

Supplement Analysis
for the
Columbia River System Operations Environmental Impact Statement
(DOE/EIS-0529/SA-04)

2024–2033 Proposed Operation Changes

Bonneville Power Administration
Department of Energy



Background

In September of 2020, Bonneville Power Administration (Bonneville) along with the U.S. Army Corps of Engineers (Corps) and Bureau of Reclamation (Reclamation) issued a joint Record of Decision (ROD) for the Columbia River System Operations Environmental Impact Statement (CRSO EIS) (DOE/EIS-0529). The CRSO EIS, dated July 2020, addressed the ongoing operations, maintenance, and configuration of the 14 federal Columbia River System (CRS) projects on the Columbia and Snake rivers. The 14 projects are Libby, Hungry Horse, Albeni Falls, Grand Coulee, Chief Joseph, Dworshak, Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville. The co-lead agencies (Corps, Reclamation, and Bonneville) share responsibility and legal authority for managing the CRS. These three co-lead agencies coordinate the operation of the CRS and worked together to develop the EIS. The Corps and Reclamation develop operating requirements for their projects. These are the limits within which a reservoir or dam must be operated. Some requirements are established by Congress when a project is authorized, while others are established by the agencies based on operating experience. Within these operating limits, Bonneville schedules and dispatches power. This process requires continuous communication and coordination among the three agencies.

As part of the CRSO EIS, the agencies considered six alternatives to CRS operations, maintenance, and configuration. The agencies analyzed the effects of these alternatives on the human environment, including environmental, economic, and social impacts. On February 28, 2020, the co-lead agencies released for public comment the Draft CRSO EIS describing the effects of these alternatives and identifying the agencies' Preferred Alternative. The 45-day public comment period ended on April 13, 2020, and the agencies reviewed and responded to these comments in the Final CRSO EIS. The co-lead agencies released the Final EIS on July 28, 2020, and the agencies issued a joint ROD adopting the Selected Alternative identified in the Draft EIS on September 28, 2020.

Since the issuance of the joint ROD in 2020, Bonneville has prepared three supplement analyses (SAs) evaluating the CRSO EIS consistent with 10 Code of Federal Regulations § 1021.314. The first ([SA-01](#)) evaluated modifications to operational measures proposed in October 2021, finding that they would not result in substantial modifications to the Selected Alternative and were consistent with the effects described in the Final CRSO EIS. The second ([SA-02](#)), prepared

in August 2022, documented that the Bonneville-funded Energy and Environmental Economics, Inc. study on the future value of the lower Snake River dams did not present new circumstances or information relevant to environmental concerns not addressed in the CRSO EIS. The third ([SA-03](#)) evaluated proposed modifications proposed in October 2022 to certain measures identified under the Selected Alternative on the lower Snake and Columbia rivers, finding that they would not result in substantial modifications to the Selected Alternative and were consistent with the effects described in the Final CRSO EIS.

Building on these prior evaluations in the CRSO Final EIS and ROD and subsequent SAs, this SA evaluates proposed modifications to certain measures identified under the Selected Alternative on the lower Snake and Columbia rivers. It analyzes whether these proposed modifications to the Selected Alternative represent a substantial change to the Selected Alternative or significant new circumstances or information relevant to environmental concerns that were not addressed by the EIS, such that either would warrant the need for a supplemental EIS.

Proposed Modifications

The co-lead agencies, in coordination with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS), propose to implement the operational modifications described below for the next ten years. These proposed operations would begin in March 2024 and could continue until 2033. This SA evaluates the proposed modifications related to spring, summer, and fall spill operations. Because the modifications represent changes to current operations, they could have potential environmental effects. Additionally, under the modifications, the agencies would continue to implement all other CRS operations consistent with the Selected Alternative as outlined in the CRSO EIS ROD and subsequent operational changes as discussed in SA-01 and SA-03 and adaptive management processes. Additionally, operations will continue to be implemented consistent with other guiding documents including the annual Fish Passage Plan, including the Fish Operations Plan (FOP), and the Water Management Plan, and seasonal Water Management Plan updates.

1. Spring Spill Operations (April 3 to June 20)

The proposed modifications outlined below would change the spring component of the *Juvenile Fish Passage Spill Operations* measure described in the Final CRSO EIS in Section 7.6.3.9 and the CRSO ROD in Section 6.3.1.1.1 describing the Flexible Spill Operation.

To enhance passage for out-migrating juvenile fish in spring, the co-lead agencies would modify spill levels by increasing spill up to 125% total dissolved gas (TDG) across all hours except when adult delays are observed at all four of the lower Snake River dams (Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams) and at two lower Columbia River dams (Bonneville and McNary dams). At John Day Dam, the co-lead agencies would modify spring operations to reduce the number of hours of spill per 24-hour period. The lower Snake River dam modifications would occur from April 3 through June 20 while the lower Columbia River dam modifications would occur from April 10 through June 15.

The operational changes at the lower Snake River dams and two lower Columbia River dams would eliminate the option to reduce spill operations for 8 hours per day to optimize hydropower production for hours of peak power demand. These reduced spill operations were last conducted in 2021. Under the proposed operational changes, the four lower Snake River dams and two lower Columbia River dams would spill to 125% TDG gas cap 24 hours per day, seven days a week (24-hour/7-days-per-week spill) during the spring migratory period for juvenile salmon species. At Little Goose Dam, all spill operations above 30% of total river volume have resulted in adult delays in entering the fish ladders and will transition to 16-hour/7-days-per-week operations at 125% TDG and 8-hour/7-days-per-week 30% spill volumes during daytime hours identified in the FOP to improve passage conditions. Prior to this transition at Little Goose Dam, all flexible spill operations have been eliminated (125% TDG gas cap 24-hour/7-days-per-week). At Lower Granite and Lower Monumental dams, the co-lead agencies would limit the 24-hour/7-days-per-week spill-to-125% TDG operation outlined above to 40% of total river volume 8 hours a day when adult fish delays are detected at the dams. This would help reduce adult delays and potential effects from gas-bubble trauma. The co-lead agencies would continue to utilize the current Columbia River Data Access in Real Time (DART) Reach Distribution and Delay for PIT Tag Adult Returns tool, or “DART tool,” to identify adult delays and passage issues.

At John Day Dam, the co-lead agencies would modify operations based on discussions with NMFS and USFWS. This modification would limit the number of hours of spill up to 125% TDG to 8 hours per 24-hour period during nighttime hours and on average 40% spill volume during daytime hours. Upon implementation, these changes would likely result in little change in the current flow patterns during low-flow conditions (e.g., minimum generation and spilling the remaining river flow), and increased spill during average- and high-flow conditions during nighttime hours to reduce powerhouse encounter rates by migrating fish.

As discussed in detail above, these modifications to the spill level fit the *Set Juvenile Fish Passage Spill to Not Exceed 125 Percent TDG* measure described in CRSO Final EIS Section 2.4.6.1 and would be consistent with the modifications increasing spill subsequently evaluated in SA-01 and SA-03.

2. Summer, Fall, and Winter Spill Operations (August 1 to March 31)

The co-lead agencies propose to implement three modifications to summer, fall and late-winter spill operations: (1) shifting the transition date from higher spill to lower spill levels from August 15 to August 1 at lower Snake River and lower Columbia River dams; (2) spilling 4 hours per day 7 days per week at a single surface weir on each of the lower Snake River dams and one lower Columbia River dam (McNary Dam) September 1 through November 15; and,; and (3) spilling 4 hours per day 7 days per week at a single surface weir on each of the lower Snake River dams and one lower Columbia River dam (McNary Dam) March 1 through March 20, then on March 21 transition surface weir spill operation from 4 hours to 24 hours per day on each of the lower Snake River dams and two lower Columbia River dam (McNary and John Day dams) until the start of spring spill operations (see section above).

For the first of these operational changes, the only change would move up the transition date from August 15 to August 1, and would, therefore, not alter any other operations such as the rate of water spilled at each of the lower Snake River and Columbia River dams. The co-lead agencies tailored this date change based on DART historical records showing that most migrating fish would not be present. Based on this evidence, and prior consultation with NMFS, the co-lead agencies determined that shifting this date would maintain protection for 90-95% of annual fall sub-yearling Chinook salmon run during active downstream migration for lower Snake River and lower Columbia River stocks. Moreover, in implementing this proposed measure, the co-lead agencies would follow the DART tool described above, and adaptively manage operations¹ to identify and minimize fish passage impacts. This SA evaluates the potential environmental effects, relative to those evaluated in the CRSO EIS and its subsequent SAs, from moving up the transition date from higher to lower spill volumes.

For the second of these operational changes, the current operation that spills 4 hours per day would increase the time period of spill from every third day to daily at all lower Snake River dams between September 1 and November 15. For the third operational change, spill operations would commence again for 24-hours per day on March 20 through a single spill weir. A core element of this proposed operational modification limits this spill operation to a single surface weir at each dam. As explained in the *Surface Spill to Reduce Take of Overshooting Adult Steelhead* measure in the CRSO Final EIS, the purpose of spilling at a single surface weir is to reduce take occurring for adult steelhead overshoots.

The first proposed modification outlined above would end summer juvenile fish passage spill by July 31 consistent with the operational measure of the *Limit fish passage to 110 percent TDG* measure (Final EIS Section 2.4.4.1, page 2-52) and reduced summer spill in the Final EIS (Final EIS Section 2.4.5.1, page 2-60). The second and third modifications would change *Surface Spill to Reduce Take of Overshooting Adult Steelhead* measure described in Section 7.6.4.3 of the CRSO Final EIS and CRSO EIS ROD Section 6.3.1.1.2.

¹ See generally Appendix R to the CRSO EIS, Mitigation, Monitoring, and Adaptive Management, Part 1: Monitoring and Adaptive Management Plan.

3. Lower Granite Reservoir Operations (August 15 to August 31)

The co-lead agencies propose to maintain reservoir levels, as measured in the forebays behind lower Snake and lower Columbia dams, within the standard operating ranges evaluated under the Selected Alternative and adopted in the CRSO EIS ROD. As part of this commitment, the co-lead agencies would implement minimum operating pool (MOP) between the months of April and August. MOP reservoir operations generally allow flexibility to temporarily store water, restricting it from entering powerhouses to shift generation patterns to match hours of heavier power demand—such as shifting generation from light-load evening hours to heavier-load day-time hours. The only proposed change to MOP reservoir operations would push back the end date at Lower Granite Dam, from August 15 to August 31, for the co-lead agencies, to hold, to the extent practicable, the minimum operating range at Lower Granite dam within 1 foot of MOP.

Overall, notwithstanding the date change to the MOP operation at Lower Granite Dam, the proposed operations are consistent with ongoing implementation of the Selected Alternative evaluated in the Final EIS and adopted in the CRSO EIS ROD. The only change would occur due to the minor change in the date range for implementing MOP at Lower Granite Dam described above; therefore, it represents the only change to reservoir operations with potential environmental effects further evaluated in this SA. The agencies will otherwise continue to implement CRS reservoir operations consistent with the Selected Alternative as outlined in the CRSO EIS ROD and the subsequent operational changes evaluated for both the 2022 and 2023 fish operations in SA-01 and SA-03, respectively. Unless noted in this SA, other reservoir operations would continue as described in the CRSO EIS ROD and associated SAs, and adaptive management processes. Finally, operations will continue to be implemented consistent with other guiding documents including the annual Fish Passage Plan and Water Management Plan. This includes, but is not limited to, reservoir elevation operations (or MOP) on the lower Snake and Columbia rivers.

Analysis

The proposed modifications would result in more spill in spring, fall, and winter, on average, than the current operations. In early August, the operational changes would result in increased generation capacity. In general, this could result in slight changes in effects to water quality, fish, power generation, as well as air quality and greenhouse-gas emissions attributable to spot-market power purchases to offset reduced hydropower generation; however, effects to other resources are not expected given relatively minor change to operations. As explained in detail below, the modified spill levels and reservoir operation at Lower Granite Dam during the summer would result in similar effects to resources considered in the CRSO Final EIS and ROD. When considering the modified spill level in the context of all operational measures evaluated in the CRSO Final EIS and those included as part of the Selected Alternative, it does not represent a substantial change to the Selected Alternative and is consistent with the effects described in the CRSO Final EIS.

Through discussions with the NMFS and USFWS, the co-lead agencies have confirmed that the modification to the Selected Alternative would fall within the range of effects considered in the ESA Section 7 consultations on the operations and maintenance of the CRS and would not require reinitiation of Section 7 consultation. Similarly, the proposed modification would comply with all applicable laws, including the Clean Water Act and existing water quality standards, the National Historic Preservation Act, and the Northwest Power Act.

As discussed in more detail below, the anticipated effects from the proposed modifications fall within the scope of effects analyzed in the Final EIS, which analyzed effects from the *Juvenile Fish Passage Spill Operations*, *Surface Spill to Reduce Take of Overshooting Adult Steelhead*, and the *Spill to 125% TDG* measures. Accordingly, the following discussion specifically evaluates the proposed modifications relative to the impacts evaluated in the Final EIS and the Selected Alternative for water quality, fish, power, air quality, and greenhouse-gas emissions to determine whether the proposed modifications represent substantial changes to the Selected Alternative relevant to environmental concerns or significant new circumstances or information relevant to environmental concerns bearing on the Selected Alternative or its impacts.

1. Water Quality

The proposed increase in spring spill under the modifications of up to 125% TDG 24 hours per day and the elimination of the flexible spill operation would increase the overall spill volume and could elevate TDG levels as measured at the tailrace of each dam. The CRSO Final EIS explained that the highest spill levels, and associated water quality effects from TDG, are associated with Multiple Objective (MO) 4 (see FEIS sections 2.4.6). MO4's *Spill to 125% TDG* measure sets juvenile fish passage spill to not exceed 125 percent TDG saturation, as measured at the tailrace, at all lower Snake River dams from March 1 to August 31.

In Section 3.4.3.7, the Final EIS specifically analyzed effects from the measure entitled, *Set juvenile fish passage spill to not exceed 125 percent TDG*, generally finding increases in TDG saturation (Final EIS Section 3.4.3.7, pages 3-286) over both the spring and summer spill seasons. Under the Selected Alternative, the co-lead agencies continue to monitor effects from increases in TDG from the proposed spring spill operation and could exercise their ability to modify spill to adhere to state water quality standards (*See generally* Final EIS Section 7.7.3.3, page 7-88; ROD Section 3.9; ROD Attachment 2, page A2-1; 2023 FOP, Sections 2.1 and 4.1). The Selected Alternative also includes a mitigation action measure entitled *Temporary Extension of Performance Standard Spill Operation* (Final EIS Section 7.6.4.2, page 7-44; ROD Section 2.7.3) that would be implemented if TDG levels result in impacts to salmonid or resident non-salmonid fishes or if increased spill levels result in delays to adult passage. If exceeding certain biological conditions for gas bubble trauma in state water quality standards or if observing a delay in adult salmon and steelhead upstream passage, operations would revert to performance standard spill operation until resolution of the adverse impact to fish. Because the proposed modifications to the spring spill operation would have similar water quality effects described for the *Set juvenile fish passage spill to not exceed 125 percent TDG* measure analyzed in the Final EIS, and the co-lead agencies would continue to monitor TDG

levels and utilize the *Temporary Extension of Performance Standard Spill Operation* mitigation measure and existing off-ramps in other guiding documents such as the annual Fish Passage Plan, including the FOP, Water Management Plan, and seasonal Water Management Plan updates, if necessary, this modification does not represent a substantial change to the Selected Alternative or significant new circumstance or information relevant to water quality effects.

For the fall and winter surface weir operational changes, the frequency of spill levels would increase, which, in turn, could elevate TDG saturation. The increased frequency of single surface weir spill operation under the proposed modifications would result in similar water quality impacts in the fall and March 1 to 20 as those currently occurring under the three-day per week surface weir spill. The transition of spill on March 21 through the start of spring spill may result in elevated TDG saturation, although this spill is not expected to exceed water quality standards for fish operations. Similar to the spring spill discussed above, the co-lead agencies would continue to monitor effects (see CRSO EIS ROD Section 6.3.1.1.2 that references the potential for adaptive management) from any increases in TDG and associated fish effects from the proposed surface weir spill operation and could exercise their ability to modify spill.

Turning to the August transition date, modifying the summer spill operation by moving up the date transitioning higher spill to lower spill levels would generally result in reduced water quality effects resulting from elevated TDG in both the lower Columbia and lower Snake rivers and negligible impacts to water temperature. These effects are generally consistent with those analyzed for the *Limit fish passage to 110 percent TDG* measure (Final EIS Section 2.4.4.1, page 2-52) described in the Final EIS. As explained in this section of the Final EIS, this measure aims to reduce the duration of summer juvenile fish passage spill by ending summer spill on July 31. Accordingly, for these measures, the Final EIS generally found that its implementation would lower TDG saturations in August (Final EIS Section 3.4.3.5, page 3-270 to 3-271). Like the effects found for this measure, which would end spill earlier in summer, the Final EIS analyzes the resulting water quality effects (reduced TDG) from a transition occurring about two weeks earlier than the Selected Alternative, as described above. Finally, for the proposed change to reservoir operations at Lower Granite Dam during the month of August, the Corps would operate within 1.5 feet of MOP through August 31 to maximize cool water releases from Dworshak Dam to meet water temperature targets in the tailwater and the adult trap of Lower Granite Dam. For these reasons, and consistent with this Final EIS finding of improved water quality conditions from reduced August TDG levels, transitioning from higher to lower spill at an earlier date does not represent a substantial change compared to the Selected Alternative or significant new information or circumstance bearing on the water quality effects analyzed in the CRSO Final EIS.

2. Fish

The proposed spring spill operational modifications would generally increase spill levels and thereby increase numbers of fish passing dams via spillways. This would likely reduce powerhouse encounters. As described below, consistent with the Final EIS analysis, biological studies confirm that the proposed modifications would not represent a substantial change

compared to the Selected Alternative nor would significant new information or circumstances bear on the analysis of fish effects analyzed in the EIS.

A 2021 Pacific Northwest National Laboratory (PNNL) study² confirms that the anticipated fish effects fall within the range of these effects analyzed in the CRSO EIS. For example, as discussed for the lower spill level at Lower Monumental Dam evaluated in SA-03, the 2021 PNNL study found that powerhouse passage probability generally decreases (and spillway passage probability increases) with increasing spill levels, especially during high-flow conditions. This study suggests that higher spill levels, such as spilling to 125% TDG on a daily basis under the proposed spring operation, especially during nighttime hours, would likely reduce powerhouse encounter rates and increase the overall proportion of juveniles passing through the spillway, contributing to more adults eventually returning to the Snake River system based on decreased potential latent mortality impacts. Moreover, additional spill at average-to-high flows at John Day Dam would increase spillway passage and improve overall survival of juveniles passing the project and the CRS.³

These findings confirm that the effects anticipated from the increased spill duration under the modification would be consistent with those evaluated in the Final EIS. In Section 3.5.3.7, the Final EIS analyzes the effects resulting from the operational measure increasing spill levels (i.e., *Set juvenile fish passage spill to not exceed 125 percent TDG* measure) at CRS dams during juvenile fish passage spill in spring. Generally, higher spill volumes have the net effect of routing greater numbers of juvenile salmon and steelhead into spill routes with fewer individuals traveling through powerhouse routes, such as fish bypass and turbine routes. The effectiveness of spill to attract fish to pass through the spillway (surface or bottom spill) varies by species, daytime versus nighttime hours, time of year, and other environmental conditions associated with seasonal changes. The Final EIS also found that increased spill under that measure could reduce instances of fish injury and likely contribute to increases in abundance of returning salmon and steelhead (Final EIS Section 3.5.3.7, pages 3-626 to 3-628).

The Final EIS analysis also considered potentially adverse effects to fish resulting from potential TDG exposure due to the higher and prolonged spill levels during the longer time period from March 1 to August 31, finding an increase in reach-average exposure to TDG during those months (Final EIS Section 3.5.3.7, page 3-627). The Final EIS found that TDG exposure has the potential to delay adult upstream passage for migrating salmon and steelhead (Final EIS Section 3.5.3.3, page 3-401). In addition, the Final EIS found that higher spill operations can result in large eddies that slow juvenile migration (Final EIS Section 3.5.3.7, page 3-649). For bull trout, the Final EIS found increased potential for delayed upstream dam passage due to higher spill resulting in elevated TDG levels that potentially degrade feeding, migrating, and wintering

² Harnish, R.A., K.D. Ham, J.R. Skalski, and R.A. Buchanan. May 2021. *Factors affecting dam passage routing and in-river survival of juvenile salmonids in the lower Snake and Columbia rivers*. Report prepared for U.S. Department of Energy under Contract DE-AC05-76RL01830 by Pacific Northwest National Laboratory (PNNL-30641), at page 70, Figure 36; at page 82, Figure 44.

³ *Id.*

habitat in the lower Snake River, as well as affect bull trout individuals leaving the CRS in May and June (Final EIS Section 3.5.3.7, page 3-675).

For the spring operation at John Day that would reduce the level of spill based on time of day, a 2023 PNNL publication⁴ provides support that confining increased spill to nighttime instead of daytime hours minimally affects fish passage. This study evaluated dam-passage events at lower Snake and lower Columbia river dams and specifically found a higher probability of fish passing through powerhouses at higher rates during evening hours and lower rates during daytime hours. Specifically for John Day Dam, modeling conducted for the study suggests that yearling Chinook salmon passed in 1.8 to 2.8 times greater numbers through that powerhouse at John Day Dam during the night than during the day; and 1.6 to 2 times greater for steelhead.⁵ In addition, the co-lead agencies have closely coordinated with NMFS in devising this proposed operational modification for John Day Dam to ensure that it falls within the incidental take allowable under 2020 NMFS Biological Opinion Terms and Conditions. Therefore, based on the foregoing, limiting the number of hours of spill under the proposed operation up to 125% TDG to 8 hours during nighttime hours, and up to 40% spill volume during daytime hours, would result in minor additional effects to anadromous fish compared to the current operation carried out under the Selected Alternative, and hence does not represent a substantial change in the Selected Alternative relevant to fish effects.

Potential steelhead overshoots may occur when migrating steelhead move upstream from the tributaries where they spawn. Studies cited in the CRSO Final EIS suggest that surface flow passage routes such as spillway weirs pass adult steelhead effectively on Columbia River projects when steelhead migrate downstream to return to their natal streams.⁶ Accordingly, these studies provide support that the operational modification altering spill so it occurs at a single surface weir when 24/7 spill begins March 21 would further minimize effects to steelhead individuals. Furthermore, this spill volume is consistent with both the *Spill to 125% TDG* measure described above and represents a direct application of the *Surface Spill to Reduce Take of Overshooting Adult Steelhead* measure analyzed in the Final EIS that the co-lead

⁴ Harnish, R.A., K.D. Ham, J.R. Skalski, R.L. Townsend, and R.A. Buchanan. November 2023. *Factors affecting powerhouse passage of spring migrant smolts at federally operated hydroelectric dams of the Snake and Columbia rivers*. Canadian Journal of Fisheries and Aquatic Sciences. Available at:

<https://cdnsiencepub.com/doi/10.1139/cjfas-2022-0217> (last accessed November 9, 2023).

⁵ *Id.* at page 5.

⁶ See Final EIS Section 7.7.4.1, at page 7-103 (describing reduced steelhead fallback when a surface passage route is available, citing Richins & Skalski. 2018. *Steelhead Overshoot and Fallback Rates in the Columbia– Snake River Basin and the Influence of Hatchery and Hydrosystem Operations*. North American Journal of Fisheries Management 38(5):1122–1137). See also Keefer et al. Adult Salmon And Steelhead Passage Through Fishways And Transition Pools At Bonneville Dam, 1997-2002. Technical Report 2008-5. U.S. Geological Survey, Idaho Cooperative Fish and Wildlife Research Unit University of Idaho, Moscow, Idaho, for U.S. Army Corps of Engineers, Portland and Walla Walla Districts, and Bonneville Power Administration, Portland, OR; Keefer, M.L., Caudill, C.C., Clabough, T.S., and K. Colins. September 2016. *Adult steelhead passage behaviors and survival in the Federal Columbia River Power System* Final Technical Report for U.S. Army Corps of Engineers, Portland and Walla Walla Districts, and Bonneville Power Administration, Portland, OR; Keefer, M.L., Caudill, C.C., and C. Peery. 2008. *Overwintering Distribution, Behavior, and Survival of Adult Summer Steelhead: Variability among Columbia River Populations* North American Journal of Fisheries Management (28:81–96).

agencies began implementing in 2020 at McNary Dam and at the lower Snake River projects (Final EIS Section 7.6.4.3, page 7-49; ROD Section 6.3.1.1.2, page 59). Furthermore, the co-lead agencies subsequently extended the application of this measure by one month from October 1 to September 1, which was evaluated relative to the analysis of effects in the CRSO Final EIS in SA-01. Accordingly, expanding the number of dams implementing surface spill to reduce take of overshooting adult steelhead to all lower Columbia River and lower Snake River dams while continuing adaptive management processes under the Selected Alternative,⁷ consistent with ongoing coordination with NMFS and its 2020 Biological Opinion Terms and Conditions, is a proposed modification that does not represent a substantial change to the Selected Alternative or significant new circumstance or information relevant to environmental concerns.

The modified spring operation would also continue mitigation adopted for the Selected Alternative to temporarily operate to performance spill upon observing a delay in upstream passage (see *Temporary Extension of Performance Spill Standard* mitigation measure in Final EIS Section 7.6.4.2, page 7-44; ROD Section 2.7.3). This protects against unexpected fish effects, such as adult migration delay and gas bubble trauma from spill up to 125% TDG (Final EIS Section 7.6.3.9, page 7-34). The Final EIS found that implementing this mitigation measure as part of the Selected Alternative reduces a potentially adverse effect to migrating fish from TDG (Final EIS Section 7.6.3.9, page 7-34). Moreover, in-season adaptive management will occur if adult delays are identified.

For the higher-to-lower spill date transition from August 15 to August 1, the Final EIS found that water quality impacts would generally decrease under the *Limit fish passage spill to 110 percent TDG* measure in MO2 that would end summer spill on July 31 (Final EIS page 3-272), as discussed above. This reduction in TDG levels would reduce adverse fish effects. Accordingly, the Final EIS found slightly reduced effects on anadromous fish species (Final EIS Section 3.5.3.5, page 3-576 to 3-577). Furthermore, as noted above, the co-lead agencies tailored the date change based on DART historical records showing that most migrating fish would not be present. Based on this evidence, and prior consultation with NMFS, the co-lead agencies determined that shifting this date would maintain protection for 90-95% of annual fall sub-yearling Chinook salmon run during active downstream migration for lower Snake River and lower Columbia River stocks. Moreover, in implementing this proposed operational change, the co-lead agencies would follow the DART tool described above, and adaptively manage operations to identify and minimize fish passage impacts. In addition, the co-lead agencies will implement this operation consistent with, and within allowable incidental take, under the Terms and Conditions of the 2020 CRS Biological Opinions.

For the reasons explained above, the proposed modifications would result in effects to fish consistent with those analyzed in the Final EIS, and with the implementation of the mitigation measures and existing off-ramps in other guiding documents such as the annual Fish Passage

⁷ The CRSO EIS ROD, in Section 6.3.1.1.2, references the potential for adaptively managing the time period of spill to reduce effects to overshooting adult steelhead. In addition, Part 1 in Appendix R to the CRSO EIS outlines the co-lead agencies proposed framework for adaptive management, discussing surface spill to reduce take of overshooting adult steelhead in Section 2.4.2.

Plan, including the FOP, Water Management Plan, and seasonal Water Management Plan updates, would not result in a substantial change to the Selected Alternative or significant new circumstance or information relevant to fish effects.

3. Power and Transmission

The proposed operational modifications would reduce generation during the spring due to increased spill. It would increase generation during early August due to an earlier transition date, moving from a higher spill to a lower spill volume on August 1 instead of August 15 under the current operation. Holding the operating range within 1 foot from MOP to the extent practicable at Lower Granite Dam and modifying the dates for the reservoir operation MOP would potentially reduce operational flexibility to generate at lower Snake River dams during periods of high power demand between August 1 and August 31. For the reasons explained below, these changes would result in effects that fall within the power and transmission effects analyzed in the CRSO Final EIS, and therefore do not represent a substantial change in the effects evaluated for the Selected Alternative.

For spring spill operations, modifying the *Spill to 125% TDG* measure would reduce hydropower generation during daily spill operations conducted on a 24/7 basis between April 10 and June 15. Spill increases will vary by project and environmental conditions. On average, this additional spring spill would result in an annual average reduction in power generation of approximately 64 aMW, which would result in a reduction in capacity of 140,000 MWh, and up to a maximum reduction in power generation of 360,000 MWh compared to the Selected Alternative in the 2020 CRSO EIS. In Section 3.7.3.6, the Final EIS analyzed the effects resulting in changes to power generation from large increases in spring and summer fish passage spill, and found that the largest generation decreases occur between March to the end of August when dams would operate only at minimum generation levels, except for the wettest years, under the higher spill levels of the *Spill to 125 % TDG* measure (Final EIS Section 3.7.3.6, page 3-978). In addition, the Final EIS analyzed the potential for reliability issues associated with the reduction of hydropower generation during these months and found increased potential for loss of load probability (Final EIS Section 3.7.3.6, page 3-980).

The proposed spring modification would fall well within the range of these effects analyzed in the Final EIS because anticipated decreases in hydropower production would primarily occur during a period of low regional loads in the spring and would not impact the summer and winter months when demand is higher (e.g., “Firm Load Forecast” affected environment discussion in Final EIS Section 3.7.2.7, page 3-835). Offsetting some of that anticipated loss in generation discussed in the CRSO EIS would occur from shifting the transition date from August 15 to August 1. This would increase generation compared to the current operation. As noted, the proposed reservoir operation for MOP is largely consistent with the Selected Alternative and represents a minor change, hence the potential for effects to operational flexibility would be offset through mitigation such as contingency reserves to maintain grid reliability. On balance, there would be little to no change in effects compared to the Selected Alternative implemented under the current operation. In addition, as described above, Bonneville holds

contingency reserves under the Selected Alternative during fish passage spill operations to maintain grid reliability (Final EIS Section 7.6.3.10), which can have the effect of reducing planned spill levels in some circumstances. The FOP includes routine reliability tools and contingency operations to resolve adverse transmission conditions. Additional flexibility for deploying reserves in the lower Columbia River at three dams (McNary, John Day and Bonneville) will be implemented above minimum generation levels as required and when flexibility elsewhere has been maximized (e.g., reserves at Chief Joseph and Grand Coulee dams).

For the higher-to-lower spill transition date, a reduction in summer spill flows would occur between August 1 and August 15, which would result in a moderate increase in annual power generation compared to the current operation of 383 aMW, resulting in an average increase in capacity of 280,000 MWh (ranging from 220,000 MWh to 330,000 MWh). In the Final EIS, MO2 included the measure, *Reduce the duration of summer juvenile fish passage spill*, which would end juvenile fish passage spill at all projects at midnight on July 31 (Final EIS Section 2.4.5, page 2-60). In the analysis of effects for MO2, the co-lead agencies found that power generation would increase due in part to the implementation of this measure. Accordingly, in Section 3.7.3.4, the Final EIS found that, compared to the No Action Alternative, CRS generation could increase by as much as 20 percent in August due to ending summer spill on July 31, therefore enhancing the ability of the CRS as a whole to meet peak and heavy loads and contribute to its flexibility to integrate renewables (Final EIS Section 3.7.3.4, page 3-9-20 to page 3-9-21). Thus, because shifting the spill-transition date would result in increased generation that falls within the range of these effects, it would not result in effects that substantially differ from those analyzed in the CRSO Final EIS. Bonneville also evaluated the rate impacts from the operational changes and certain Bonneville funding actions and determined these actions would not impact base power rates during the BP-24 rate period and would have only a minimal impact on future rates, with an estimated average annual rate impact of 0.7%.

For these reasons, the proposed operational modifications do not represent a substantial change to the Selected Alternative or significant new circumstances or information relevant to power and transmission concerns.

4. Air Quality and Greenhouse Gases

The proposed operational changes during spring spill operations would result in an average 64 aMW reduction (capacity reduction of 140,000 MWh) in hydropower generation each year. This would result in increased air quality impacts from fossil-fuel-based generation anticipated to offset this loss of hydropower generation. By contrast, for the summer operation, ending higher spill by August 1, instead of August 15 under the current operation, would increase generation by an annual average of 383 aMW (capacity increase of 280,000 MWh). For fall and late winter, generation would decrease resulting in an annual average 29 aMW reduction (capacity reduction of 150,000 MWh). Annually, greenhouse gas (GHG) emissions resulting from the proposed modifications would range from a reduction of 9,844 metric tons (MT) CO₂e to an increase of 10,272 MT CO₂e compared to the current operation. This averages an annual GHG

increase of 4,280 MT CO₂e. Put in perspective, this annual average increase is the GHG equivalent of annual emissions from 952 gasoline-powered passenger cars.⁸

The CRSO Final EIS evaluated air quality and greenhouse gas emissions for the CRSO EIS alternatives and generally found that CRS hydropower production affects the emissions profiles for power production across the Western Interconnection. Recognizing this relationship, in Table 3-202, the Final EIS summarizes air quality and greenhouse gas emissions effects by CRSO alternative. These range from minor beneficial effects from reduced reliance on fossil fuels due to increased hydropower generation (see MO2 summary on Final EIS page 3-1026) to long-term moderate adverse effects, particularly in Montana and Wyoming, due to the reductions in hydropower generation from spill increasing instances of reliance on coal generation and the associated localized air quality effects and resulting increases in GHG emissions (see MO4 summary on Final EIS page 3-1027). Specifically, for the long-term adverse air quality effects resulting from reductions in hydropower production during periods of increased spill such as those analyzed in the Final EIS for MO4—an alternative maximizing implementation of the *Spill to 125% TDG* measure among other measures—the resulting coal generation in Wyoming and Montana would increase emissions of criteria pollutants such as sulfur dioxide, nitrous oxide, and particulate matter (PM). The Final EIS acknowledged that the coal plants likely to operate are located near non-attainment areas for PM and therefore could affect Clean Air Act (National Ambient Air Quality Standards) compliance in those states (Final EIS section 3.8.3.6, page 3-1067). In addition, recognizing shifting economics, ongoing efforts of many states and utilities to decarbonize the grid, and imminent or potential closures of coal plants, the Final EIS conducted sensitivity studies of “limited-coal” and “no-coal” scenarios (see generally “Availability of Coal Resources,” Final EIS pages 3-875 to 3-877). Accordingly, these scenarios reflect the range of reductions in air quality impacts correlating with coal-plant closures that could occur during the term of the proposed operational modifications. Consistent with those findings, to the extent the proposed modifications to spring, summer, fall, and winter spill and reservoir operations at Lower Granite Dam in August alter generation patterns compared to the current operation under the Selected Alternative, these increases and decreases in air quality and GHG effects would fall within the range of effects in the Final EIS findings summarized above.

Overall, for the resource areas discussed above, the proposed modifications would not result in a substantial modification to the Selected Alternative and are consistent with the effects described in the CRSO Final EIS and do not represent significant new circumstance or information relevant to environmental concerns since the issuance of the Final EIS and ROD in 2020 and subsequent supplement analyses. Therefore, Bonneville has determined the proposed modifications do not warrant preparation of a supplemental or new EIS.

⁸ GHG emissions equivalency estimate provided by the U.S. Environmental Protection Agency’s Greenhouse Gas Equivalencies Calculator, available at: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results> (last accessed December 11, 2023).

Findings

Bonneville finds that the proposed activities and potential impacts related to the proposed operational changes are similar to those analyzed in the CRSO Final EIS (DOE/EIS-0529). There are no substantial modifications to the CRSO EIS ROD Selected Alternative and no significant new circumstances or information relevant to environmental concerns bearing on the Selected Alternative or its impacts within the meaning of 10 CFR § 1021.314(c)(1) and 40 CFR § 1502.9(d). Therefore, no further NEPA analysis or documentation is required.

/s/ Jeff Maslow

Jeff Maslow

Senior Environmental Protection Specialist

Concur:

/s/ Katey Grange

Katey Grange

NEPA Compliance Officer

Date: December 12, 2023