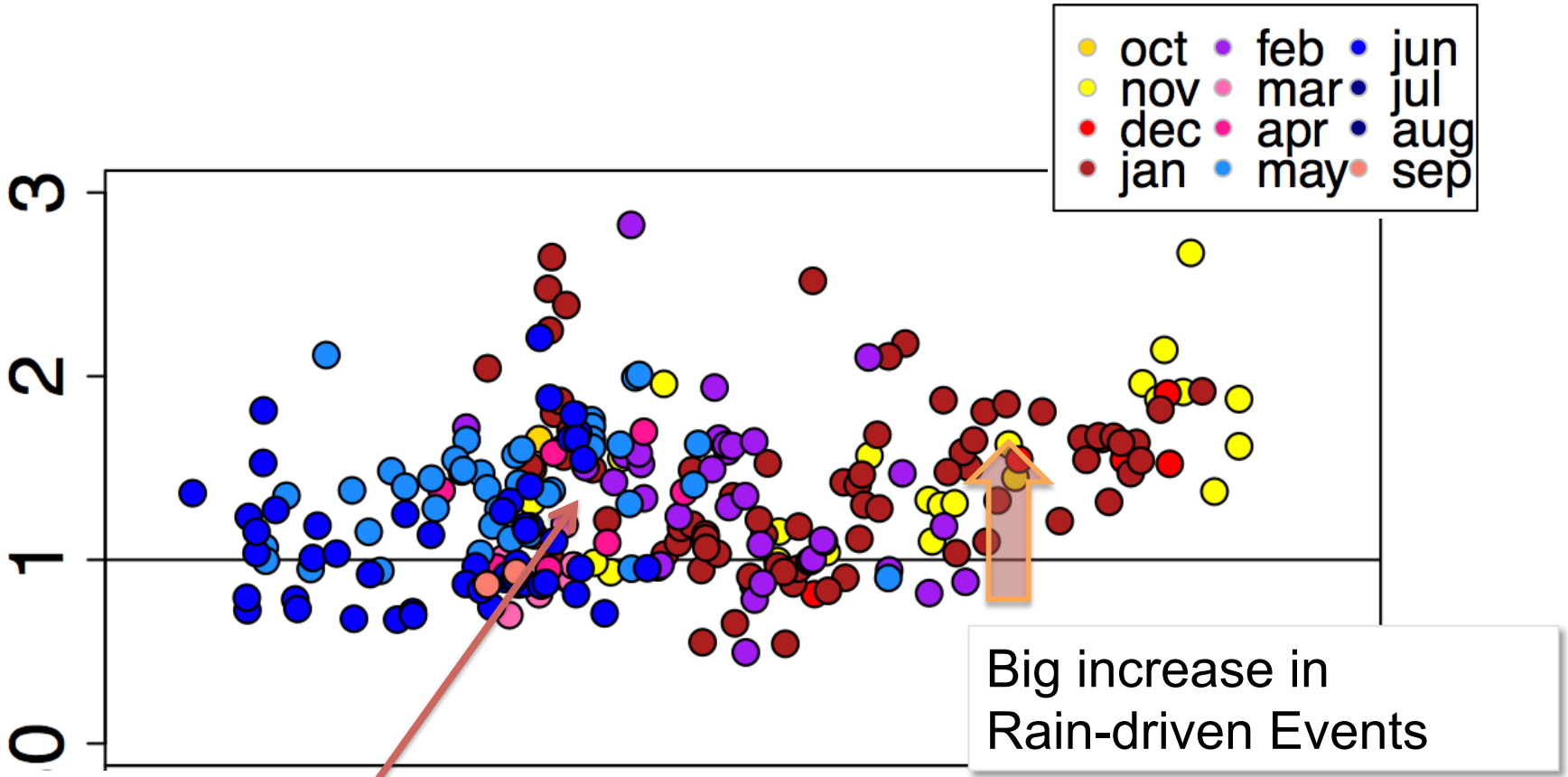
Warner et al, 2014

Results from Statistical Downscaling



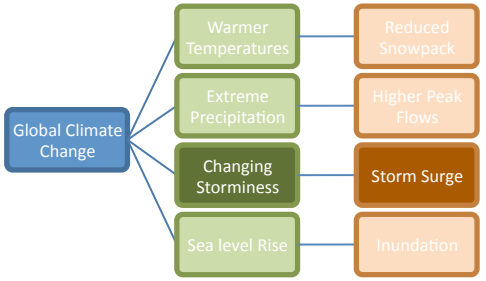
Salathé et al 2014

Results from WRF

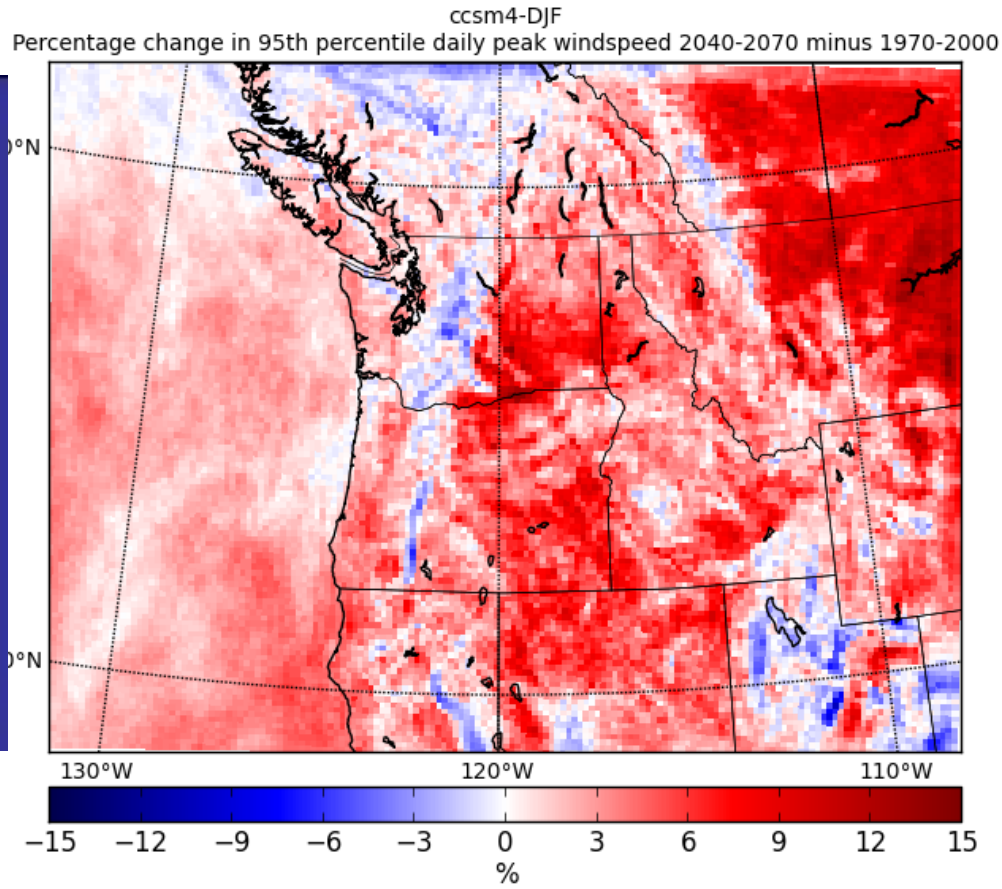


Salathé et al 2014

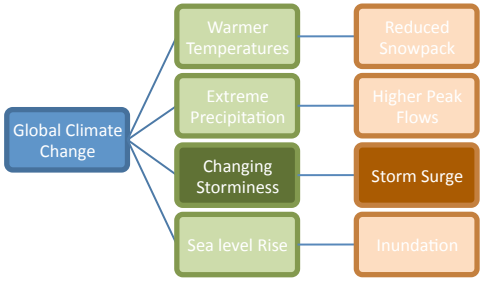
Storm Surge

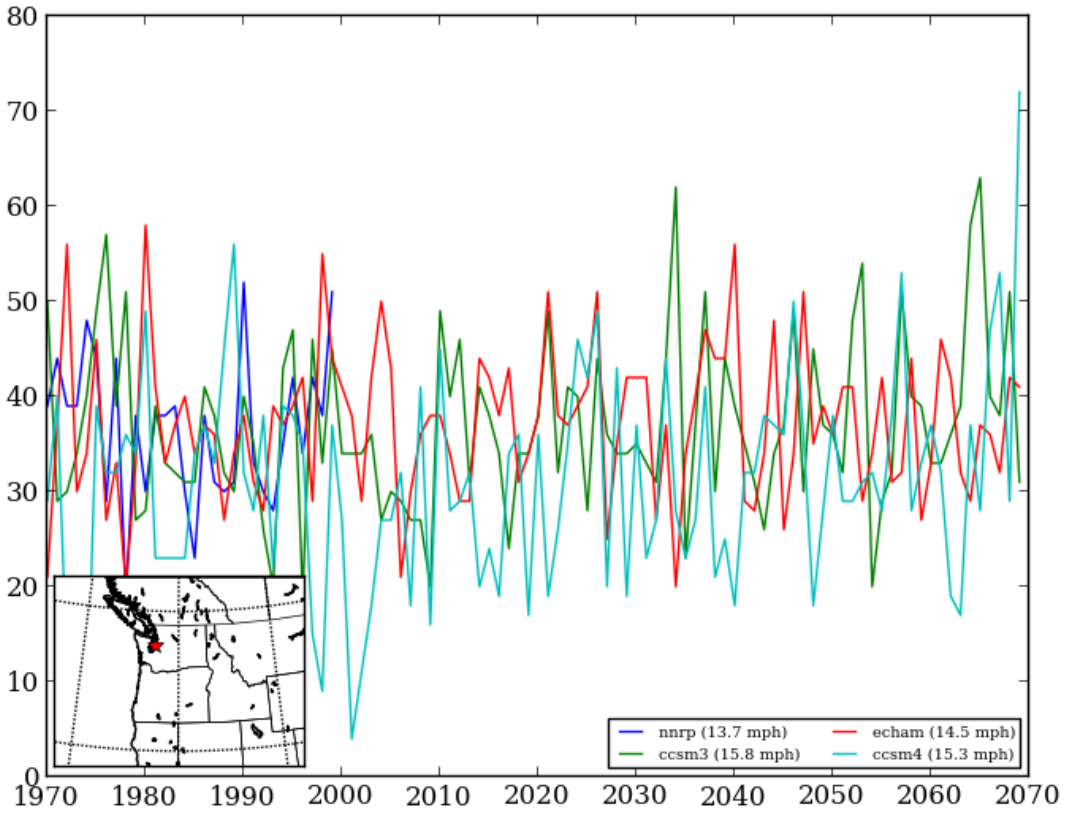

Global Climate Change
Warmer Temperatures
Extreme Precipitation
Changing Storminess
Sea level Rise
Reduced Snowpack
Higher Peak Flows
Storm Surge
Inundation


Anacortes (4 February 2006)


ccsm4-DJF
Percentage change in 95th percentile daily peak windspeed 2040-2070 minus 1970-2000
°N
°N
130°W
120°W
110°W
−15 −12 −9 −6 −3 0 3 6 9 12 15
%

Winter Time Series





Climate Change Pathways