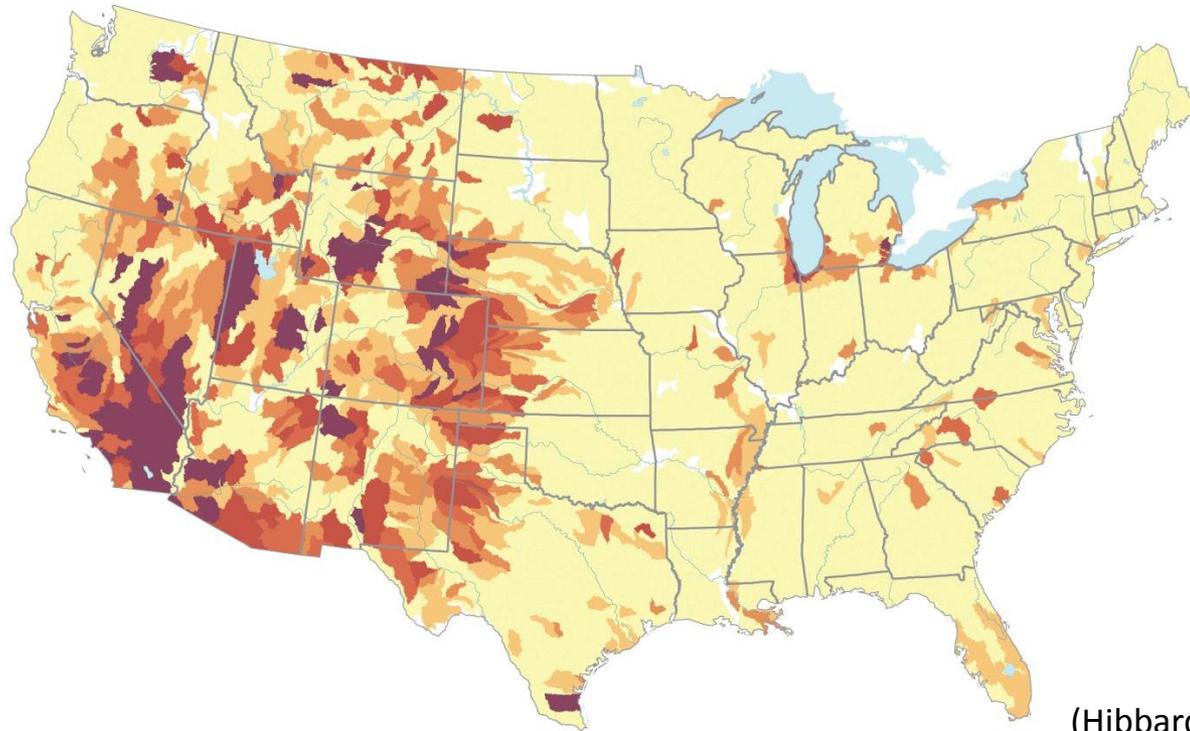


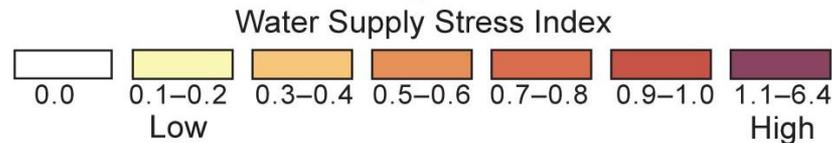
Recycled Water As a Tool for Adaptation in the PNW

Chris Stoll
President, WaterReuse PNW
Kennedy/Jenks Consultants
May 17, 2017

Water Stress



(Hibbard, et al. 2014)



“The droughts of today are likely the average water conditions we will face in the future.”

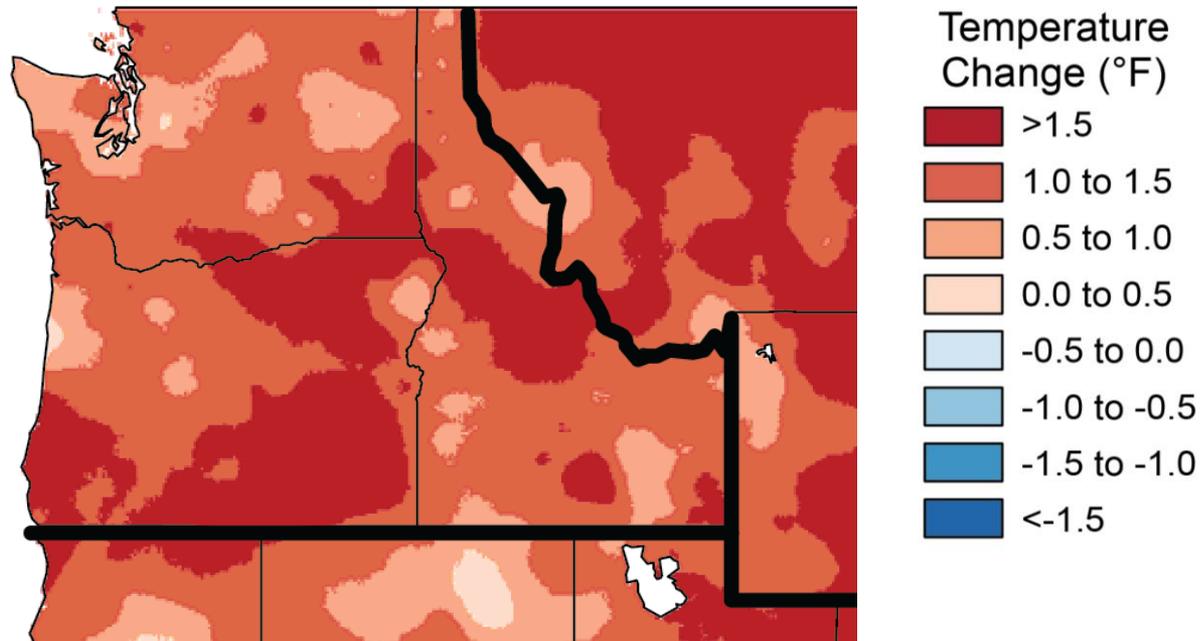
~G. Thomas Tebb, Director, WA Dept. of Ecology Office of Columbia River

PNW Water Related Resources

- Largest producer of tree fruit in the world
- \$17 billion worth of agricultural commodities
- Commercial fish and shellfish resources valued at \$480 million in 2011
- 126.5 million ac-ft/yr water (Columbia River Basin median)
- 12.5 million people

Observed Changes

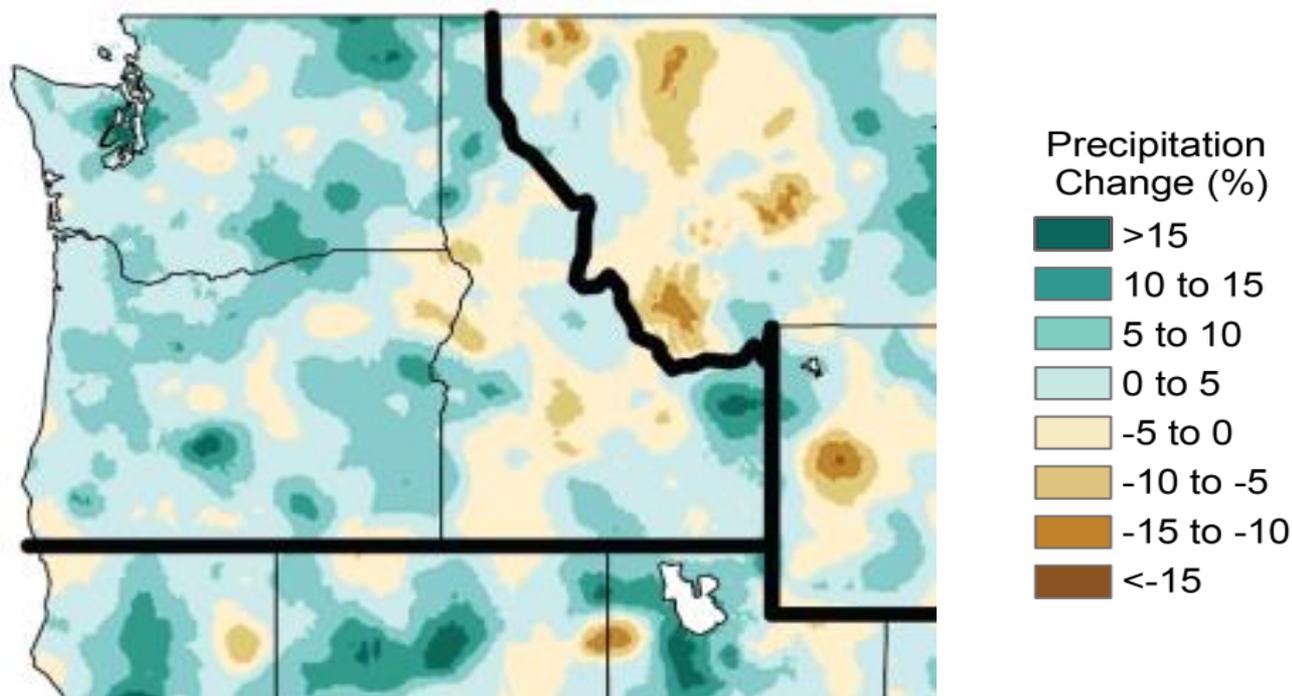
Temperature



(Walsh, et al. 2014)

Observed Changes

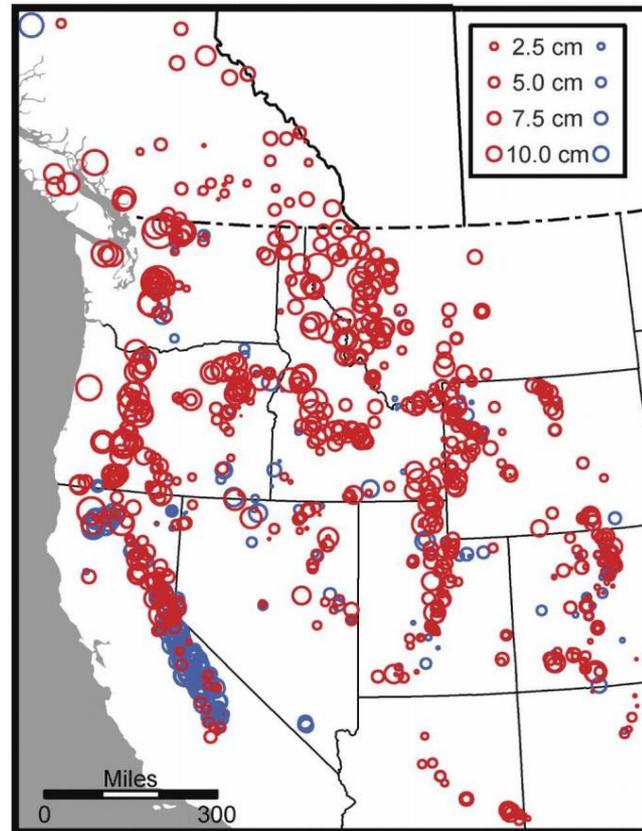
Annual Precipitation



(Walsh, et al. 2014)

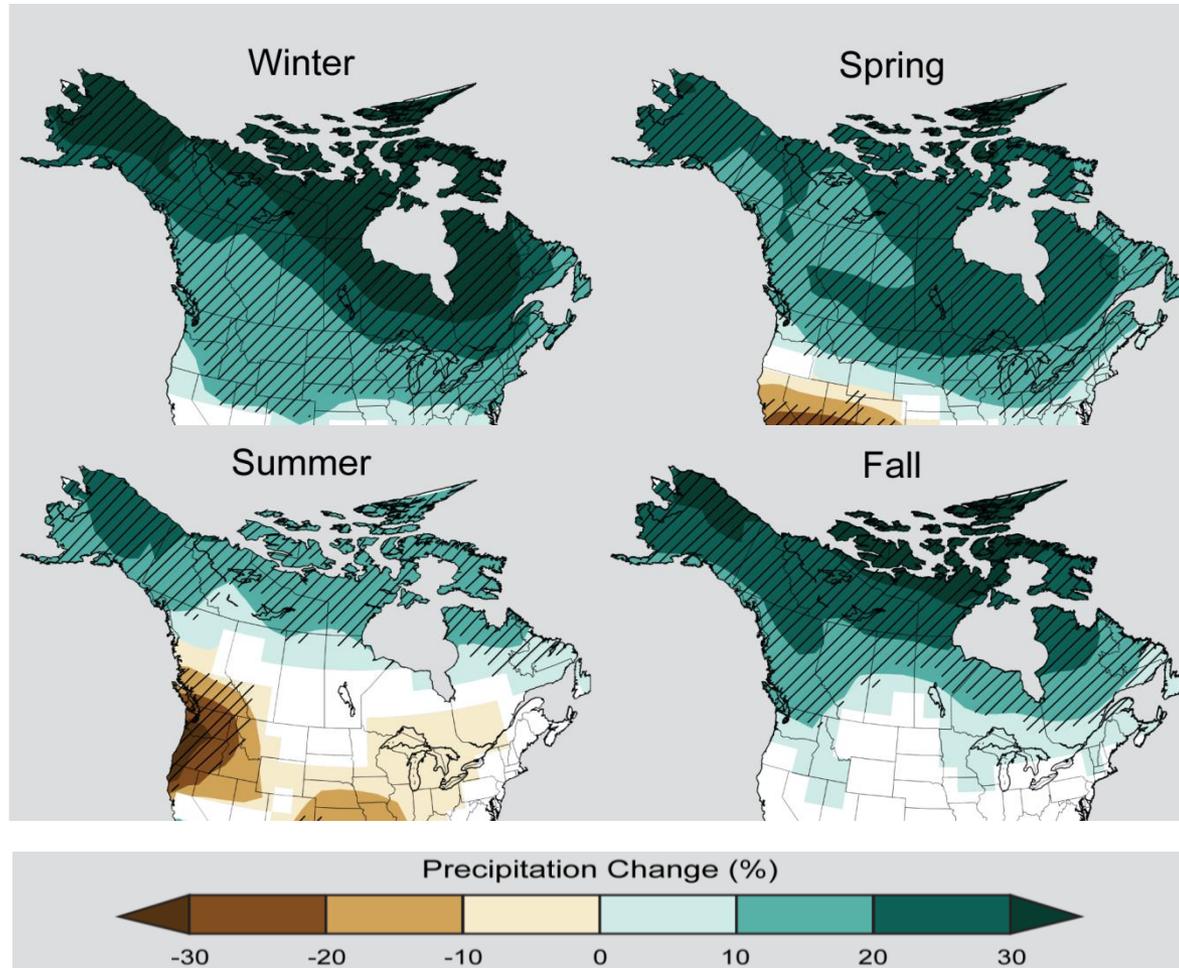
Observed Changes

Snow Water Equivalent



(Mote 2006)

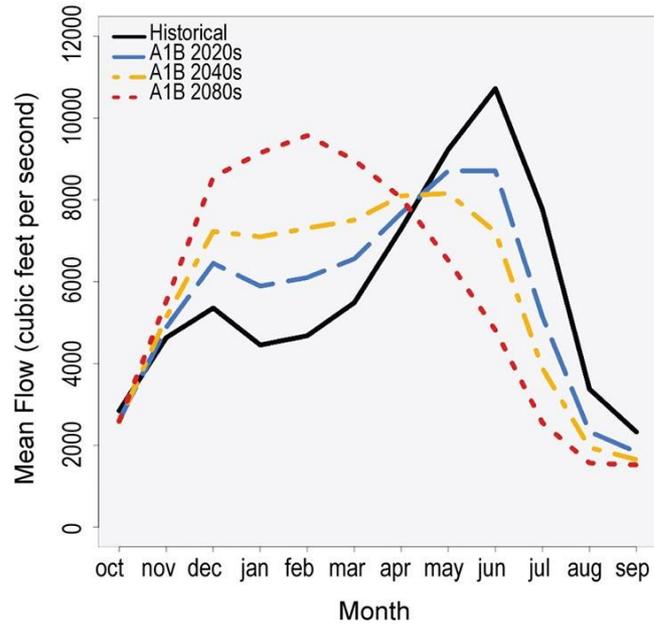
Projections



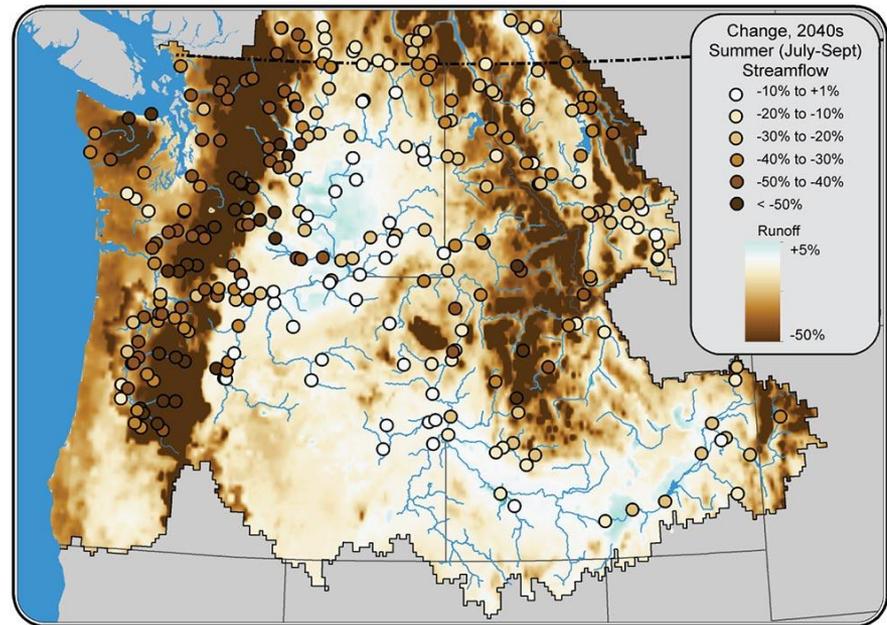
(Walsh, et al. 2014)

Projections

Future Shift in Timing of Stream Flows

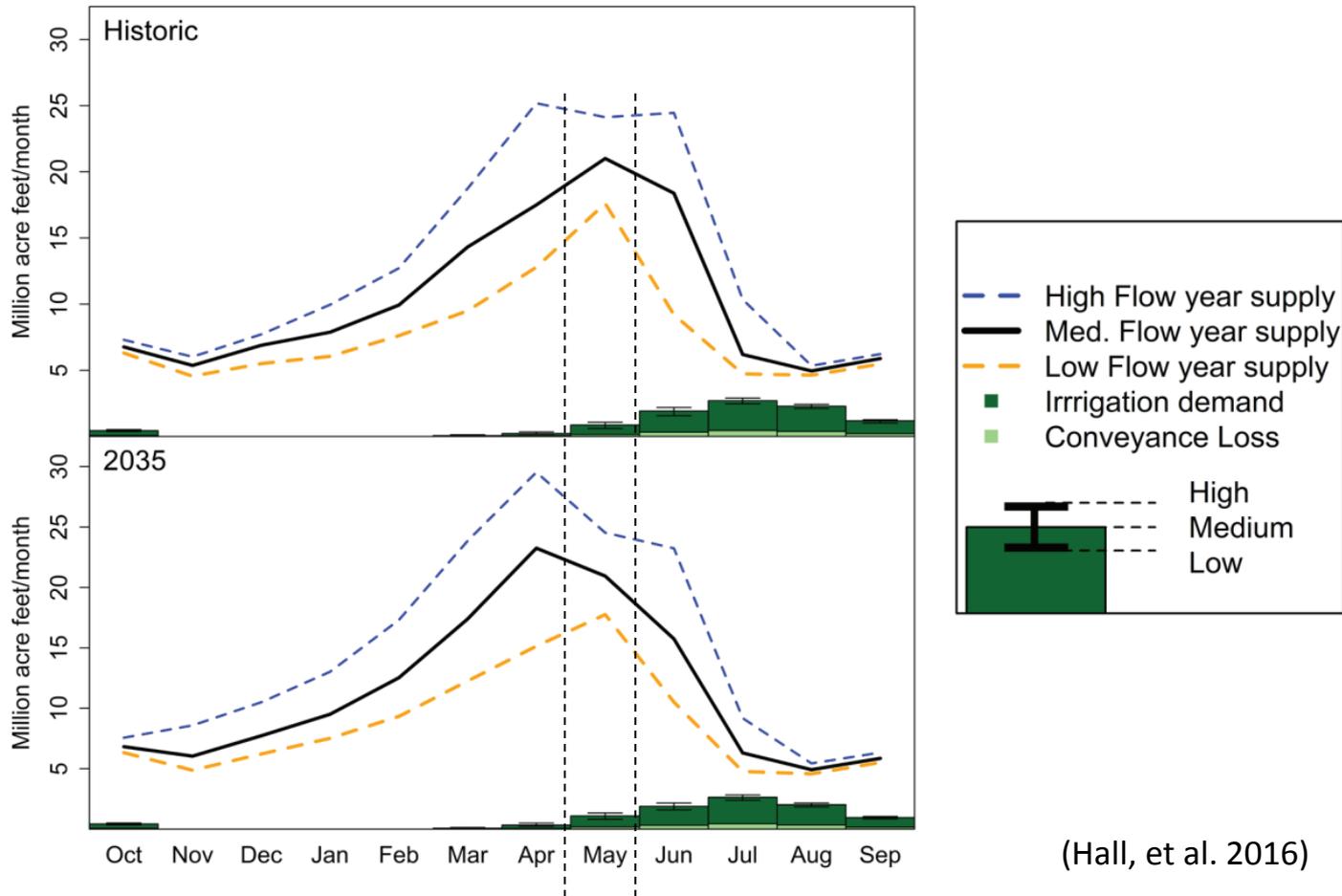


Reduced Summer Flows



(Mote, et al. 2014)

Projections



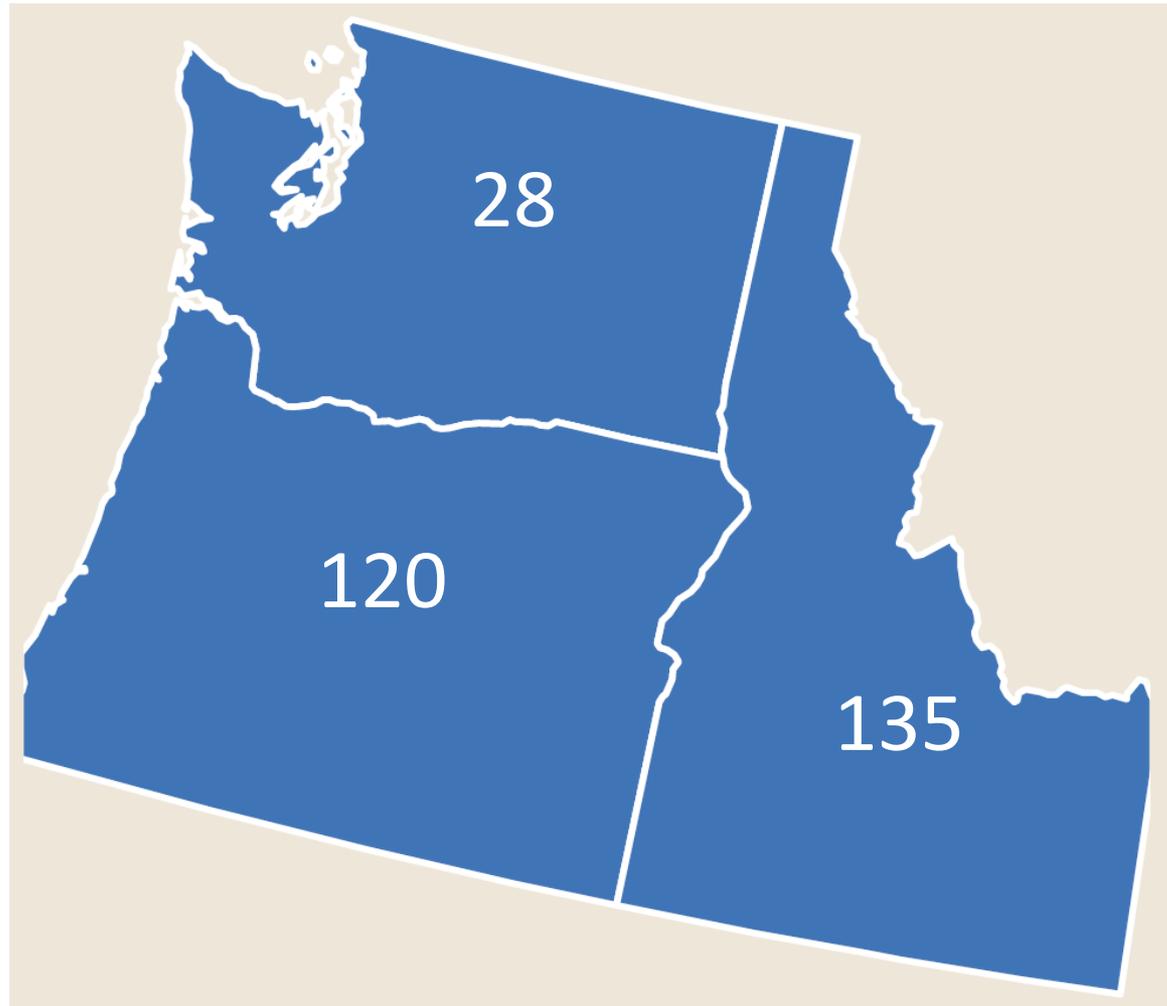
(Hall, et al. 2016)

Future problems

- Agricultural Impacts
 - Decreased surface water supply
 - Increased temperatures
 - Changing water quality
 - Production Impacts
- Streamflow
 - Increased stream/reservoir temperature
 - Decreased groundwater
 - Aquatic habitat
- Utility Impacts
 - Water supply reliability
 - Water quality changes
 - Stormwater systems
 - Flooding
 - NPDES requirements

RECYCLED WATER

Current Recycled/Reclaimed Facilities/Permits



Utility

- MWMC, OR
- 400 ac of poplar trees
- Recycled water used for irrigation
- Biosolids used as fertilizer



<http://www.mwmcpartners.org/biocyyclefarm.html>

Streamflow/Wetland

- Carnation, WA
 - 59 ac wetland
 - Up to 0.5 MGD
 - 18,000 trees
 - Salmon/wildlife
 - Recreation



<http://www.kingcounty.gov/depts/dnrp/wtd/system/carnation/chinook-bend.aspx>

Water Supply/Quality

- Sequim, WA WRF
 - 1.7 MGD
 - 2,800 ac of shellfish beds re-opened
 - Stream flow augmentation
 - Irrigation
 - Groundwater Recharge



Summary

Recycled water can be used as a tool to adapt to changing conditions

Toilet to Tap



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