MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO:	Commissioners Mital, Simpson, Helgeson, Manning and Brown
FROM:	Mel Damewood, Engineering Manager; Mike McCann, Generation Manager; Lance Robertson, Public Affairs Manager; Steve Newcomb, Environmental Services Manager; Brad Taylor, Water Operations Manager; Karl Morgenstern, Environmental Services Supervisor and Drinking Water Source Protection Coordinator; Mark Zinniker, Generation Engineering Supervisor
DATE:	Aug. 21, 2015
SUBJECT:	McKenzie River issues, projects and initiatives
OBJECTIVE:	Information in advance of Sept. 1 Board meeting in Leaburg

Issue
Each year, the Board of Commissioners holds a meeting in the McKenzie River area that is served by the utility, to inform customers about EWEB issues of importance to them, and to provide an opportunity for upriver customers to engage the Board with questions or comments. The upriver meeting this year is scheduled for Tuesday, Sept. 1, from 6:00 p.m. to approximately 9:00 p.m., at the McKenzie Fire & Rescue Training Center, 42870 McKenzie Highway, Leaburg.

Background
This year's format follows a traditional agenda, with public input scheduled as one of the first items, followed by board action items and then general business items. Doors will open at 5:30 p.m., with an opportunity for commissioners and staff to meet informally with early arrivals from the community.

Management will conduct three presentations of interest to McKenzie River Valley customers:

- An overview of the current low-water river conditions and impacts to EWEB's water filtration plant and hydroelectric generation on the McKenzie River.
- An update on repairs to the Leaburg Dam roll gates.
- An overview of EWEB's development of a forest management plan for forestland property the utility owns near Leaburg.

This memo provides background materials in advance of those three presentations, as well as information and updates on other EWEB projects, initiatives and issues in the McKenzie River area. Due to the contributions of multiple EWEB employees with this memo, please direct questions in advance of the Sept. 1 meeting to General Manager Gray, who will then ask the appropriate staff person to respond.

Discussion
The following offers information about the three agenda items referenced above as well as other McKenzie-related issues. For the agenda items, staff will conduct a brief presentation and then open it up for questions from commissioners.

Leaburg Dam roll gate repair status
EWEB's recovery from the roll gate hoist system failures at Leaburg Dam is progressing well. Roll Gate No. 2 was released for fully automated operation in February 2015. To date, Leaburg operations staff report robust equipment quality and superior performance relative to the old hydraulic motor hoist systems. EWEB issued a "notice to proceed" for Knight Construction to begin work on replacing the failed Roll Gate No. 1 hoist system immediately after the Board approved a contract amendment in May 2015. As required by the Federal Energy Regulatory Commission's regional dam safety engineer, the new system currently under construction essentially will be identical to the hoist installed for Roll Gate No. 2. The contractor has also purchased a third hoist for Roll Gate No. 3, which will be installed in 2016, also per the FERC's requirement.

The construction work this summer has been smooth and is currently progressing ahead of schedule. Lessons learned during the Roll Gate No. 2 construction work are paying off with respect to both construction activities and coordination with the affected public. The contractor's latest schedule shows full operation Roll Gate No. 1 in early November 2015. The contractor will return to replace the Roll Gate No. 3 hoist system in May 2016 (post flood season) and expects to complete the final phase of work in October 2016.

EWEB also continues to engage customers affected residents and entities (such as the U.S. Postal Service) regarding closure of the road across Leaburg Dam. In general, the road is closed weekdays during construction, from 8 a.m. to noon and 1 p.m. to 4 p.m. Public Affairs updates residents, via an email list and web site, of any changes to the schedule. Feedback from residents on the communications effort has been positive.

The costs incurred to date for the roll gate replacement work total $2.9 million. The total project costs by the end of 2016 are anticipated to reach $5.5 million. Cost projections remain consistent with the budget allocation for 2015 and CIP budget recommendation for 2016.

Leaburg Forest Management Plan
The McKenzie Watershed is comprised of 88% forested land, with a mixture of public and privately-owned lands. Forested watersheds, like the McKenzie, produce better water quality than any other land uses. However, some forest management activities can adversely impact downstream water quality, including aerial application of pesticides, road building and failures, and various timber harvest techniques. The Healthy Forests Clean Water Program, part of EWEB's source protection activities, aims to increase the economic viability of forestry in the area while reducing chemical use and other potential impacts to the watershed from forestry activities.

The EWEB Leaburg Forest is a patchwork of properties bordering the Leaburg canal (see Attachment) consisting of approximately 500 acres, of which over 350 acres are forested. The land was purchased in the 1920s during construction of the Leaburg hydroelectric project, largely to safeguard the canal from landslides. The forest was managed into the early 1970s by an EWEB contractor through selective harvests. Since the early 1970s, activity in the area has been limited to the removal of hazard trees.

EWEB is now interested in developing a management plan for the Leaburg Forest to guide future activities on the property and to demonstrate forestry practices that are protective of water quality and forest health. Previous research into using the Forest as a local carbon offset marketplace concluded that without recent management to establish baseline conditions, this was not viable. However, there is an opportunity to improve forest conditions for fish and wildlife habitat, to mitigate fire and nuisance risks, provide education and recreation benefits, and maintain the stable slope conditions above the canal that are necessary for safe power generation.

This past spring, EWEB released a Request for Proposals for professional forestry consulting services to develop and implement a forest management plan that meets multiple objectives, including sustainable timber harvest, clean water, soil stability, wildlife habitat and recreational opportunities. Trout Mountain Forestry,

out of Corvallis, was selected through this competitive process, and is in the beginning stages of creating the management plan as well as partnering with EWEB in a public outreach process. Project representatives will share more information with the EWEB Board about their early thinking around stakeholder engagement and potential forestry activities for 2016.

Current river conditions

As you are well aware, we are in the midst of a drought and experiencing historically low-flow conditions on local rivers. Current flows in the McKenzie are at or below the historic lows for this time of year.

In the McKenzie basin, impacts resulting from climate change have been predictively modeled (Gordon Grant, Christina Tague and Kathleen Farley, 2010) using climate change altered inputs. The model shows that although the McKenzie is driven by spring water, the relative impacts of shifts in snow patterns and precipitation will be more significant for the McKenzie than for other less spring water dominated systems. The winter of 2014 provides a glimpse of a future with minimal snow accumulation and near normal rainfall amounts in the High Cascades. Measured river flows for 2014-15 are attached as figures for Clear Lake (headwaters), Vida and Hayden Bridge gauges with historical reference flows for comparison. The highlighted flows for 2014-15 show almost no snow melt response in the spring and flows decreasing to base flow levels by early June. Environmental impacts of reduced flows include impacts to salmon attempting to migrate and spawn in the spring (usually helped by high flows) and significantly reduced flows in the summer season. Additionally, reduced flows increase vulnerability of the watershed to fire, increase the potential for algal blooms in reservoirs and increase water temperatures in the river. The impacts noted this year are the result of 1-year of reduced snowpack in the headwaters of the McKenzie. Models predict that accumulated impacts will be more significant, impacting the upper reaches of the McKenzie drainage over time and significantly reducing overall flows in the river. As an example of the magnitude of the 2014-2015 impact, mean average flows at Vida over the past decade for May have been close to 8,000 cfs (spring runoff) and this year flow at Vida averaged less than 2,000 cfs for May. The only other year of record with a similar flow condition is 1977 which was an isolated 1-year low flow season.

Low flows have not yet had any significant impact on EWEB's ability to draw water from the McKenzie for potable water consumption. Water treatment has exceeded 50 million gallons on only three days so far this summer. Given the extended periods of high heat and lack of precipitation, we normally would expect to see daily consumption in the 55 to 60 million gallons per day range. EWEB has conducted a public outreach campaign this year to encourage customers to be mindful of water use during these hot spells, which may have had an impact on customer consumption patterns.

For comparison purposes, the all-time high daily water consumption was about 72 million gallons on July 28, 1998. The water-treatment plant has the capacity to treat and deliver about 82 million gallons per day. At 50 million gallons per day, EWEB is drawing about 5 percent of the McKenzie's flow (at 1,800 cfs).

Hydroelectric generation on the McKenzie

Hydroelectric generation relies on water as the fuel to spin the turbine. Turbines, when designed and constructed, are based on a minimum, typical and maximum flow range. When there is too much water we can bypass excess flow either past the intake or over the spillway. It's not so easy when there is too little water, as there is this year. As the amount of water decreases, turbines operate less efficiently and they are subject to a variety of operational issues such as increased vibration and cavitation. These issues can damage the turbine, resulting in costly, and unplanned, repairs. As inflows drop and output drops, the risk of damaging the unit becomes greater than the benefit of the output. As a result, we generally shut down turbines when inflows reach a critical minimum level.

We did this in early July at the Trail Bridge plant at Carmen-Smith. It wasn't the first time we've had to turn off Trail Bridge due to low water conditions, but it was earlier in the year than anyone remembers. The next plant to go off line on the McKenzie will likely be the Walterville Plant. While it continues to operate at this time, the output from the plant is very low. It is also likely that the Leaburg Hydroelectric Project, which was reduced from two to one operating turbines in May, will go offline sometime in September.

Our final, and largest, McKenzie River generating plant is the Carmen powerhouse at Carmen-Smith. The Carmen plant normally only operates for part of the day during periods when wholesale power prices are higher. We will be able to continue operating the Carmen plant in a peaking mode, although the peaks (output) and the duration of operation will continue to decrease as inflow decreases. During the winter, we often run both Carmen units at the same time. For the remainder of the summer and into early fall, we will be limited to one unit operation at Carmen. The lake level at Trail Bridge will also remain fairly constant and all water exiting the project will leave via the spillway.

The bottom line is that by sometime in September, our only McKenzie River generation will be one Carmen turbine, and even that will be on a very limited schedule. This directly impacts our power supply and our financial condition. However, we aren't the only utility in this situation. Up and down the West Coast, utilities are struggling to deal with a lack of water for hydroelectric generation. Our best hope is for an early and wet winter.

Wildfire Emergency Preparedness for Generation Facilities

Hydroelectric generating facilities, by their nature, tend to be located in rural or remote forested areas, and, consequently, especially in the western United States, subject to the risks and concerns that come with the possibility of wildfire. This is especially true in times of drought. EWEB's facilities are no different, and we plan and prepare for wildfire on an annual basis. Our preparation includes prevention, protection, response and evacuation planning.

At Carmen-Smith, which is located almost entirely on national forest land, we meet with U.S. Forest Service (USFS) fire managers from the McKenzie Ranger District prior to fire season for inspection and preparation. We also work internally on a staff and family evacuation plan and a facility make safe plan. During fire season, we track and follow all USFS rules for work during fire season. In the event of a forest fire near Carmen-Smith, we work with and respond to the USFS and will shut down, make safe and evacuate as instructed.

At Leaburg and Walterville, we tend to work more directly with the Oregon Department of Forestry (ODF) and McKenzie Fire & Rescue. EWEB is on contact lists for both organizations and we meet with them regularly. We follow ODF fire prevention rules and notify McKenzie Fire when doing work during fire season. Similar to Carmen-Smith, we have shut down, make safe and evacuation procedures in place for the Leaburg and Walterville Projects.

Both McKenzie River facilities have pickup-mounted fire pump and hose equipment for fire protection at job sites. Work plan review and daily tailboard safety sessions review fire prevention and protection as well as evacuation.

Wildfire impacts to the McKenzie Watershed will depend on severity, size, and location of the fire and method of attack. Impacts could include increased ash/debris and sediment loads during initial storm events post fire. If large quantities of retardant are used this could lead to increased nutrients in the system and result in algal blooms in impacted reservoirs, ponds and slack water areas of the river. These impacts could potentially result in increased treatment costs and formation of disinfection byproducts.

McKenzie Valley Transmission and Substation Projects
Several transmission lines run through the McKenzie River Valley, including two owned and operated by Eugene Water & Electric Board. One EWEB transmission line runs between the Leaburg powerhouse and EWEB's Hayden Bridge water treatment plant. A second EWEB transmission line parallels the first line between Leaburg and the Walterville powerhouse, then crosses the river to the Thurston area substation. In addition to the EWEB transmission lines, Bonneville Power Administration (BPA) owns a line that connects the Carmen Smith and Cougar generation sites with the I-5 corridor (McKenzie Substation), which also runs within 1,200 feet of the Leaburg generation site.

Over the next two years, EWEB will be working to connect the Leaburg generation site to the existing BPA transmission lines mentioned above. This interconnection will eliminate the need for approximately 8 miles of two parallel EWEB transmission lines (16 circuit miles) running between Leaburg and Walterville, but will require the construction of a substation approximately 1,200 feet west of the Leaburg generation site where the BPA line passes. The new substation is identified as the Holden Creek Substation.

Besides the social and environmental benefits of removing 8 miles of parallel lines, as well as avoiding the high reconstruction cost of the transmission lines being removed, the Holden Creek substation will also increase reliability and move oil-filled equipment, including transformers, away from the Leaburg tailrace and the McKenzie River. Much of this equipment dates back to the 1940s. Presently, the Holden Creek Substation is being planned and designed for construction to begin in mid-2016. Depending on equipment procurement and BPA interconnection, the completion of the substation will range between late 2016 to mid-2017.

The removal of parallel transmission lines between Leaburg and Walterville, and the construction of the Holden Creek Substation, are the first of potentially several transmission changes in the McKenzie River Valley. Over the next 20 years, EWEB intends to evaluate and potentially remove additional transmission lines between Walterville and Thurston and Hayden Bridge, including several river crossings. The timing of these changes will depend on other infrastructure projects including upgrades and interconnections.

Recommendation
None; information purposes only.

Requested Board Action
None. As mentioned previously, due to the contributions of multiple EWEB employees with this memo, please direct questions in advance of the Sept. 1 meeting to General Manager Gray, who will then ask the appropriate staff person to respond.