



# MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

*Rely on us.*

TO: Commissioners Brown, Carlson, Barofsky, McRae and Schlossberg

FROM: Matthew Schroettig, Power Planning Supervisor & Staff Counsel;  
Jonathan Hart, Power Trader

DATE: May 3, 2022

SUBJECT: Water Supply Forecasting for Electric Generation Resources

OBJECTIVE: Information

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## **Issue**

Power Planning is presenting on EWEB's 2022 water supply forecast for electric generation resources. The purpose of this presentation is to provide the Board with insights into how hydroelectric resources drive change in EWEB's portfolio, and how staff monitor the physical and financial impacts of those changes.

## **Background**

In an average year, approximately 75-80 percent of EWEB's total electric generation comes from hydroelectric resources. Like all renewable resources, the incremental cost of hydroelectric generation is assumed to be very low, because the fuel for hydro electric generators (water), is functionally free. However, unlike conventional thermal generation resources, the fuel supply for hydroelectric generation resources is variable, meaning that in any given year the amount of generation produced by these resources can change. As such, this type of electric resource creates forms of operational and financial risk to the utility, which require ongoing management and prudent planning. EWEB's electric portfolio contains three main sources of risk including hydroelectric generation (hydro risk), retail revenue, and wholesale market prices. Of the three risks, hydro risk, due to water supply uncertainty, is generally EWEB's largest single source of electric portfolio financial risk.

Hydro risk management occurs at every level in the Energy Division. It can impact staff's ability to balance the portfolio in the next hour, day, month, and year. Its continuous presence influences the way staff hedge the portfolio, manage compliance, and plan for the future. The presentation on EWEB's 2022 water supply presents a high-level view of EWEB's hydro risk for the current year, but the lessons on the underlying uncertainty in 2022 can help provide meaningful context to hydroelectric generation as a resource, and the role it may serve in EWEB's next Integrated Resource Plan (IRP).

## **Discussion**

During the May Board Meeting, staff will present EWEB's 2022 water supply forecast for electric generation resources. This presentation brings high-level context for why EWEB forecasts water supply, the assumptions we make at the start of every water year, and this current year's water supply. After the presentation, the Board should have a better understanding of how EWEB's current water supply compares to historical water years, including 2021. The Board should also have a better understanding of the connection between water supply and EWEB's financial risk in general.

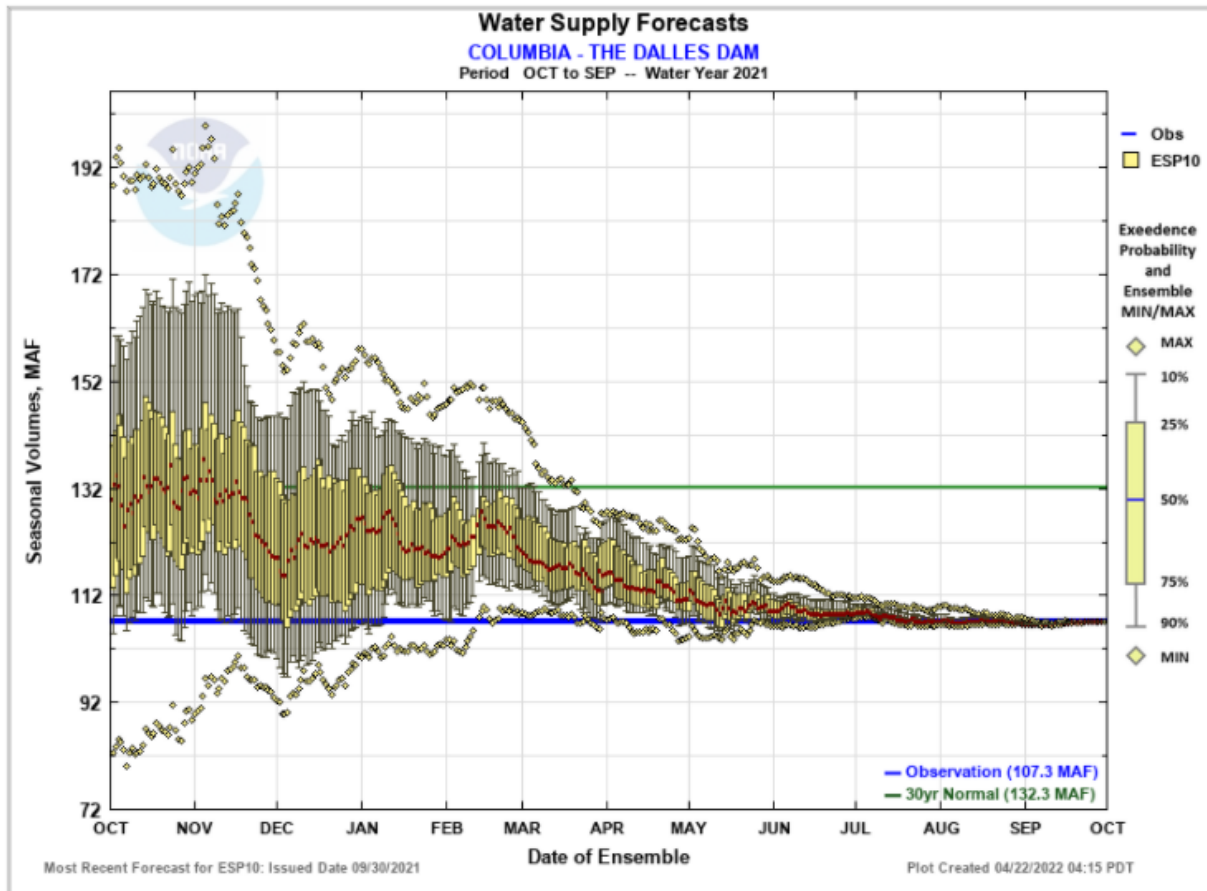
There are some technical terms and concepts that will be used during the presentation, which may need explanation. To limit confusion, some of these items are defined below.

- **Columbia River Basin:** A drainage basin that feeds into the Columbia River, spanning parts of seven US states and one Canadian province. All of EWEB's owned and contracted hydroelectric resources are located in this basin, including all Bonneville Power Administration resources.
- **La Nina/El Nino:** La Nina and El Nino climate conditions are the result of a cycle of oceanic oscillations that can influence changes in seasonal temperature and rainfall. In the northwest, La Nina water years are frequently wetter and colder than other years on average.
- **Median, Expected, Budget, Firm:** These terms are applied to different hydro forecast scenarios. Generally, they indicate the probability that EWEB will realize that level of forecasted generation or better. It's very probable that EWEB will realize a more conservative, "firm" forecast or better. A median forecast is supposed to reflect a level of generation that on average EWEB will realize 50 percent of the time.
- **Risk:** Risk is defined in a lot of ways, but for hydroelectric generation we can generally say that it's the *potential* loss in portfolio value due to a reduction in forecasted generation. The loss can come from reductions in wholesale revenue, increases in purchased power cost, or both.
- **Slice/Block:** These are the names given to the two energy products that EWEB buys from the Bonneville Power Administration through the Regional Dialogue contract. The Slice product contains direct hydro risk where the amount of available Slice generation can change hourly. The Block contract contains indirect hydro risk that may result in a financial impact to EWEB through changes in BPA's rates.
- **Water supply forecast vs generation forecast:** Water supply forecasting attempts to forecast the amount of water (fuel) available for hydroelectric generation, but it is only one component of a generation forecast. To convert water supply to generation you need to also know the efficiency and non-power requirements (e.g. spill, fish passage, bypass flows) of the plant. Water supply and generation forecasts are positively correlated, but generally the relationship is non-linear; a 1% change in water supply does not always result in a 1% change in hydroelectric generation.
- **Water year:** A water year is a 12-month period, starting in October and ending in September of the following calendar year. Hydrologically speaking, the Columbia River "resets" itself at the start of each water year, meaning that the initial condition of the system are roughly the same every October. EWEB's 12-month budget year, spans parts of two water years.

The presentation uses a couple different box-and-whisker diagrams to illustrate a potential range of forecasted outcomes. One such chart, example shown below in Figure 1, shows a daily history of 2021 water supply forecasts starting in October of 2020. As you read the chart, from left to right, the box-and-

whisker diagrams begin to “shrink” towards a central point indicating that the probabilistic range of forecasted outcomes is converging towards a single observed outcome for the year.

**Figure 1: Water Year 2021 – Example Water Supply Forecast Chart**



**Recommendation**

No recommendation is made at this time. Further information on EWEB’s use of hydroelectric generation resources to meet customer needs will be included 2022 IRP update.

**Requested Board Action**

No action is requested at this time. This is information for Board awareness only.