COLUMBIA RIVER BASIN
2021 LONG-TERM WATER SUPPLY & DEMAND FORECAST

DEPARTMENT OF ECOLOGY State of Washington

WASHINGTON STATE UNIVERSITY

THE UNIVERSITY OF UTAH

Aspect

WRC STATE OF WASHINGTON WATER RESEARCH CENTER

DOH WUE Webinar
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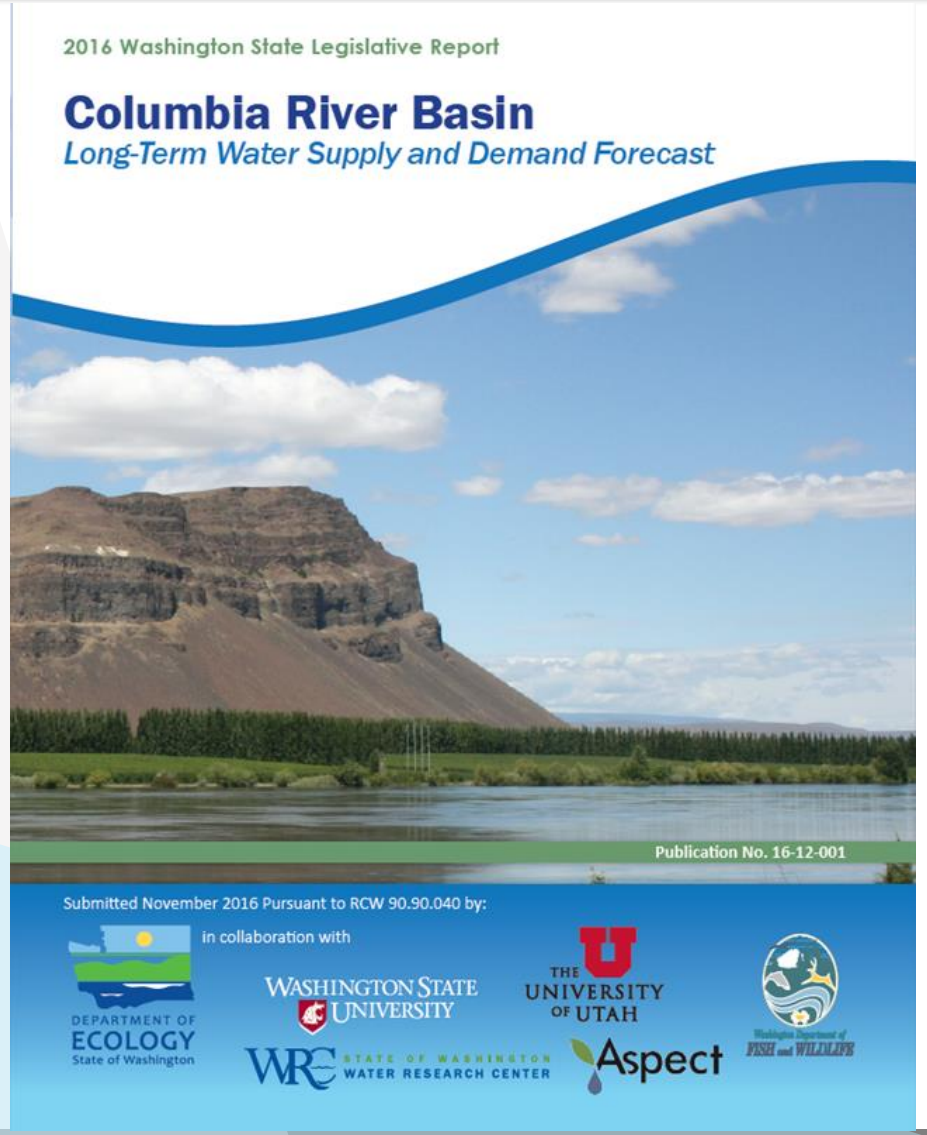
Background



- Every 5 years, the Washington State Department of Ecology's Office of the Columbia River (OCR) is required to submit a long-term (20-year) water supply and demand forecast to the State Legislature
- Washington State University (WSU) was assigned to develop the forecast for water supply and out-of-stream demand
- The forecast helps improve understanding of where additional water supply is most critically needed, now and in the future

FORECAST COMPONENTS

Water Supply

Intersection

- Interruption of water rights
- Drought impacts

Water Demand

Irrigation

Hydropower

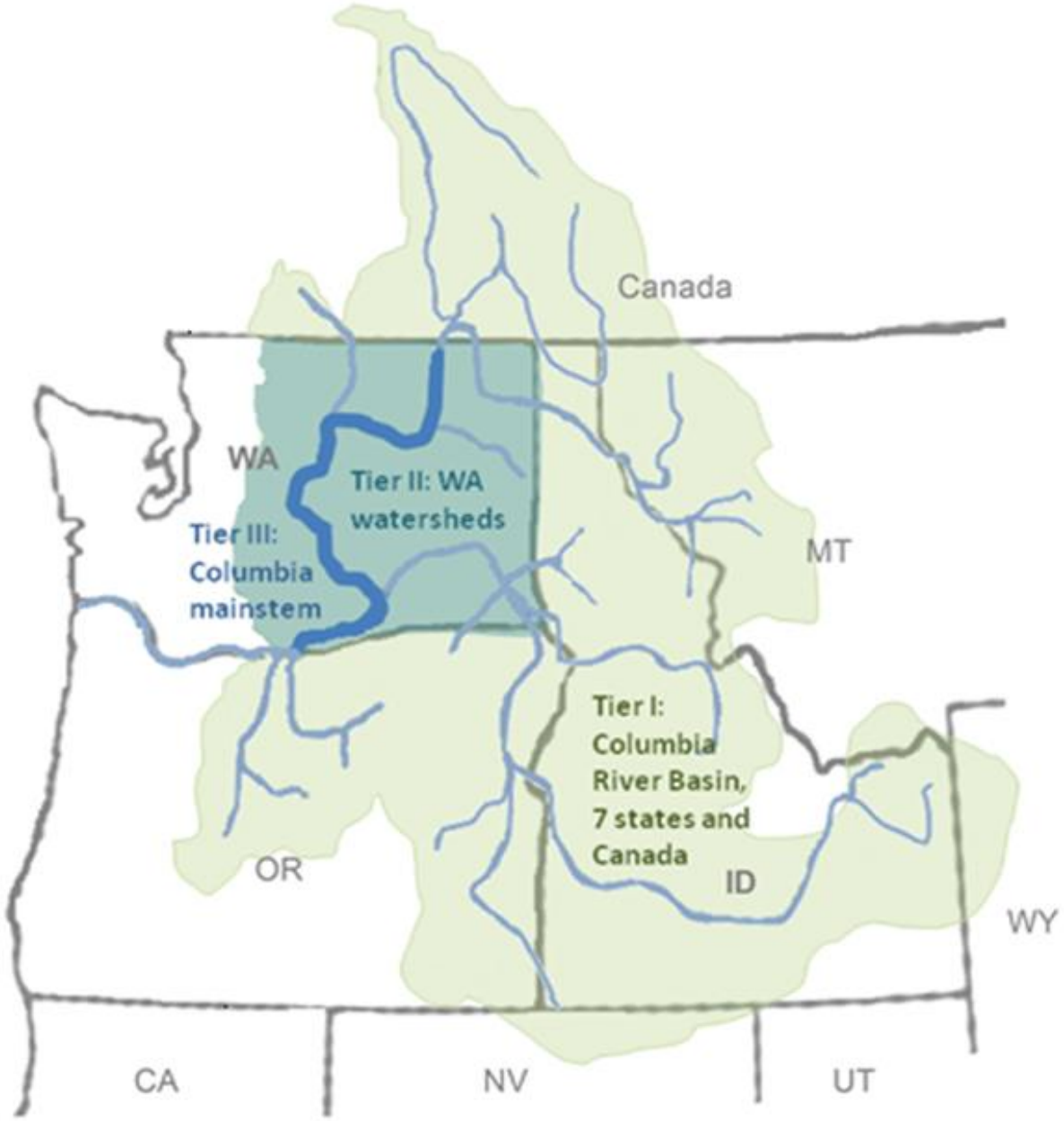
Residential

2021 Forecast: Modules Selected for Funding

1. **Improved Residential Demand Modeling**
   - PAG and other State Agency enthusiasm for this module, especially since Hirst decision
2. **Improved Water Rights Interruption Modeling**
   - PAG interest in a tool for tracking, planning, and forecasting interruption decisions; enthusiasm expressed by water masters in previous State Caucuses
3. **Double Cropping**
   - PAG discussion on how double cropping in a warmer climate would increase crop water needs, particularly during the late summer season of diminishing flows
4. **Groundwater Integration – Data Coordination, Collection & Curtailment**
   - Clear PAG and other State Agency support due to hydrologic connections between surface and groundwater systems and that many agencies are concerned about sustainable management of GW resources

Spatial Tiers

- **Tier I: Columbia River Basin, 7 states and Canada**
- **Tier II: WA watersheds**
- **Tier III: Columbia mainstem**



Summary of 2016 Water Demand Results

Water Use or Need	Estimated Volume (AF) (average of climate scenarios)
Projected changes in Eastern WA Agricultural Demand by 2035	-332,837 to -250,027
Projected changes in Agricultural Demand by 2035 with 10% Double Cropping	-272,837 to -130,027
Projected changes in Agricultural Demand by 2035 with 10% Double Cropping and Planned Water Supply Projects	27,163 to 169,973
Projected changes in Eastern WA Municipal and Domestic Demand (including municipally-supplied commercial) by 2035	80,000
Projected changes in CRB Hydropower Demand by 2035	35,000 to 75,000
Water Use or Need to be Met with Surface Supplies	
Unmet Columbia River Instream Flows in 2001 at McNary Dam	13,400,000
Unmet Tributary Instream Flows (historical droughts)	30,000 to 660,000
Unmet Columbia River Interruptibles (historical droughts)	40,000 to 310,000
Yakima Basin Water Supply (pro-ratables, municipal/ domestic and fish) (from 2011 Yakima Report)	450,000
Alternate Supply for Odessa (from 2010 Odessa Report)	155,000
Declining Groundwater Supplies (other than in the Odessa Subarea)	750,000

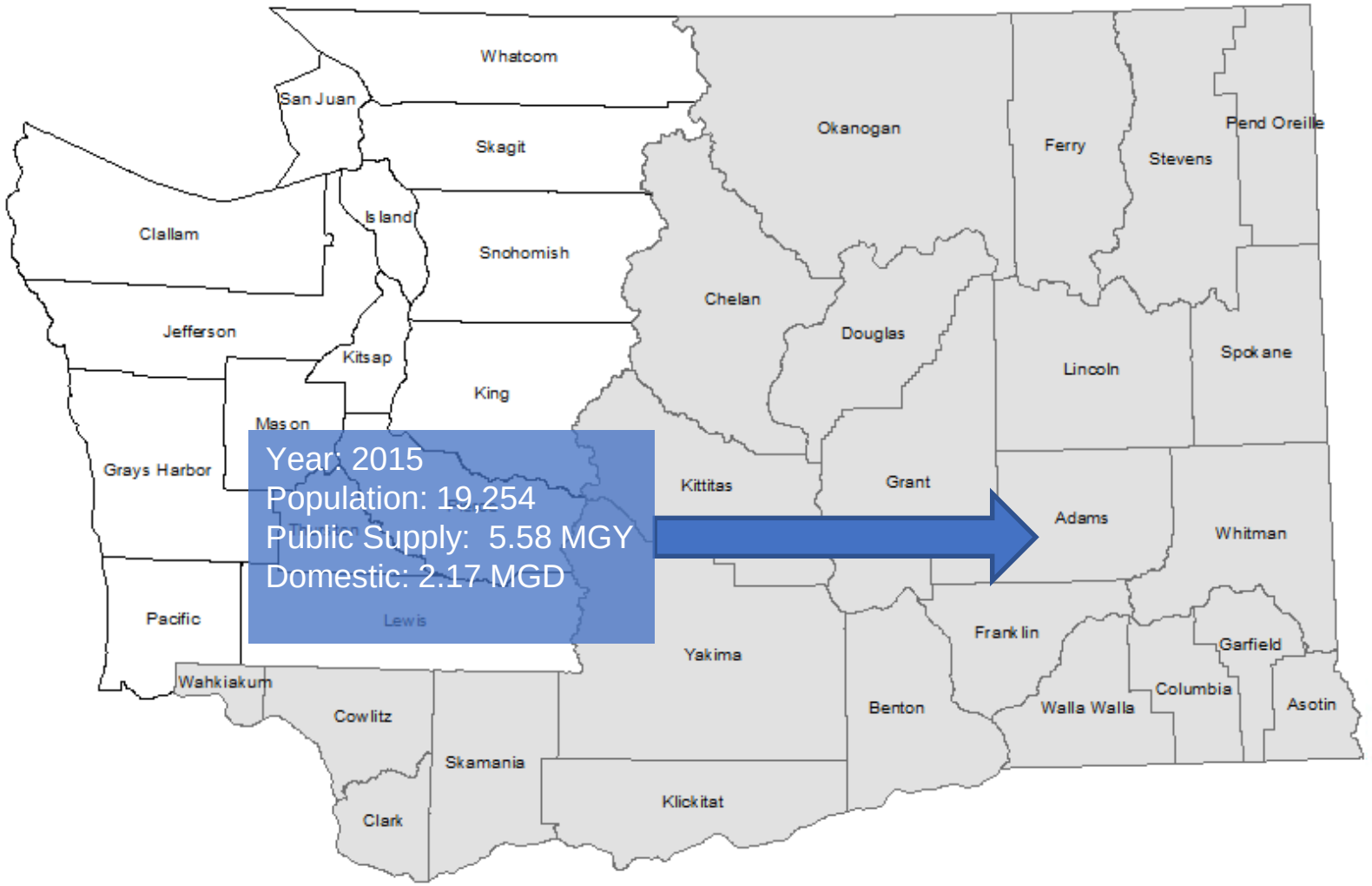
- Wetter springs
- Shifting irrigation timing
- More water-use efficient crops

2016 Methodology for Residential Water Estimates

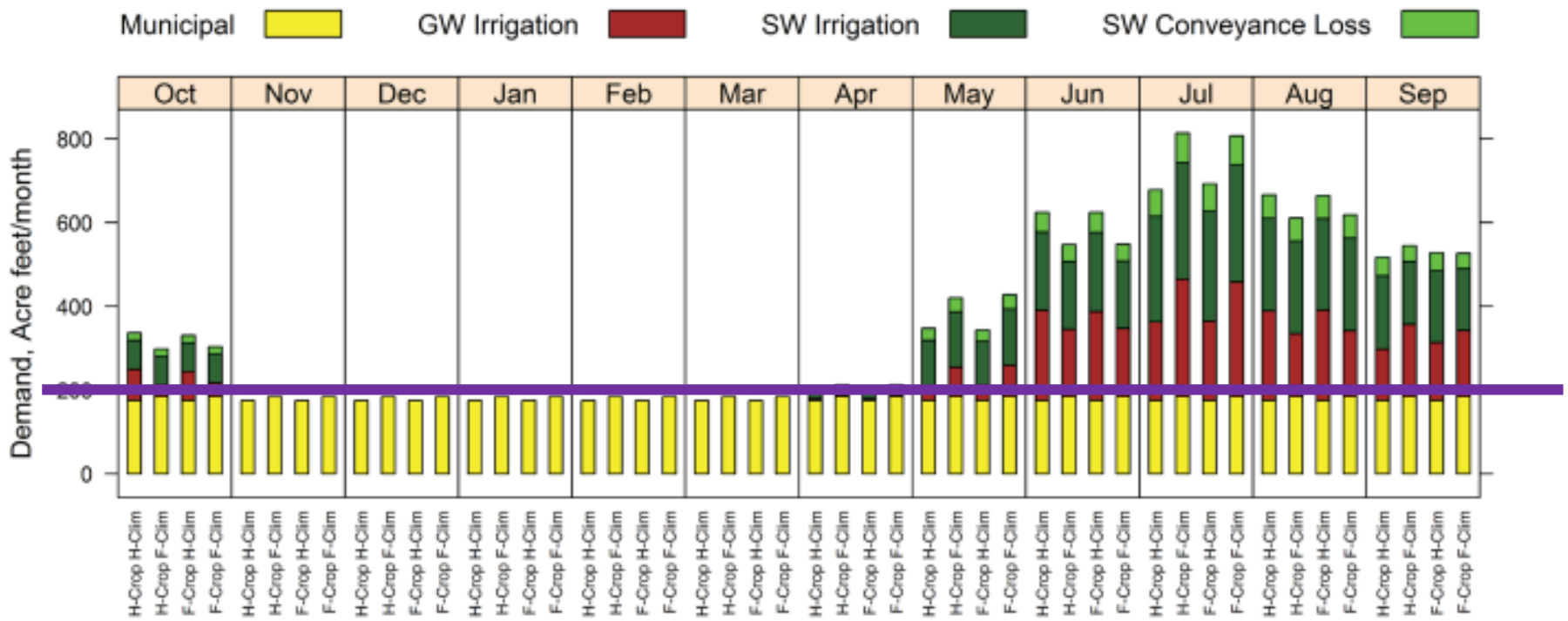
Municipal and Domestic demand estimated from:

- 5-yr averaged, county-level water use data (USGS)
- County-level OFM population estimates

Reported as annual water demands



2016 Forecast Ex. WRIA 35: Middle Snake



Modeled historical (1981-2011) and forecast (2035) agricultural, municipal, and instream flow water demands within the WRIA. Water demand was forecast under four scenarios combination of: a) "H-Crop H-Clim", b)"H-Crop F-Clim", c)"F-Crop H-Clim", and d) "F-Crop F-Clim" where "H-Crop" represents historic crop mix; "F-Crop" as future crop mix under medium economic scenario,"H-Clim" as historic climate and "F-Clim" values represent demand forecast under IPCC Representative Concentration Pathway (RCP) 4.5 centering 2035. Each bar represents median (50th percentile) demand condition. Ground water (GW, brown) and surface water (SW, dark green) irrigation demands are shown at the "top of crop" and include water that will actually be used by plants, as well as on-field losses based on irrigation type. Conveyance losses (light green) are estimated separately. Consumptive municipal demands (yellow) include self-supplied domestic use, but exclude self-supplied industrial use.

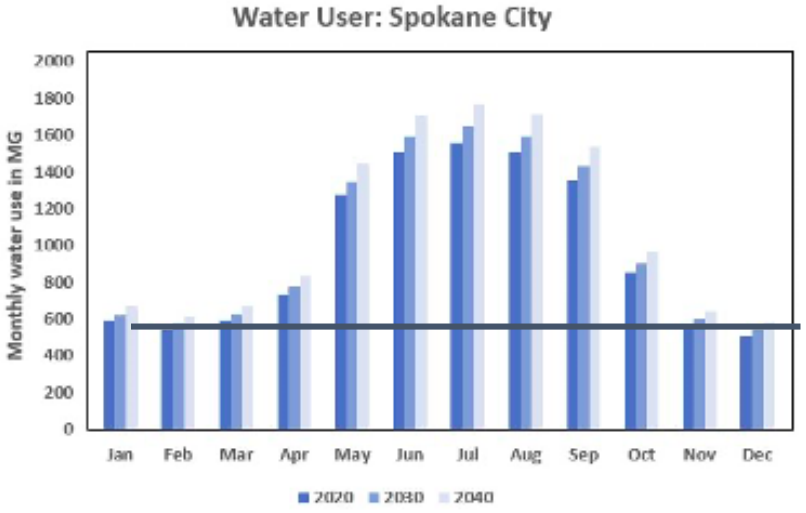
2021 Methods for Estimating Residential Demand

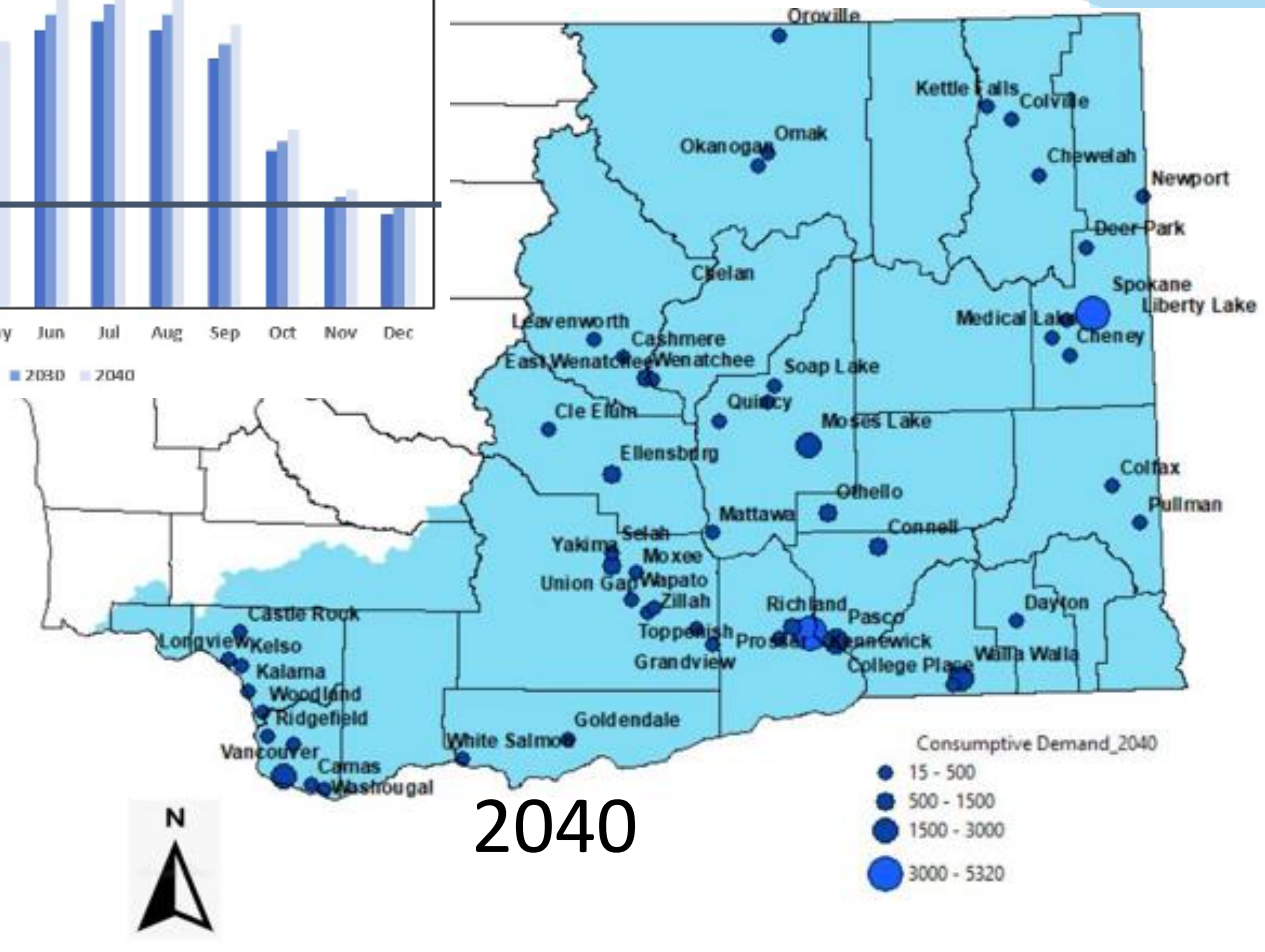
Overview:

- 55 water providers studied
- Data collected from Comprehensive Water System Plans

Limitations:

- Not inclusive of all water providers
- Data isn't always very current





Related WUE Survey Questions

What we would like from water providers:

- **Monthly/Seasonal Water Production Data**
  - Provide either monthly or seasonal (summer vs. winter) water consumption data.
  - Information would help future Forecast assessments accurately estimate demands for residential sector
  - Better data will help us identify where priority areas are for dealing with future water scarcity issues

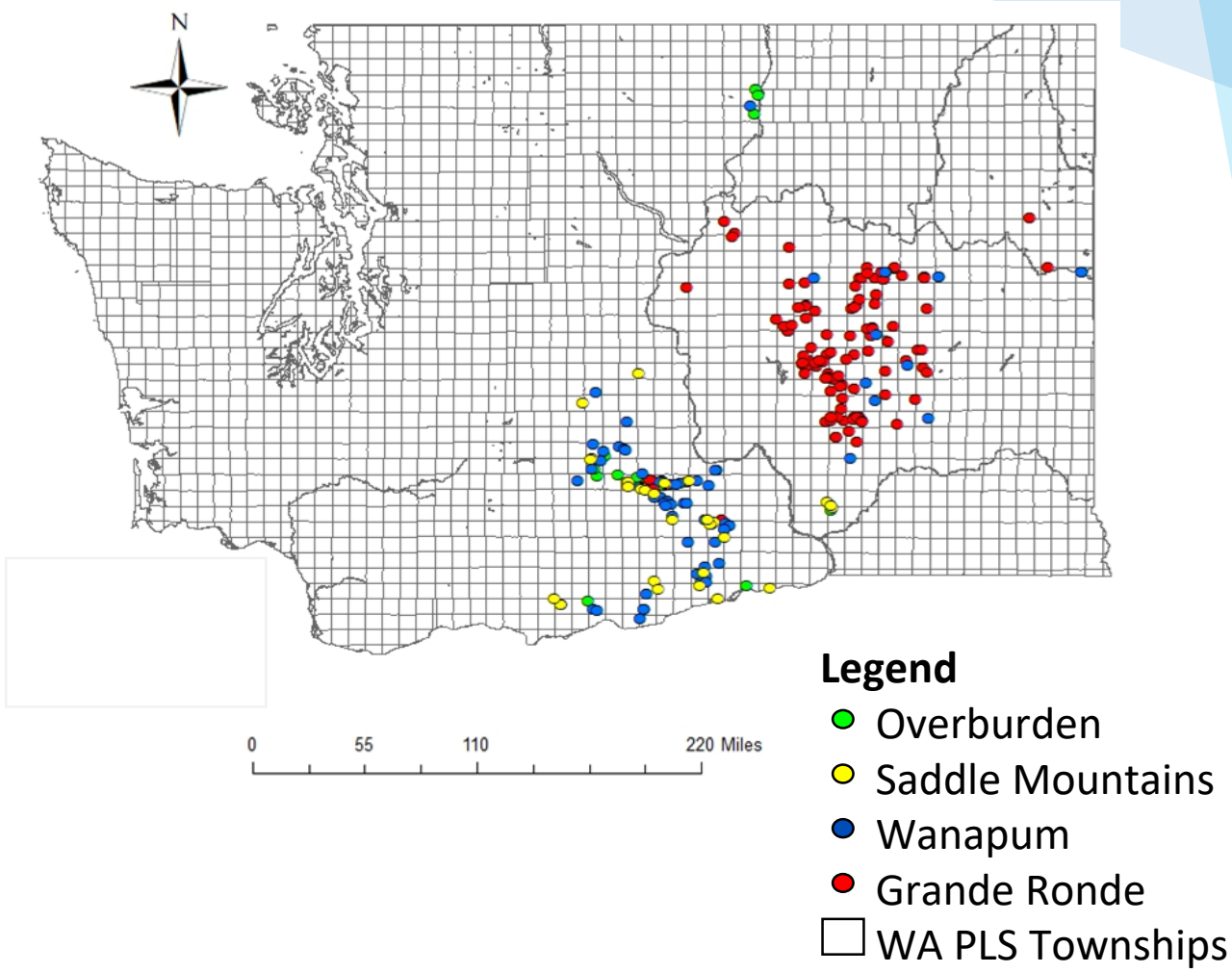
2016 Methodology for Groundwater Estimation

- **First time groundwater was incorporated into Forecast**
  - Reviewed literature to summarize current state of WA groundwater supplies
    - Identified areas of known groundwater decline
    - Identified existing data and/or models that could be used to further quantify groundwater changes in hotspot areas
    - Found further groundwater investigations needed in future Forecast assessments.

Drilling near Dallesport Washington, Klickitat County

2021 Methods for Assessing Groundwater Availability

- **Trend analysis**
  - How have recent (2000-2020) and long-term (1975-2020) water levels changed by aquifer layer?
- **Project trends to assess vulnerability**
  - Project current trends and compare to average well depths across aquifer layers



To improve Forecast results:

- **Top needs:**
  - **Water production data at a monthly or seasonal timestep** to more accurately account for water demands within a year.
  - **Groundwater level data on monthly or seasonal timestep** to help assess where groundwater declines may impact water production during peak drawdown and in Spring highs
- **Other lower priorities:**
  - Historical records of water production and groundwater levels
  - Knowledge about future water supply plans

Benefits from providing data:

1. **Better knowledge of how regional water use may impact your water supply in the long-term**
2. **Clearer understanding of how water use changes within a year in response to seasonal demands to support demand management**
3. **Ability to identify common issues/areas of concern that may need to be addressed at a larger scale between systems**
4. **Improved prediction of demand exceeding supply**

Thank You!

Questions?

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