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February 26, 2009

## MEMORANDUM

**TO:** Council Members

**FROM:** James Ruff -- Manager, Mainstem Passage and River Operations

**SUBJECT:** Background materials for session on status of adult salmon runs, ocean conditions and mainstem passage

### Purpose

The purpose of this special session is to provide the Council with the most recent information concerning the status of adult upriver salmon runs, ocean conditions and mainstem fish passage research and improvements.

### Background

Since late 2008, I have been working with Chairman Booth, Idaho Council staff, Idaho Department of Fish and Game staff and Tony Grover to develop an agenda and recruit presenters for a special session for the March 2009 Council meeting. Toward that end, together we developed an agenda for the afternoon of March 10<sup>th</sup> meeting with seven presentations covering the status of adult upriver salmon runs, ocean conditions and mainstem passage research and improvements. For each presentation, abstracts have been prepared by the presenters and are provided below for background information, as well as the PowerPoint presentations if available at packet deadline.

### Abstracts: Status of Adult Salmon Runs, Ocean Conditions and Mainstem Passage Review

1. Ten-year summary of Columbia River adult salmon and steelhead counts: Pete Hassemer, Idaho Department of Fish and Game. [phassemer@idfg.idaho.gov](mailto:phassemer@idfg.idaho.gov)

This presentation will summarize the recent 10-year history of salmon and steelhead returns to the Columbia River, focusing on the species/run groupings of spring, summer and fall Chinook salmon, summer steelhead and sockeye salmon. For each species/run grouping, counts of adult fish crossing Bonneville Dam provide the most recognized, and annually the first, accounting of run strength. Numbers of fish entering the Columbia River at its mouth will be presented where applicable to compare to the counts at Bonneville Dam and to distinguish between lower river

(below Bonneville Dam) stocks and upriver stocks. Special attention will be given to fish that returned to the river in 2008.

Note: A PowerPoint file for this presentation will be available at the Council meeting.

2. Ocean conditions, juvenile abundance index, and the Pacific Decadal Oscillation – an update with management implications: John Ferguson, NOAA-Northwest Fisheries Science Center.  
[john.w.ferguson@noaa.gov](mailto:john.w.ferguson@noaa.gov)

The productivity of the California Current Ecosystem (CCE), which smolts enter when leaving the Columbia River and coastal rivers, changes rapidly due to shifts in large-scale forces reflected in the Pacific Decadal Oscillation (PDO). The marine survival of salmon in the CCE responds to both long- and short-term (rapid) changes in ocean conditions. The NWFSC has developed an index of ocean conditions comprised of 11 individual indicators. Through ocean monitoring, we assess the physical and biological state of the CCE each year. Since 1998, trends in adult returns of fall and spring Chinook salmon and coho salmon have been captured by the index, but sockeye returns have not. Starting in 2006, the productivity of the CCE has improved along with adult returns. Conditions in 2008 were excellent for salmon, and based on our index, a key indicator within the index, and additional analyses, we expect to see good adult returns in 2009 and 2010. Looking further out, global warming could affect the duration and variability in large scale forcing. Even though it appears the PDO as a signal of these forcings will persist, IPCC models predict the NE Pacific Ocean will be warming throughout this century, which in general is a negative change in terms of the productivity of the CCE, the marine survival of salmon, and adult returns. This suggests that actions to maintain and recover salmon populations in freshwater need to be integrated with changes in marine productivity. With this goal in mind, we will be meeting with fishery managers on the U.S. v. Oregon Technical Advisory Committee in May to discuss and analyze whether ocean indicators of CCE productivity can be used to improve pre-season escapement forecasts for the Columbia River.

3. 2009 salmon and steelhead run forecasts: Bill Tweit, Washington Department of Fish and Wildlife. [tweitwmt@dfw.wa.gov](mailto:tweitwmt@dfw.wa.gov)

This presentation will cover historical Columbia River salmon and steelhead adult returns and 2009 run forecasts for spring Chinook, summer Chinook, fall Chinook, sockeye and steelhead. In addition, a brief summary of expectations for the 2009 Columbia River fishery will be presented.

4. The Idaho Update -- recent trends in salmon and steelhead abundance and outlook on 2009 adult returns: Paul Kline, Idaho Department of Fish and Game. [pkline@idfg.idaho.gov](mailto:pkline@idfg.idaho.gov)

This presentation will summarize the recent 10-year history of salmon and steelhead returns to the lower Snake River in Washington, focusing on the species/run groupings of spring, summer and fall Chinook salmon; summer steelhead; and sockeye salmon. For each species/run grouping, counts of fish crossing Lower Granite Dam will be presented. Numbers of fish passing Lower Granite Dam comprise the aggregate count of adult salmon and steelhead destined primarily for eastern Oregon's Grande Ronde and Imnaha river drainages and Idaho's Clearwater and Salmon river drainages. In addition to 10-year trend information, 2009 forecast information for spring/summer Chinook salmon, summer steelhead, and sockeye salmon will be presented. Special attention will be given to the 2008 return of sockeye salmon to the Sawtooth Basin in Idaho and efforts currently underway to expand the captive broodstock program.

Note: A PowerPoint file for this presentation will be available at the Council meeting.

5. Columbia River Fish Mitigation Program -- update on recent research results, fish passage improvements and future plans: Rock Peters, Mike Langeslay and Marvin Shutters, U.S. Army Corps of Engineers. [rock.d.peters@usace.army.mil](mailto:rock.d.peters@usace.army.mil) [michael.j.langeslay@usace.army.mil](mailto:michael.j.langeslay@usace.army.mil) [marvin.k.shutters@usace.army.mil](mailto:marvin.k.shutters@usace.army.mil)

Recent research results conducted under the Corps' Anadromous Fish Evaluation Program (AFEP) on fish passage at federal mainstem dams on the Lower Snake and Columbia Rivers will be presented. In 2008, the major areas of study in the Corps' AFEP included juvenile fish passage studies, juvenile fish transportation, adult fish passage, avian and pinniped predation, turbine passage and lamprey passage. In the discussion we will focus on the most significant fish passage projects in the program, and will present 2008 results, compare 2008 to previous years, and discuss the future planned actions and operations as a result of this information.

Juvenile Passage Studies

Recent configuration actions at the mainstem dams have focused on surface passage strategies, spillway improvements, juvenile bypass improvements and turbine passage. Today we will provide results on recent actions and evaluations at Bonneville, John Day, McNary, and Lower Monumental dams. Actions evaluated at Bonneville Dam in 2008 include spillway operational improvements aimed at improving survival of fish that pass through the spillway, and a second powerhouse behavioral guidance curtain designed to guide more fish into the Corner Collector, a surface passage route. In 2008, we installed two surface weirs at John Day Dam and initiated a two-year evaluation to assess the relative performance of the surface weirs to reduce turbine entrainment, reduce forebay residence time and improve dam survival. We will provide results of the first year of the evaluation and discuss plans for future testing at the dam. At McNary Dam we installed two surface weirs in 2007. In 2008, we completed a second year of testing which assessed the juvenile passage distribution and survival associated with the surface weirs, as well as all juvenile passage routes at the dam. We will also discuss future plans at McNary Dam to reach the survival performance standards consistent with the 2008 FCRPS BiOp. A surface weir was also installed at Lower Monumental Dam in 2008. The first year biological results of testing the surface weir will be discussed as well as future testing plans for the project.

### Transport Studies

Several transport-related studies were continued in 2008 including evaluating the seasonality of transport effects on Snake River spring Chinook and steelhead and assessing operational effects on Snake River fall Chinook. We will provide updates on the transport-related studies and future direction of the program.

### Avian Predation

Avian predation actions in the estuary are underway to improve habitat outside the Columbia River basin with the intent to reduce tern habitat in the estuary. Studies related to assessing predation rates on juvenile fish from avian predators continued in 2008, both in the estuary as well as inland. We will provide recent results of this work and future direction of the program.

### Lamprey Passage Studies

Studies of juvenile and adult lamprey have been underway for several years. The Corps has been testing new adult lamprey passage systems at Bonneville Dam which may be incorporated in other mainstem projects in the future. We will provide recent results of the new lamprey passage system and discuss the future direction of the program.

Note: A PowerPoint file for this presentation will be available at the Council meeting.

6. 2008 survival of migrating juvenile salmonids in the Snake and Columbia rivers: John Williams, NOAA-Northwest Fisheries Science Center. [john.g.williams@noaa.gov](mailto:john.g.williams@noaa.gov)

Seven of the eight federal mainstem dams that Snake River salmon and steelhead stocks pass during their downstream migration have PIT-tag detection systems within their juvenile fish bypass systems. Using the detection history of each individually tagged migrant (those fish detected and those not detected at each dam), we used Cormack-Jolly-Seber methods to estimate survival of PIT-tagged juveniles through individual reaches (one reservoir and dam combination) and combined reaches. During 2008, a high flow and spill year, juvenile fish survival through individual reaches averaged 91% for yearling Chinook salmon and 92% for steelhead. Survival through the entire 750 km federal hydropower system (from the Snake River trap to the Bonneville Dam tailrace) was 46.1% for yearling Chinook salmon and 47.8% for steelhead. Survival through the final reach, from John Day Dam tailrace to Bonneville Dam tailrace, was poor in 2008, particularly for yearling Chinook salmon. High spill rates, coupled with removable spillway weirs operating at several Snake River dams and a delayed start to transportation, resulted in a greater number of non PIT-tagged smolts in the Snake River in 2007 and 2008. As a result, fewer PIT-tagged steelhead were eaten in those years near the confluence of the Snake and Columbia rivers by piscivorous birds, resulting in increased estimated survival through the Snake River.

7. Survival of juvenile Chinook salmon in the lower Columbia River and estuary: Blaine D. Ebberts, U.S. Army Corps of Engineers. [blaine.d.ebberts@usace.army.mil](mailto:blaine.d.ebberts@usace.army.mil)

A brief overview of the Post-FCRPS Juvenile Salmon Survival Study will be given. Progress to date (as of February 10, 2009) relative to the 2008 study will be summarized (see below). The results presented should be considered preliminary and subject to change pending final analyses. Preliminary 2008 survival estimates from Bonneville Dam tailrace to the mouth of the Columbia River for yearling Chinook salmon averaged 0.785 (range = 0.65 to 0.94) and for subyearling Chinook salmon averaged 0.83 (range = 0.64 to 0.93). The largest loss appeared to occur in the lower 35 km of the river for yearlings and in the lower 50 km for subyearling Chinook salmon. The joint probability of migration and survival was much higher later in the season for subyearling Chinook salmon in 2008 than in the previous three years. Passage route assignments of fish passing John Day (JDA) and Bonneville (BON) dams from Juvenile Salmon Acoustic Telemetry System (JSATS) detections, as well as PIT-tag detections in the Juvenile Fish Bypass (JFB) at JDA and BON dams and the Corner Collector at BON, will be used to form experimental groups for survival comparisons. Migration pathways of 7,926 yearling and 6,751 subyearling Chinook salmon and 2,820 steelhead released for this study and other studies, regrouped passing through the BON Dam tailrace or at river km 86 (Oak Point), were determined for estuary island side channels and well off the navigation channel into Gray's Bay in the freshwater tidal portion of the Columbia River Estuary. An average of 8% of the yearling Chinook salmon were detected in the estuary islands, while 8% were detected in Gray's Bay. More subyearling Chinook salmon were detected in the islands (13%) and in Gray's Bay (14%). Steelhead were also detected in these non-main-channel migration areas; with 8% detected in the islands and 5 % detected in Gray's Bay. A separate R&D effort developed and tested a prototype plume and near-ocean receiver that was successfully deployed and tested in 100 meter (deep) water off the Columbia River Plume. As part of this study we produced a prototype JSATS transmitter weighing 0.30 g in air. This prototype transmitter has been used in preliminary evaluations of bio-effects in a laboratory setting. Survival estimates from 2008 will be compared to previous years. A short discussion on management implications for this study will be presented.

Note: A PowerPoint file for this presentation will be available at the Council meeting.