

COMPARISON OF HYDRO OPERATIONS UNDER DIFFERENT SPILL REGIMES

Quick Overview

This document provides an overview and comparison of different spill regimes and their impact on the Federal Columbia River Power System (FCRPS). Here is a quick summary:

- **“No Action Alternative”** – Baseline operations that generally represent 2016 hydro operations
- **“2018 Injunctive Spill”** and **“Flexible Spill Agreement”** – Each result in a loss of about 200 aMW of annual generation (concentrated in spring) that represents about \$40M average value to the Tier 1 rate
- **CRSO “MO3”** – Breach Lower Snake River Dams, plus 120% Total Dissolved Gas (TDG) spring spill at Lower Columbia Dams – *very high cost and reliability impact*
- **CRSO “MO4”** – Maximum spill alternative, 125% TDG spill at all eight dams at all hours, spring through summer, plus upstream flow augmentation to further support downstream fish migration – *highest cost and reliability impact*

Reliability Impacts to the Power System Due to Increased Spill

- Increased spill decreases the number of FCRPS projects available to operate flexibly in response to the reliability needs of the transmission system.
- In order to meet unexpected real-time variations on the power grid, BPA relies on flexibility in the FCRPS to alter reservoir levels and the amount of water passing through the turbines.
- Loss of hydro system flexibility increases the risk of a transmission system emergency and, ultimately, the risk of a blackout.

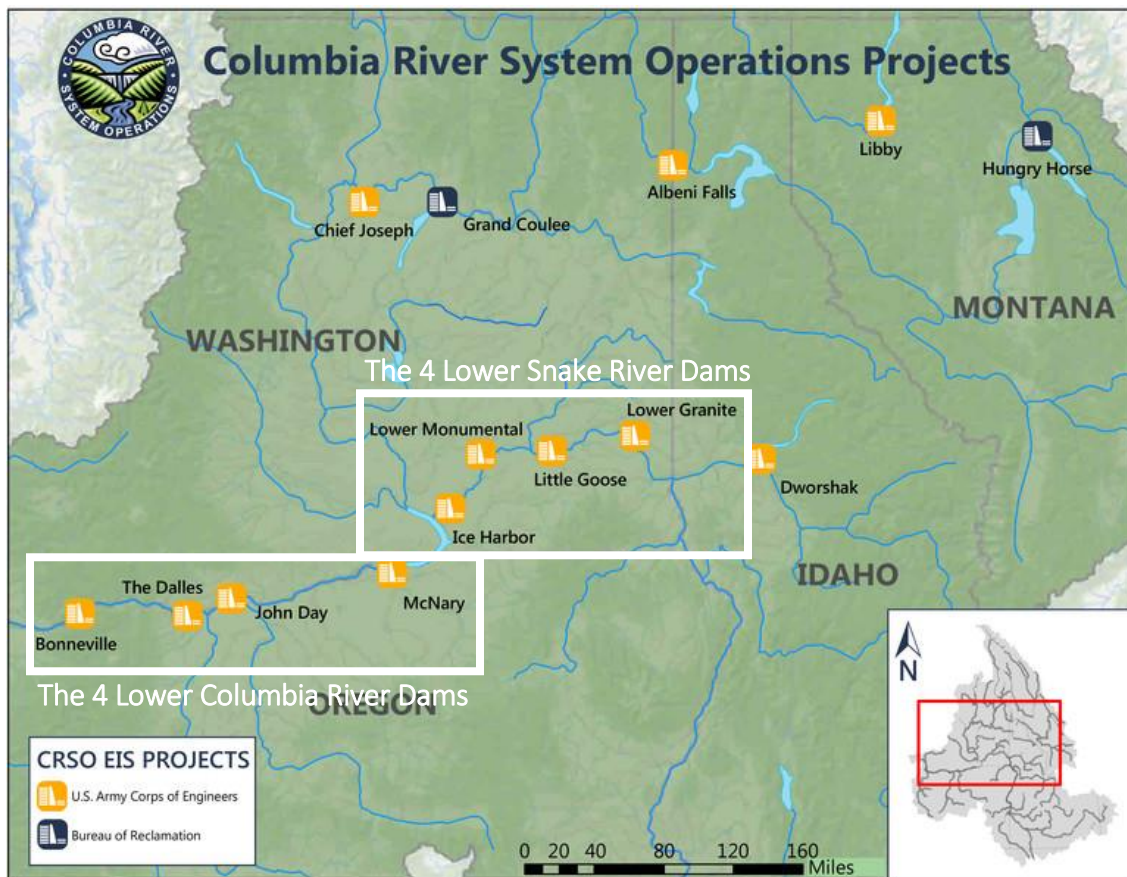
Sources: [CRSO EIS website](#); 2/9/2017 Declaration of Kieran Connolly filed at the US District Court; BPA presentation at 10/23/2019 customer meeting

Detailed Hydro Operation Alternatives Summary

Below is a high-level summary of various hydro operations on the four Lower Snake River dams and the four Lower Columbia River dams. The matrices will be filled in as more information is known, particularly upon release of the CRSO EIS in February 2020.

Below are the eight dams whose operations are impacted:

- Lower Snake River dams = Lower Granite, Little Goose, Lower Monumental, and Ice Harbor
- Lower Columbia River dams = McNary, John Day, The Dalles, and Bonneville



NOTES:

- “Performance Standard Spill” refers to the 2008 BiOp as supplemented in 2010 and 2014
- % Total Dissolved Gas (TDG) shown at tailrace unless otherwise specified
- The matrices below attempt to highlight the major impacts to hydro operations; there are additional structural and operational measures provided for under these regimes

Regime	“No Action” Alternative
Summary	The operations that were in effect in September 2016. Generally similar to “Performance Standard Spill” or “BiOp” spill with differences at certain projects.

Regime	2018 Injunctive Spill
Summary	Result of Judge Simon’s court order
Impact on Lower Snake	<p><i>Spring spill (Apr 3 – Jun 20):</i></p> <ul style="list-style-type: none"> ▪ 24 hours/day ▪ TDG: 120% at tailrace and 115% at forebay <p><i>Summer spill (through Aug 31): Performance standard</i></p>
Impact on Lower Columbia	<p><i>Spring spill (Apr 10 – Jun 15):</i></p> <ul style="list-style-type: none"> ▪ 24 hours/day ▪ TDG: 120% @ tailrace and 115% @ forebay <p><i>Summer spill (through Aug 31): Performance standard</i></p>
Impact to Hydro System	Based on critical water, results in decrease of 140 aMW Based on 80 water years, results in decrease of 203 aMW (decrease of 815 aMW Apr-Jun)
Impact on Power Costs	Approximately \$40M

Regime	2019 Flex Spill Agreement
Summary	Year 1 of multi-year agreement between OR, WA, Nez Perce Tribe, BPA, Corps and Reclamation (and supported by ID and MT) to avoid litigation while the CRSO EIS is completed. The agreement calls for flexible spill operations that meet three objectives: provide additional fish benefits by increasing spill; keep power system costs at or better than Injunctive Spill costs and preserve hydro system flexibility; and retain operational feasibility.
Impact on Lower Snake	<p><i>Spring Spill (Apr 3 – Jun 21):</i></p> <ul style="list-style-type: none"> ▪ 8 hours/day @ performance standard ▪ 16 hours/day @ 120% <p><i>Summer Spill (Jun 21 – Aug 31):</i> volume/percent of total flow routed to spillway listed by project; no spill curtailment criteria</p>
Impact on Lower Columbia	<p><i>Spring Spill (Apr 10 – Jun 16):</i></p> <ul style="list-style-type: none"> ▪ 8 hours/day @ performance standard ▪ 16 hours/day @ 120% <p><i>Summer Spill (Jun 16 – Aug 31):</i> volume/percent of total flow routed to spillway listed by project; no spill curtailment criteria</p>
Impact to Hydro System	
Impact on Power Costs	2019 actuals were \$0 to \$1M worse than 2018 injunctive spill

Regime	2020 Flex Spill Agreement
Summary	Year 2 of the multi-year agreement; planned operations shown below based on BPA presentation at 10/23/2019 customer meeting
Impact on Lower Snake	<p><i>Spring Spill (Apr 3 – Jun 21):</i></p> <ul style="list-style-type: none"> ▪ 8 hours/day @ performance standard ▪ 16 hours/day @ 125% <p><i>Summer Spill (Jun 21 – Aug 31):</i> August spill reduced to minimum spill starting August 15th</p>
Impact on Lower Columbia	<p><i>Spring Spill (Apr 10 – Jun 16):</i></p> <ul style="list-style-type: none"> ▪ For McNary and Bonneville: 8 hours/day @ performance standard and 16 hours/day @ 125% ▪ For The Dalles: 24 hours/day @ performance standard ▪ For John Day: 8 hours/day @ performance standard and 16 hours/day @ 120% <p><i>Summer Spill (Jun 16 – Aug 31):</i> August spill reduced to minimum spill starting August 15th</p>
Impact to Hydro System	Assume no reductions in hydro generation relative to BP-20, due to summer gains generally offset the spring reductions
Impact on Power Costs	Goal: not increase power costs above 2018 injunctive spill; modeling of spring spill and August spill reductions shows estimated costs \$2.4M better than 2018 Injunctive Spill

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Regime	MO-3
Summary	Breach the four Lower Snake River dams
Impact on Lower Snake	Breached – no generation
Impact on Lower Columbia	<p><i>Spring spill (Apr 10 – Jun 15):</i></p> <ul style="list-style-type: none"> ▪ 24 hours/day @ 120% <p><i>Summer spill (Jun 16-Jul 31):</i> Summer spill would end at midnight Jul 31</p>
Impact to Hydro System	Loss of approximately 1000 aMW of average annual energy (561 aMW critical water energy)
Impact on Power Costs	Very high (hundreds of millions per year)

Regime	MO-4
Summary	Most aggressive spill operations to support juvenile fish passage
Impact on Lower Snake	<p>Spring & Summer Spill (Mar 1 – Aug 31)</p> <ul style="list-style-type: none"> ▪ 24 hours/day @ 125%
Impact on Lower Columbia	<p>Spring & Summer Spill (Mar 1 – Aug 31)</p> <ul style="list-style-type: none"> ▪ 24 hours/day @ 125%
Impact to the Hydro System	<p>Up to 2 million acre feet drawdown at Grand Coulee and other upstream reservoirs to augment flows in the lower Columbia, specifically the McNary flow target</p> <p>Operate all 8 dams (4 LSR + 4 LCR) at near minimum operating levels in the spring and summer, greatly reducing generation and flexibility of those 8 dams, and also negatively impacting the generation and flexibility of the other dams</p>
Impact on Power Costs	Very high (hundreds of millions per year)