



## Department of Energy

Bonneville Power Administration  
P.O. Box 3621  
Portland, Oregon 97208-3621

EXECUTIVE OFFICE

JUN 05 2017

In reply refer to: DIR-7

The Honorable Cathy McMorris Rodgers  
United States House of Representatives  
Washington, DC 20515

Dear Congresswoman McMorris Rodgers:

Thank you for the inquiry you and your colleagues addressed to the Federal agencies with roles in the operations of the Federal Columbia River Power System and associated fish and wildlife protection, enhancement, and mitigation programs. I am responding for the Bonneville Power Administration (Bonneville). My counterparts at the U.S. Army Corps of Engineers (Corps), the Bureau of Reclamation (Reclamation), and NOAA Fisheries (NMFS) are responding through their respective Departments. We have collaborated on our separate responses.

**1. How much does BPA annually spend on fish and wildlife mitigation?**

Over the last 10 years, the cost of Bonneville's fish and wildlife actions has averaged \$727 million per year. This includes Bonneville's spending on its direct fish and wildlife program, the power share of Corps and Reclamation fish and wildlife spending, the Lower Snake Compensation Plan hatcheries of the U.S. Fish and Wildlife Service, 50 percent of the Northwest Power and Conservation Council budget, interest and depreciation of related capital investments, as well as forgone revenues and replacement power purchases.

**2. If these payments were reflected in a ratepayer's monthly bill, can you estimate this percentage in the statement?**

Bonneville's average annual fish and wildlife costs have a variable impact on wholesale power rates over time, but are about one-third of the rate impact to preference customer utilities. The variability over time is the result of the varying market value of replacement power purchases and forgone revenue. The impact reflected in a ratepayer's monthly bill depends on how much of their utility's power supply comes from Bonneville and then how much power purchase costs comprise that utility's residential rates. In addition, a given utility's retail rate includes its own costs for system operations and maintenance and any long term debt repayments. In an average year, if a retail customer is a customer of a Bonneville full requirements utility and that utility's

own costs are about equal to its power purchases from Bonneville, then the impact of Bonneville's fish and wildlife costs to a retail customer would be about one-sixth of their bill.

**3. Between the three Action Agencies referenced above, how much has the federal government spent on fish recovery and mitigation in the FCRPS?**

The Northwest Power and Conservation Council annually reports on Bonneville's fish and wildlife expenditures, including an estimate of the cumulative expenditures of Bonneville on fish and wildlife protection, mitigation, and enhancement. The Council's most recent report summarized expenditures through Fiscal Year 2015<sup>1</sup>.

That report states that Bonneville's total spending from 1978, when its fish and wildlife expenditures began, through 2015 was \$15.28 billion. That total included:

- \$4.31 billion for power purchases to meet electricity demand requirements in response to river and dam operations that benefit fish but reduce hydropower generation;
- \$3.34 billion in forgone hydropower sales revenue. Bonneville calculates the value of hydropower that could not be generated (revenue that is forgone) because of river operations to assist fish passage and improve fish survival, such as water spills at the dams when juvenile salmon and steelhead are migrating to the ocean;
- \$3.57 billion for the "direct program;" the projects and programs Bonneville directly funds such as habitat restoration, hatcheries and monitoring. This amount does not include annual commitments to capital investments in the direct program.
- \$2.54 billion in fixed expenses for interest, amortization, and depreciation on capital investments; and
- \$1.52 billion to: 1) directly fund fish and wildlife projects undertaken by the Corps or Reclamation, some of which predate the 1980 Northwest Power Act, and for which Bonneville pays the hydropower share consistent with the Power Act (these expenditures include, for example, operations and maintenance costs of certain fish-production facilities, fish passage facilities at dams, and research activities); and 2) reimburse the U.S. Treasury for the hydropower share of major dam modifications by the Corps, such as installing spillway weirs, bypass systems, fish-deflection screens in front of turbine entrances, and spillway gas abatement. These reimbursements reflect Bonneville's repayments to the Treasury for the appropriated capital investments in the Columbia River Fish Mitigation program referenced below.

<sup>1</sup> 2015 Columbia River Basin Fish and Wildlife Program Costs Report, 15<sup>th</sup> Annual Report to the Northwest Governors; Northwest Power and Conservation Council.



The Corps' total allocations of funds for fish recovery and mitigation in the FCRPS from 1988-2017 is \$2 billion. This includes appropriations for operation and maintenance (\$119 million), Columbia River Fish Mitigation Program (\$1.9 billion), and Lower Columbia Ecosystem Restoration (\$44.7 million).

The Columbia River Fish Mitigation Program is the total of annual congressional appropriations to the Corps, of which the power share of approximately 83 percent is repaid over time from Bonneville power sales.

Reclamation has spent over \$288 million since 2001 to conduct Section 7 ESA consultations, meet the requirements of FCRPS Biological Opinions, and address associated litigation.

**4. What are fish survival percentages through each of the four lower Snake River Dams (Ice Harbor Dam, Lower Monumental Dam, Little Goose Dam, and Lower Granite Dam) and how do those compare to estimated survival of the fish before these dams were constructed?**

The Federal Action Agencies have made considerable progress in increasing juvenile salmon survival rates at the eight mainstem Snake and Columbia River dams. Based on the most recent testing, average juvenile dam passage survival (which does not include survival through the reservoirs) ranges from about 96 to 99 percent for yearling Chinook salmon and steelhead smolts at each dam.

Reach survival estimates, which incorporate both dam and reservoir mortalities, are more useful for assessing annual differences in survival. Recent smolt survival estimates from Lower Granite to McNary Dam (2010-16) average about 72 and 67 percent for wild yearling Chinook and wild steelhead, respectively.

There are no direct estimates of smolt survival prior to the construction of the Snake River dams. Recent survival estimates of wild smolts tagged at traps and hatchery smolts released throughout the Snake River Basin to Lower Granite Dam, as well as estimates from other undammed river systems, suggest that historical losses between Lower Granite reservoir and Ice Harbor Dam (about 209 kilometers) were likely substantial.

**5. What is the percentage of juvenile and adult fish lost to pinniped, predator fish, and bird predation?**

Pinnipeds (especially California and Stellar sea lions), are a substantial source of adult fish mortality. NMFS's Northwest Fisheries Science Center has found that adult spring/summer Chinook salmon losses between the mouth of the Columbia River and Bonneville Dam (236 km) are strongly influenced by the number of sea lions observed and the migration timing of the fish populations. From 2013-2015, the median survival rates (including harvest rates) of early, intermediate, and late migrating populations ranged from 50 to 70 percent, 67 to 85 percent, and 83 to 92 percent, respectively.

Native northern pikeminnows were estimated to have eaten about 8 percent of all out-migrating salmon and steelhead smolts in the Columbia River Basin in the early 1990s (Beamesderfer, et al. 1996). Since then, Bonneville estimates that its pikeminnow bounty program has reduced this impact by over 38 percent. Non-native game fish (smallmouth bass, walleye, etc.) are also known to feed on migrating salmon and steelhead smolts. Few specific estimates of their predation rates are available, but their effect is captured in annual smolt survival reach estimates.

Both Caspian terns and Double-crested cormorants have large colonies on East Sand Island in the Columbia River estuary. Roby et al. (2017) estimated that the Caspian tern colony consumed an average of 5 percent of spring/summer Chinook salmon smolts and 22 percent of steelhead smolts from the Snake River during 2000-2010, before the size of the tern colony was managed to reduce impacts to ESA-listed fish. From 2011-2016, average consumption of Chinook salmon and steelhead declined by more than 50 percent. NMFS estimates that, on average, the Double-crested cormorant colony consumes about 6 percent of Snake River steelhead and 2 percent of Snake River spring/summer Chinook smolts in the Columbia River estuary. The Double-crested cormorant management plan called for in the 2014 Supplemental biological opinion (NMFS 2014) directed the Corps to reduce the number of nesting pairs by roughly 54 percent, which is expected to return average consumption rates to levels observed prior to 2003 - about three percent for steelhead and one percent for yearling Chinook salmon smolts.

Caspian tern and gull colonies consumed substantial numbers of salmon and steelhead smolts migrating between Lower Granite and Bonneville Dam. In 2015 Caspian terns were prevented from nesting at both the Crescent Island and Goose Island colonies. Some of these birds relocated to Blalock Islands (downstream), are having poor nesting success, and are expected to eventually resettle outside the Columbia Basin. As with non-native game fish, these impacts are captured in annual smolt survival reach estimates.

## **6. What are the adverse consequences to increased spill?**

Consequences of additional spill beyond the current levels identified in the 2014 Supplemental BiOp fall into at least three categories: biological, physical and/or structural, and potential adverse consequences for the combined Federal power and transmission system.

These adverse biological consequences include potential passage and migration delay of returning adult salmon and steelhead at some dams. An increase in spill may also increase the rate that fish “fallback” over the spillway after successful passage. Additionally, if significant passage delay due to increased spill occurs immediately below Bonneville Dam, predation rates of returning adults by sea lions would likely increase. Increased spill may also impact downstream juvenile migrant passage and survival. At some dams, increased spill may create hydraulic conditions in the dam’s tailrace that delay downstream egress. This delay could increase predation rates of juveniles and extend overall migration time through the system.

Bonneville notes that the risks of exposing fish to the maximum total dissolved gas (TDG) level throughout the duration of the spring migration period have not been evaluated, nor has it been



recommended by NMFS or the Corps. The potential for adverse effects from exposure to increased system-wide TDG levels is a concern recognized by experts in the region and also creates risk of adverse consequences for other aquatic species.

Increased spill may also increase erosion at some dams that could threaten the structural integrity of some dam features. For instance, at Bonneville Dam, high levels of spill are known to pull large rocks into the spillway stilling basin and erode concrete near the base of the spillway. Additionally, erosion due to spill along the south shore of the spillway channel at Bonneville Dam has undermined the footings of the B-Branch fish ladder, requiring emergency repair on two different occasions. The Corps is assessing other projects to determine the potential for increased erosion of dam features at other dams due to increased spill. It is important to note that the spillways at each of the eight fish passage dams on the lower Snake and lower Columbia Rivers were not designed to pass large amounts of spill for several months out of the year on an annual basis.

It is also possible that increased spill would likely be a negative impact to navigation during the spring. Spill operations are known to impact safe navigation at a number of the downstream navigation lock approaches at the projects in the lower Snake and Columbia Rivers. It is likely that higher spill would negatively impact navigation at these projects in the spring due to more unbalanced tailrace hydraulics as a result of increased spill and reduced powerhouse flow. The Corps currently makes short-term spill adjustments in real-time to provide safe navigation conditions as warranted. Under current operations, spill is modified for navigation primarily at Lower Monumental, McNary and John Day dams. It is anticipated that higher spill percentages will increase the number and duration of spill curtailments for barge and cruise ship traffic.

Bonneville has also identified possible impacts to the combined Federal power and transmission system, including:

- Increased frequency of operating the Federal dams on the Lower Columbia and Lower Snake Rivers at “minimum generation” levels for hydropower, particularly during periods of low river flow, which can occur before and after the spring freshet in all but the highest water years;
- Decreased flexibility to utilize the Federal dams to provide reliability services for the interconnected federal power and transmission system with increased risk of disruptions of the regional grid;
- Decreased ability to carry power generation reserves to maintain power and transmission system stability and integrate variable renewable resources;
- Increased risk of transmission system emergencies; and

- Increased costs for Northwest power system ratepayers – in the recent district court litigation in *National Wildlife Federation v. National Marine Fisheries Service*, Bonneville estimated that the spill levels requested by the plaintiffs would result in an increase in fish costs of \$40 million per year, on average.

**7. By increasing spill, what would be the quantifiable benefit for fish recovery given the cost of increasing spill and all of the other current actions to increase fry passage?**

NMFS expects that estimates of direct survival (e.g., juvenile reach survival estimates) would likely increase slightly from increasing spill. In addition to slight increases in direct survival, some proponents of increased spill argue that these operational changes will increase the proportion of smolts passing dams via spillbays and surface passage routes; reduce the proportion of juveniles passing dams via the turbines and screened bypass systems; and thereby substantially increase smolt-to-adult returns (SARs) back to Lower Granite Dam. While NMFS and other experts continue to question some key assumptions of this theory, if proponents are correct, substantially increasing SARs would significantly improve the status (productivity and abundance) of many Snake River spring/summer Chinook salmon and steelhead populations relative to proposed recovery criteria.

However, in addition to NMFS's response, proponents of increasing spring spill rely heavily on the uncertain estimates of the benefits of spill while downplaying the numerous adverse consequences including impacts to fish, ratepayers, and the Federal power and transmission system, discussed in greater detail in our answer to question 6, above.

**8. How much are BPA, the Army Corps, and the Bureau of Reclamation budgeting for the National Environmental Policy Act review for the FCRPS in relation to the Court's 2016 order?**

The three agencies estimate the costs for the Columbia River System Operations environmental impact statement will total \$81.07 million over Fiscal Years 2017 to 2021. The majority of these costs will be either directly funded or repaid over time by Bonneville ratepayers. In addition to its own internal and contracted expenditures, Bonneville repays the U.S. Treasury for the power share of costs of the Corps and the Bureau. The Corps will use capital funding under the Columbia River Fish Mitigation Program totaling \$27 million; Bonneville ratepayers will repay the power share, or \$22.42 million over time. The chart below summarizes annual expenditures by agency and funding source.





# Columbia River System Operations EIS

## Summary of Expenditures

Agency	FY-17	FY-18	FY-19	FY-20	FY-21	Total \$
<b>CORPS (Expense Cost)</b>						
OSM (BPA direct, 90% power share)	\$ 3.80	\$ 6.12	\$ 3.82	\$ 2.00	\$ 0.61	\$ 16.20
OSM (COI 10% non-power share)	\$ 0.40	\$ 0.66	\$ 0.42	\$ 0.22	\$ 0.07	\$ 1.80
OSM Total	\$ 4.00	\$ 6.80	\$ 4.24	\$ 2.28	\$ 0.68	\$ 18.00
<b>CORPS (CRFM Capital Cost)</b>						
CRFM (EOI app, 80% power share)	\$ 4.98	\$ 8.47	\$ 5.29	\$ 2.84	\$ 0.85	\$ 22.42
CRFM (COI app, 17% non-power)	\$ 1.02	\$ 1.73	\$ 1.08	\$ 0.58	\$ 0.17	\$ 4.58
CRFM Total (Note 1)	\$ 6.00	\$ 10.20	\$ 6.36	\$ 3.42	\$ 1.02	\$ 27.00
<b>CORPS TOTAL</b>	\$ 10.00	\$ 17.00	\$ 10.60	\$ 5.70	\$ 1.70	\$ 45.00
<b>BOR</b>						
OSM (BPA direct, power share)	\$ 1.17	\$ 1.43	\$ 1.52	\$ 1.13	\$ 0.45	\$ 5.70
OSM (BOR app, non-power share)	\$ 0.17	\$ 0.20	\$ 0.22	\$ 0.16	\$ 0.06	\$ 0.80
<b>BOR TOTAL</b>	\$ 1.34	\$ 1.63	\$ 1.74	\$ 1.28	\$ 0.51	\$ 6.50
<b>BPA</b>						
Contract & Modeling	\$ 0.69	\$ 1.45	\$ 1.60	\$ 1.40	\$ 1.40	\$ 6.51
labor (materialized)	\$ 3.18	\$ 3.25	\$ 3.40	\$ 3.60	\$ 3.60	\$ 17.01
<b>BPA TOTAL</b>	\$ 3.87	\$ 4.70	\$ 5.00	\$ 5.00	\$ 5.00	\$ 23.57
Additional Estimated Contract Costs	\$ 1.20	\$ 1.20	\$ 1.20	\$ 1.20	\$ 1.20	\$ 6.00
<b>Total Estimate Annual Expenditures</b>	\$ 15.41	\$ 24.52	\$ 18.54	\$ 13.28	\$ 8.41	\$ 81.07

Note 1: BPA capitalizes CRFM and collects these CRFM costs in rates over a 75 year period. The \$22.4 million, plus interest, will be collected in rates in the form of annual amortization and interest costs. These CRFM costs are planned to be put into service after the record of decision (2021).



U.S. Army Corps  
of Engineers  
Northwest Division

1



9. Prior to any future status conferences or filings with the Court, we respectfully request that you inform us in advance of your discussions and any decisions regarding the appropriate protocol and methodology for spill at each dam.

You also requested that we inform you in advance of discussions and any decisions regarding the appropriate protocol and methodology for spill at each dam. Through the years of litigation on the FCRPS Biological Opinion we have appreciated the opportunities to regularly brief members and staff of the Northwest delegation of the status of litigation and anticipated Federal engagement. We will continue do so, including at the specific decision points you listed. In addition, please feel free to contact me or Sonya Baskerville, Bonneville's manager for National Relations, at 202-586-5640 at any time if you or your staff have questions.

Sincerely,

Elliot E. Mainzer  
Administrator and Chief Executive Officer

cc: The Honorable Peter DeFazio, U.S. Representative  
The Honorable Kurt Schrader, U.S. Representative  
The Honorable Dan Newhouse, U.S. Representative