MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO:	Commissioners Brown, Carlson, Mital, Simpson and Helgeson
FROM:	Mike McCann, Electric Generation Manager; Lisa McLaughlin, Environmental Supervisor
DATE:	November 21, 2018
SUBJECT:	2017 EWEB Operational Greenhouse Gas Inventory
OBJECTIVE:	Information Only

Issue

EWEB has been tracking operational (internal) greenhouse gas (GHG) emissions since 2009. Included with this correspondence is the 2017 report.

Background

Sources of operational GHG emissions include natural gas, fleet fuel, electricity, and fugitive releases of refrigerants and insulating gas (SF_6).

Discussion

The purpose of the 2017 GHG report is to track progress towards EWEB's emissions reduction goals. It will also be posted on the EWEB website so that it may be easily viewed by the public.

Requested Board Action

None. This memorandum is provided for informational purposes only.

EUGENE WATER & ELECTRIC BOARD 2017 OPERATIONAL GREENHOUSE GAS INVENTORY

Executive Summary

Between 2009 and 2017, the Eugene Water & Electric Board's (EWEB) Scope 1 and 2 emissions have decreased by 3,972 MT CO_2e, or 35%, using location-based accounting for electricity. This decrease is primarily due to a 39% reduction in fossil fuel fleet emissions and a 30% reduction in electricity based emissions, which is largely the result of a reduction in the location-based emissions factor for electricity consumption (Figure 1). EWEB's emissions in 2016 were the lowest during the reporting period (2009-2017) at 7,404 MT CO_2e. This is primarily related to the relatively low location-based emissions factor that was applied to energy consumption that year, during which there was above average Columbia Basin snowpack that resulted in an optimal year for hydropower generation. EWEB's fleet also had its greatest reduction in emissions in 2016, at 56%, due to the increased use of biofuels. Figure 2 considers the same emissions sources, but uses the significantly lower market-based emissions factor (first made available in 2010). For more details on location-based vs. market-based accounting, see the section *Calculating the Carbon Footprint of Electricity Use* on page 12.

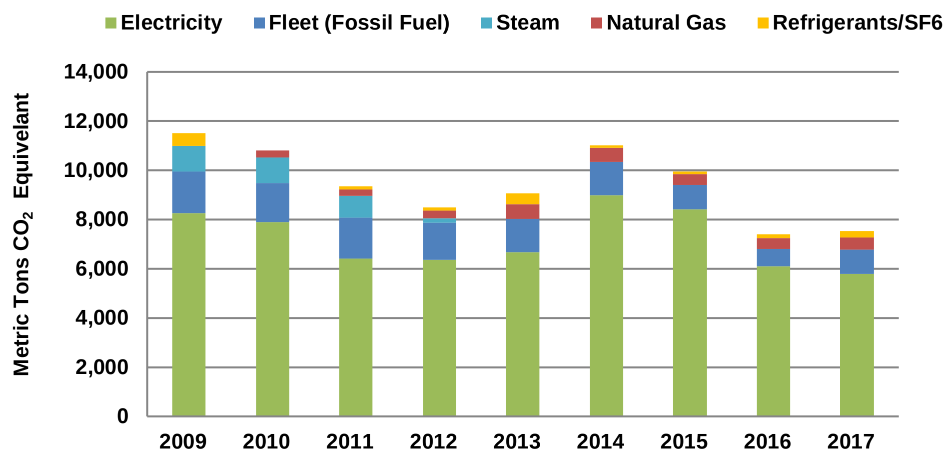


Figure 1. Scope 1 and 2 emissions using location-based emissions factor, 2009-2017.

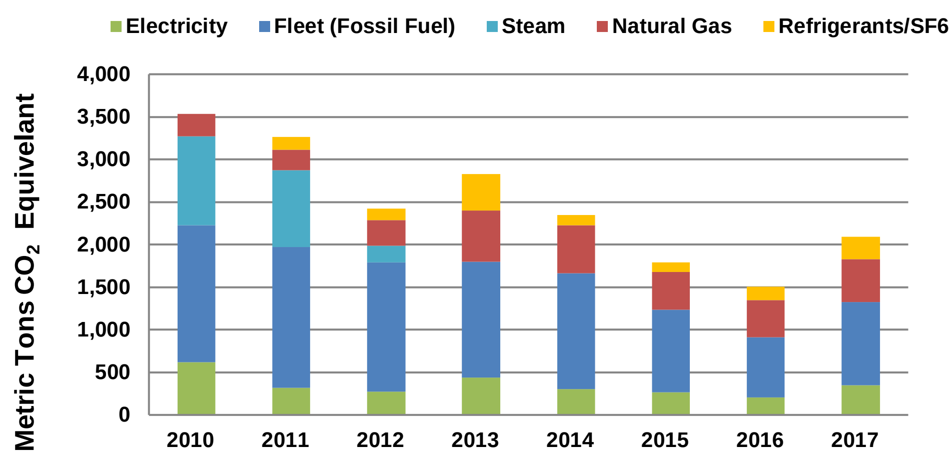


Figure 2. Scope 1 and 2 emissions using market-based emissions factor (first made available in 2010), 2010-2017.

Overview

In order to better understand our contribution to global climate change and to measure our progress in reducing our climate impacts, EWEB annually prepares a greenhouse gas (GHG) inventory. The focus is on the GHG emissions associated with core business operations, such as fleet fuel consumption, electricity, and natural gas use. In 2011, EWEB GHG emission reduction goals were developed to set a target for reductions within our own operations. The goals are:

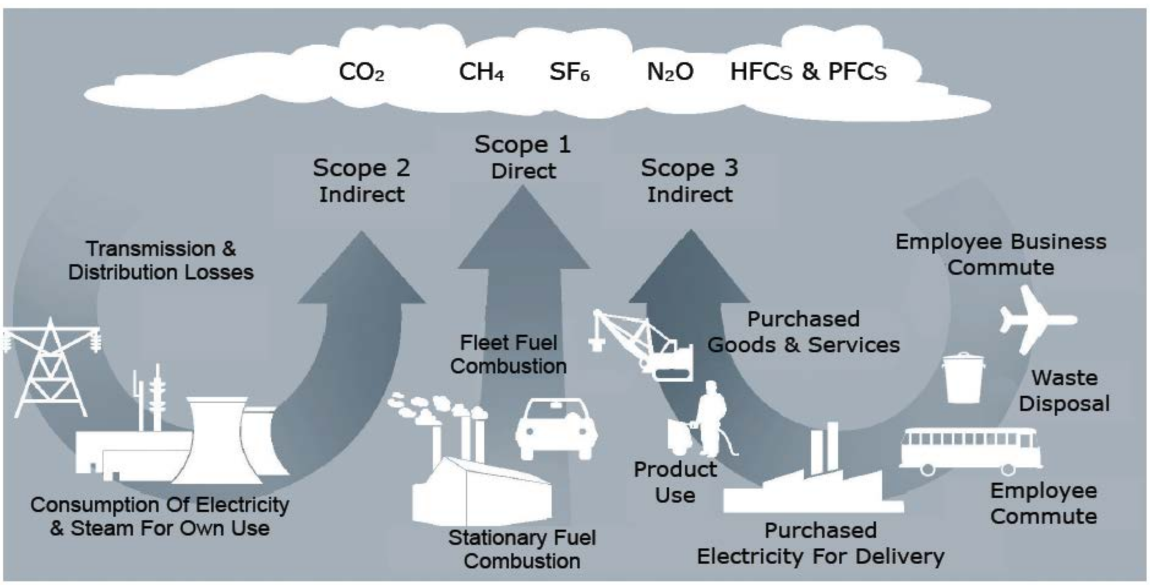
- By 2020 achieve greenhouse gas levels 25% below 2009 levels in all EWEB operations
- By 2030, reduce fossil fuel use by 50% (compared to 2009 levels)
- By 2050, EWEB operations will be carbon-neutral (i.e. reduce net carbon to zero)

In quantifying our operational emissions, EWEB follows the guidelines of The Climate Registry's General Reporting Protocol. Per The Climate Registry's protocol, emissions sources are divided into three reporting scopes (see Figure 3 below).

Scope 1 – This includes direct GHG emissions that originate from operations-based equipment and facilities owned or operated by EWEB, such as the stationary and mobile combustion of fossil fuels, including vehicles and generators. This also includes the fugitive release of sulfur hexafluoride (SF_6) from the operation of high voltage equipment used in electricity transmission and distribution equipment.

Scope 2 – This includes indirect GHG emissions associated with the purchase of electricity and steam for internal consumption.

Scope 3 – This includes all other indirect GHG emissions resulting from EWEB's operational activities that occur from sources owned or controlled by another entity, such as business travel, employee commute, embodied emissions in purchased goods and services, and emissions from land-filled solid waste.



Source: WRI/WBCSD Greenhouse Gas Protocol, Corporate Accounting and Reporting Standard (Revised Edition), Chapter 4.

Figure 3. Greenhouse gas accounting reporting scopes.

This inventory estimates emissions associated with EWEB's facility operations. The quantification of our facility operations emissions is limited to EWEB facilities in the Eugene-Springfield metropolitan area as well as the McKenzie River hydroelectric facilities (Leaburg-Walterville and Carmen-Smith).

In 2009-2014, the largest single source of emissions associated with EWEB's operations continued to be from our supply chain – those GHG emissions embodied in purchased goods and services. However, given the limitations of the methodology used to calculate these emissions, they should be considered estimates[1]. Due to changes in accounting practices that occurred in late 2014, it is no longer possible to estimate supply chain emissions. Therefore it wasn't calculated in 2015, nor will it be in future reports. This report focuses on Scope 1 and 2 emissions, specifically those attributed to natural gas combustion by buildings, gasoline and diesel combustion by EWEB owned vehicles and equipment, fugitive releases of refrigerants and insulating gas (SF_6), and electricity use in buildings.

EWEB's ability to manage our GHG emissions varies considerably across emission scopes. We have specific control over some sources, such as our vehicle fleet, and can and do take direct steps to minimize emissions associated with the utilization of these vehicles. Influencing emissions in our supply chain is more challenging, as we do not control the energy and carbon intensity of our suppliers manufacturing processes. However, we can seek to mitigate our supply chain emissions by making changes in our purchasing decisions by specifying lower carbon intensive products (e.g., choosing goods with high recycled content).

Calculating the Carbon Footprint of Electricity Use: Location vs. Market-Based Electricity Accounting

The most widely used standard to account for Scope 2 (Electricity) emissions is the Greenhouse Gas Protocol's Scope 2 Guidance, which directs organizations to use two methods -location-based and market-based.

The location-based method (or regional grid) reflects the average emissions intensity of the Northwest Power Pool (NWPP). The market-based (or utility specific) method reflects emissions from the specific utility.

EWEB's market-based emissions factor is developed through the annual reporting process to the Oregon Department of Environmental Quality (DEQ), in which consumer-owned utilities, like EWEB, are required to report the megawatt hours of electricity distributed to end users of electricity in Oregon (i.e., our retail customers) and the source of that electricity. EWEB's market-based emissions factor is about 17 times less carbon intensive than the regional average and about 25 times less than the national average (Table 1 & Figure 4).

EWEB's 2017 GHG report to DEQ reflects that 81% of the power distributed to our retail customers in 2017 was from BPA (a combination of hydroelectric, nuclear, wind, and unspecified market purchases), 12% was from EWEB's owned hydroelectric resources, and the remaining 7% came from a combination of owned and purchased resources. The carbon intensity can fluctuate significantly from year to year based on the amount of hydroelectric power generated by BPA.

[1] The methodology for estimating supply chain carbon is Economic Input-Output Life-Cycle Analysis (EIOLCA). EIOLCA, while reputable and credible as an estimation tool, lacks precision because the analysis is not built on vendor-specific data. Therefore, the estimate, while useful for "sense of scale", is not precise.

Table 1. Comparison of location-based and market-based emission factors.

Accounting Method	2017 EWEB Operational Consumption (MWh)	Emissions Factor (MT CO_2e/MWh)	Emissions (MT CO2e)
Location-Based (NWPP)[2]	19,509	0.297	5,794
Market-Based (EWEB)[3]		0.018	351
National Average[2]		0.455	8,876

2. Northwest Power Pool (NWPP) Emissions Factor is from eGRID 2016. 2016 is the most recent factor available.

3. EWEB Emissions Factor is based on 2017 reporting by Oregon Department of Environmental Quality.

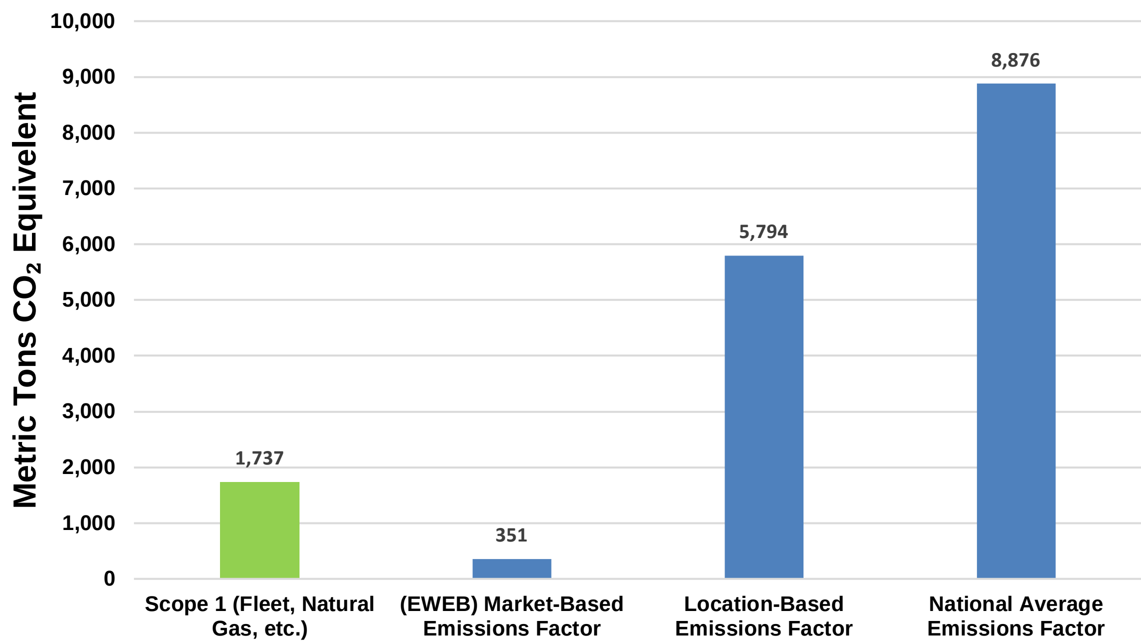


Figure 4. Comparison of market-based, location-based, and the national average emissions factors for Scope 2 (electricity) GHG emissions. Scope 1 emissions are presented for comparison purposes, 2017.

Electricity Consumption

In 2017, EWEB buildings consumed 19,509 MWh of electricity and emitted 5,794 MT CO_2e (using location-based accounting) and 351 MT CO_2e (using market-based accounting). The operation of the Hayden Bridge Treatment Plant and pump stations account for the majority (60%) of EWEB's electricity consumption, at 11,714 MWh. The Headquarters building is the second-largest source of electricity consumption (3,198 MWh), followed by the Roosevelt Operations Center (2,591 MWh). Electricity use at EWEB's McKenzie River hydroelectric facilities, substations, and other Eugene facilities accounted for (2,006 MWh) (Figure 5). There was a 9% reduction in electricity consumption in 2017 compared to 2009 (Figure 6).

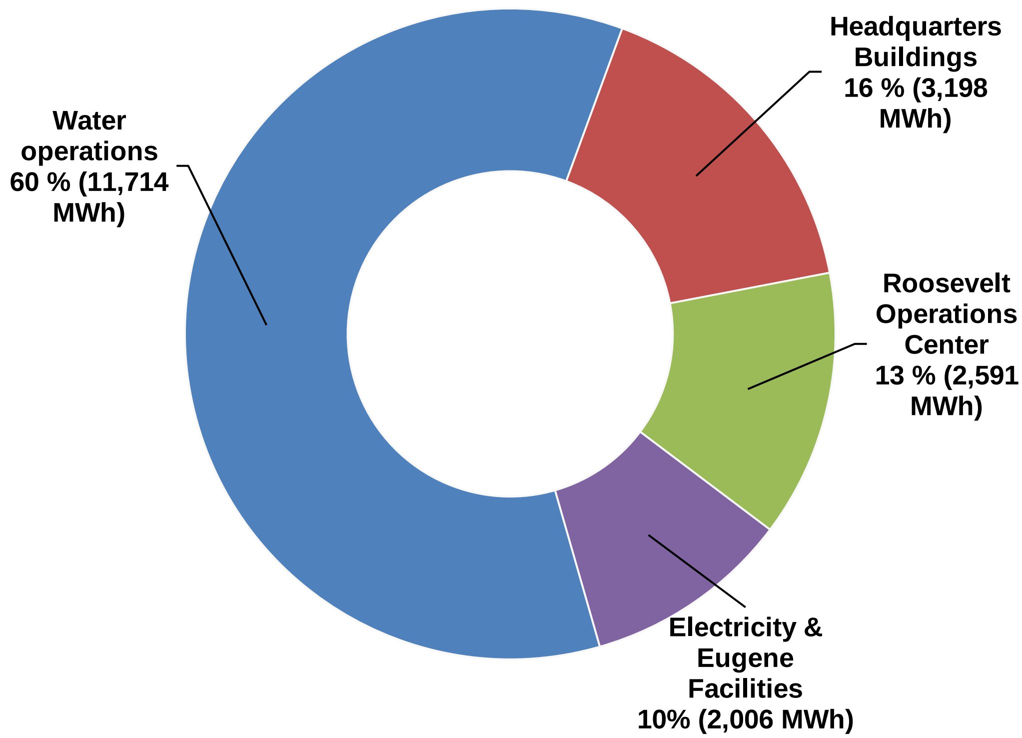


Figure 5. Electricity consumption by EWEB facilities, 2016-2017 average.

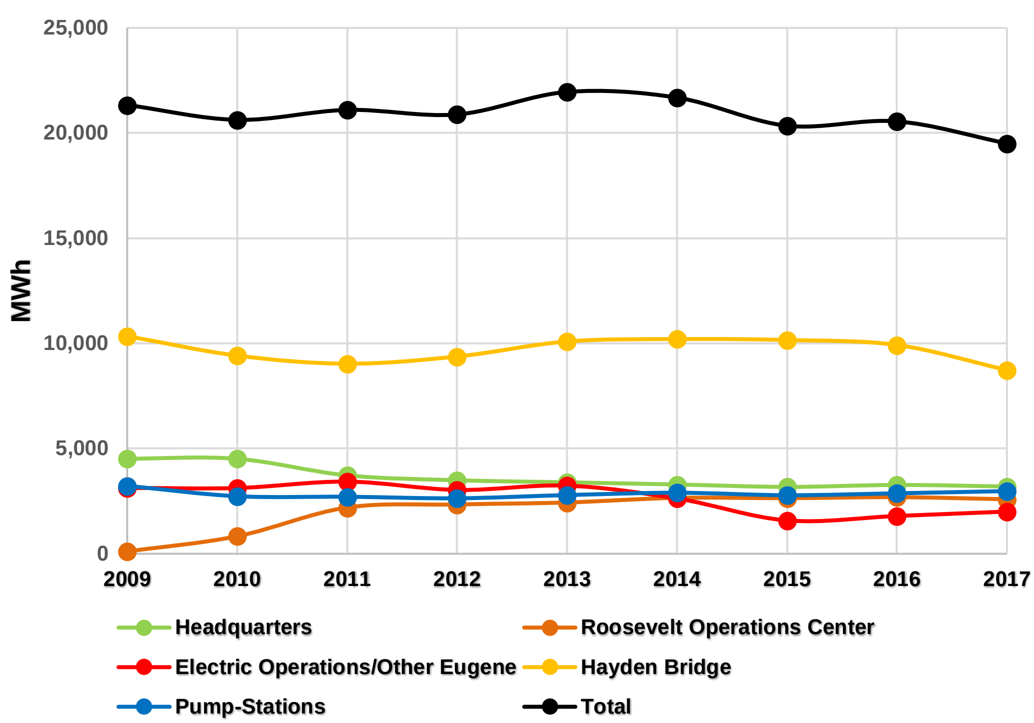


Figure 6. Electricity consumption by EWEB facilities, 2009-2017.

Natural Gas Consumption

EWEB facilities consumed 98,922 therms of natural gas in 2017 and emitted 505 MT CO_2e. Natural gas consumption at the Headquarters building and the Roosevelt Operations Center were 47,522 and 51,401 therms, respectively. Natural gas consumption at the Headquarters building began in 2012, following the decommissioning of the steam plant, which had supplied steam heating for 50 years up to that point. Although there was an 8% reduction in natural gas consumption between 2013 and 2016, there was a 16% increase in 2017 (Figure 8).

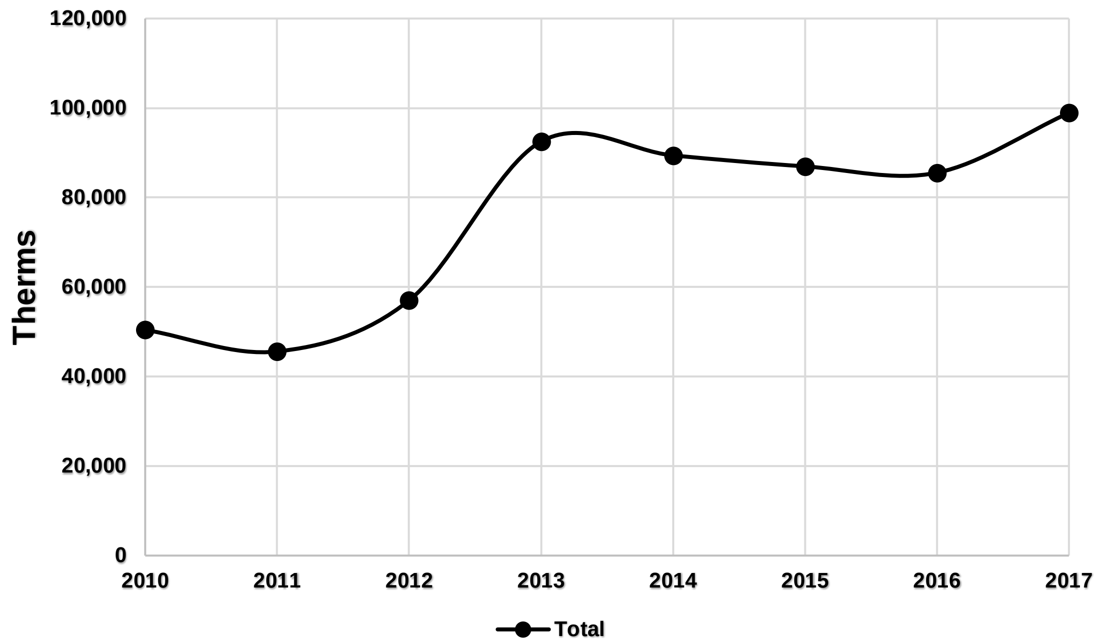


Figure 8. Natural gas consumption by the Roosevelt Operations Center and Headquarters Building, 2010-2017.

Fleet Fuel Consumption

In 2017, EWEB's fleet consumed 175,383 gallons of fuel, 60% of which was fossil fuels (gasoline and diesel) and 40% was biofuels (ethanol and biodiesel) (Figure 9). Fossil fuel consumption accounted for 973 MT CO_2e of emissions. There has been a 42% decrease in the use of fossil fuels and an almost sixfold increase in biofuel use since 2009, which has resulted in a 42% decrease in emissions during this time period. Although EWEB's fleet is primarily fueled by gasoline blended with ethanol (E15 and E85) and diesel blended with biodiesel (B5, B15, B30), an increased amount (80,295 gal.) of renewable diesel (R99) was purchased in 2016, which resulted in a 56% reduction in emissions and the lowest levels during the reporting period (2009-2017), at 708 MT CO_2e.

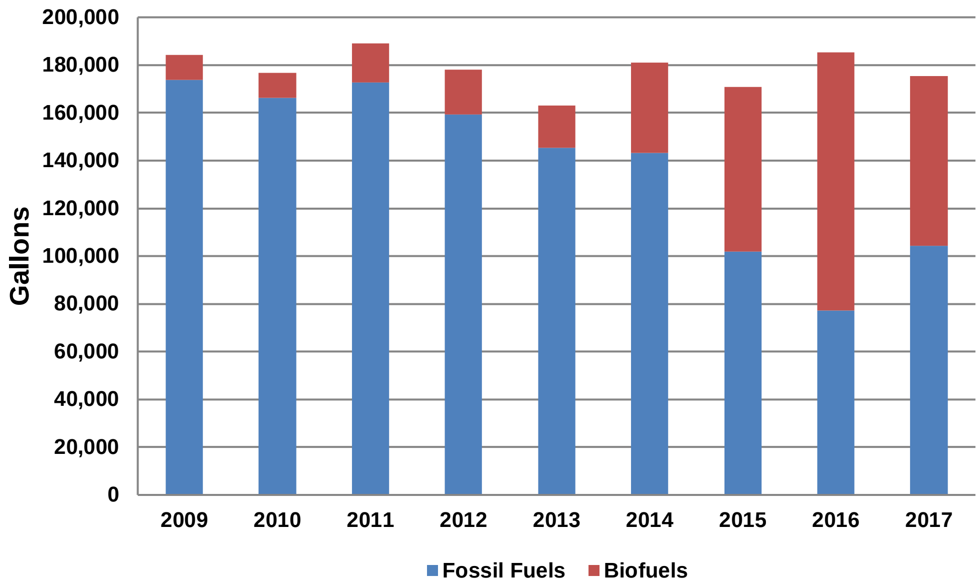


Figure 9. Fuel consumption by EWEB's fleet, 2009-2017.

Conclusion

Using the location-based (regional) emission factor, Scope 1 (fleet, natural gas, etc.) and 2 (electricity) emissions were 7,531 MT CO2e in 2017, however when using the market-based (EWEB) factor they were 72% less, at 2,088 MT CO2e. Figure 10 shows the trend, using the location-based emissions factor, in Scope 1 and 2 emissions (the dashed red line) compared to historic GHG emission levels (the shaded blue area) and the GHG emission levels EWEB needs to meet to achieve emissions reduction goals (the shaded green area). At the current rate, EWEB has already reduced emissions by 35%, ahead of the 25% goal, and is projected to reduce emissions by 38% by 2020. Figure 11 shows the trend, using the market-based emissions factor (2010 is the earliest year with this factor) for Scope 1 and 2 emissions. At the current rate, EWEB has already reduced emission by 41% and would achieve a 76% reduction by 2020. The discrepancy in emissions underscores the importance of considering both factors when conducting a GHG inventory and the context provided by the location-based factor suggests that the combination of a low carbon power portfolio and marginal changes in internal electricity consumption can translate into meaningful emissions reduction. The significant reduction (56%) in fleet emissions in 2016 highlights the importance that biofuels and fuel conservation play in EWEB's emissions reduction strategy.

For more information, contact Lisa McLaughlin, EWEB's Environmental Manager, at Lisa.mclaughlin@eweb.org, or Andrew Janos, Environmental Specialist, at Andrew.janos@eweb.org.

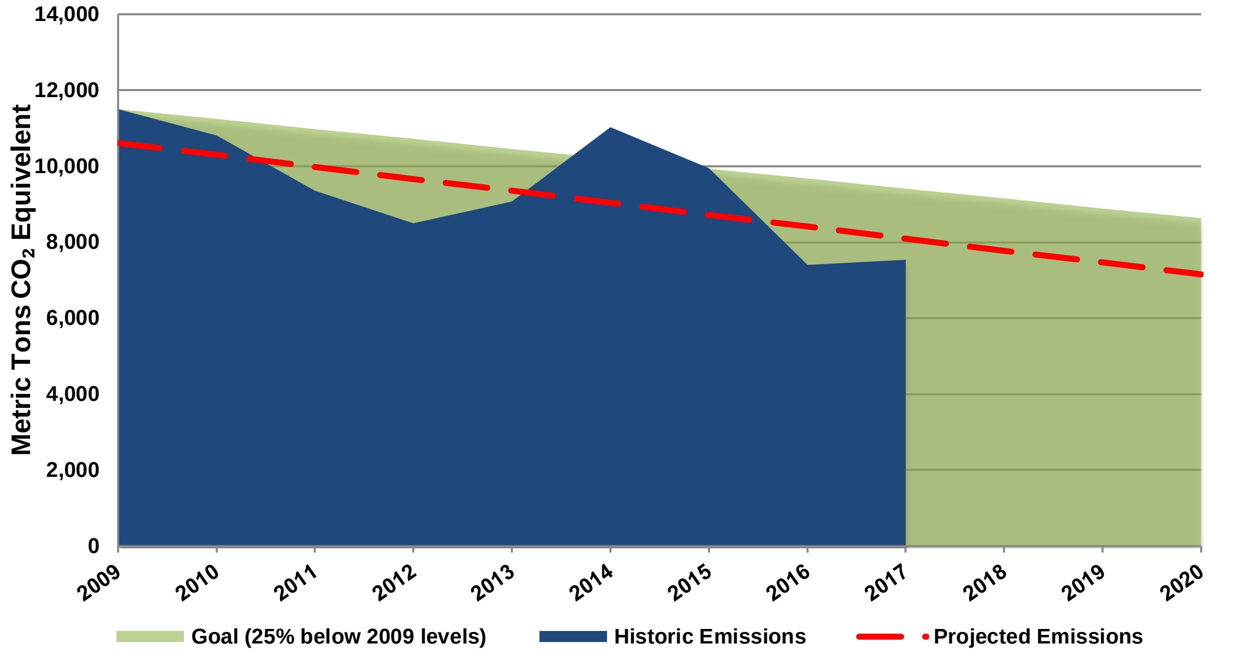


Figure 10. Projected Scope 1 and 2 GHG emissions using the location-based (regional) emissions factor.

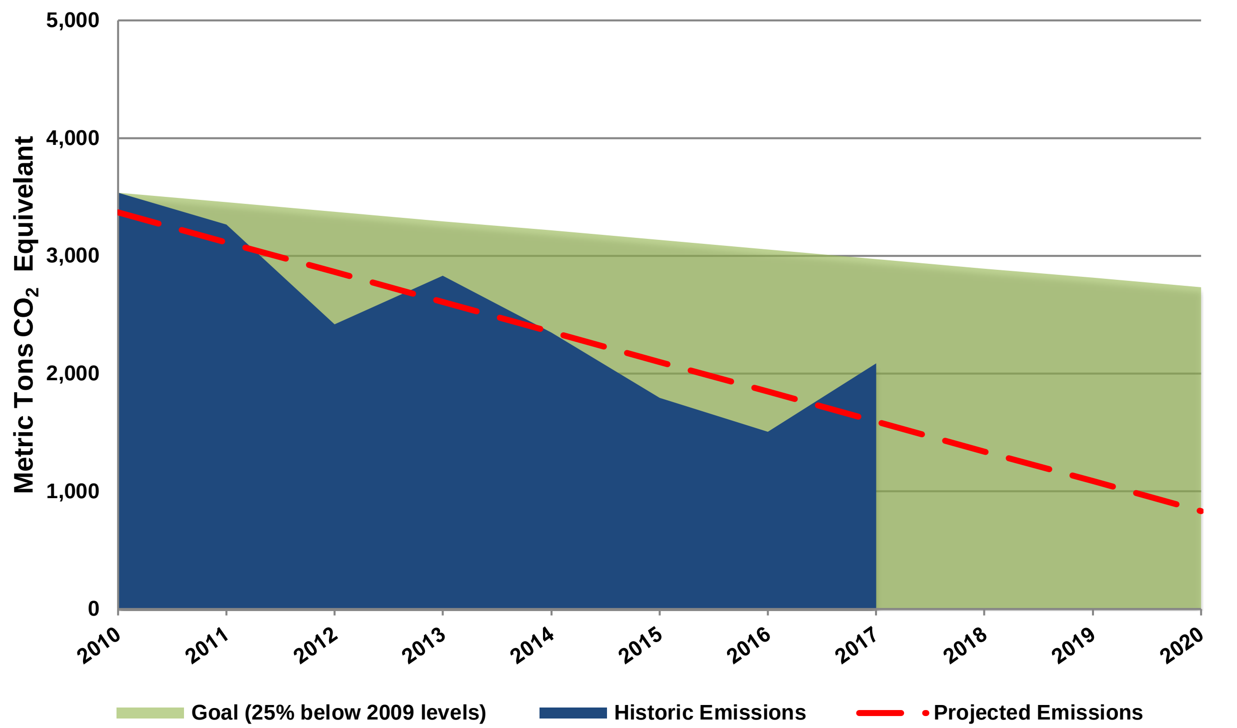


Figure 11. Projected Scope 1 and 2 GHG emissions using the market-based (EWEB) emissions factor.

MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO: Commissioners Brown, Carlson, Helgeson, Mital and Simpson

FROM: Rene Gonzalez, Customer Solutions Manager; Anna Wade, Business Line Manager

DATE: November 21, 2018

SUBJECT: Limited Income Initiative Update

OBJECTIVE: Information Only

Issue
This update is provided to ensure ongoing alignment between Board direction and staff progress relating to EWEBs limited income program enhancement initiative.

Background
The Board has driven the development of strategies to revamp EWEBs programs for limited income customers. Following thorough analysis, staff has identified opportunities to improve the EWEB Customer Care Program (ECC), and recalibrate the customer education and efficiency offerings. Included in these opportunities is the discontinuation of the EWEB Customer Care Plus Program (ECCP).

Discussion
In developing a vision for future programs, management has codified four elements of EWEB's limited income strategy: Energy Burden, Peak Burden, Crisis Relief and Education.

Energy Burden:
Energy burden is the weight of a customer's utility expenses relative to income, which is consistent with our overall efforts to control costs. EWEBs Integrated approach to addressing Energy Burden encompasses solutions to reduce overall consumption, alleviate Peak Burden, improving the efficiency and customer experience in issuing Crisis Relief as well as to provide empowerment through customer education. Additional efforts to address Utility Cost Burden were presented to the Board in October within the context of EWEBs development policy initiative.

Peak Burden:
The winter heating season can produce an affordability crisis for some of EWEBs customers. Reducing monthly bill volatility is the most effective way to address Peak Burden for these customers. Designing system based solutions that enhance customer experience and are operationally viable has proved challenging. A recent analysis of our processes and procedures revealed potential opportunities for EWEBs current Budget Billing program. In order to serve as an effective solution for Limited Income customers, staff is looking at options to expand access and help customers stay enrolled during financial hardship. More information on these improvements can be found in the Customer Experience Improvement Project Memo.

Crisis Relief:
The total budget for bill assistance is materially unchanged. However, more of these funds will go directly to those in need, and less to administration. Funds previously allocated to ECCP will be reallocated and consolidated under ECC. Preliminary budgets, currently under Board review, set the 2019 allocation at $950,000.

Staff has made significant progress in reducing the administrative costs to deliver bill assistance and energy efficiency to limited income customers. EWEB and Lane County have agreed to an administrative fee for services rendered in 2019, which will be capped at 18% of bill assistance issued. This service fee is based on delivered results (funds to customers), and represents $505,000 in savings from 2017. Contractual agreements with Lane County Human Services Department are being prepared.

The table below reflects program expenses relating to Lane County delivery, administration and labor for 2017 and 2018, with preliminary estimates for 2019.

	2017	2018	2019
ECC	$230,000	$190,000	$150,000
ECCP	$425,000	$420,000	$0
	$655,000	$610,000	$150,000

Focused education:
In the first week of December staff will conclude the process of EWEB Customer Care Plus dissolution. EWEB will fulfill financial obligations to program enrollees with a final ECCP credit in an amount equal to what the customer would have otherwise been able to earn through program activities.

In the coming year, EWEB staff will begin delivering customer education to the home, in concert with an energy audit. Staff are targeting a total of 500 additional home visits in the initial program year. At the time of the visit, customers will receive efficiency and resiliency items, utility information and consumption tips. Following the in-home visit, Staff will provide a cohesive customer report outlining opportunities and available programs to support energy efficiency.

- **Kits**: Efficiency items will include energy saving products (e.g. LED bulbs) and emergency preparedness items (e.g. warming products and water container). EWEB staff will assist customers with these items as requested to facilitate the realization of the benefits.
- **Information**: EWEBs Energy Specialists will guide customers through educational materials and survey the dwelling for efficiency opportunities during the energy audit.
- **Follow up**: Customers will receive a custom dwelling report, consumption history, efficiency recommendations with potential benefits and available rebates or incentives, emergency preparedness tips and price structure information.

Request for Board Action
Information only. No action is requested at this time.

MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO:	Commissioners Brown, Carlson, Mital, Simpson and Helgeson
FROM:	Mike McCann, Electric Generation Manager; Lisa McLaughlin, Environmental Supervisor
DATE:	November 21, 2018
SUBJECT:	Lower McKenzie River Water Temperature Study - 2018 Results
OBJECTIVE:	Information Only

Issue

This memorandum presents water temperature data from 2018, the second year of a two-year study on river temperatures in the lower McKenzie River in proximity to EWEB's Leaburg and Walterville hydroelectric projects.

Background

On March 7, 2017, staff submitted a memorandum to the Board regarding the impacts of the Leaburg and Walterville hydroelectric projects on river temperatures in the lower McKenzie River. The March 7th memorandum entitled *Lower McKenzie River Water Temperature* contained background information on the temperature studies that had been conducted previously in support of the relicensing of the projects and the development of the Total Maximum Daily Loads (TMDLs) for the McKenzie River. Due to the lack of recent temperature data, staff recommended that EWEB initiate a two-year water temperature monitoring study in order to better understand temperature dynamics and the potential effect of the Leaburg and Walterville hydroelectric projects on water temperatures in the McKenzie River. In response to this staff recommendation, EWEB initiated a temperature study between May and October of 2017 and 2018. This memorandum provides a description of the study design, highlights some of the data that was generated in 2018, and compares the 2017 and 2018 results.

Methods and Project Description

On May 14, 2018, EWEB deployed 14 *Tidbit* temperature loggers at various locations within the project area. All of the loggers were retrieved on October 16th. The loggers were deployed upstream and downstream of EWEB facilities and were programmed to record temperature readings every half hour. Ten of the loggers were deemed to be the most critical in determining potential impacts to water temperature and are the subject of this analysis. Their location within the project area is depicted in Figure 1. In an effort to compare study results with previous DEQ modeling efforts, the average of seven consecutive daily maximum temperatures (7DADM) on a rolling basis was used for this analysis.

Leaburg Project

The Leaburg project features a 5-mile canal flowing between the diversion at Leaburg Dam at river mile (RM) 39, and the powerhouse, at RM 39. The 5.8 mile stretch of river between the diversion at Leaburg Dam and the Leaburg powerhouse tailrace is referred to as the Leaburg bypass reach.

In order to measure temperature impacts of the Leaburg Project, temperature loggers were placed at the top of the bypass reach below the dam (Logger 1), at the canal diversion (Logger 2), at the bottom of the bypass reach above the confluence with the tailrace (Logger 3), and in the tailrace below the powerhouse (Logger 4). Temperatures at the downstream locations were compared with their upstream counterparts to determine temperature variations in the canal and bypass reach. An additional logger (Logger 5) was placed at Deerhorn Bridge, approximately 2 miles downstream of the confluence of the Leaburg tailrace and the bypass, to measure if any potential temperature impacts were detectable below the mixing of the two flows.

Walterville Project

The Walterville project includes a 4.5-mile canal and a 2-mile tailrace canal that flows from the diversion at RM 28 and returns to the McKenzie River at RM 21. The 7.3-mile stretch of river between the Walterville Tailrace and the Walterville canal intake is referred to as the Walterville bypass reach.

To measure temperature impacts of the Walterville Project, temperature loggers were placed at the canal diversion (Logger 6), at the top of the bypass reach (Logger 7), in the tailrace above the barrier (Logger 8), and at the bottom of the bypass reach (Logger 9). Temperatures at the downstream locations were compared with their upstream counterparts to determine temperature variations in the canal and bypass reach. An additional logger (Logger 10) was placed at Bellinger Boat Ramp, approximately 2 miles downstream of the confluence of the tailrace and the bypass, to measure if any potential temperature impacts were detectable below the mixing of the two flows.

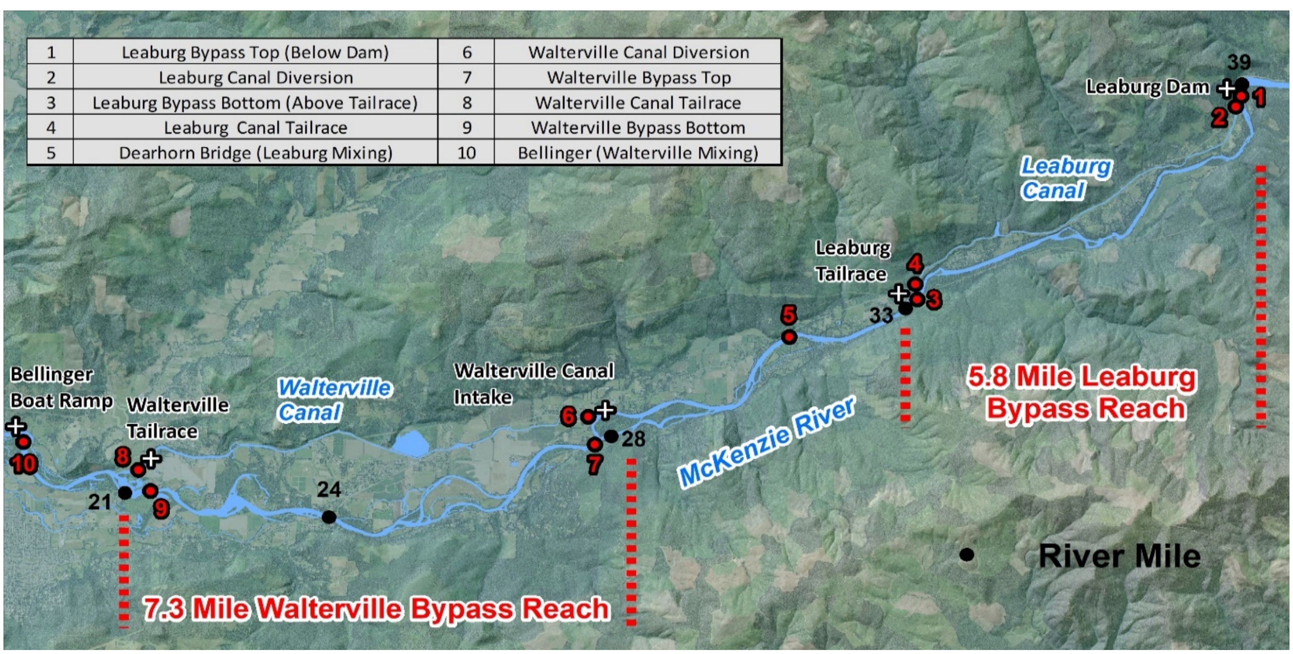


Figure 1. Locations of temperature loggers in the Leaburg-Walterville Project Area.

Results

Leaburg Project

In 2018, there was noticeable warming in the Leaburg bypass reach between the canal diversion and the tailrace reach (Figure 2). The maximum change was 0.9 °C and the median change was 0.4 °C. Although there was a slight period of warming, overall, cooling was observed at Deerhorn Bridge when compared to the downstream end of the Leaburg project.

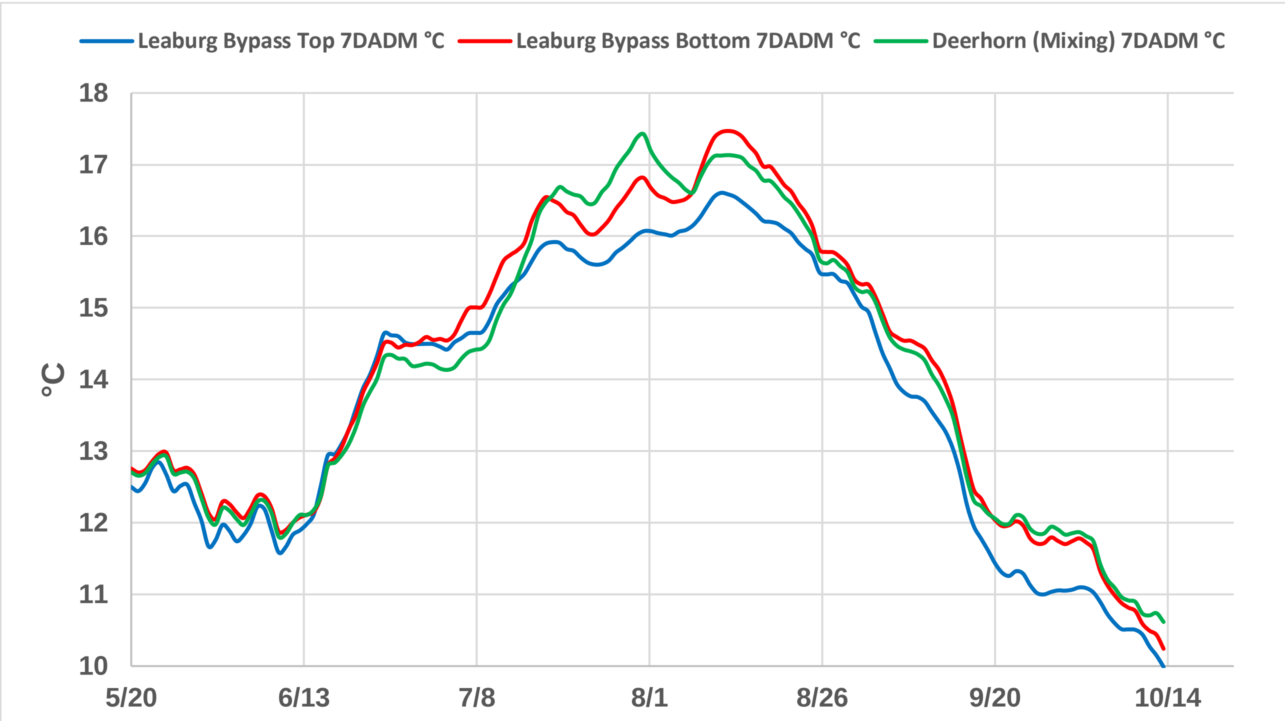


Figure 2. Comparison of temperatures (7DADM) at top of Leaburg bypass, bottom of Leaburg bypass, and Deerhorn Bridge.

Walterville Project

In 2018, there was noticeable warming in the Walterville bypass reach between the canal diversion and the tailrace. The Walterville bypass reach experienced a maximum of 2.3 °C warming during the study period and the median change was 1.3 °C (Figure 4). The river at Bellinger Boat Ramp experienced a maximum of 1.2 °C cooling and a median of 0.6 °C, when compared to the warming that occurred in the bypass reach (Figures 3).

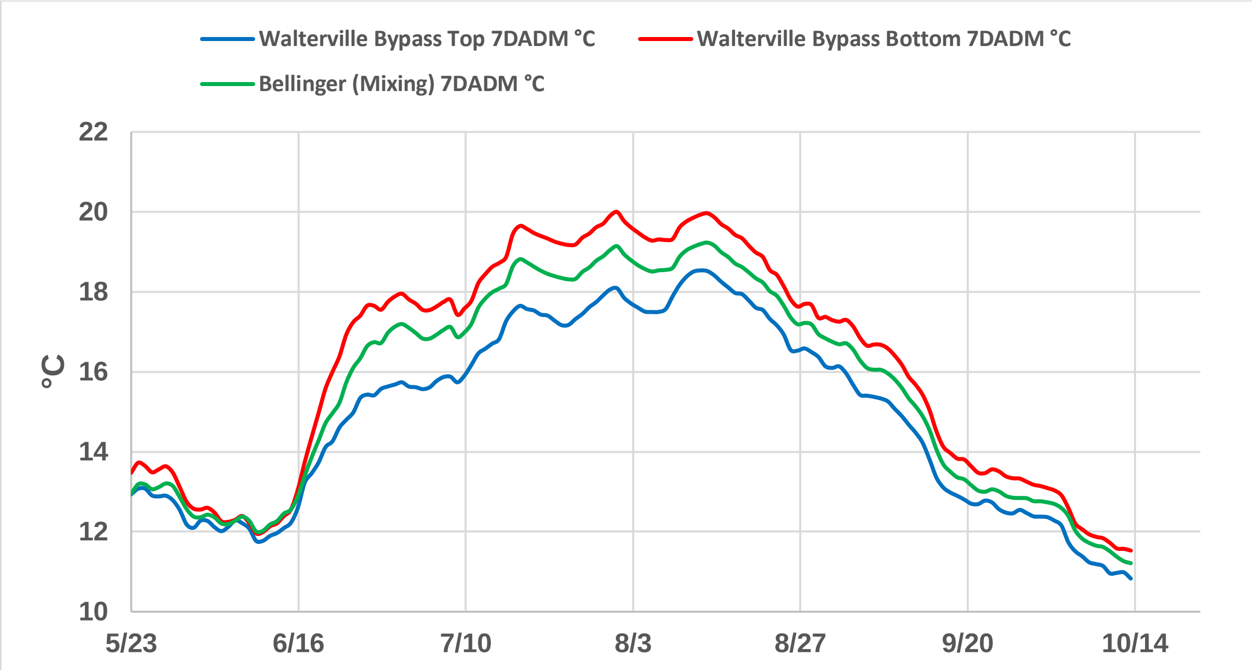


Figure 3. Comparison of temperatures (7DADM) at top of Walterville bypass, bottom of Walterville bypass and Bellinger Boat Ramp.

Discussion

The 2018 results are similar to the findings from the 2017 study with a few key differences. Unlike 2017 where there was negligible impact, the Leaburg Project appeared to have an overall warming impact in 2018, with a maximum warming of 0.9 °C and a median change of 0.4 °C. Like 2017, the Walterville bypass reach experienced warming in 2018, although less severe with a maximum of 2.3 °C and a median of 1.3 °C. The maximum and median for 2017 were 2.6 °C and 1.7 °C, respectively. Again, in 2018 there was cooling that occurred below the mixing of the canal and the bypass at Bellinger Boat Ramp, with a maximum of 1.2 °C. This is the result of the thermal moderating effects of the canal. Water diverted through the canal is exposed to less solar radiation because flow velocities are greater and the canals are deeper and narrower than the bypass reach. Conversely, the increase in water temperature in the bypass reach is due to the reduction in flow which can result in reduced heat capacity, lower stream velocities, and increased travel time. During the warm summer months, these factors allow for greater exposure to solar radiation heat loads and warmer temperatures in the bypass reach.

The results from this study are likely influenced by a combination of the operational, hydrological, and atmospheric conditions that occurred during the 2017 and 2018 study periods. The median daily maximum air temperature was 2 °C higher in 2017 than in 2018 during the study period. Even though air temperatures were on average warmer in 2017, the median daily water temperature was 0.9 °C warmer in study area in 2018. This is potentially due to the low water conditions that persisted throughout the study period in 2018. There was 21% more water flowing into the Leaburg-Walterville project area (USGS Vida gage) in 2017 than in 2018. The Leaburg and Walterville bypass reaches had roughly 12% more water in 2017 than in 2018. The comparatively low water conditions existed in the Walterville bypass reach despite the January 10, 2018 Record of Decision that states "In years with below median expected summer stream flows/snowpack, from May 20th through October 31st, EWEB will voluntarily adjust the power canal intake in order to maintain at least 10% more flow in the McKenzie bypass reach of the Walterville hydroelectric project than flows exiting the tailrace of the project”. However, because of the intentional flow increase, there was more water during the late June through mid July period in 2018 than in 2017. This corresponds with the typical peak migration of spring Chinook through the bypass reach and likely improved passage around the tailrace barrier and through the return channel. The warming in the bypass is most readily observed when the reach recedes to just above the minimum flow of 1,000 cfs. This typically occurs in June after the project outage and occurred a week earlier in 2018 than in 2017.

The varying temperature effects in the two bypass reaches are due, in part, to the geomorphology of the reaches themselves. The Leaburg bypass reach is located in the middle McKenzie River Basin and is characterized by narrow, confined, and stable riffle pool morphology which results in higher stream velocities and decreased travel times as compared to the Walterville bypass reach. The Walterville bypass is located in the lower McKenzie Basin and the reach is characterized by wide shallow glides, an unconfined floodplain containing numerous off-channels habitats and side-channels, all of which contribute to reduced stream velocities, increased travel time and, therefore, an increased potential for warming. The geomorphic features precede project operations and have likely contributed to historical variances in the temperature regimes of the reaches.

Requested Board Action

None. This memorandum is provided for informational purposes only.