FISH PASSAGE CENTER

847 NE 19th Avenue, #250, Portland, OR 97232
Phone: (503) 833-3900 Fax: (503) 232-1259
www.fpc.org/
e-mail us at fpcstaff@fpc.org

MEMORANDUM

TO: Marylou Soscia, EPA
Christine Psyk, EPA
John Palmer, EPA

FROM: Fish Passage Center Staff

DATE: August 26, 2015

SUBJECT: Information regarding 2015 conditions at Bonneville Dam

In response to your request we have assembled data to describe the conditions that occurred in the Columbia River near Bonneville Dam in 2015. The following graph depicts the annual runoff volume that occurred above The Dalles Dam in 2015, as well as in the past 10-year period (2005–2014). (The Dalles Dam is the consistent historic monitoring location for runoff volume in the Middle Columbia River.) The annual runoff volume indicates the amount of water that will be in the river during the salmon migration season. As can be observed from the graph below, the 2015 runoff is among the lowest observed in the past 11 years (Figure 1).

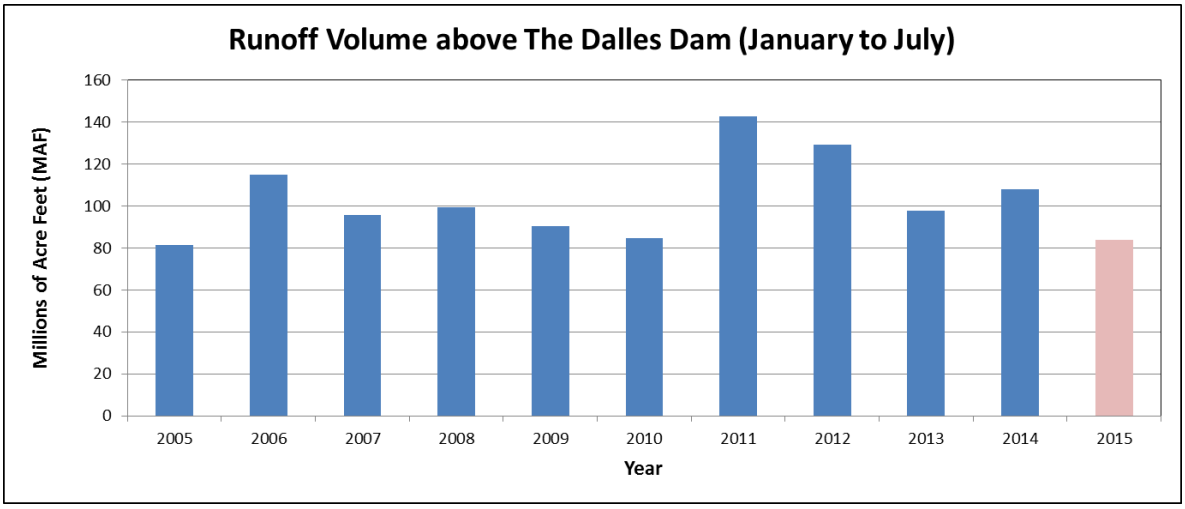

Figure 1. Runoff volume observed above The Dalles Dam for the 10-year period 2005–2014 and that observed for 2015.

The runoff volume determines the magnitude of water available, but the shape of the runoff is determined by precipitation, and whether it occurs as snow or rain. In a more normal year most of the precipitation during the winter months occurs as snow deposited at higher elevations. Consequently, flows during the winter and early spring months are lower, and increases in flow occur as temperatures warm and snow melts. However, the 2015 period was characterized as having a considerably warmer than average winter period, with a dryer and warmer than average spring and summer period. Consequently, most of the January through July runoff volume occurred from January through April. From May through most of July, flows were the lowest observed in the past 11 years (Figure 2).

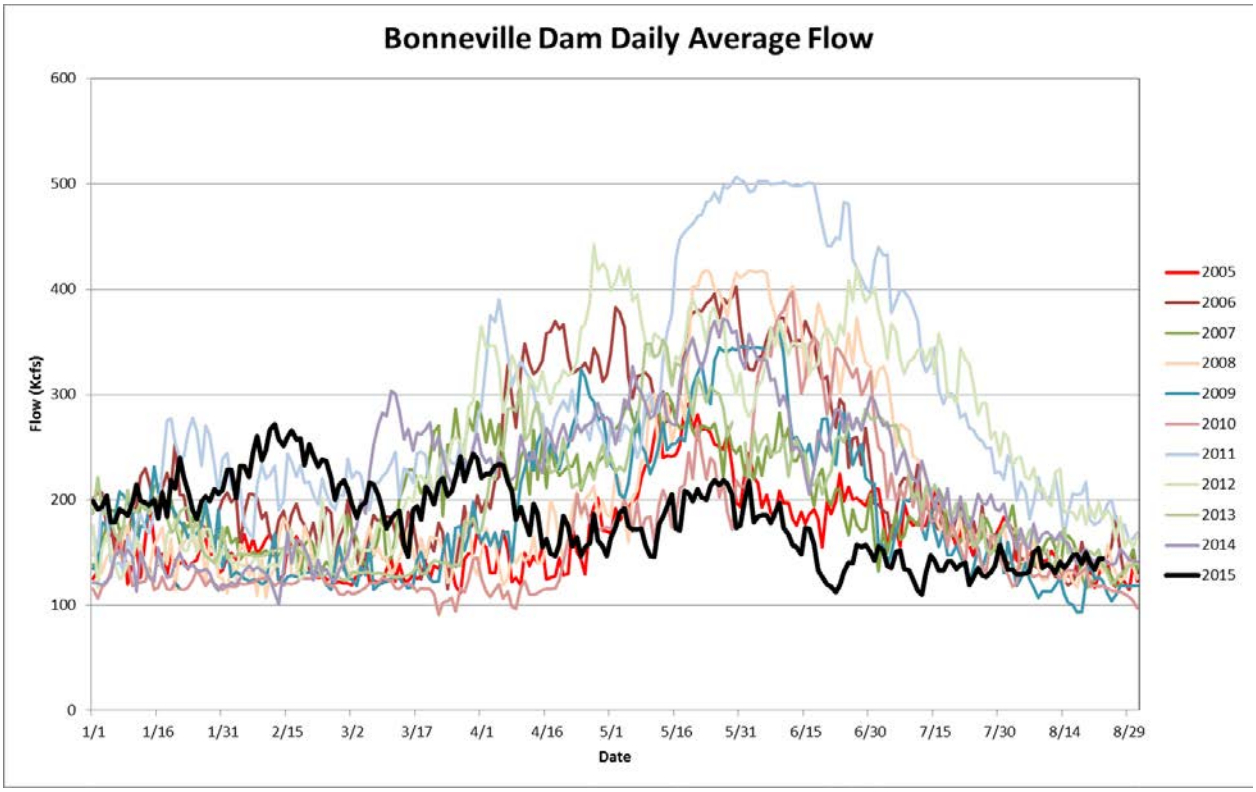

Figure 2. Daily average Flow at Bonneville Dam for the 10-year period 2005–2014 and that observed for 2015.

In your data request you asked why flows were so low in late June and early July. Under the Federal Columbia River Power System Biological Opinion there are both spring and summer flow objectives. The spring flow objectives are for flows averaged between April 1st and June 30th, while the summer flow objectives are for flows averaged from July 1 to August 30th. The spring flow objective for the Middle Columbia River is measured at McNary Dam and ranges from 220 to 260 Kcfs, dependent on the runoff volume. The summer flow objective is 200 Kcfs in any year independent of the runoff volume. In most years flows are normally decreasing in late June as we transition to the summer flow objective, but is likely more noticeable in lower flow years where flow is more controllable. In most years the transition to summer flow objectives is followed by the July 4th holiday, and if it falls on a weekend (as it did in 2015). Flows are usually managed lower by adjusting upstream water releases, due to the decreased power needs during the holiday period (Figure 3).

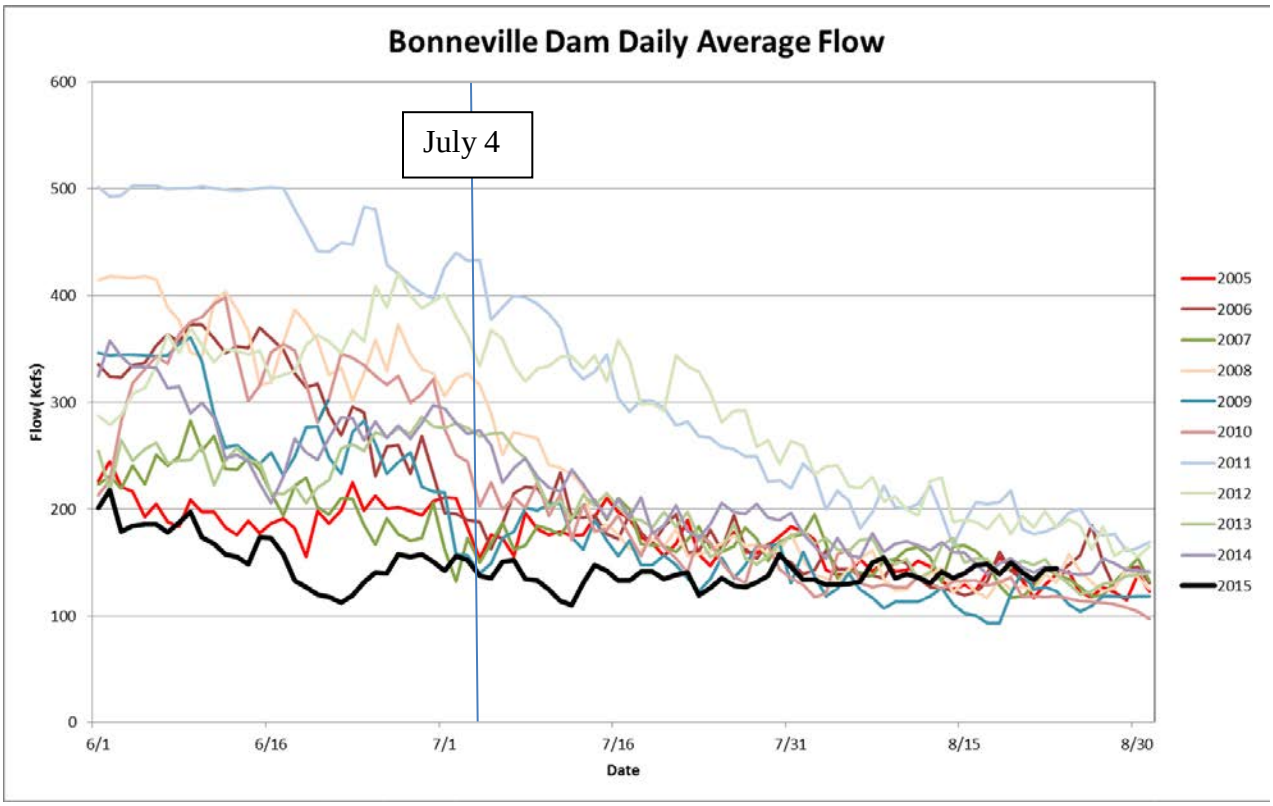

Figure 3. Daily average flow at Bonneville Dam for June-August 2005 to 2014 and observed thus far for 2015.

You also asked why the early August flows this year were higher than what was observed in late June and early July. There is a clause in the Columbia River Treaty between the United States and Canada that provides more water for power generation in dry water years. In dry water years, operating plans developed under the Treaty may result in Treaty reservoirs being operated below their normal refill levels in the late spring and summer, therefore increasing flows during that period relative to a standard refill operation. This is what happened in 2015 when the dry water year clause was implemented. Some of that water was used in July, and some was used in August, leading to the higher than expected August river flows.

The last observation that was made was relative to the dead sockeye observed. The temperature in the Columbia River hydrosystem often exceeds the 68°F threshold for much of the summer period. In 2015 we observed significantly higher temperatures earlier than observed in the past 10 years (Figure 4 tracks the Bonneville Dam forebay and Figure 5 tracks the Bonneville Dam Tailrace).

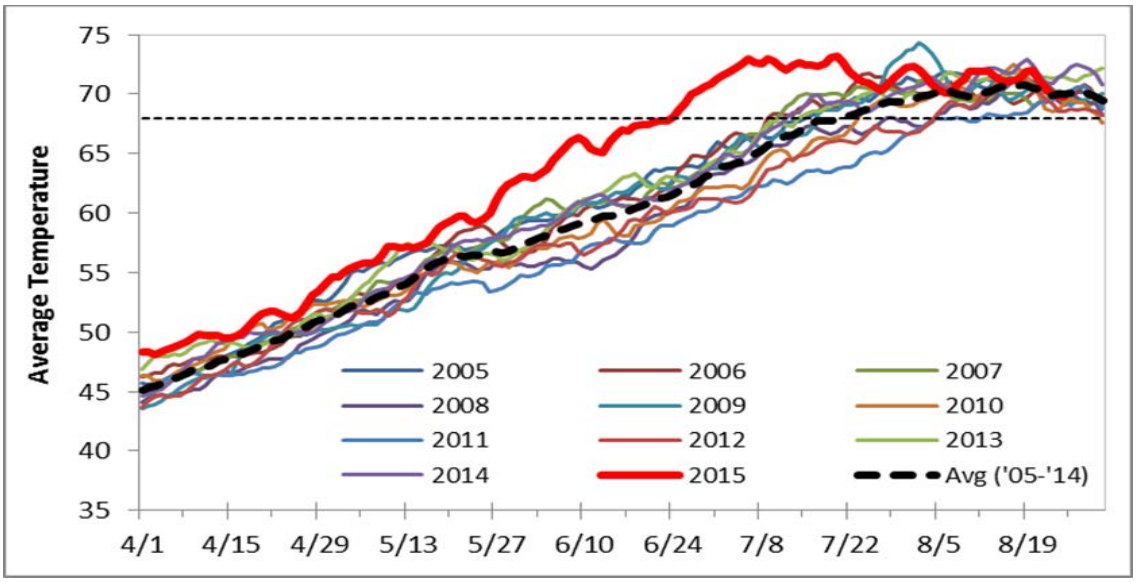

Figure 4. April through August daily average temperatures at Bonneville Dam forebay (2005–2015). 2015 data are through August 25th.

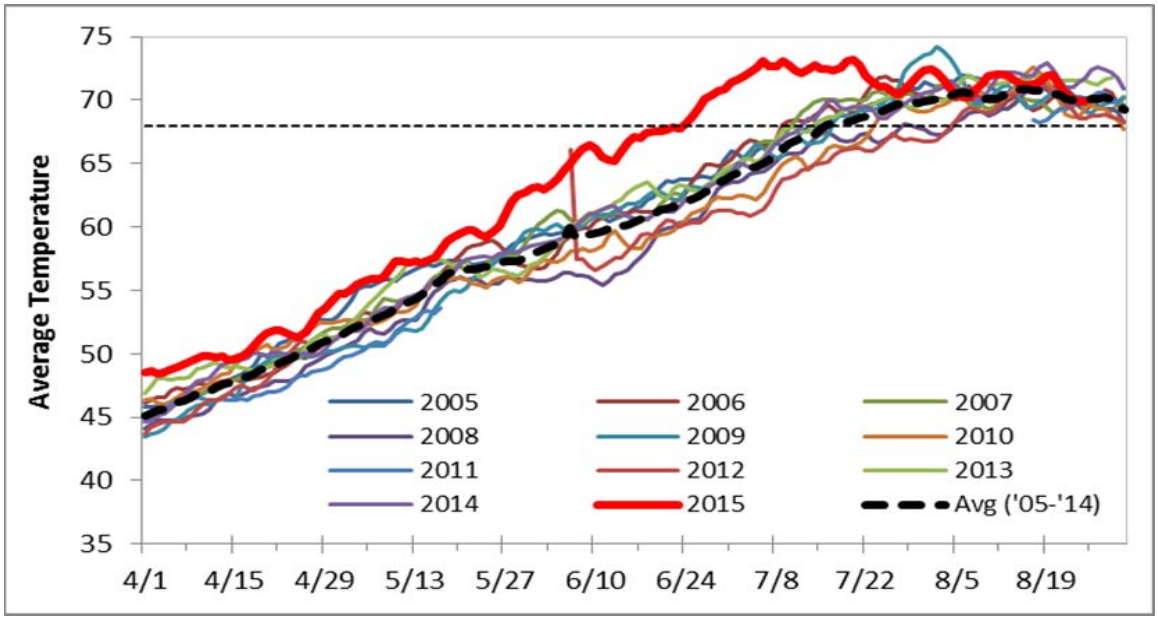

Figure 5. April through August daily average temperatures at Bonneville Dam tailrace at Cascade Island (2005–2015). 2015 data are through August 25th.

The following graph (Figure 6) shows the timing of the sockeye run returning to the Columbia River. The dam counts at Bonneville Dam show that the sockeye migration entered the hydrosystem under conditions where the water temperatures were extremely high. The temperatures at Bonneville Dam were as high as 73.2°F and remained high as fish migrated upstream through the hydrosystem.

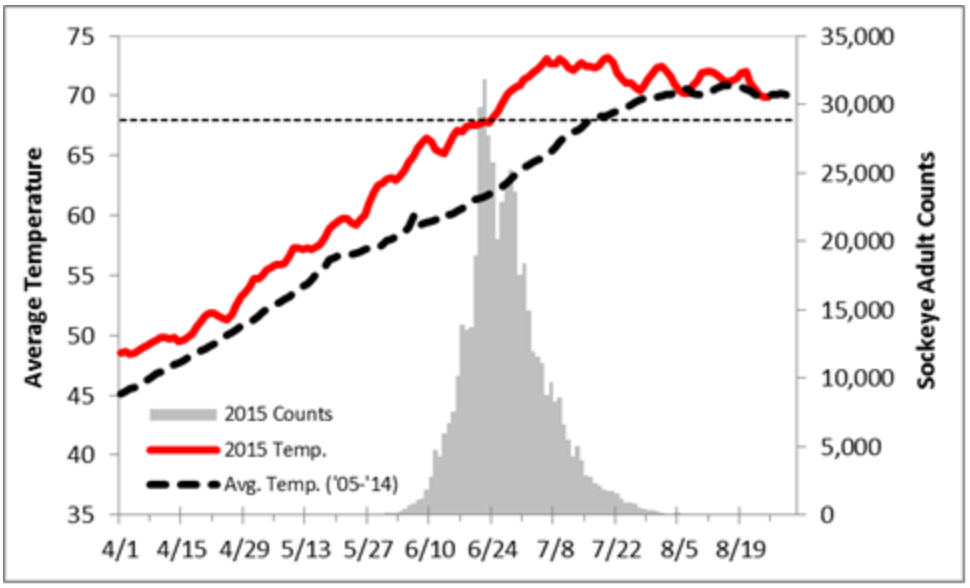

Figure 6. Water temperature at Bonneville Dam in 2015 compared to the average for the past 10 years, and the adult sockeye dam counts at Bonneville Dam in 2015.

The adult sockeye had been exposed to high temperatures downstream of Bonneville Dam and through their migration in the hydrosystem. At these high temperatures fish will succumb to heat-related stress and disease. There were many accounts of dead sockeye reported and the estimates of losses to the population are very large. It was estimated that based on PIT-tagged fish, more than 96% of sockeye returning to the Snake River were lost between Bonneville and Lower Granite dams. An exact assessment of the numbers of Upper Columbia sockeye that were lost is not yet available, but early estimates reported it to be as high as 80%.

In summary, high temperatures coupled with a low flow year created unsuitable migration conditions for adult migrants (particularly sockeye) returning to the Columbia River in 2015. Although analyses have not yet been conducted on the juvenile fish migrating to the ocean this year, it is anticipated that there will be impacts from migrating under these conditions.

If you would like any additional information, or would like to meet with FPC for further discussion on this topic, please contact Margaret Filardo at mfilardo@fpc.org or 503 833-3910.