

OFFICIAL COORDINATION REQUEST FOR NON-ROUTINE OPERATIONS AND MAINTENANCE

TITLE- 21DET01 Detroit Dam IRRM Temporary Pool Restrictions

COORDINATION DATE- 02 April 2021

PROJECT- Detroit Dam

RESPONSE DATE- 16 April 2021

Description of the problem

The U.S. Army Corps of Engineers (USACE) is proposing dam safety interim risk reduction measures (IRRM) at Detroit Dam starting in spring 2021. This proposed action is part of USACE's dam safety program includes inspections, monitoring, emergency action planning, and risk assessments. As part of its comprehensive dam safety program, the Corps is continuously assessing its dams to better understand dam safety risks and inform future actions. Detroit Dam is located about 150 miles east of the Cascadia Subduction Zone, a megathrust fault along the Oregon Coast. The Cascadia Subduction Zone is capable of producing very large, long duration earthquakes every 300-500 years. Seismic hazard and seismic performance of the dams in the Willamette Valley is a focus area for the program.

In 2020, an updated seismic hazard analysis was completed for Detroit Dam to better understand the potential earthquake ground motions at the site. This hazard study has been used to analyze the performance of the spillway gates and found the risk to be higher than previously assessed. The performance of the spillway gates in an earthquake is a function of the potential ground motions, the height of the gates above the dam foundation, and the water level acting on the gates at the time of an earthquake. Structural analysis of the spillway gates has shown there is a possibility for buckling of the spillway gate's supporting arms resulting in an uncontrolled release of water from the dam. Because Detroit Dam is located upstream of many communities including Salem, Oregon, there is potential for devastating flooding to affect large portions of the narrow North Santiam River canyon and urban areas.

The potential impacts of a breach of the spillway gates are high due to the large downstream population. Therefore, immediate action is warranted to reduce risk to tolerable levels. The Corps defines moderate urgency as confirmed and unconfirmed dam safety issues, the combination of life, economic, or environmental consequences with likelihood of failure is moderate. The Corps considered this level of life-risk to be unacceptable except in unusual circumstances. More information on these definitions can be found at the following link; [ER Regulation](#) or by searching for Engineering Regulation, ER 1110-2-1156 (USACE Publications). Targeted measures (called Interim Risk Reduction Measures, IRRM) would be implemented in spring 2021 to reduce life-safety risk while issues are evaluated further. The IRRM to be implemented, starting in the spring of 2021, is to reduce the maximum conservation pool of the Detroit reservoir by 5 feet from elevation 1563.5 feet to 1558.5 feet NGVD29 as depicted in Figure 1.

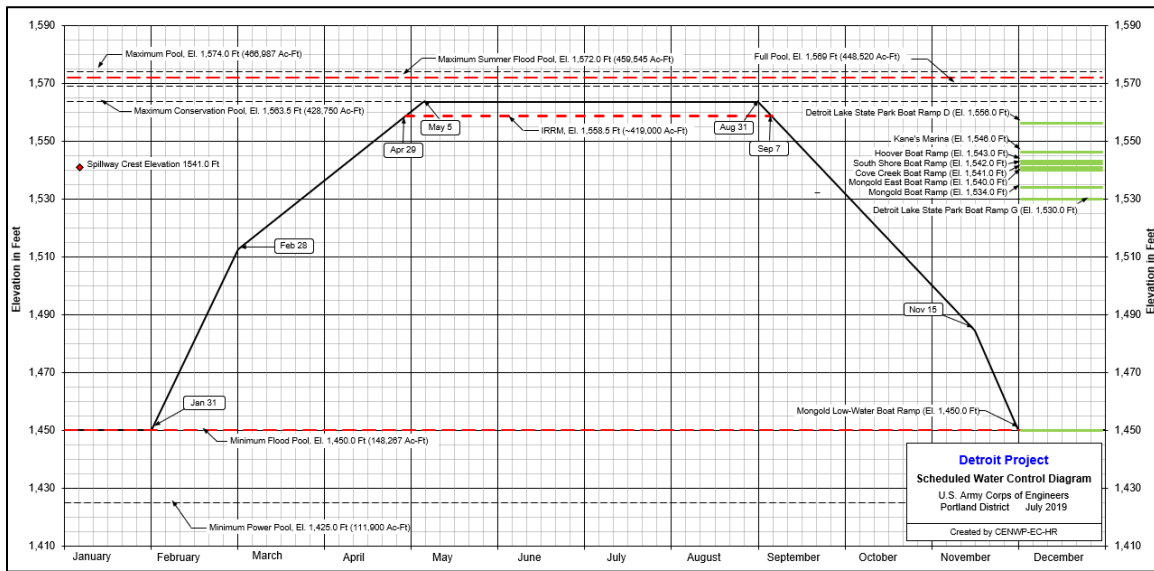


Figure 1. Proposed IRRM restrictions at Detroit Dam

Type of outage/change required – The change would temporarily modify the operations, or rule curve, for Detroit Dam. The Corps proposes to implement a maximum conservation pool restriction of 5 feet at the Detroit Dam. Currently, the maximum conservation pool elevation of 1563.5 feet.

Impact on facility operation – Impacts of the IRRM pool restriction were modeled by utilizing the Corps’ Hydrologic Engineering Center (HEC) ResSim analysis tool. The effects of the restriction were modeled for water years 1935-2008. In 21% of years Detroit does not fill to the IRRM elevation of 1558.5 and no impacts will be realized. In the remainder of years maximum conservation storage will be reduced up to 17 KAF resulting in potential impacts to other project purposes. Impacts to potential hydropower production range from -2,000 MWh to +3,000 MWh based on the timing and outlets used to pass flow for various water years modeled. Minimum BiOp flows are not impacted. In half of years, boat ramp availability for seven of the nine boat ramps are likely to be reduced by less than one week. The State Park boat ramp, located at 1556 feet, just below the IRRM level of 1558.5 feet, could be reduced by 19 days. The maximum anticipated reduction in boat ramp availability is anticipated to be between 13 and 20 days at 7 of the 9 boat ramps and one month for the State Park boat ramp located at 1556 feet. Mongold Low boat ramp is located at 1450’ and is not impacted by the IRRM. Impacts on fish and water quality are discussed below.

Dates of impacts/repairs – Pool Restrictions would be implemented starting April 29th until September 7th, starting in 2021 and continuing while issues are further studied and long-term solutions are completed.

Length of time for repairs – This IRRM does not involve any structural modifications or repairs. The purpose of this action is to implement an interim risk reduction measures (IRRM) while permanent solutions are pursued. This measure will be implemented initially in spring 2021. The Corps will continue to study the risks and the expected seismic performance of the spillway structures. An advanced risk assessment (called Issue Evaluation Study, IES) is scheduled to begin sometime in 2022 to determine if

long-term risk reduction actions are required. If required, a Dam Safety Modification Study (DSMS) will develop and evaluate long-term risk reduction actions. This process is expected to take several years to complete.


Expected impacts on fish – Impacts to fish are expected to be negligible. The IRRM pool restriction does not impact BiOp tributary or BiOp mainstem flows in comparison to reservoir operations applying the current maximum conservation pool. Based on RES-SIM modeling of the POR flows, the IRRM pool restriction has the potential to reduce total conservation storage capacity by as much as 6% but only in years when conservation storage fills to above 94%. In these years Detroit is still able to provide minimum tributary flows and contributions to minimum flows at Salem for the entirety of the conservation season.


The RES-SIM model was also utilized to estimate the number of days that total dissolved gas could exceed 110% which is the Oregon State water quality standard. This indicated the proposed IRRM could result in minor to negligible increases to the number of days per month in which non-turbine releases (spill) were greater than zero at Detroit. During spring (May-June) of abundant (wet) years, the proposed IRRM would result in increased discharges downstream for a short period at the beginning of a large flow event. A cumulative distribution (non-exceedance percentiles) of the estimated TDG downstream of Big Cliff Dam shows that the proposed IRRM is largely indistinguishable from the No Action alternative, especially above 110% saturation.

Changes in water temperatures are expected to be negligible. RES-SIM Modeling shows that there may be reduced summer spillway usage (about 5 fewer days in half of the years, 151 days v. 156 days) in the proposed alternative compared to the no action alternative. Spillway usage during the summer helps achieve more normative water temperatures in summer and fall. Reduced summer spillway usage leads to more stored heat (warm water) in Detroit Lake that is then released downstream months later, resulting in warmer water temperatures during the fall. Based on historical data analysis, this IRRM would likely result in no more than three days earlier of emergence of chinook eggs compared to the No Action Alternative. Effects as a result of temperature change in the river would be most impacted during normal to dry years, but is a small impact (measured by egg emergence of < three days) compared to the assumed incubation timeframe of about three months.

Please email or call with questions or concern.
Thank you,

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Comments from agencies
ODFW Comments 2021.04.16

Thank-you for the opportunity to comment.

Due to the reduced availability of spill at the lower reservoir elevation, ODFW requests the USACE model initiating spill earlier in the season to determine if it will reduce the amount of warm water in the reservoir in the fall and if the earlier spill will improve the ability to meet downstream temperature targets. If earlier spill can achieve these objectives, it should be considered as a management option.

Since recreational boating will be impacted by lowered reservoir levels, ODFW requests the USACE create additional low-water boat ramp access at Detroit Reservoir (in addition to Mongold) to increase reservoir accessibility. In addition, ODFW requests that the boat ramp at Big Cliff Reservoir be upgraded to provide additional boater/angler access.