



MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO: Commissioners Helgeson, Brown, Mital, Simpson and Carlson
FROM: Mike McCann, Electric Operations Manager, and Lisa McLaughlin, Environmental Supervisor
DATE: May 16, 2017
SUBJECT: Lower McKenzie River Hydroelectric Generation

Issue

The Board has raised concerns over the effects of EWEB's diversion of water at the Walterville Hydroelectric project, for the purposes of power generation, on fish populations, water temperature, and recreation. This memo briefly evaluates those impacts and compares the cost and benefit of diverting less water for generation so that river flow exceeds canal flow during specified periods.

Background

EWEB owns and operates the Walterville hydroelectric project, with a nameplate capacity of 8 MW, on the lower McKenzie River under a federal license issued by the Federal Energy Regulatory Commission on April 27, 2000. The license term is 40 years.

Under the terms of the license, EWEB is required to maintain minimum instream flows in the bypassed reach of the McKenzie River of 1,000 cubic feet per second (cfs) at all times. This value was established by the FERC as part of the license proceedings based upon scientific studies conducted by EWEB's contractor during the licensing process. Up to 2,577 cfs can be diverted into the Walterville canal at the Walterville diversion under normal operations. EWEB holds a water right for the full diversion into the project. When available water in the river at Walterville drops below 3,600 cfs, EWEB diverts less water into the Walterville canal to maintain minimum instream flows, reducing generation at the Walterville power plant.

Over the years, Board members have raised concerns about how the diversion of water effects various resources. Most of these discussions have revolved around impacts to Willamette spring Chinook salmon. However, water temperature, recreation, and impacts to other species have also been raised. Increasing instream flow is likely to benefit all of the aforementioned resources, but will result in reduced generation.

Discussion

Environmental and Recreation Benefits from Increased Instream Flow

Willamette spring Chinook salmon

Spring Chinook salmon in the McKenzie River are federally listed as Threatened under the Endangered Species Act. The adults are often attracted into the Walterville tailrace reach on their upstream migration to spawning grounds, potentially resulting in migration delay. This is most likely to occur when canal flow exceeds bypass reach flow, causing salmon to cue in on the tailrace rather than the main river (known as false attraction). At full diversion of 2,577 cfs, canal flow can exceed bypass reach flow by 2.5 times. This represents the “worst case scenario” in terms of attraction for fish. However, false attraction occurs to some degree at most flows. A tailrace barrier prevents salmon from continuing up the canal to the powerhouse. A fish return channel located at the tailrace barrier provides passage for their return to the main McKenzie River to continue their migration upstream.

Due to salmon delay concerns, EWEB completed modifications to the Walterville fish return channel in 2011 that dramatically improved its effectiveness. This was verified by a radio tracking study that was conducted in 2012. Although 50% of the radio tagged fish entered the Walterville tailrace, they were able to find the return channel quickly and return to the main river. The number of salmon entering the tailrace decreased drastically when river flow exceeded canal flow. In addition, the salmon migration typically begins in mid-May and peaks in June so the annual Walterville maintenance outage is always scheduled to occur during early June to allow the peak of the run to pass the Walterville tailrace without getting falsely attracted to it.

Gravel accumulation at the upstream end of the fish return channel can result in impeded flow and reduced passage efficiency for fish moving from the tailrace back to the McKenzie River. EWEB moves gravel annually, if needed, to maintain effective fish passage through the return channel. This action is dependent on low flow conditions, which usually occur in July. Greater bypass reach flow will increase flow in the Walterville fish return channel, thereby increasing its effectiveness. This is particularly beneficial in low flow years if gravel accumulation is impeding return channel flow. Because gravel removal must be conducted during low flow, usually in July, more water in the bypass reach during May and June could benefit fish passage through the return channel until gravel relocation can be completed.

Habitat for Other Species

Given the alluvial geology of the Waterville reach (spread out and braided), additional flow during the historically low flow months would benefit a host of other species. Generally speaking, during the summer months when baseline flow is relatively low, more flow provides greater inundation area and, thus, more habitat for fish species and macro invertebrates. Specifically, more gravel bars would be inundated with water, providing interstitial spaces for macro invertebrates to thrive and more side channels that provide habitat for rearing fish.

Water Temperature

More water in the bypass reach could result in less warming and benefit water quality in terms of temperature. However, it would be difficult to measure such a change. Current water temperature data is scant. EWEB has initiated a temperature monitoring study to better understand temperature dynamics and the potential effect of the Walterville Project.

Recreation

The McKenzie River is a valued recreation area and is highly used by boaters and anglers. The Walterville reach is alluvial in nature, meaning it tends to be more spread out and braided, and contains very shallow areas during low flow periods. Greater flow during the summer months of low flow years, particularly July through September, would increase navigability for boaters.

Revenue Impacts from Lost Generation

Staff analyzed the revenue impact of maintaining 10% more flow in the river than the canal during two specified periods. The 10% figure was chosen based on the professional opinion of EWEB fish biologists and is expected to result in fewer fish entering the tailrace, in addition to potential benefits to other species, water temperature, and recreation.

1. May 20th to July 15th – This period encompasses the peak of the adult spring Chinook salmon upstream migration and is, therefore, focused on benefit to that species.
2. May 20th to October 31st – This period encompasses the entire adult spring Chinook salmon migration and spawning period, the entirety of the warmer summer months, and the peak recreation season.

The financial impacts to EWEB of leaving additional water in the McKenzie River will vary from year to year and are dependent upon the flow in the river and wholesale energy prices. For the purpose of this memorandum, we considered the revenue impact at various flows using the current 2017 forward price curve. Operational costs for the project are sunk costs and, therefore, would not change by reducing generation.

In a median flow year, the estimated cost of lost generation for maintaining 10% more flow in the river than the canal from May 20th through July 15th would be roughly \$24,844. From May 20th to October 31st, the estimated cost would be \$34,337. These estimates assume the annual maintenance outage will continue to occur for two weeks in early June. During lower flow years (25th percentile and below), generation at the Walterville Project is typically curtailed in the summer months due to lack of water. During higher flow years (75th percentile and above), generation typically extends throughout August and September, when power prices are higher. For 2017, the value of water for generation is expected to be 2.7 times greater in September than in May. Therefore, there is a larger revenue impact for voluntary generation curtailment during higher flow years. For example, at flows over the 90th percentile, the estimated cost of lost generation for the period of May 15th through October 31st is \$98,495.

Potential Annual Revenue Loss					
Flow	10 th Percentile	25 th Percentile	Median	75 th Percentile	90 th Percentile
May 20 – July 15	\$12,276	\$24,148	\$24,844	\$24,300	\$17,623
May 20 – Oct 31	\$12,726	\$24,148	\$34,337	\$71,681	\$98,495

10th Percentile – Flow is expected to be lower than this 10% of the time. Flow is too low to generate during the summer months.

90th Percentile – Flow is expected to be lower than this 90% of the time.

Summary

Curtailing generation at the Walterville plant so that bypass reach flow is greater than canal flow has both environmental and recreational benefits, but it would also impact EWEB in terms of lost revenue. Curtailing generation from May 20th to July 15th focuses the benefit on spring Chinook salmon, with ancillary benefits to other species and recreation. The period of May 20th to October 31st has the greatest environmental and recreation benefits, but is substantially more costly in terms of lost revenue.

Notably, the environmental and recreation benefit of these scenarios is greatest in lower water years (25th percentile and below), which coincides with a smaller financial impact because generation at the Walterville plant is generally curtailed anyway due to lack of water. During higher water years, the environmental value is less pronounced, but revenue loss would be greater.