Water in 2035: Water Supply and Demand Forecast for the Columbia River Basin

Jennifer Adam, Muhammad Barik, Kirti Rajagopalan, Mike Brady, Jon Yoder, Dan Haller, Sonia A. Hall, Georgine Yorgey, Chad E. Kruger, Keyvan Malek, Rushi Begum, Claudio Stockle, and Roger Nelson

The Columbia River Basin is intensively managed to meet a range of competing demands for water, and is essential for the growth and enhancement of the region. Every five years the Washington State Legislature requires an updated long-term forecast of water supply and water demand. The latest Forecast, completed in late 2016, used integrated biophysical-economic modeling to explore the impact of projected climate change, crop mix changes, and changes in water availability on water supply and demand by 2035.

Warmer temperatures, wetter winters and springs, and smaller and earlier snowmelt peaks are projected. While annual water supplies are projected to increase across the Basin (+14.63% (±8.29%)), timing will shift earlier: unregulated supply is projected to decrease 10.28% (±7.86%) from June-October, and increase 30.79% (±9.41%) from November-May (Figure 1). Climate change is projected to lead to a 3.98% (±0.83%) decrease in irrigation water demand, assuming irrigated acreage remains constant (Table 1). Projected changes in crop mix (e.g. shift towards more water-use efficient crops) would further decrease demand.

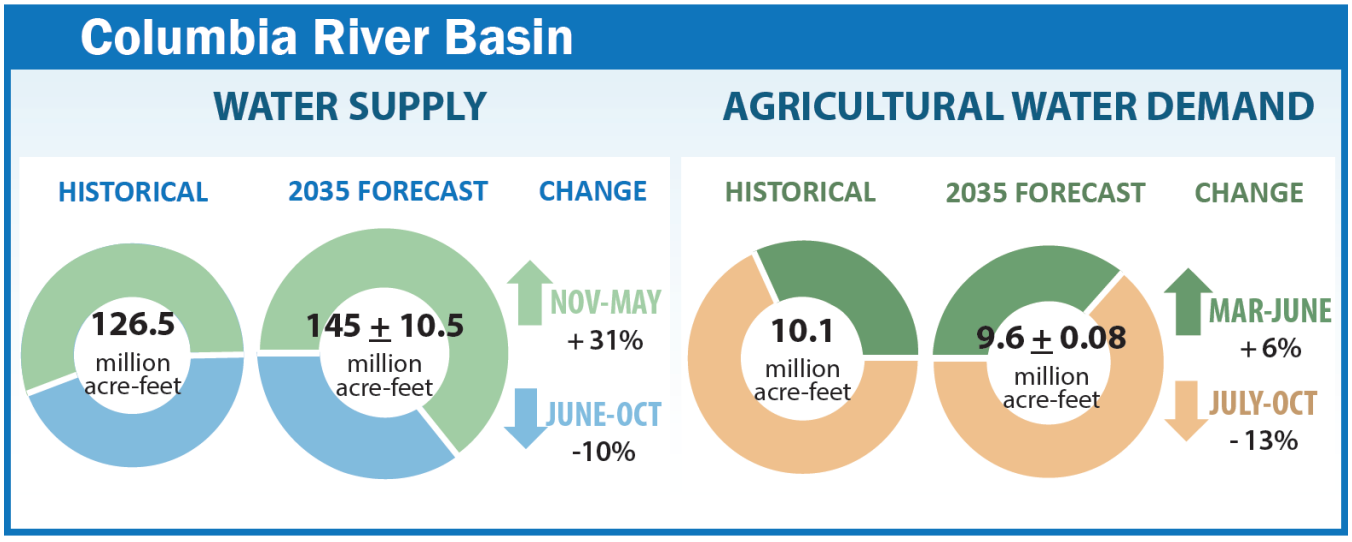

Figure 1. Summary of projected changes in annual and seasonal water supply and agricultural water demand across the Columbia River Basin 20 years into the future. Copied from Washington Department of Ecology Publication No. 16-12-005.

Though these annual supply and demand projections appear encouraging, there are important caveats to consider, including:

- Future producer or agency decisions, such as increases in double-cropping and increased irrigated acreage resulting from planned water storage projects, could lead to increased demand for irrigation water.
- These results reflect median years, while vulnerability to future climatic changes will be most apparent in drought years, generally expected to occur more frequently in the future.
- Frequency and magnitude of curtailments in the spring are projected to increase in some watersheds, likely because the shift in demand towards earlier in the season is expected to occur faster than the shift in supply.

Changes in Annual Demand for Eastern Washington by 2035

AGRICULTURE 	**- 6%** to **+ 4%**	**-332,837 to +169,973 acre-feet** depending on climate scenario, double cropping, and planned water supply projects. Decreases are due to wetter springs and projected shift to more water-efficient crops. Increases are projected with increases in irrigated acreage due to planned water supply projects.
MUNICIPAL 	**+ 18%**	**80,000 acre-feet** in total diversion demands for municipal and domestic water. Increase is due to projected increases in population.
HYDROPOWER 	**+12%** to **+25%**	**+35,000 to +75,000 acre-feet** in instream flows to provide sufficient additional hydropower generation capacity to meet projected increases in energy demand **for the entire Columbia River Basin.**

Table 1. Summary of projected changes in water demand for different uses in eastern Washington 20 years into the future. Copied from Washington Department of Ecology Publication No. 16-12-005.

Future forecasts will build on this work and may look more closely at these issues, as well as improving estimates of municipal and hydropower water needs, and the potential impacts of changes to the Columbia River Treaty with Canada.

For a summary of results of the 2016 Columbia River Basin Long-Term Water Supply and Demand Forecast, please check out Ecology Publication No. 16-12-005, available online at https://fortress.wa.gov/ecy/publications/SummaryPages/1612005.html

For the complete set of results submitted to the Washington State Legislature, please check out the 2016 Washington State Legislative Report, Ecology Publication No. 16-12-001, available online at https://fortress.wa.gov/ecy/publications/SummaryPages/1612001.html For additional technical details, please check out the 2016 Technical Supplement, to be released in February 2017 via the Washington Department of Ecology's Office of the Columbia River Publications page, https://fortress.wa.gov/ecy/publications/UIPages/PublicationList.aspx?IndexTypeName=Program&NameValue=Office%20of%20Columbia%20River&DocumentTypeName=Publication.