CHELAN PUD
CLIMATE CHANGE FORECAST

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Today's Presentation

Overview of District efforts to understand possible impacts of climate change

How climate data is developed and utilized

Climate Change Forecast

- »Discuss impacted areas of interest
- »Preliminary analysis

Climate Change Vulnerability Assessments

Next steps

INFORMATION ONLY TODAY

NO DECISIONS

Potential Impact Areas

I. Columbia River mainstem
   a. Power generation
   b. Aquatic resources
   c. Water quality

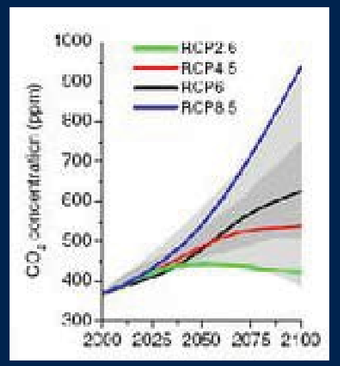
II. Lake Chelan Basin
   a. Chelan Powerhouse generation
   b. Lake level management
   c. Chelan River flows

III. Wenatchee and Methow rivers
   a. HCP hatchery program

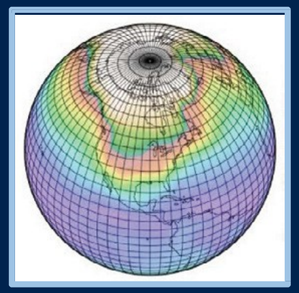
IV. Distribution system load

Quantifying Climate Impacts

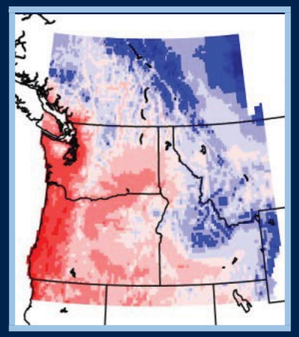
Storylines of global emissions trajectories



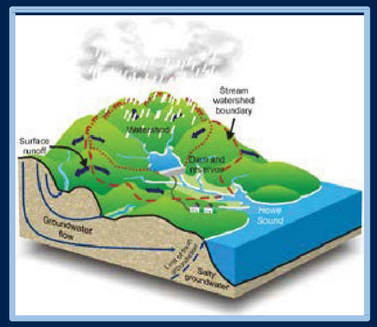
Global Climate Model projections (50-250 Km, daily meteorological data)



Downscaling (5-6 km, daily meteorological data)



Impacts models (<6 km, daily/sub-daily streamflow, water temperature,)



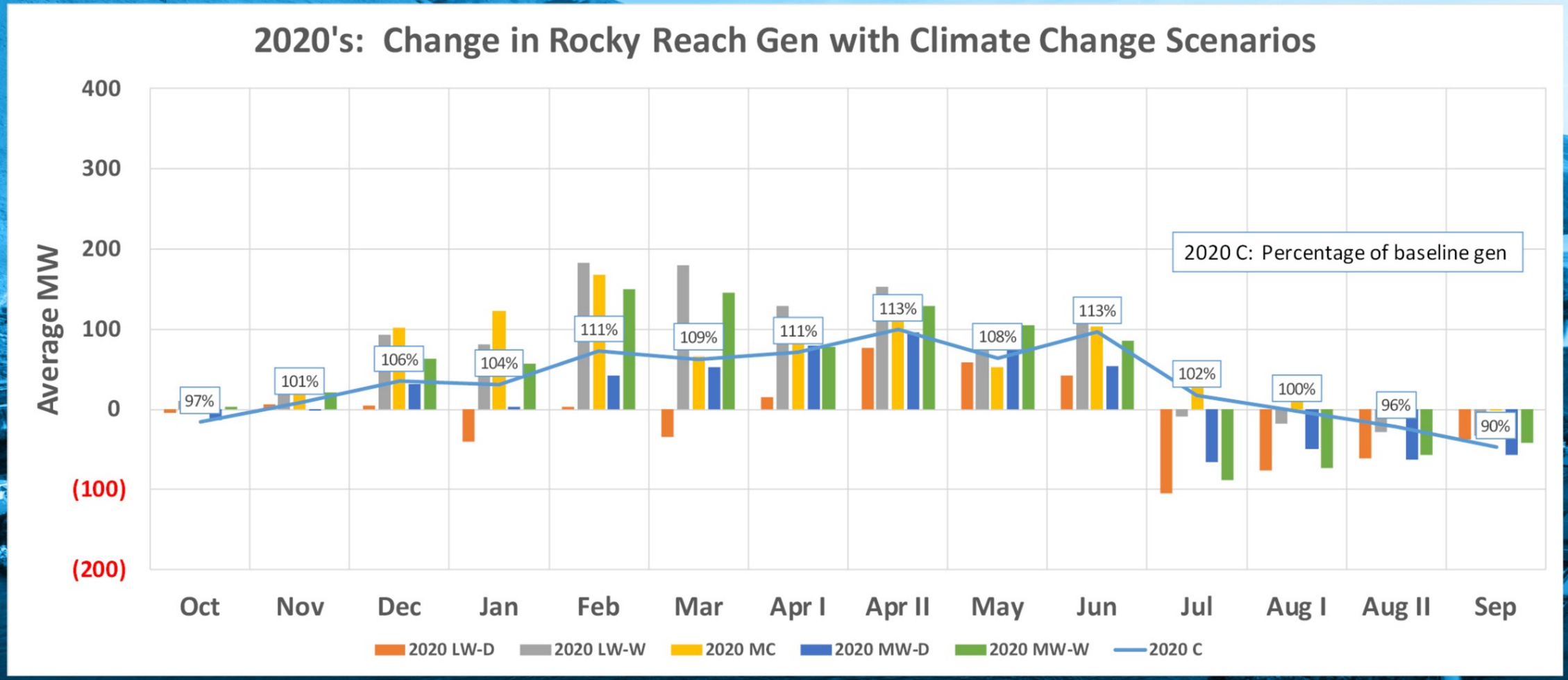
Greenhouse Gas Emission Scenarios → Global Climate Models → Regional Climate Data → Impacts Modeling → Monitoring, Assessment, Planning

Columbia River Flows

River Management Joint Operating Committee (RMJOC)

- Leading the effort for mainstem
- Identified 22 scenarios to produce regulated stream flows
- Stream flow data expected this November

Chelan will use the data to analyze impacts to our Columbia river operations



LW-D Less Warming and Drier

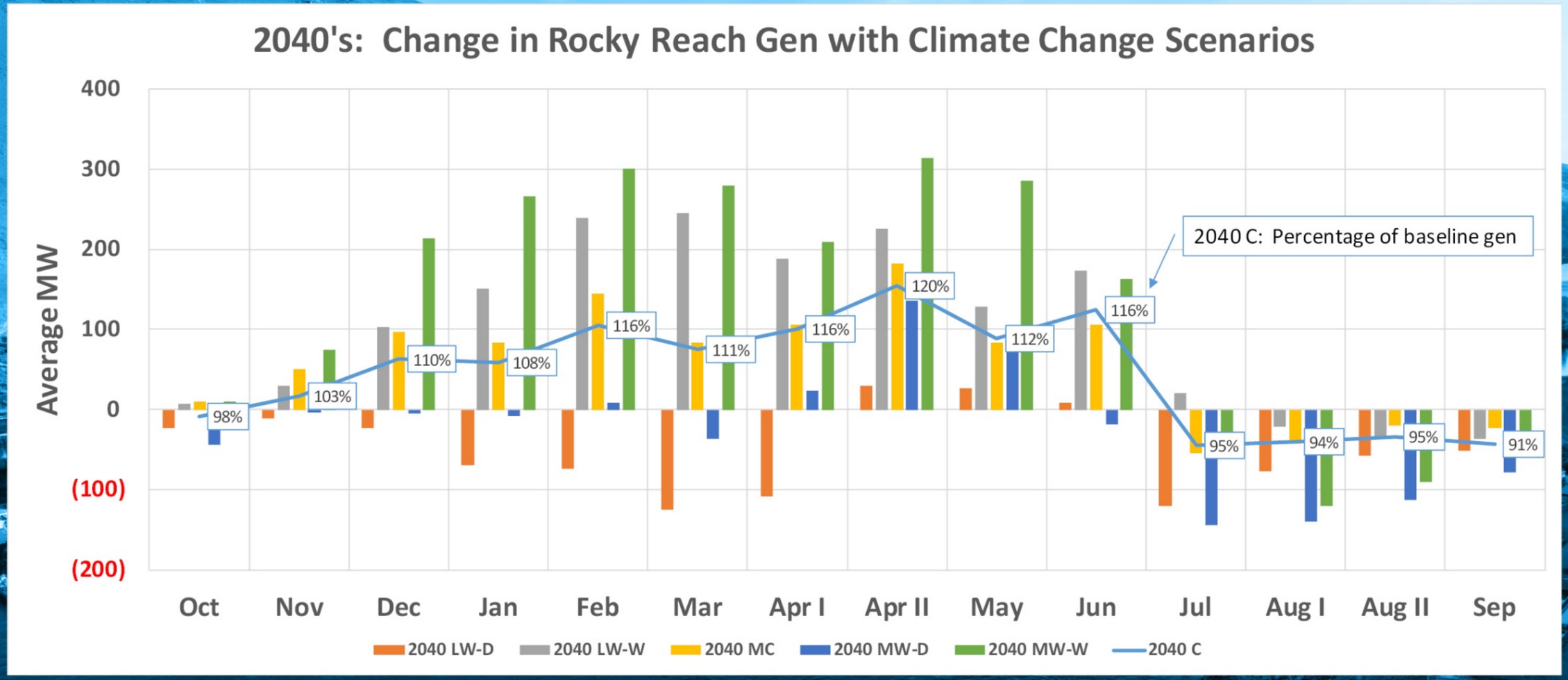
LW-W Less Warming and Wetter

MC Minimal Change

MW-D More Warming and Drier

MW-W More Warming and Wetter

C Central



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Lake Chelan Basin
Power Generation and Lake level Management

Using current CHEOPS model

Working with UW Climate Impacts Group staff to:

- »Understand current data
- »Identify which data sets to use

Power generation

- »Water available for generation

Lake level management

- »License requirements
- »Chelan River flows

Distribution system load

Average monthly temperatures forecasted to change

»Higher in both winter and summer

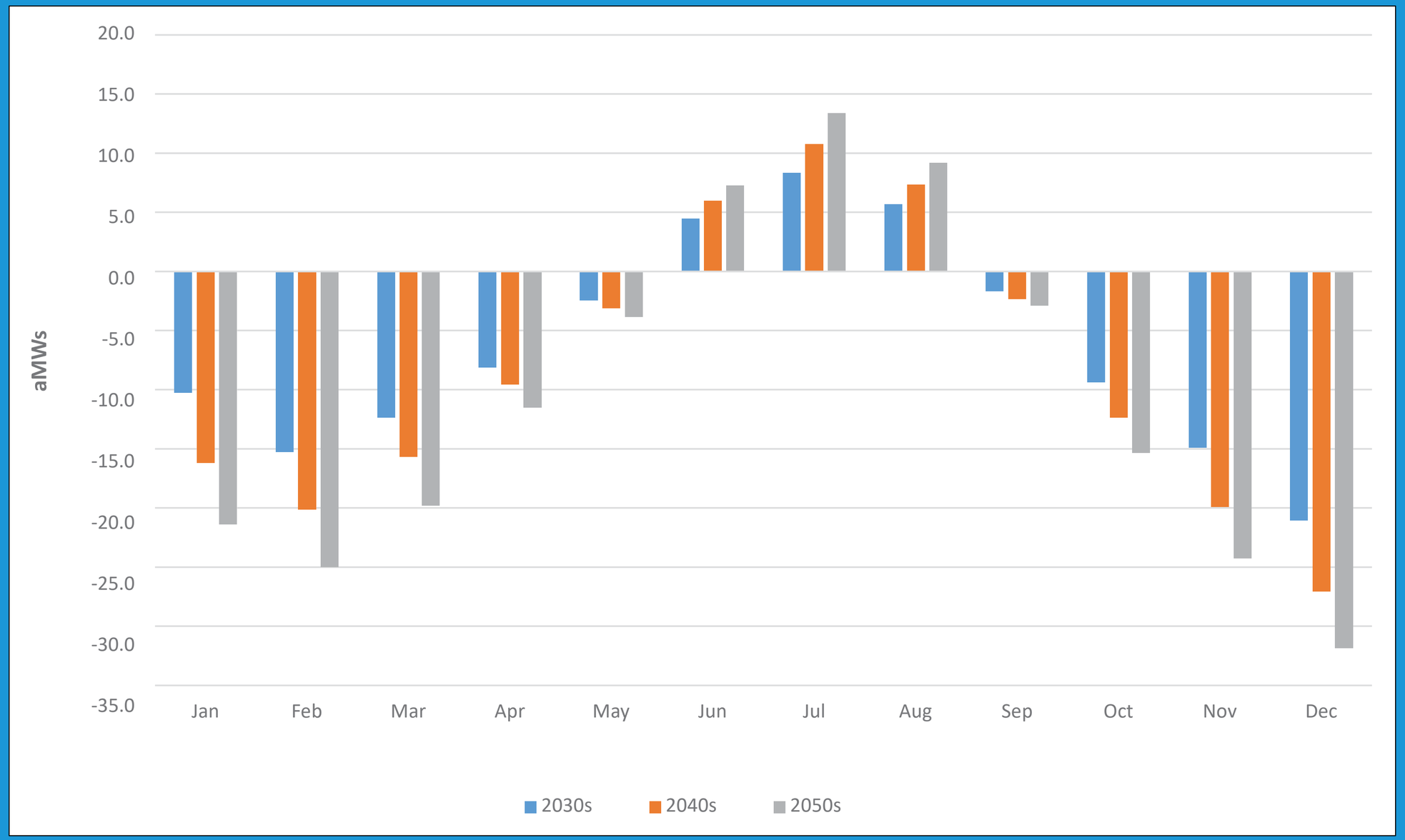
»Greater changes in winter temperatures

Initial forecasting uses Saddlerock Substation temperature data as a proxy site and 2007-2016 average peak loads

UW CIG provided forecast temperature changes based on a similar location

The forecast does not account for load growth

District-wide change in monthly demand (aMWs)



Vulnerability Assessments

Qualitative assessments to identify how climate change effects could impact the District

Assessed the likelihood, impact, and timing of these changes

Used this data to prioritize further actions

Assessment areas

Hydro Operations

Transmission

Energy Resources

Electric Distribution

Water & Wastewater

Fiber & Telecom

Fisheries & Wildlife

Licensing & Compliance

Parks

District Vulnerabilities Assessment

Table 2a. Maintain Highly Reliable and Cost Effective Electrical Distribution Infrastructure

	District Vulnerabilities	Climatic Driver	Time Frame (Velocity) and Likelihood			Adaptation Response Strategies				
			0-3 years	3-10 years	10+ years	Regulatory Coordination	Research and Analysis	O&M Budget	Capital Budget	Stakeholder Coordination
A.1	Damage to or interference with infrastructure due to increased number of plant species and growth rate may require additional maintenance staff and cost in order to manage vegetation proactively. Currently vegetation inspection is on a 2 to 4 year cycle.		L	L	M		✓[12]	✓		✓[13]
A.2	Damage to infrastructure from fire may require additional emergency staff and cost in order to respond and repair/replace.		L	M	M		✓[14]	✓	✓	
A.3	Damage to infrastructure from increased tree death due to disease and/or fire may require additional staff and cost in order to manage vegetation proactively.		L	L	M		✓	✓		
A.4	Changes in load shape during winter (i.e., reduction in typical winter peaking) could reduce operational pinch points and make additional power available.		L	L	L		✓	✓		
A.5	Increased precipitation may cause flooding and landslides that damage infrastructure, requiring additional emergency staff and cost in order to respond, repair, and replace.		M	M	M			✓	✓	

Next steps

Lake Chelan Modeling

»Select data sets, perform model runs and complete analysis

Vulnerability Assessments

»Deeper dive into the priority vulnerabilities as needed

»Initial review of highest priority vulnerabilities completed

»Continue work on medium priorities this year

Institutionalize potential climate change impacts analysis into decision making processes