

RECLAMATION

Managing Water in the West

Upper Missouri Climate Impact Assessment: Climate Change Analysis

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U.S. Department of the Interior
Bureau of Reclamation

Outline

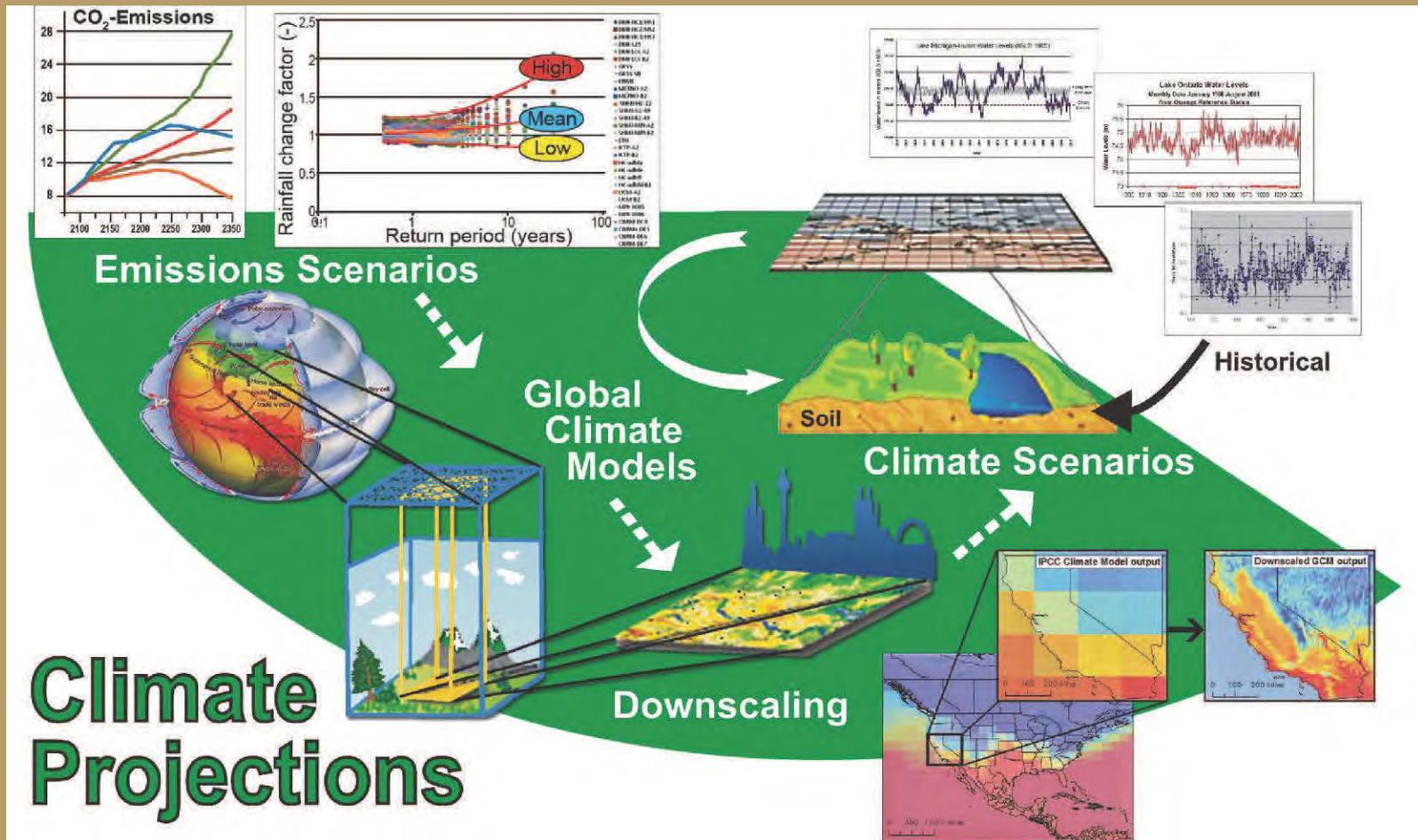
- Study framework
- What the Impacts Assessment entails
- Scenario planning approach



Canyon Ferry Reservoir.

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Climate Change Scenario Development



	CMIP3	CMIP5
Web Address	http://cmip-pcmdi.llnl.gov/cmip3_overview.html	http://cmip-pcmdi.llnl.gov/cmip5/index.html
Emissions Scenarios	<p>SRES A2: High emissions scenario characterized by globally fragmented development and slower economic growth</p> <p>SRES A1B: Medium emissions scenario characterized by rapid economic growth and a balance between fossil and alternative energy sources</p> <p>SRES B1: Low emissions scenario characterized by rapid changes in economic structures, with reductions in material intensity and introduction of clean and resource-efficient technologies</p>	<p>RCP 8.5: "Business as usual" scenario. High emissions scenario where greenhouse gas concentrations continue to rise unchecked</p> <p>RCP 6.0: "Medium emissions scenario by 2080" assumes a mitigation strategy where greenhouse gas emissions peak around 2080 and decline thereafter</p> <p>RCP 4.5: "Medium emissions scenario by 2040" assumes a mitigation strategy where greenhouse gas emissions peak around 2040 and decline thereafter</p> <p>RCP 2.6: "High mitigation" scenario, considered the low emissions scenario, assumes that greenhouse gas emissions peak between 2010 and 2020 and decline substantially thereafter</p>
Number of GCMs	23	61
Model Resolution (Atmospheric Grid)	<p>Latitude: 1.125° – 5.0°</p> <p>Longitude: 1.125° – 4.0°</p>	<p>Latitude: 0.56° – 3.44°</p> <p>Longitude: 0.56° – 3.75°</p>

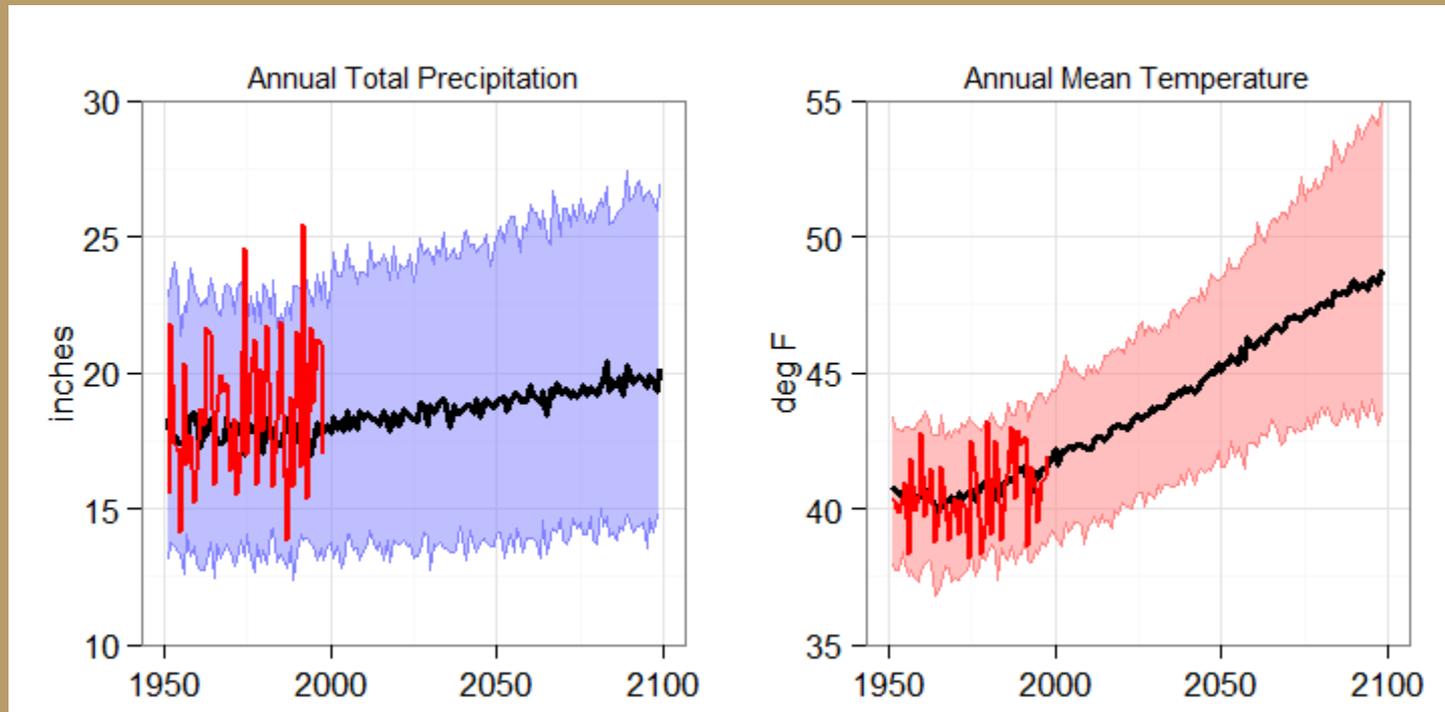
<http://www.usbr.gov/watersmart/wcra/docs/WWCRAClimateProjectionSelection.pdf>

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Climate Change Scenario Development

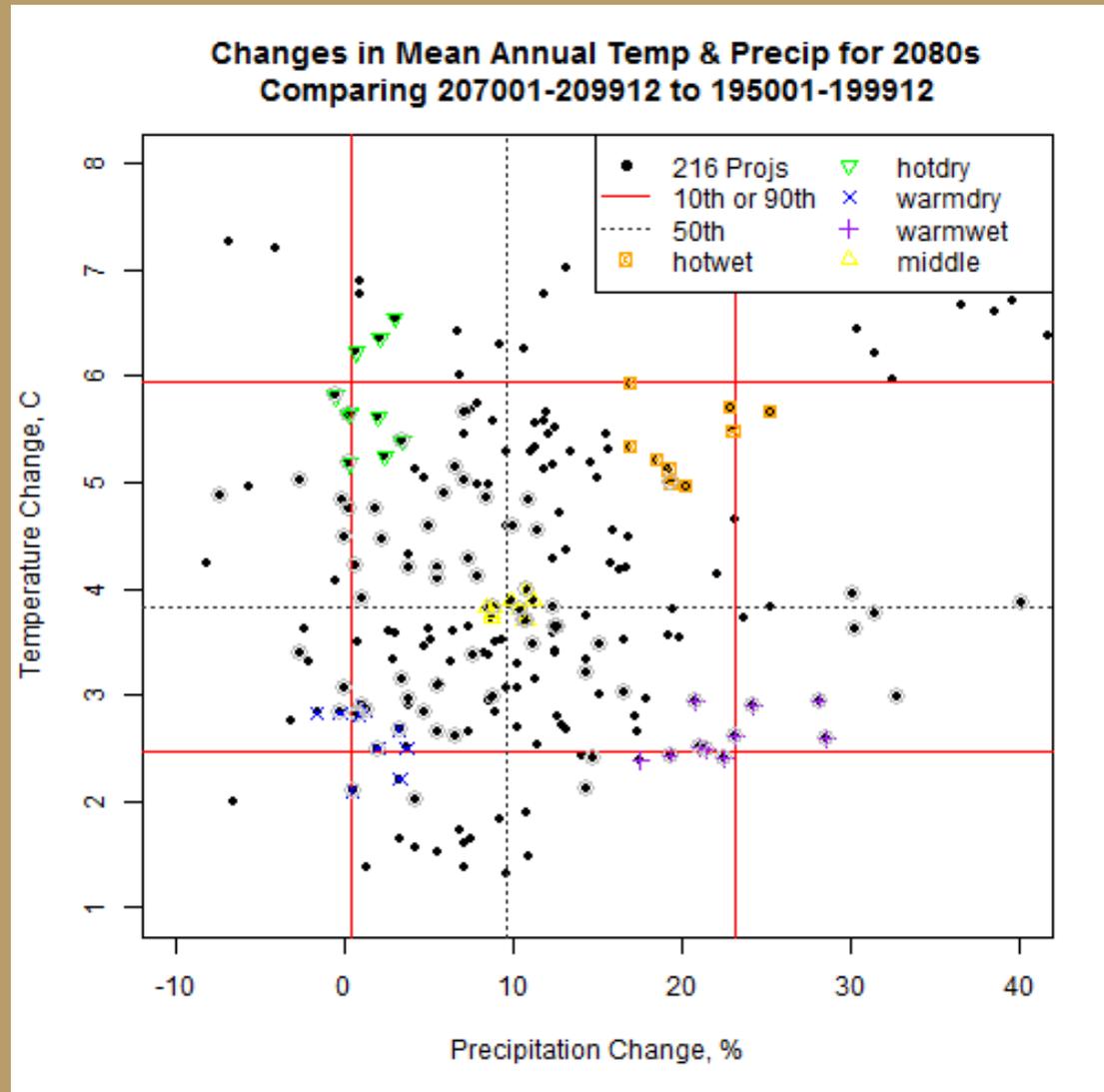
- Use of CMIP3 and CMIP5 climate projections
- Selected CMIP3 A1B & A2, CMIP5 RCP 4.5 & 8.5
- Resulted in 216 projections considered
 - 75 CMIP3, 141 CMIP5

Climate Projections CMIP3 & CMIP5

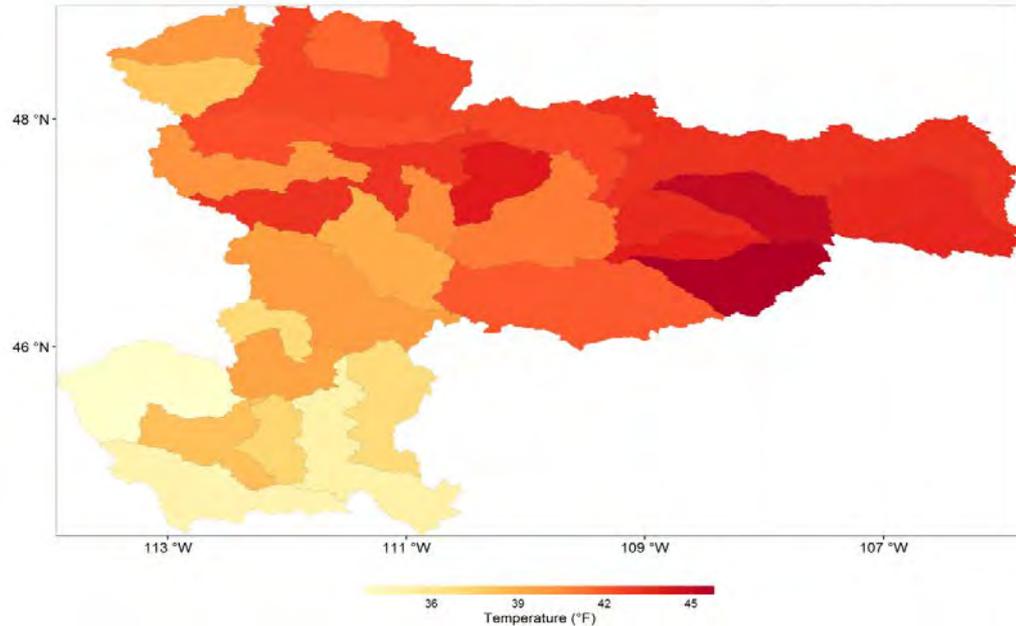
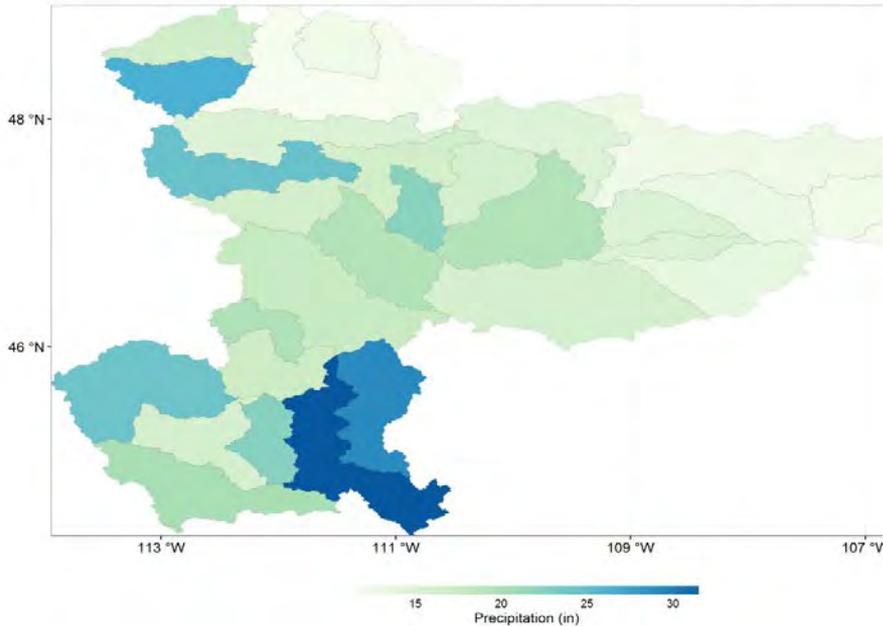


Mean annual precipitation (left) and temperature (right), overlaying historical dataset on annual BCS D climate projections through 2100.

Climate Projection Selection (example 2080s)



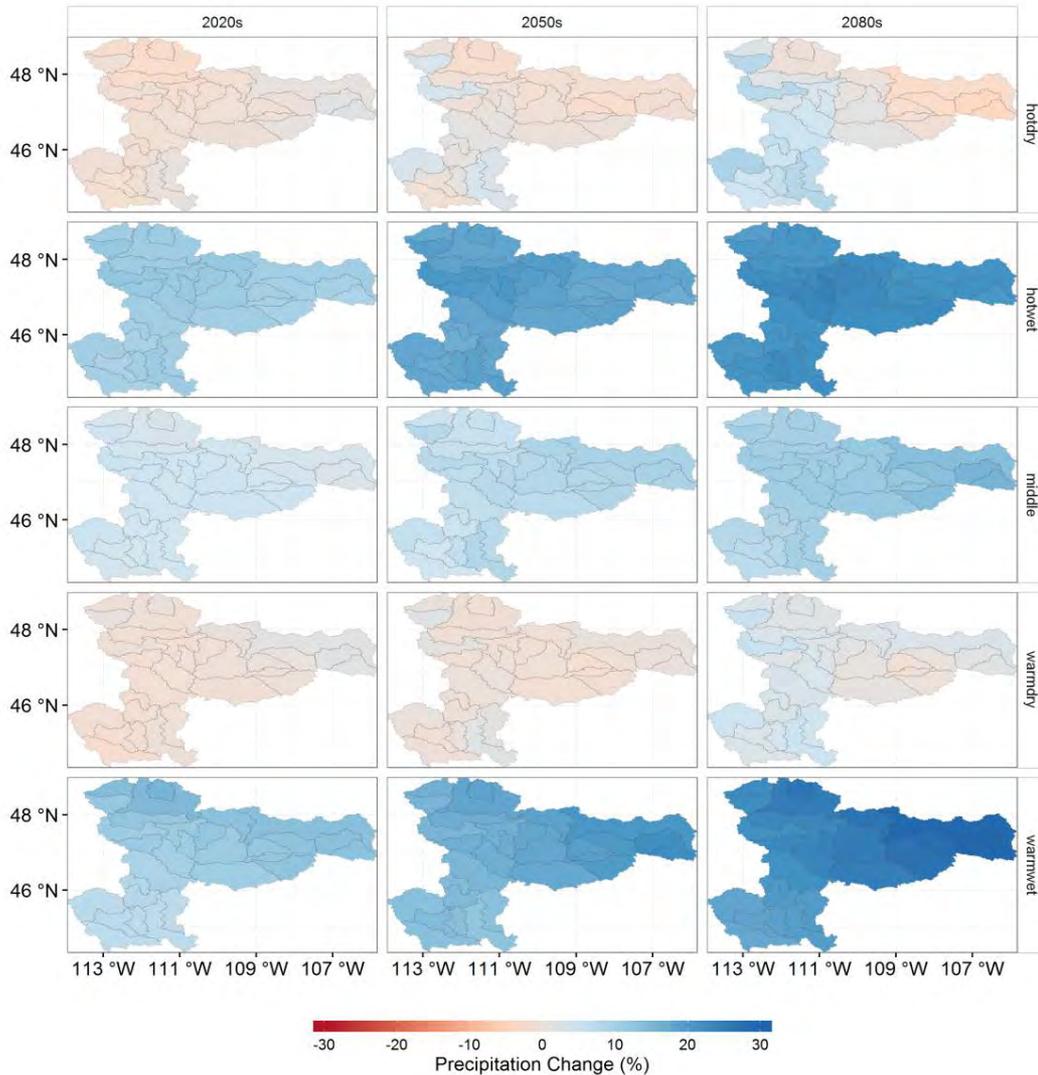
Historical Mean Annual Precipitation and Temperature (wy 1951-1999)



Precipitation:
17.8 inches (12 in. – 32 in. range)

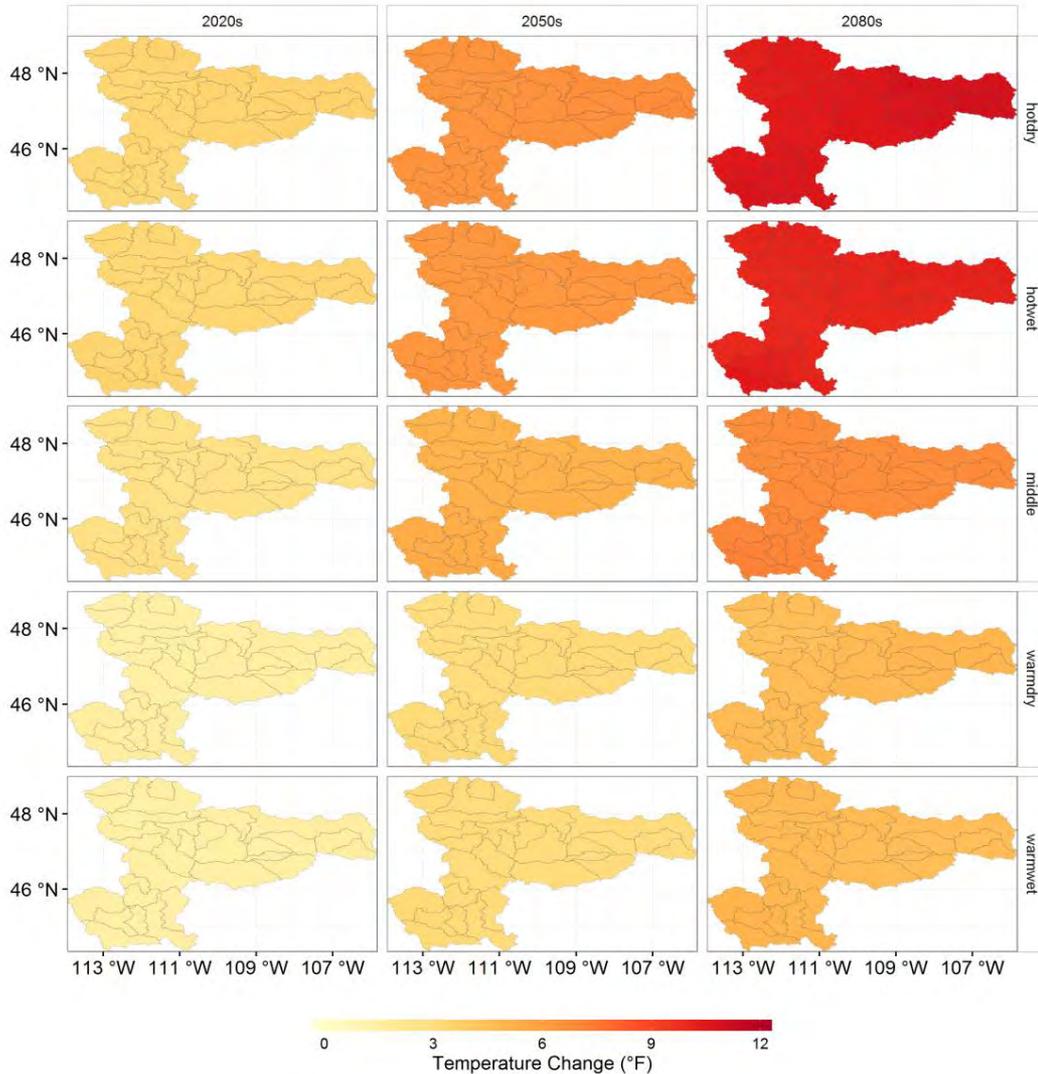
Temperature:
40.7 degrees F (34 – 46 deg range)

Projected Changes in Mean Annual Precipitation



Scenario	2020s	2050s	2080s
Hot-dry	-1.0%	0.2%	3.0%
Hot-wet	10.8	18.7%	21.8%
Central Tendency	4.1%	7.1%	10.8%
Warm-dry	-0.8%	-0.3%	2.7%
Warm-wet	10.6%	16.6%	23.3%

Projected Changes in Mean Annual Temperature



Scenario	2020s	2050s	2080s
Hot-dry	3.6°F	6.6°F	10.5°F
Hot-wet	3.5°F	6.4°F	10.0°F
Central Tendency	2.7°F	5.2°F	6.9°F
Warm-dry	1.6°F	3.2°F	4.8°F
Warm-wet	1.5°F	3.1°F	4.8°F

Questions?



Swift Current Creek

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