Oregon

Kate Brown, Governor

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MEMORANDUM

TO: Water Resources Commission

FROM: Brenda Bateman, Technical Services Division Administrator
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SUBJECT: Agenda Item P, November 20, 2015
Water Resources Commission Meeting

2015 Statewide Long-Term Water Demand Forecast Update

I. Introduction

This informational report provides an overview of the 2015 Statewide Long-Term Water Demand Forecast (Demand Forecast). The 2015 Demand Forecast, completed with consulting assistance from MWH Global, describes water demands based on potential future scenarios and conditions that communities around Oregon may experience; it is intended to be a tool to better understand how water demands may change over time.

II. Background

The Department first published a Water Demand Forecast in 2008, characterizing current and possible future water demands throughout Oregon. During the past eight years, several changes in Oregon have affected water demands, leading to a need to update the forecast as highlighted in Recommended Action 2A of the Integrated Water Resources Strategy.

Since the 2008 Demand Forecast, Oregon's population and municipal demands for water have increased. At the same time, the national economy has slowed and rebounded, leading growth in urban water use to be slower than anticipated. Recent global climatic conditions have trended outside of the historical ranges; Oregon has not been an exception. Annual temperatures have been warmer than normal, and crop water demands and planting dates have been shifting in response.

III. Scenarios

The Demand Forecast uses scenarios to compare current water demands with possible future conditions. The scenarios assume the same acreages and crop selections as the current scenario; therefore, projected increases in agricultural water demands result from projected changes in Oregon's climate. For agricultural water use, five future scenarios were utilized which included hotter-drier, hotter-wetter, warmer-drier, warmer-wetter, and an average of all the future climate predictions called a "central tendency" condition. These scenarios are based on the range of climate projections for 2050 at key agricultural meteorological stations across the state that project an increase in average annual temperatures of 0.5 to 5 degrees Fahrenheit and a change of -4.1 to +9.8 inches in precipitation .

Since climate is less of a driver in municipal and industrial demand than population growth, only one future scenario was developed which reported on forecasted increases in water demand due to population growth and per capita demand.

IV. Key Assumptions

The Demand Forecast is a tool to understand how water demands may change under specific and defined scenarios, but cannot predict actual future water use. Scenarios can be used to facilitate "what if" discussions to support planning for future needs. In developing these scenarios and estimates of demand, a number of assumptions were made. Assumptions in the Demand Forecast frame some of the levers that those undertaking planning efforts can adjust when determining how to address changing demands.

<u>Important Assumptions in Estimating Agricultural Water Diversion Demands</u>

- County crop acreages and the types of crops grown within each county are held constant between current (2015) and future (2050) conditions.
- The Net Irrigation Water Requirement (NIWR) calculations are based on crops being maintained in fully watered, optimal conditions, which may differ from actual agricultural practices. NIWR is the amount of irrigation water consumed by a crop under these optimal conditions. NIWR does not account for limits on water availability, and thus potential real-world shortages and water right permit conditions (e.g.; duty limits) are not considered in these calculations.
- Total diversion demand is the volume of water diverted to meet the crop's consumptive demand plus the amount of water needed for conveyance, and application efficiency. Calculation of total diversion demand is based on a NIWR that assumed conveyance efficiencies of 80 percent and application efficiencies of 66 percent. These efficiencies are based on reported information in the 2008 Water Demand Forecast and do not consider any efficiency improvements of agricultural technologies or practices that have occurred since 2008 nor actual local conditions. Local conditions will likely differ from these assumptions.

- Livestock water demands, which accounted for 0.5 percent of the statewide agricultural water demand in the 2008 Water Demand Forecast, were not considered in this report. However, irrigation for livestock forage grown in Oregon is accounted for in the agricultural water demands of the report.

Important Assumptions in Estimating Municipal and Industrial Water Diversion Demands

- Expected changes in population by 2050 were based on forecasts obtained from the Portland State University (PSU) Population Research Center, with data from the Oregon Office of Economic Analysis 2000 county forecasts used to fill in gaps in the PSU forecast.
- Changes in per capita demand were estimated using 50 of the most recent Water Management and Conservation Plans (WMCPs) from communities across Oregon. For communities without recent WMCP's, changes in per capita demand were estimated using reported values from communities with similar residential and industrial mixes
- Many WMCPs stated that the most cost effective water conservation and efficiency projects have already been implemented and a majority of the water savings from these planned conservation efforts have already been realized. Further conservation efforts would likely require significant investments.

V. Estimated Changes in Water Demand (by 2050) for Range of Scenarios

The Executive Summary of the 2015 Demand Forecast is attached. A growing population and changing crop demands are the two major drivers of increases in consumptive water demands. When combining estimates for both agricultural and municipal/industrial demands under the scenarios presented in the Demand Forecast, total statewide diversion demand is estimated to increase between 10 and 15 percent by 2050 (baseline of 2015).

Agricultural Water Demands

Under the various scenarios explored for agricultural water demands, expected increases in temperature drive increases in water demand, even under the wetter scenarios. This is because increases in temperature will lead to longer growing seasons and increase crop's overall consumptive water demand. As a result, demands for irrigation water would be expected to increase by 7 to 14 percent under the various scenarios, or by up to a diversion volume of over one million acre-feet per year.

Municipal and Industrial Water Demands

Increases in population of 40 percent (~1.5 million people) by 2050, would be expected to increase municipal and industrial water demands by 20 percent. Population is the key driver, since there is minimal projected change in average per capita demand (combined domestic, industrial, and commercial) for municipal and industrial demand.

VI. Conclusion

The Demand Forecast is a tool to understand possible water demands in the future under different scenarios, both at the state level and locally. Understanding the potential range of increases in consumptive demands, provides important information for state and local level decisions to help plan for meeting Oregonians future water needs.

Attachment

1. 2015 Statewide Long-Term Water Demand Forecast Executive Summary

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Starting the Discussion

To assist with local discussions and water supply planning, the Oregon Water Resources Department has launched the Water Resources Development Program, providing funding and technical assistance for Place-Based Planning, Feasibility Studies and the implementation of Water Supply Development projects.

For more information about these programs, please see the Department's website or scan the QR code to the right.

Place-Based Planning

Place-based planning is a voluntary, locally initiated and led effort in which a balanced representation of water interests within a basin, watershed or groundwater area work in partnership with the state to: characterize current water resources and issues; understand current and future instream and out-of-stream water needs; identify and prioritize strategic solutions to address those needs; and, develop a placebased integrated water resources plan that informs the state strategy.

Feasibility Studies

Once potential projects are identified, communities often find it difficult to secure funding to assess their viability. This program component addresses that need by providing grant funding to cover 50% of the cost of conducting feasibility studies for potential water conservation, storage and reuse projects. A feasibility study is an assessment of the practicality of a proposed project or plan and can be used to determine if and how a project should proceed to the implementation phase.

Implementation

The Water Supply Development Grants & Loans account provides grants and loans to evaluate, plan and implement instream and out-of-stream water projects that have economic, environmental and social/ cultural benefits. Eligible projects include, but are not limited to projects that: increase water use efficiency; protect or restore stream flows; develop new or expanded storage; allocate federally stored water; and, promote water reuse or conservation.

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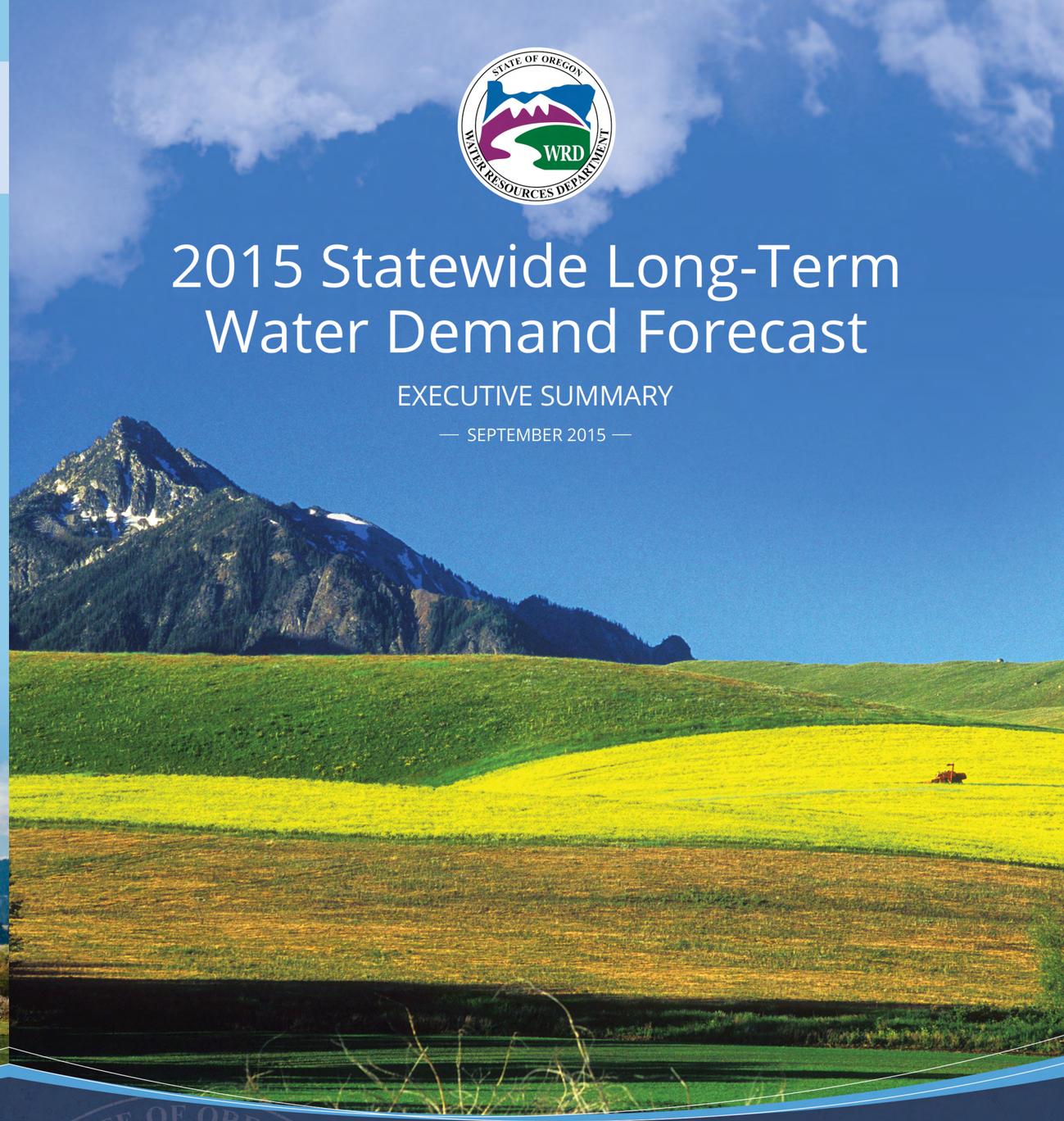
2015 Statewide Long-Term Water Demand Forecast

EXECUTIVE SUMMARY

— SEPTEMBER 2015 —



OREGON WATER RESOURCES DEPARTMENT

In Partnership with MWH

BUILDING A BETTER WORLD

OUR MISSION

To serve the public by practicing and promoting responsible water management through two key goals:

To directly address Oregon's water supply needs, and

To restore and protect streamflows and watersheds in order to ensure the long-term sustainability of Oregon's ecosystems, economy, and quality of life.

What We Know

Water is the key to the health of Oregon's economy, environment, and communities; and to sustaining life itself. To better identify what is ahead in the state's water future, the Department developed the 2015 Statewide Long-Term Water Demand Forecast (2015 Demand Forecast), as called for in the 2012 Integrated Water Resources Strategy. We must plan for our future water needs and this document is an important supporting step.

Climate simulations for Oregon project an increase from 1970-1999 to 2041-2070 of average annual temperatures of between 2.0 to 8.5 degrees Fahrenheit. Annual precipitation within the same period is projected to change by -5% to +14%. Summer rainfall is projected by many models to decrease by as much as 34%.

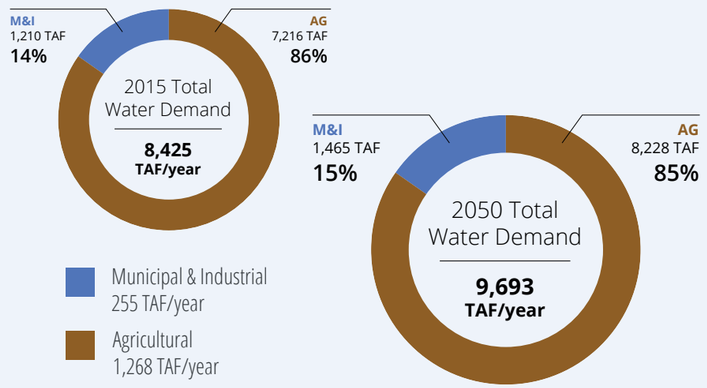
Scan this QR code to link to a copy of the 2015 Demand Forecast.

Starting the Discussion

The *2015 Demand Forecast* is a conversation starter, describing potential long-term water needs in an Oregon that may not be able to rely on historic patterns to predict future rainfall and snowpack. Some counties and basins may face potentially important changes by 2050 because of the resulng growth in water demand. The total change in water demand rests on numerous assumptions about the future, assumptions that communities, governments and private partners can address together.

The document builds upon the *2008 Statewide Water Needs Assessment*, which explored future scenarios or pathways to possible conditions, based on certain assumptions. The 2015 studies, scenarios, and assumptions include a projected increase in both population and a longer, warmer growing season, leading to more demand from agricultural, commercial, residential and industrial water users by 2050. Oregon's agricultural sector currently accounts for 85 percent of the state's diverted water and irrigation needs are predicted to increase. If a hotter-drier scenario does develop, Oregon could be faced with a need for an additional 1.3 million acre feet of water annually, or nearly 424 billion gallons per year.

Possible Trends in Oregon's Water Use

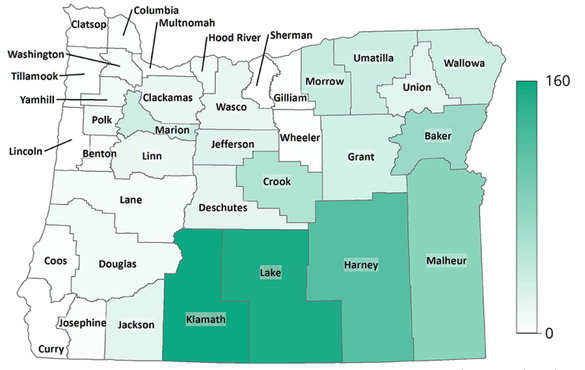


BY 2050, OREGON'S STATEWIDE DIVERSION DEMANDS ARE EXPECTED TO GROW BY APPROXIMATELY

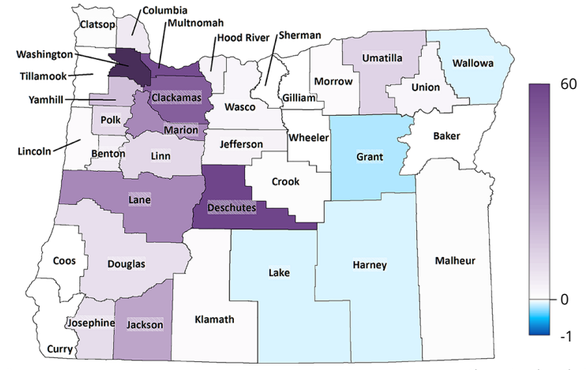
1.3 MILLION AF/YEAR

(255 TAF/year from Municipal & Industrial and 900 TAF/year from Agricultural)

CHANGES TO COME *by* 2050



Change in volume by 2050 (thousand acre feet)



Change in volume by 2050 (thousand acre feet)

Change in Annual Agricultural Demand

Possible changes in agricultural water demand are expected to result from changes in the climate that could prolong the agricultural growing season, increase day-to-day demands for water, and ultimately increase the volume of water needed to sustain irrigated agriculture.

INCREASES IN AGRICULTURAL DEMANDS

UP TO 9%	UP TO 8.5°	UP TO 14%
Increase in the total consumption of water by Oregon's crops	Increase in temperature by mid-century	Increase in statewide average irrigation demands

Change in Annual Municipal & Industrial Demand

Shifts in municipal and industrual water demands are expected to echo increases and decreases in the state's population. The areas with the largest predicted increases in population include existing major population centers of the state.

CHANGES IN MUNICIPAL & INDUSTRIAL DEMAND

20%	40%	+1.5 GALLONS PER DAY
Projected increase in M&I demands	Projected increase in population statewide (~1.5 million people)	The statewide average M&I water use is expected to increase slightly, from 150.5 to 152 gallons per day, per person.

Answering the Challenge of Increased Demand

The Oregon Integrated Water Resources Strategy demonstrates the commitment by the Oregon Water Resources Department to public involvement, innovation, planning, and investment. Each of these core values are foundational to Oregon's efforts to assist local and regional communities in prioritizing and developing long-term water supplies.

Understanding Oregon's Water Resources

Collecting and providing crucial monitoring data about groundwater, streamflow, and water needs are complemented by studies and assessments of the resource. Addressing changing conditions such as population and climate are key to helping communities across Oregon prepare to meet future water needs.

Managing Oregon's Water Resources

With five regional offices and 21 watermasters, the Oregon Water Resources Department provides on-the-ground services to commercial, residential and industrial water users. This includes ensuring dam safety, ensuring water rights are enforced for both instream and out-of-stream users, and providing technical assistance to Oregon's communities.