DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NORTHWESTERN DIVISION
PO BOX 2870
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April 1, 2020

SUBJECT: Clarification and Additional Information to the Biological Assessment of Effects of the Operations and Maintenance of the Columbia River System on ESA-listed Species Transmitted to the Services on January 23, 2020

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Dear Ms. Abrams and Mr. Thom:

The U.S. Army Corps of Engineers (Corps) submits the following clarifications to the January 2020 Biological Assessment (BA) on behalf of the Corps, Bureau of Reclamation (Reclamation), and the Bonneville Power Administration (Bonneville) (collectively, the “Action Agencies”). In December 2019, as revised in January 2020, the Action Agencies submitted a BA to initiate formal consultation under Section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the operations and maintenance of the 14 Federal multiple-use projects of the Columbia River System on ESA-listed species under the jurisdiction of the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) (collectively, the “Services”).

The purpose of this transmittal is to provide further clarification on specific aspects of the proposed action (PA) in response to comments received from the Services, and incorporate refinements to the PA to ensure consistency with the Columbia River System Operations (CRSO) Draft Environmental Impact Statement (DEIS). The PA is consistent with the DEIS Preferred Alternative and clarifications provided in this letter. The co-lead agencies do not plan to update the content of this BA, but will continue coordinating with the Services to clarify content of this BA as needed. If the future clarifications affect the Preferred Alternative, the co-lead agencies will include those changes in the Final EIS. Should there be any changes made during the EIS process to the Preferred Alternative that are relevant to the ESA consultation, the Action Agencies will promptly notify the Services.

The following clarifications should be considered part of the BA proposed action:

Process for Adaptive Implementation of the Flexible Spill Operational Component of the Columbia River System Spill Operations (Adaptive Implementation Framework or AIF): The draft AIF is attached to the DEIS Appendix R (Part 2), released on February 28, 2020[1] for public review and comment. This AIF appended to the DEIS replaces the previous draft version shared with the Services on January 23, 2020.

Continued funding for mitigation production hatcheries: The Action Agencies note the continued existence of their respective independent Congressionally-authorized hatchery mitigation responsibilities, including, but not limited to, Grand Coulee mitigation, John Day mitigation, and programs funded and administered by other entities, such as Lower Snake River Compensation Plan (LSRCP), which is administered by USFWS. Similar to the conservation and safety-net programs and where appropriate, the Action Agencies will, or have conducted, separate consultations addressing effects to ESA-listed species from the operations and maintenance, as well as associated monitoring and evaluation (including tagging) for these programs.

Clarification of the proposed action related to monitoring consistent with state Water Quality Standards: During the 2020 spring spill season, the first year when some dams will be spilling at 125% TDG gas cap spill, gas bubble trauma (GBT) monitoring of juvenile salmonids will continue using the primary established protocols[2]. The unpaired fins and eyes will be examined for the presence of bubbles and the area covered with bubbles will be quantified at five of the Columbia River System dams (Lower Granite, Little Goose, Lower Monumental, McNary, and Bonneville dams). Native non-salmonid fish collected in the Juvenile Bypass Systems (JBS) will be monitored using the same methods applied to salmonids. The data will be reported to fisheries management entities and the water quality agencies of Washington and Oregon on a daily basis. The data will be made available to other interested parties through Fish Passage Center (FPC) weekly reports and when postings are made to the FPC web site during the season. The 2020 sampling methodologies and data collected will be used to develop biological monitoring plans required for the 2021 spring spill season.

In 2020, the Action Agencies will investigate the feasibility of native non-salmonid fish collection at the current JBS locations and the likelihood of meeting the Washington Department of Ecology (WDOE)-required minimum sample size of 50 native non-salmonid fish per week and at least three species. The Action Agencies will also explore the practicality of secondary native non-salmonid fish collection and GBT monitoring through the Northern Pikeminnow Removal Program index sampling that currently exists downstream of a dam project where 125% TDG gas cap spill occurs.

Correction regarding temperature targets downstream of Libby Dam: The Final BA included an inaccurate reference to a 64°F (18°C) upper temperature limit in the Kootenai River,

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[1]The Columbia River System Operations (CRSO) Draft Environmental Impact Statement (DEIS) can be referenced here: https://www.nwd.usace.army.mil/CRSO/info.

[2]Gas Bubble Trauma Monitoring Protocol (http://www.fpc.org/documents/metadata/GBTMonitoringProtocol.pdf).

as measured at Bonners Ferry, in July and August (p. 2-36). The relevant text should read: "The Action Agencies will strive to provide a stable to steadily increasing thermograph at Bonners Ferry during spawning, incubation, hatching and larval development; minimum target temperature at Bonners Ferry is 50°F (10°C), with no more than a 3.6°F (2°C) decrease in discharge temperature from Libby Dam as measured at Bonners Ferry. During non-isothermic conditions in the reservoir, the Action Agencies will continue to attempt to match pre-dam thermal conditions to enable maximization of riverine biological productivity."

Correction regarding Dworshak Dam turbine maintenance window: The Final BA incorrectly states that the turbine maintenance schedule at Dworshak Dam is from September through January (p. 2-79 – 2-80). This is inaccurate and is based on past practice. Per updates to the Fish Passage Plan, the current maintenance window at Dworshak Dam is 15 September through the end of February.

Avian predation monitoring activities in the Columbia River Basin: The BA identifies *Future Considerations for Avian Predation* including "Bonneville will continue to fund avian predation monitoring in the near term with a goal of evaluating the biological effectiveness of avian predation management actions in the Columbia River System." (2-94). NMFS asked for additional information regarding the Action Agencies' commitment to implement (and fund) future avian monitoring activities in the Columbia River basin. In 2020, Bonneville is funding a system-wide analysis of presence/absence, abundance, and colony-specific information, and predation rates within the lower Columbia River, specifically from McNary Dam through the Columbia River estuary (BPA 2020). This analysis is consistent with Bonneville's commitment to evaluate the biological effectiveness of avian predation management in the lower Columbia River, in the near term. The Priest Rapids Coordinating Committee (PRCC) is conducting a similar effort upstream of McNary Dam to compliment Bonneville's efforts to complete a basin-wide monitoring. The additional effort by the PRCC will focus on Caspian tern nesting colonies in the Columbia Plateau and their foraging/predation impacts on ESA-listed Upper Columbia River and/or Snake River juvenile salmonids. In addition to these system-wide analyses, for each respective (geographic) avian management plan, the Action Agencies will:

a. **Inland Avian Predation Management Plan**: The Corps will monitor presence/absence of Caspian terns (once during the peak breeding season) on Crescent Island, indefinitely. Reclamation will continue to monitor, passively and actively dissuade Caspian terns, and (optionally) lethally take up to 200 tern eggs (all sites combined) on Goose Island and other areas in the North Potholes Reservoir until permanent and sustainable nesting deterrent achieve the metric thresholds outlined in the Inland Avian Predation Management Plan: less than 40 breeding pairs/site, and less than 200 breeding pairs all sites combined. At the conclusion of the Synthesis Report, and informed by preliminary information from the 2020 studies funded by Bonneville and the PRCC, the Action Agencies will coordinate with the Services through the appropriate Regional Forum workgroup(s) (e.g., FPOM) to determine need for and scope of future Action Agency-sponsored inland avian predation management and monitoring in the Columbia Plateau.

b. **Caspian Tern Management Plan**: On East Sand Island, the Action Agencies will monitor peak colony size and predation rate (on PIT-tagged juvenile salmonids) until actions achieve the management goal: less than 4,375 breeding pairs (3-yr average). To-date, this management goal has been met in two of the past three years, 2017 and 2019 respectively. Afterwards, the Caspian tern East Sand Island peak colony size and predation impact / rates on PIT-tagged juvenile salmonids will be monitored, as warranted by study findings and regional coordination. At the estuary dredge material placement islands, the Corps will continue to monitor tern presence / absence (in perpetuity) per commitments under a separate biological opinion (NMFS 2012). At the conclusion of the Synthesis Report, and informed by preliminary information from the 2020 studies funded by Bonneville and the PRCC, the Action Agencies will work with the Services through the appropriate Regional Forum workgroup(s) (e.g., FPOM) to determine need for and scope of future Action Agency-sponsored Caspian tern management and monitoring in the Columbia Plateau.

c. **Double-crested Cormorant (DCCO) Management Plan**: On East Sand Island, the Action Agencies will monitor peak colony size and predation rate on PIT-tagged juvenile salmonids through 2020. In the Columbia River Estuary, the Corps will also monitor dispersal, disposition (e.g., roosting, nesting, etc.) and colony size through 2020 and as needed thereafter. On the estuary dredge material placement islands, the Corps will monitor double-crested cormorant presence/absence (as needed) per commitment under a separate biological opinion (NMFS 2012). Finally, at the conclusion of the Synthesis Report, and informed by preliminary information from the 2020 studies funded by Bonneville and the PRCC, the Action Agencies will work with the Services through the Regional Forum workgroup(s) (e.g., FPOM) to determine need for and scope of future Action Agency-sponsored double-crested cormorant management and monitoring on East Sand Island and the larger Columbia River estuary.

Reference:
NMFS 2012. Columbia River Navigation Channel Operations and Maintenance, Mouth of the Columbia River to Bonneville Dam, Oregon and Washington Biological Opinion.

BPA 2020. Avian Predation on Juvenile Salmonids in the Lower Columbia River. Statement of Work for Project No. 1997-024-00 by Oregon State University and Real Time Research, Inc.

Tributary habitat project accomplishment metrics: In response to NMFS' request for clarification on tributary habitat improvement project accomplishment metrics for Middle Columbia Steelhead, the Action Agencies have provided the below numbers for the years 2007-2018 (Bonneville 2019). The categories, acres protected; acres improved; miles of enhanced stream complexity; and miles protected, also encompass actions directed at reducing sediments and reconnecting floodplains.

Tributary Habitat Action Type	**Amount**
Acre-feet of Water Protected (Measure 16) *(purchasing land, leasing land, or acquiring water)*	123,896
Riparian Acres Protected (Measure 82) *(by land purchases or conservation easements via purchasing, leasing or fencing land)*	50,696

Riparian Acres Improved (Measure 83) *(to improve riparian habitat, such as enhancing floodplains, removing dikes, planting or restoring wetlands)*	8,857
Miles of enhanced or newly accessible habitat (Measure 10) *(by providing passage or removing barriers)*	1,985
Miles of improved stream complexity (Measure 6) *(by adding wood or boulder structures or reconnecting existing habitat, such as side channels)*	224
Miles protected (Measure 80) *(by land purchases, conservation easements and fencing)*	1,583
Screens installed or addressed (Measure 78) *(installing or addressing fish screens or by elimination/consolidation of diversions)*	341

Tributary Technical Team: In Chapter 2 of the BA, the Action Agencies described a team that will be convened by the Tributary Habitat Steering Committee (THSC) in order to provide technical information and analysis of issues related to the tributary habitat program. This team was referred to as the Tributary Habitat Science Committee. Upon further consideration of the role of that team, which is still under development, the Action Agencies will now refer to that team as the Tributary Technical Team or “TTT”. Please use these references insofar as they are needed in the Biological Opinion. The Action Agencies have also updated the primary functions of the Tributary Technical Team as follows:

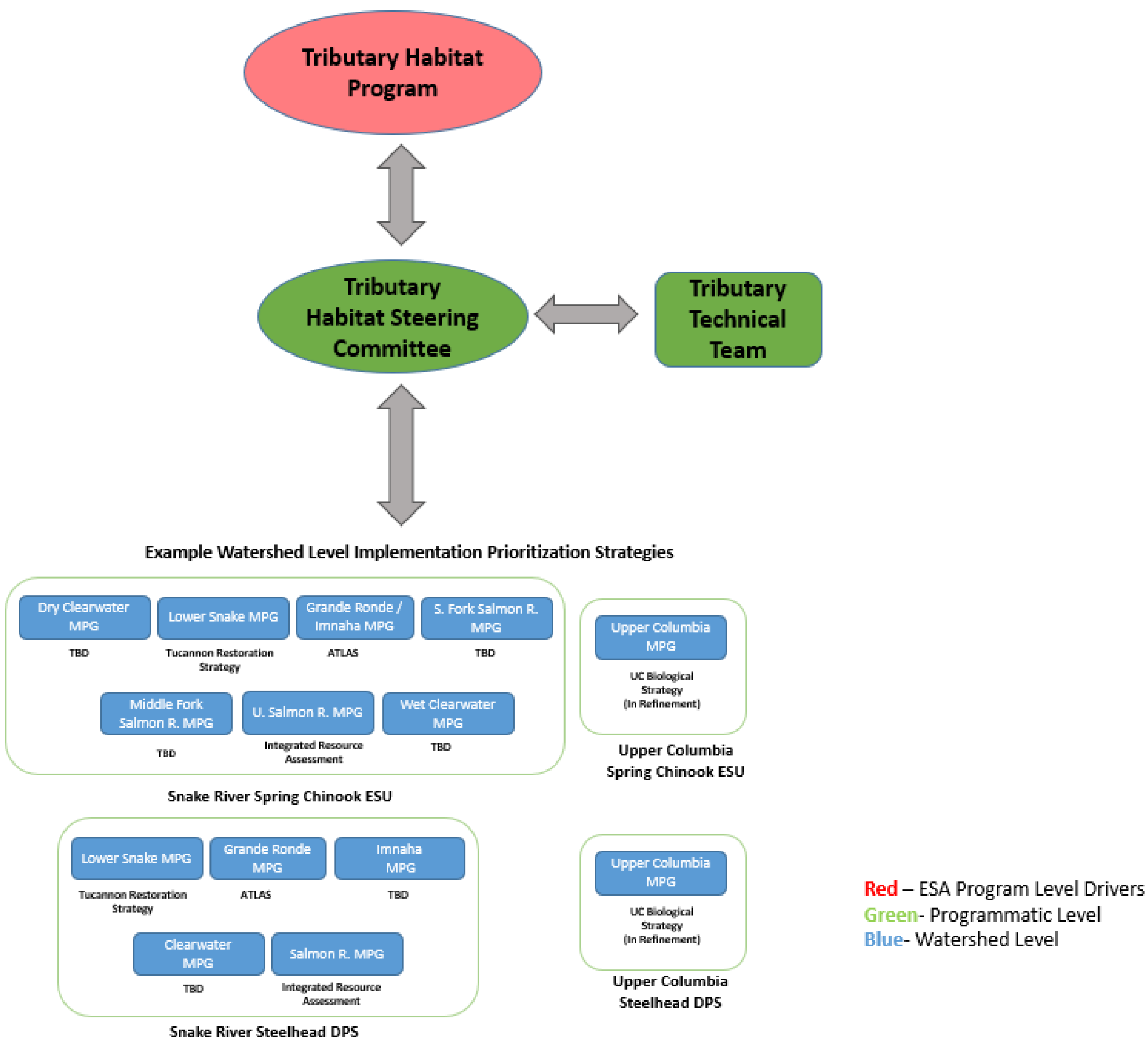
a. Provide input, scientific information, and data to the THSC to support implementation of the tributary habitat program to ensure that the program’s goals and objectives are achieved and to allow the THSC to evaluate benefits of actions.

b. Establish a framework of “best practices” based on existing literature and contemporary, applicable examples (e.g. Puget Sound) and provide input on potential guiding principles for habitat improvement programs.

c. Ensure that information provided integrates regionally applicable science.

d. Establish a framework to enable the THSC to identify and prioritize actions to ensure that they are technically sound and consistent with best practices.

e. Support the THSC to ensure scientifically accurate outreach and communications to other entities engaged in implementing tributary habitat improvement actions.



Albeni Falls Fish Passage: The Corps agrees that providing fish passage at Albeni Falls Dam would benefit bull trout and the broader ecosystem. The Corps has expressed capability for this project and has received a funding allocation of $6.5M in the FY20 Work Plan. These funds will enable design work to proceed. The Corps believes that securing Congressional funding for design efforts demonstrates tangible evidence of the Corps' support for this project. The Corps also hopes this support helps the USFWS and other partners secure funds for construction of the fish passage facility. Additional details regarding the Corps design process, e.g., geo-tech analysis, will be outlined in a separate letter to the USFWS.

While the Action Agencies continue to support this project, upstream fish passage at Albeni Falls Dam is precluded by the existence of the dam. Upstream fish passage at Albeni Falls

Dam is not precluded by the continued operation and maintenance of the dam. As such, the Action Agencies believe it is inappropriate to make fish passage a requirement in the USFWS' forthcoming biological opinion on the operation and maintenance of the CRS.

Operation of turbines above the 1% peak efficiency: Generally, the best operating range for turbines is within ±1% of peak efficiency. For hydropower generation, operating within this range produces the most power for a given volume of water. However, under some conditions, it can be advantageous to operate at higher levels. As one component of the PA, and as described in the CRSO DEIS Preferred Alternative (Chapter 7, Section 7.6.3.12), the Action Agencies have requested the operational flexibility to operate turbines above the ±1% of peak efficiency range. The PA would occur under limited conditions and durations to provide grid reliability, flexibility to incorporate other resources (such as wind, solar, other hydro projects, gas, coal, and nuclear), and additional power generation when demand and market are available.

The PA operation above the ±1% of peak efficiency range (also referred herein as 1%) would be implemented through the use of contingency reserves, when mitigating total dissolved gas (TDG) during high flow events, and in carrying balancing reserves. The Action Agencies incorporated this operation into the PA modeling results shared with the Services; modeling parameters also included a reduction in total generation capacity at each project based on routine and non-routine outages of turbines for maintenance.

The PA operation in this letter of clarification targets the timeframe of April - August 31 (beginning April 3 on the lower Snake River and April 10 on the lower Columbia River) and is specific to operation during the spring and summer spill operations for juvenile salmon and steelhead. During the months of April - August, Bonneville will operate as a soft constraint within 1% peak efficiency and a hard constraint of within and above 1% peak efficiency range as described in this letter. During the rest of the year, September 1 – April 3 or 10, the same soft constraints would be implemented; however, turbines may be operated within normal range (including above and below 1% peak efficiency range when applicable).

Before operating turbines above the 1% efficiency range, the Action Agencies intend to meet all required fish passage spill operations as described in the 2020 CRS Biological Assessment and 2020 CRSO DEIS Preferred Alternative. The summary below provides additional insights into the frequency and magnitude of deployment of the PA operation as it relates to: (1) Contingency Reserves; (2) TDG Management; (3) Balancing Reserves, and (4) Reporting.

1. Contingency Reserves

Bonneville deploys contingency reserves to meet energy demands caused by unexpected events such as transmission interruption or failure of a generator. Bonneville cannot predict the exact timing, magnitude, and the location of the need to deploy contingency reserves, which makes pre-coordination for each individual event impossible. In the PA, Bonneville may depend on turbine operations above the 1% of peak efficiency range for deployment of contingency reserves (Figure 1).

These events are rare and, when they occur, Bonneville will strive to cover the contingencies without temporarily operating above the ±1% of peak efficiency range. Carrying contingency reserves above the 1% of peak efficiency range would provide operating flexibility and would allow Bonneville to generate at higher levels for limited durations to maintain power system reliability. Based on an analysis of historic system operations, Bonneville estimated the use of contingency reserves that might include operations above the 1% range are expected to occur approximately once per month and the duration has averaged 35 minutes. Power reliability regulations limit the use of contingency reserves at no more than 90 minutes per event. If an event is large enough to require action for greater than 90 minutes (e.g., loss of generation from nuclear plant), Bonneville will find other tools to maintain grid reliability.

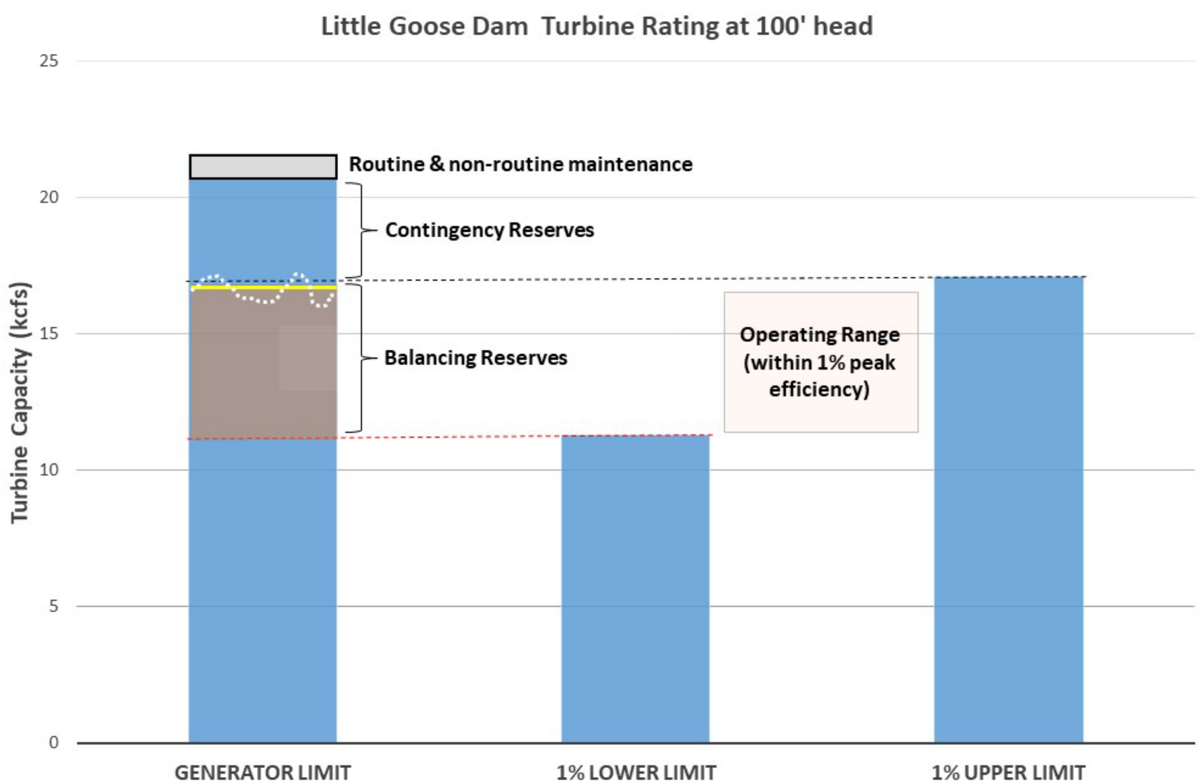


Figure 1. Little Goose Dam turbine rating at 100 feet head illustrates turbine capacity (kcfs) by generator limit, 1% lower and 1% upper peak ranges. The normal operating range within ±1% of peak efficiency shown between lower and upper 1% peak efficiency limits. The PA included an estimated 5% buffer from generator limit (maximum operation = generation limit – 5%) based on historic turbine outage frequency. A one-hour example project basepoint at Little Goose (yellow solid line), overlaid by deployed balancing reserves (white dotted line). Balancing reserves are discussed further in section 3.

Bonneville may deploy contingency reserves and operate turbines above the ±1% of peak efficiency range at any of the lower Snake River and Columbia River dams. Under most flow conditions, John Day Dam may hold contingency reserves, but the generator limits of the current turbines restrict operations at the upper end of the ±1% of peak efficiency range. The exception to this John Day Dam operation limitation occurs when flows increase, turbine intake screens are deployed and operating head exceeds 96 feet (range 96-103 feet). Bonneville estimates that the likelihood of flow conditions occurring when it is suitable to operate the turbines above ±1% of peak efficiency at John Day Dam will be less than the estimated frequency and duration above of approximately once per month and the duration has averaged 35 minutes.

2. TDG Management

During periods of high spring run-off when spring flows result in TDG production above 125 percent saturation, the Action Agencies may operate turbines above the ±1% of peak efficiency range to mitigate TDG production. Table 1 lists the estimated threshold flows above which TDG mitigation could occur by project (above 160 kcfs on the lower Snake River and 340 kcfs on the lower Columbia River projects). TDG management may occur at lower flows if there are a high number of turbine outages; however, the intent of this operation is to distribute flow across all available turbines at each project when this operation occurs.

Table 1. Estimated flows (kcfs) by project when turbines may operate turbines above ±1% of peak efficiency for TDG mitigation during high spring run-off conditions and balancing reserves. Actual values are dependent on turbine outages along with power demand and market availability; analyses summarized in this table and throughout this document assumed a percentage of turbines would be out of service for maintenance.

	Estimated Threshold Flow (kcfs)	
Project	**TDG Mitigation**	**Balancing Reserves**
Lower Snake River		
Lower Granite Dam	160	140
Little Goose Dam	170	150
Lower Monumental Dam	200	170
Ice Harbor Dam	200	160
Lower Columbia River		
McNary Dam	390	330
John Day Dam	430	410
The Dalles Dam	360	360
Bonneville Dam	340	310

The purpose of mitigating TDG production is to reduce the duration of exceeding water quality standards in the tailraces of each project due to uncontrolled spill levels at high river flow levels. Figure 2 (blue shaded area) illustrates an example of when this operation could have been deployed at Lower Granite Dam (June 5-11, 2010). During these high flow conditions, the Action Agencies intend to operate all available turbines before exceeding the upper 1% of peak efficiency range.

The Action Agencies will coordinate with the Regional Forum, in this case Fish Passage Operations and Maintenance (FPOM), a forum that includes NMFS Fisheries, USFWS, and regional partners, to implement a priority list of TDG mitigation operations by project. Coordination will aid in the development of a prioritized operation that minimizes negative impacts to fish and considers fish condition and survival metrics, gatewell hydraulics, unit design and project capacity.

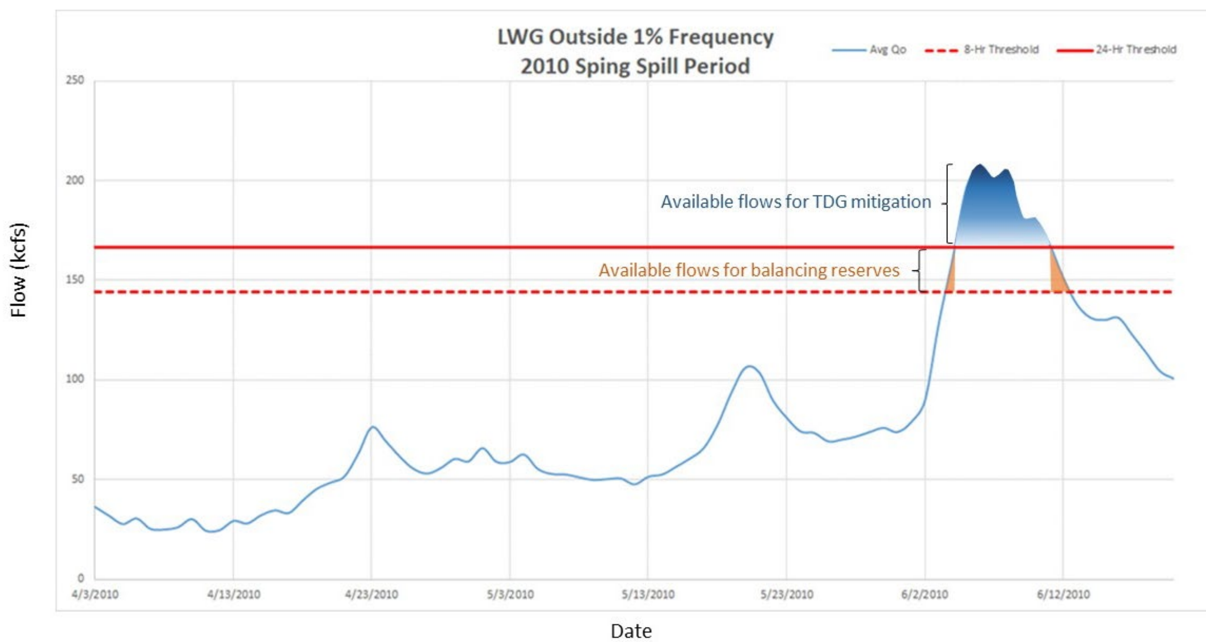


Figure 2. Example of 2010 annual flows by date (solid blue line, Q_o) at Lower Granite Dam (LWG) and the project threshold of TDG mitigation outside of ±1% of peak efficiency range (flow above solid red line, blue shading) and for balancing reserves (above dotted red line, orange shading). Example assumes a percentage of total turbines are out of service for expected or routine maintenance and that all available turbines would operate at full capacity before exceeding the upper 1% of peak efficiency range; however, this action is also dependent on additional factors, such as power demand and market conditions.

3. Balancing Reserves

Bonneville is responsible for Columbia River System grid reliability, which requires the use of balancing reserves to follow sub-hourly power demand and supply fluctuations. Because supply must equal demand for power second-by-second, power generation must increase and decrease automatically as demand for power changes. Furthermore, within its Balancing Authority, Bonneville integrates the use of other renewable power sources (e.g., wind and solar) and balancing reserves compensate for within-hour changes in wind and solar generation.

Bonneville assigns a share of balancing reserves to Grand Coulee, Chief Joseph, the four lower Snake projects, and the four lower Columbia projects according to the amount of operating flexibility each project has for the prevailing water conditions. An hourly basepoint[3] of target megawatts (MW) is allocated to available generating units at the project to meet expected power demand. If actual within hour generation is different from the set basepoint, then the project is deploying reserves to either increase generation (deploy reserves upward) or decrease generation (deploy reserves downward) to preserve the balance of supply and demand.

Using an 80-year water record data set, the likelihood of operating above ±1% of peak turbine efficiency predicted in the BA was up to 20% of water years at McNary Dam and up to 5-10% of water years at all other locations. Only a subset of these conditions would be appropriate for deploying balancing reserves. Conditions where balancing reserves would be deployed outside of the ±1% of peak efficiency range are very limited and are influenced by river flow (Table 1) and by power market conditions. Table 1 outlines the threshold flows required before this operation would typically be implemented.

Bonneville conducted two analyses of the application of balancing reserves on operations above the ±1% of peak efficiency range, first without restricting the basepoint to be within this range and then adding the restriction that basepoints would only be set within the ±1% of peak efficiency range.

The analysis of the proposed operation on actual river and market conditions observed between 2010-2019 showed that the use of balancing reserves, *without limiting basepoints to within the ±1% of peak efficiency range,* would result in exceeding the upper 1% no more than 80 hours per month per project. More specifically, on the lower Snake River projects, operating above the upper 1% when deploying balancing reserves at each project *without basepoint restrictions* may have resulted in up to a maximum of 36 hours in the month of April, 60 hours in May, and 36 hours in June. Under the same scenario on the lower Columbia River, operating each project above the upper 1% when deploying balancing reserves, *without basepoint restrictions*, may have occurred up to 80 hours in the month of April, 80 hours in May, and 44 hours in June. While annual flow conditions and power demands are variable, data analyzed from 2010-2019 illustrated that *on average*, turbines would not have exceeded 30 hours of operating above the 1% peak efficiency range at any location per month (Table 2).

Estimated hours of operation above 1% peak efficiency range that could have occurred in 2010-2019 by dam are shown in Table 2. It is important to note that these estimates are conservative and considered high because they only represent the average and range of

[3]Hourly basepoints are the generation level assigned to each hydropower project at the start of the hour, which is required to meet ***expected*** power demand. The hydro duty scheduler sets a basepoint for each project hourly (for the entire hour) and subsequent deployment of balancing reserves may cause generation at the project to drift up and down over the course of the hour.

number of hours where flow conditions would provide the opportunity to use the proposed operation. Estimates in Table 2 *do not* take into consideration the application of restricting basepoints within the upper 1% range (balancing reserves would mean that generation would be lower about 50% of the time), *nor* do they include lack of power demand and negative market conditions, which commonly occur during high flow conditions (periods when Bonneville would not want to operate the turbines higher).

Table 2. Estimated average, minimum, and maximum number of hours available to operate turbines above 1% peak efficiency at flexible spill locations on the lower Snake River and lower Columbia River dams (2010-2019).

	Month of Year (Measured by Number of Days)								
	April			May			June		
Project	**Ave.**	**Min.**	**Max.**	**Ave.**	**Min.**	**Max.**	**Ave.**	**Min.**	**Max.**
Lower Snake River									
Lower Granite Dam	19	4	36	27	8	60	17	4	32
Little Goose Dam	12	12	12	19	4	32	12	4	16
Lower Monumental Dam	6	4	8	16	8	24	23	12	36
Ice Harbor Dam	10	4	16	20	8	36	23	16	36
Lower Columbia River									
McNary Dam	30	8	80	29	8	80	24	4	44
John Day Dam	8	8	8	16	12	20	8	4	12
The Dalles Dam*	*not applicable*			*not applicable*			*not applicable*		
Bonneville Dam	16	8	24	18.5	4	28	12	4	24

**Asterisk indicates The Dalles Dam planned operations are 40% spill (24 hours per day) and not analyzed as a flexible spill project location; The Dalles Dam is not precluded from operating with balancing reserves.*

In the second analysis, a subset of years were analyzed for basepoints deviations to assess the likelihood of exceeding ±1% of peak efficiency range ***if*** Bonneville restricts basepoint generation from exceeding the upper 1% of peak efficiency range. Data analyzed included the months of April, May and June in years 2016-2019 for the frequency and magnitude of reserve deployment (measured in hours) above the upper 1% of peak efficiency ranges by project. An example is shown in Figure 3 of basepoint and actual generation departure for one full hour at The Dalles Dam (see variability of actual generation throughout the hour). Anytime the actual generation is not equal to the basepoint, the plant is deploying reserves. Each hour was further analyzed in 5-minute increments (or slices) to quantify the maximum 5-minute average basepoint of departure per hour (or exceedance above basepoint). Figure 3 defines how the average 1-hour and maximum 5-minute basepoint departures were calculated.

Tables 3 and 4 list the results of the likelihood that turbine ±1% of peak efficiency ranges may be exceeded when deploying balancing reserves (based on the 2016-2019 data set). Actual total plant generation would most frequently be at or below the project basepoint (see 50th percentiles in Tables 3 and 4). However, there could be small hourly excursions above the basepoint of less than 1 kcfs at each of the dams on the lower Snake River (e.g., deviations per turbine would be less than 1 kcfs, generally around 0.2 kcfs per turbine). On the lower Columbia River dams, there could be hourly excursions of 2-4 kcfs across each of the dams, which would mean deviations per turbine of approximately 0.1 to 0.2 kcfs (see Table 3, 95th percentile). The infrequent, less than one percent of operations, events that might exceed basepoint and ±1% of peak efficiency range are shown by the 99th percentile (Table 3). Results of maximum 5-minute average basepoint departures reflect similar trends as those shown in 1-hour average basepoint departures (see Table 4, 95th percentile).

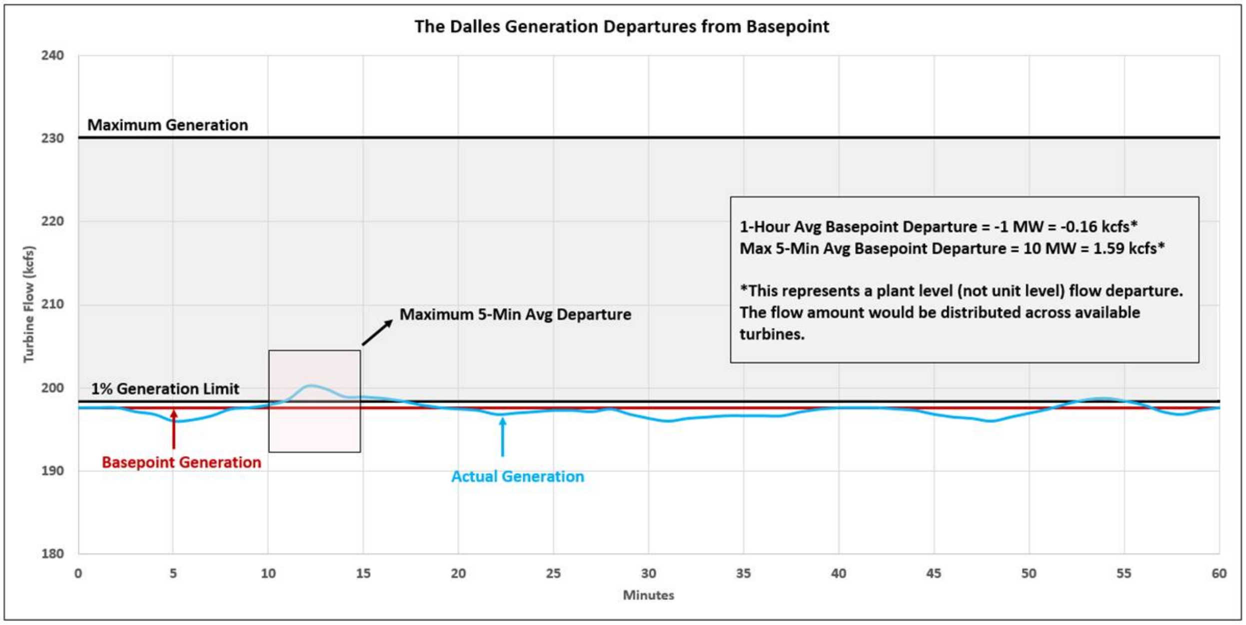


Figure 3. Example of The Dalles Dam hourly basepoint set at the upper 1% of peak efficiency range (kcfs) and generation deployed at the project through the hour. *This data does not represent actual basepoint departures, but shown to aid in understanding how basepoints are set and how a project responds to the variability in power demand. (The y-axis represents the total flow through all of the available turbines at the project.)*

Table 3. One-hour average basepoint departures expressed as flows (kcfs) for each project. The flow would be distributed across multiple turbines.

		1-Hour Average Basepoint Departures[a] (measured in kcfs)		
Project	**# of Turbines**	**50th Percentile**	**95th Percentile**	**99th Percentile**
Lower Snake River				
Lower Granite Dam	6	-0.28	0.56	0.97
Little Goose Dam	6	-0.14	0.83	1.53
Lower Monumental Dam	6	-0.14	0.69	1.81
Ice Harbor Dam	6	-0.14	0.56	1.94

Lower Columbia River				
McNary Dam	14	0.00	2.41	4.63
John Day Dam	16	-0.13	3.29	7.11
The Dalles Dam	22	-0.16	3.65	8.41
Bonneville Dam	18	0.25	2.25	3.50

[a]1-Hour average basepoint departures are estimated by subtracting the total project basepoint generation (kcfs) from the total project actual generation.

Table 4. Maximum 5-minute average basepoint departures expressed as flows (kcfs) for the project. The flow would be distributed across multiple turbines.

		Maximum 5-Minute Average Basepoint Departures[a] (measured in kcfs)		
Project	**# of Turbines**	**50th Percentile**	**95th Percentile**	**99th Percentile**
Lower Snake River				
Lower Granite Dam	6	0.14	1.67	4.58
Little Goose Dam	6	0.56	2.50	5.83
Lower Monumental Dam	6	0.14	2.64	8.06
Ice Harbor Dam	6	0.14	3.06	11.81
Lower Columbia River				
McNary Dam	14	1.30	5.74	9.81
John Day Dam	16	1.18	8.68	16.45
The Dalles Dam	22	1.59	8.57	17.46
Bonneville Dam	18	1.00	4.25	8.75

[a]Maximum 5-minute basepoint departures are estimated by subtracting the total project basepoint generation (kcfs) from the total project actual generation.

Tables 3 and 4 results are likely conservative, meaning potentially overstating the potential for higher turbine flow, at both John Day and The Dalles dams. Under the current PA, additional power flexibility to carry reserves at all projects may reduce the magnitude of departures from basepoint within each hour at all locations. It is also important to recall that these basepoint departures would only risk generating outside the ±1% range if the basepoint was set near the upper 1% limit (see Figure 1 and Figure 3). There must be flow thresholds met and a positive market (i.e., net demand for power) to acquire enough load to set a basepoint near the upper 1% limit.

As part of the PA, Bonneville intends to set all hourly basepoints for *expected* power demand *within* ±1% of peak turbine efficiency at all dams. Based on the analyses presented herein, the Action Agencies anticipate this proposed operation will result in limited frequency and magnitude of events when turbines would exceed ±1% of peak efficiency ranges, and therefore would have minimal impacts on ESA-listed salmon and steelhead.

4. Reporting

Bonneville will continue to assemble and provide monthly summaries of project specific excursions from ±1% operating range to the Corps, as outlined in Appendix C of the FPP (reporting requirements in Section 5, Quality Control). Corps will continue to provide annual reports to NMFS Fisheries of reportable excursions from ±1% operating range during fish passage season, which include codes associated with excursions (e.g., code 13, TDG reduction and code 7, emergency conditions or system failures associated with system reliability and typically deployed for contingency reserves) (Appendix C, Table C-1 of the FPP). All exceedances outside of the current codes would be a result of balancing reserves. The Action Agencies will coordinate with the Services on future reporting requirements prior to the initiation of the proposed action.

After three years of the proposed operation and implementation of the Western Energy Imbalance Market (EIM), the Action Agencies will produce a summary of frequency and duration of operations that occurred above ±1% of peak efficiency turbine operating range by project during spring and summer spill operations (as prescribed in Appendix C of the FPP) and will coordinate with the Services on future operations.

Conclusion

The Action Agencies are continuing to engage with tribal sovereigns, cooperating agencies, and other stakeholders and will be receiving comments on the Preferred Alternative during the public comment period for the DEIS. Should there be any changes made during the EIS process to the Preferred Alternative that are relevant to the ESA consultation, the Action Agencies will promptly notify the Services.

If you have any questions or would like to discuss our request, please contact Mr. Timothy A. Dykstra of my staff at 503-808-3726 or timothy.a.dykstra@usace.army.mil, Ms. Melanie Paquin of Reclamation at 208-378-5183 or mpaquin@usbr.gov, or Mr. Benjamin D. Zelinsky of Bonneville at 503-230-4737 or bdzelinsky@bpa.gov. Thank you for your consideration of these proposed action clarifications. We look forward to our continued work with NMFS and USFWS on the consultation regarding the effects of the operation and maintenance of the Columbia River System.

Sincerely,

D. Peter Helmlinger, P.E.
Brigadier General, US Army
Division Commander