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April 5, 2016

MEMORANDUM

TO: Council members

FROM: Jim Ruff – Manager, Mainstem Passage and River Operations

SUBJECT: Presentation on NOAA Fisheries' 2015 Adult Sockeye Passage Report

BACKGROUND:

Presenters: The presenter will be Ritchie Graves, Chief of the Columbia Hydropower Branch at NOAA Fisheries. In addition, staff from the Corps of Engineers and Idaho Department of Fish and Game will be on the conference line to answer questions that may arise.

Summary: ***2015 River Conditions***
In 2015, low flow conditions, coupled with extremely high air temperatures and warm water in the major tributaries to the lower Snake and Columbia rivers, resulted in the highest mainstem temperatures recorded in the Columbia River from roughly mid-June to mid-July. Although water temperatures were much higher than normal, releases from depth in the large water storage projects (e.g., Grand Coulee Dam, Dworshak Dam and Brownlee Dam), reduced temperatures in downstream reaches. For example, Hells Canyon Dam outflows (downstream of Brownlee Reservoir) were 5°C (or more) cooler than the Snake River gauge temperatures at Weiser. Releases of cool water at Dworshak Dam began earlier in 2015 in response to the higher temperatures. Unlike late June and July river temperatures, August water temperatures in 2015 were high, but not outside the range of observations in recent years.

Sockeye Salmon Abundance and Survival

The adult sockeye salmon return in 2015 was large compared to recent decades – the ladder count at Bonneville Dam was 510,706 fish (compared to a 2005-14 average of 241,351 fish). Idaho Department of Fish and Game (IDFG) estimates that about 4,000 ESA-listed Snake River sockeye salmon passed Bonneville Dam. NOAA Fisheries estimates about 472,000 sockeye salmon from the upper Columbia River (UCR) populations (unlisted Lake Wenatchee and Okanogan River sockeye salmon) passed Bonneville Dam – for a total of about 476,000 sockeye (correcting the ladder counts for fallback and re-ascension rates).

All three populations of sockeye salmon were substantially affected by the higher water temperatures in the mainstem and tributary migration corridors. PIT tag detections indicate that sockeye behavior became increasingly erratic and survival rates declined after water temperatures exceeded 20-21°C at The Dalles Dam (mid to late June). Columbia River stocks migrated about one week earlier than endangered Snake River sockeye salmon based on PIT tag detections at Bonneville Dam and were less affected by these conditions. Returning Snake River sockeye salmon adults that migrated inriver as smolts passed Bonneville Dam nearly a week earlier, and were similarly less affected, than those that were transported as juveniles. In the Bonneville Dam to McNary Dam reach, NOAA Fisheries estimates that survival rates were about 60% for UCR sockeye, and 26% (inriver) and 5% (transported) for Snake River sockeye.

About 78% of the Columbia River sockeye survived from McNary to Rock Island Dam and nearly all of those fish bound for the Okanogan River survived from Rock Island to Wells Dam. However, only about 12% of these fish survived migration through the Okanogan River to reach Zosel Dam, near their spawning grounds in Lake Osoyoos (located in both Washington and British Columbia). About 33% (inriver) and 0% (transported) of the Snake River sockeye salmon survived from McNary to Lower Granite Dam. Of the fish surviving to Lower Granite Dam, only about 29% were detected in the Sawtooth Valley. All told, of those fish passing Bonneville Dam, the fisheries managers estimate that only about 10-15% of Lake Wenatchee, 3-4.5% of Okanogan River, and < 1% of Snake River sockeye escaped to the spawning grounds.

Management Actions at Lower Granite and Little Goose Dams

Aside from system-wide releases of water from federal storage projects, several management actions (turbine unit priority, closing surface weirs and spilling through conventional bays only, etc.) were implemented at Lower Granite and Little Goose dams in an effort to improve tailrace and fishway entrance conditions for adult passage (and the number of adults that could be collected and transported by IDFG). These actions took many days or weeks to coordinate through the regional Technical Management Team. Although ladder counts increased initially, results were not conclusive.

Adult Transport at Lower Granite Dam

Fisheries managers decided to implement an emergency “trap and haul” operation at Lower Granite Dam on July 13. A total of 51 adult sockeye salmon were captured in the adult trap in the fish ladder and transported to the Eagle Fish Hatchery for holding. Of these fish, 35 (69%) were assigned to the Snake River sockeye salmon genetic stock (3 were natural-origin and 32 were hatchery-origin). The remaining 16 fish were determined to be from the upper Columbia River genetic stocks and were therefore culled. Of the 35 Snake River sockeye salmon that were trapped, one died at the hatchery and one was a non-productive female. The remaining 34 (16 females and 17 males) were spawned and contributed to brood year 2015 production. The trap and haul effort was discontinued on August 5 as the number of adult sockeye salmon declined to very low levels.

A total of 56 adults (30 females, 26 males) successfully migrated back to the basin without transportation (11 were natural-origin and 45 were hatchery-origin). The surviving fish transported from Lower Granite Dam in 2015 therefore represented about 38% of the overall return. Without the trap-and-haul operation it is likely that none of the Snake River sockeye salmon adults that passed over Lower Granite after July 16th would have survived their migration to the Sawtooth Valley.

Comparisons of egg survival to the eyed stage between trapped and hauled adults (84%) and those collected at the Redfish Lake Creek trap (67%) indicate that there was some loss of egg viability for those that migrated in-river from Lower Granite to the Sawtooth Valley.

Conclusions and Recommendations

NOAA Fisheries concludes that, although June and July river temperatures in 2015 were unprecedented, it is reasonable to expect that similar events could occur in the future. If rare, events are unlikely to have a large or lasting impact to the viability of sockeye salmon populations because their complex life histories provide resiliency against catastrophic events. However, should similar events occur frequently, sockeye salmon populations in the Columbia River basin would be substantially impacted. NOAA Fisheries is recommending a number of measures for consideration by regional parties to address uncertainties, improve future decision-making, and reduce, to the extent practicable, the negative impacts of high summer temperatures on adult sockeye salmon.

Relevance: The Council's 2014 Fish and Wildlife Program includes a sub-strategy which addresses mainstem hydrosystem flow and passage operations. It has an objective to manage dams and reservoir operations to protect and restore ecosystem function and habitat, as well as to improve fish passage and survival through the hydrosystem. Many of the Program's current

measures, including ongoing actions such as those outlined in the mainstem flow and passage operations strategy, represent priorities from earlier Fish and Wildlife Programs which are expected to continue in the 2014 Program. In addition, a principle in the Investment Strategy section urges the federal action agencies to meet their FCRPS Biological Opinion implementation and mitigation obligations.

Workplan: This presentation addresses Council work plan item 2.B, which promotes regional fish and wildlife recovery by prioritizing and implementing 2014 Fish and Wildlife Program actions.

Background: This is a follow-up presentation to the federal agencies' 2015 Dry Year Operations Implementation Strategy briefing to the Council at the June 10, 2015, meeting in Coeur d'Alene, Idaho.
<http://www.nwcouncil.org/media/7149268/4.pdf>

More Info: None.