FISH PASSAGE CENTER

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MEMORANDUM

TO: Michael Garrity, WDFW

FROM: Michele DeHart

DATE: December 28, 2018

SUBJECT: Request for graphs to illustrate timing of juvenile and adult salmonids and steelhead migrating through the Columbia and Snake rivers.

In response to your request, the Fish Passage Center (FPC) staff has prepared several graphs to illustrate the timing of juvenile and adult salmonids and steelhead as they migrate through the Columbia and Snake rivers. Juvenile timing information was based on data collected for the Smolt Monitoring Program (SMP) Lower Granite, McNary, and Bonneville dams. Adult timing information was based on adult counts at each of these three projects. "Average" timing for these graphs is based on data from the last ten years (2009-2018). Below are a few details that should be considered as you review these graphs.

Bonneville Dam (BON) (Figure 1)

Juvenile Timing Data

SMP monitoring at BON typically occurs from early March to the end of October. Therefore, we have no information of juvenile migrants passing the project prior to the initiation of sampling or after the termination of sampling. Juvenile timing at BON is highly influenced by large hatchery releases in or near the BON pool. For example, approximately 600,000-1.1 million yearling spring Chinook are released into the Little White Salmon River in mid-April each year. The mouth of the Little White Salmon River is located approximately 27 km upstream of BON. Yearling Chinook smolts at BON are a mixture of hatchery and wild Snake River spring/summer Chinook, hatchery and wild Upper Columbia spring Chinook, hatchery and wild Mid-Columbia spring Chinook and, to a lesser degree, Upper Columbia hatchery yearling

summer Chinook, Umatilla River hatchery yearling fall Chinook, and Snake River hatchery yearling fall Chinook.

Juvenile timing for subyearling Chinook smolts is complicated by releases of hatchery fall Chinook tules from Spring Creek NFH (approximately 35 km upstream of BON). Over the last ten years, these fall Chinook tules have been released in mid-April (~6.0 million) and early May (~4.5 million). Given these releases, we broke subyearling Chinook timing into two categories: 1) tules and 2) upriver brights (Figure 1). Tules were considered all subyearling Chinook passing BON through May 31st while upriver brights were considered all subyearling Chinook passing on or after June 1st.

Adult Timing Data

Adult counting at BON typically occurs year round. Determination of spring, summer, and fall Chinook adults is based on the date of counting, where spring Chinook were all Chinook adults passing through May 31st, summer Chinook were all Chinook adults passing between June 1st and July 31st, and fall Chinook were all Chinook adults passing between August 1st and December 31st. Finally, both winter and summer steelhead adults pass BON. For this request, we estimated adult timing for winter and summer stocks, based on the date of counting. Winter steelhead were all steelhead adults passing BON between November and April and summer steelhead were all steelhead passing BON between May and October.

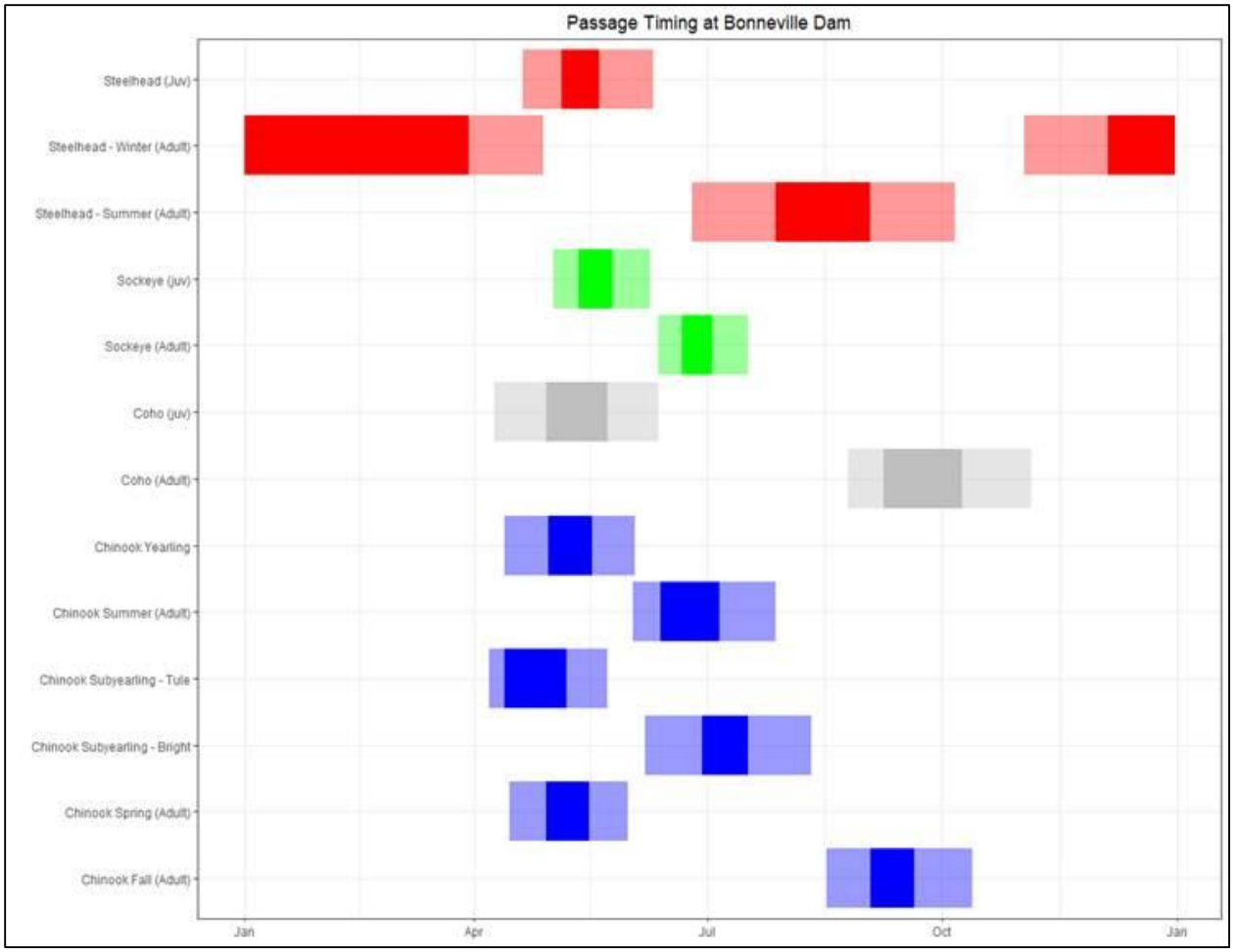

Figure 1: Passage timing by species (and life stage) at Bonneville Dam. Shaded regions represent 95% of passage (i.e., area between 2.5 and 97.5 percentiles), with darker sections representing the middle 50% of passage (i.e., area between 25 and 75 percentiles). Chinook are represented in blue, Coho in gray, Sockeye in green, and Steelhead in red. Adult timing is indicated by (Adult) in y-axis. See text above for further details.

McNary Dam (MCN) (Figure 2)

Juvenile Timing Data

SMP monitoring at MCN typically occurs from early April to the end of September. Therefore, we have no information of juvenile migrants passing the project prior to the initiation of sampling or after the termination of sampling. Sampling at MCN occurs every-other-day. Juvenile data for non-sample dates were interpolated based on passage indices from the previous and next day's samples. Yearling Chinook smolts at MCN are a mixture of hatchery and wild Snake River spring/summer Chinook, hatchery and wild Upper Columbia spring Chinook, hatchery and wild Yakima River spring Chinook and, to a lesser degree, Upper Columbia hatchery yearling summer Chinook, and Snake River hatchery yearling fall Chinook. Subyearling Chinook at MCN are a mixture of hatchery and wild Snake River subyearling fall Chinook, hatchery and wild Upper Columbia subyearling summer Chinook, wild Hanford Reach subyearling fall Chinook, and hatchery Yakima River subyearling fall Chinook.

Adult Timing Data

Adult counting at MCN typically occurs from April 1st to October 31st. Therefore, we have no information of adult passage prior to the initiation or after termination of adult counting. Determination of spring, summer, and fall Chinook adults is based on the date of counting, where spring Chinook were all Chinook adults passing through June 8th, summer Chinook were all Chinook adults passing between June 9th and August 8th, and fall Chinook were all Chinook adults passing between August 9th and December 31st.

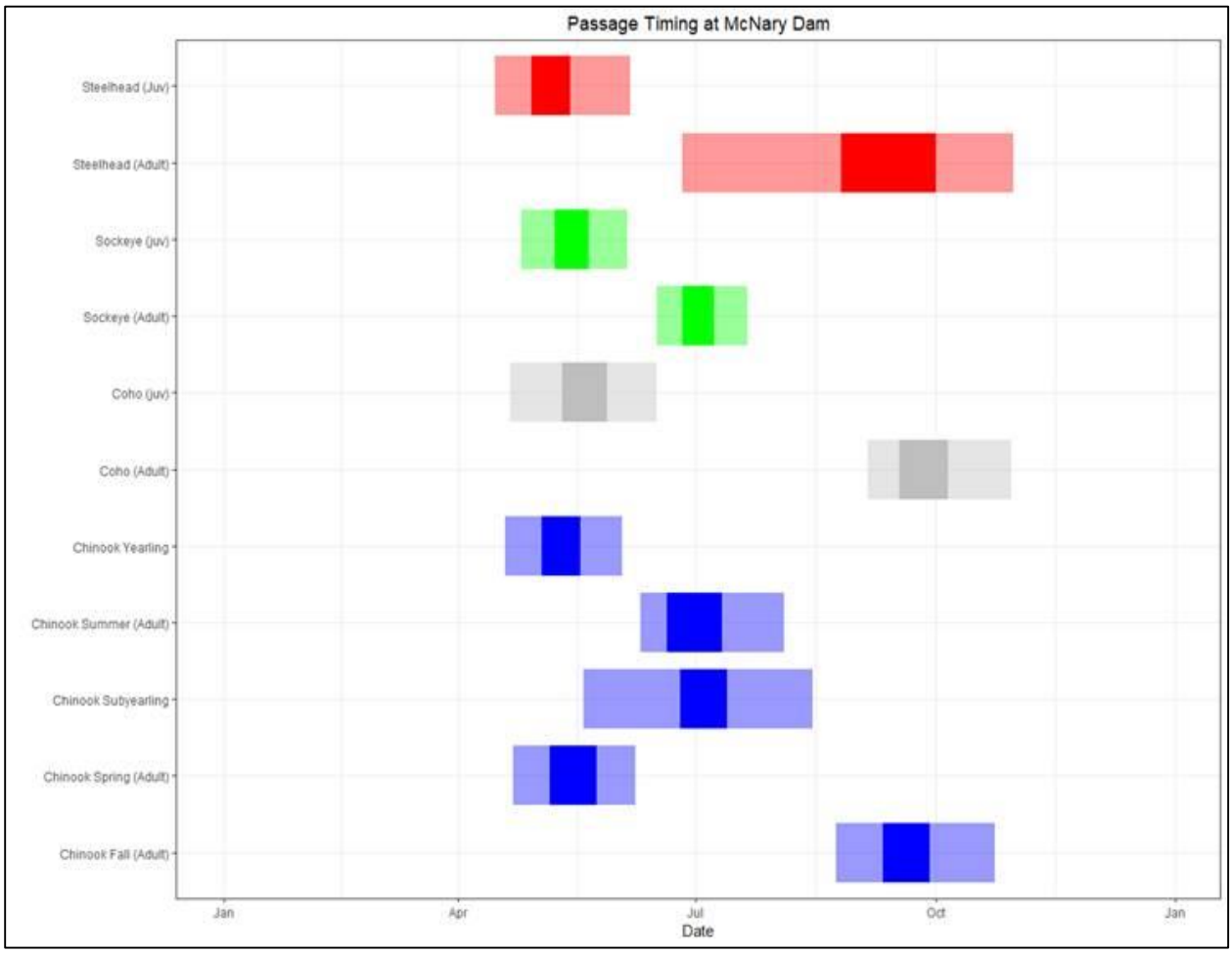

Figure 2. Passage timing by species (and life stage) at McNary Dam. Shaded regions represent 95% of passage (i.e., area between 2.5 and 97.5 percentiles), with darker sections representing the middle 50% of passage (i.e., area between 25 and 75 percentiles). Chinook are represented in blue, Coho in gray, Sockeye in green, and Steelhead in red. Adult timing is indicated by (Adult) in y-axis. See text above for further details.

Lower Granite Dam (LGR) (Figure 3)

Juvenile Timing Data

SMP monitoring at LGR typically occurs from late March to the end of October. Therefore, we have no information of juvenile migrants passing the project prior to the initiation of sampling or after the termination of sampling. Yearling Chinook smolts at LGR mostly hatchery and wild Snake River spring/summer Chinook. However, some yearling Chinook at LGR are hatchery fall Chinook that are released as yearlings and/or fall Chinook smolts that overwintered and out-migrated the following spring as yearlings. Subyearling Chinook at LGR are mostly hatchery and wild Snake River fall Chinook. Finally, sockeye timing includes kokanee that occasionally escape from Dworshak Reservoir during spill operations for flood control and/or project maintenance.

Adult Timing Data

Adult counting at LGR typically occurs from March 1st to December 31st. Therefore, we have no information of adult passage prior to the initiation or after termination of adult counting. Determination of spring, summer, and fall Chinook adults is based on the date of counting, where spring Chinook were all Chinook adults passing through June 17th, summer Chinook were all Chinook adults passing between June 18th and August 17th, and fall Chinook were all Chinook adults passing between August 18th and December 31st. Finally, the prolonged period for steelhead adult timing at LGR reflects the fact that a portion of returning Snake River steelhead adults overwinter in the Columbia or Snake River and pass LGR the following spring.

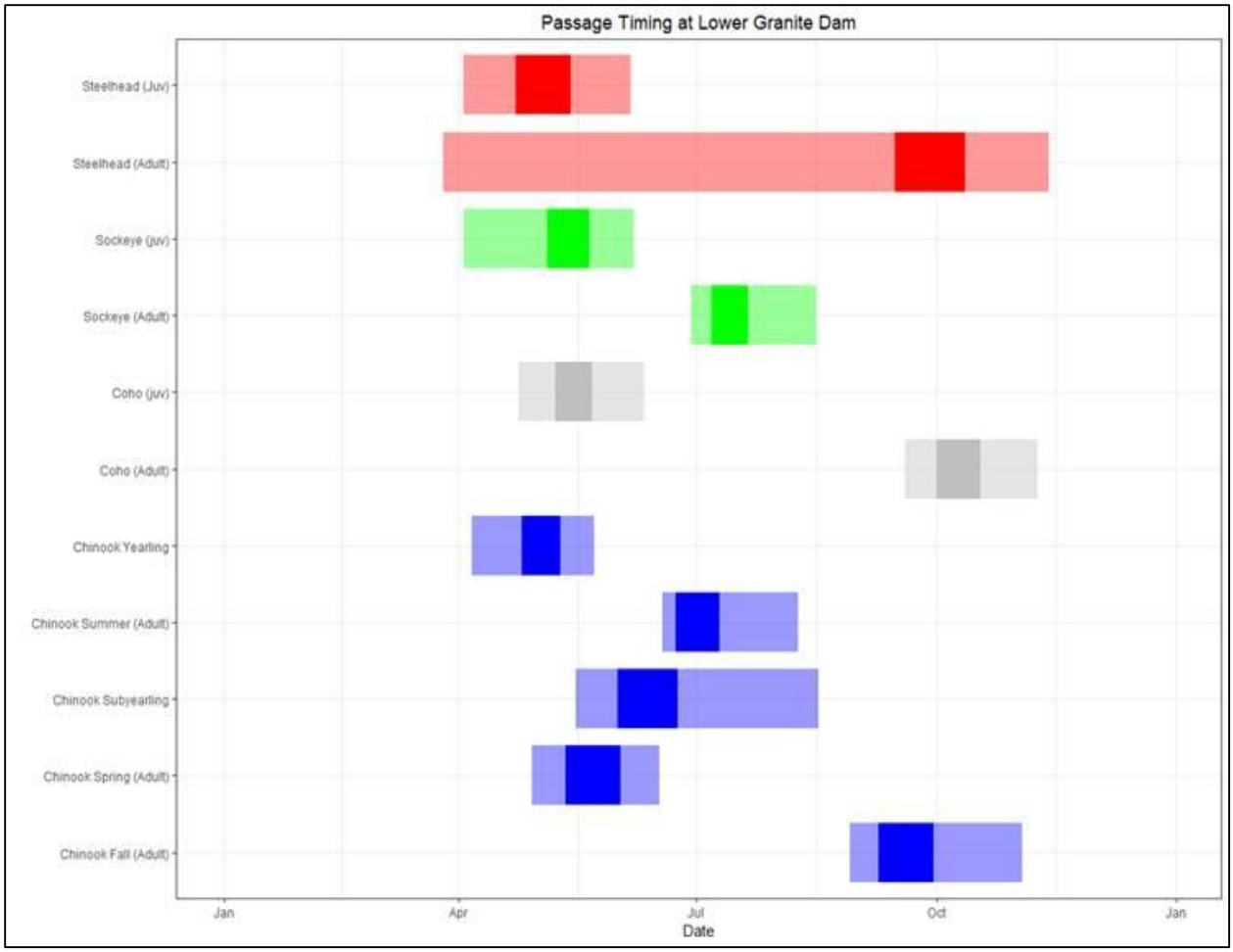

Figure 3. Passage timing by species (and life stage) Lower Granite Dam. Shaded regions represent 95% of passage (i.e., area between 2.5 and 97.5 percentiles), with darker sections representing the middle 50% of passage (i.e., area between 25 and 75 percentiles). Chinook are represented in blue, Coho in gray, Sockeye in green, and Steelhead in red. Adult timing is indicated by (Adult) in y-axis. See text above for further details.