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MEMORANDUM FOR: F/NWR1 - Rob Walton

THRU: F/NWC3 - John Ferguson

FROM: F/NWC3 - Edmundo Casillas

SUBJECT: The Columbia River Estuary and viability of the Snake River fall Chinook salmon ESU.

Questions have arisen regarding the importance of shallow water habitat for juvenile Snake River fall Chinook salmon, particularly in the tidal freshwater region of the Columbia River below Bonneville Dam. This memorandum provides a synopsis of the rationale for highlighting the importance of this particular habitat to this ESU.

The primary basis for identifying the importance of shallow water habitat in the tidal freshwater region of the Columbia River for Snake River fall Chinook salmon resides within the recently developed NOAA Technical Memorandum “Role of the Estuary in the Recovery of Columbia River Basin Salmon and Steelhead: An Evaluation of the Effects of Selected Factors on Salmonid Population Viability”. This document was developed to define the role of the Columbia River estuary in the recovery and management of threatened and endangered anadromous salmonids in the Columbia River basin in support of the Biological Opinion by the National Marine Fisheries Service on operation of the Federal Columbia River Hydropower System. We acknowledge in the NOAA Technical Memorandum that the Columbia River basin is data poor with respect to habitat use, survival, and growth in the Columbia River estuary by specific populations and ESUs. As a result, we developed a model for the role of the estuary in supporting viability of anadromous salmonids based upon information obtained on juvenile salmon use of estuaries throughout the Pacific Northwest (including the Columbia River). This model is built upon the framework developed in the draft NOAA Technical Memorandum “Salmon at River’s End” by Dan Bottom and coauthors. A fundamental conclusion of the analysis was use of estuarine habitats differed between ESUs and populations based upon life history type, i.e., whether they were stream-type or ocean-type in nature. Ocean-type ESUs (such as the Snake River fall Chinook

salmon ESU) make more extensive use of shallow water, peripheral, and largely vegetated types of estuarine habitats (e.g., emergent marshes) than stream-type ESUs (such as the Snake River spring Chinook salmon ESU). These differences in habitat use are primarily a result of differences in the distribution of size classes of members associated with each life history type as they enter the lower Columbia River environment. Smaller size classes of juvenile salmon, which are more prevalent in estuarine shallow water, peripheral habitats, are more characteristic of salmon populations that are classified as ocean-type compared to stream-type ESUs. In addition, ocean-type ESUs from the Columbia River expand their habitat use into both shallow and deep areas as they increase in size rather than switch habitat preference, as commonly perceived. Members of stream-type ESUs, in contrast, occupy deeper water areas and minimally use shallow water areas with increased size as they move into the Columbia River estuary. Thus, we conclude that the viability of ocean-type ESUs can be improved by actions that restore shallow water, estuarine habitats, regardless of the size of entry of juvenile salmon into the lower Columbia River.

Until we know more about how specific ESUs and populations use the estuary, we recommend that a landscape approach to identifying habitat for protection and restorative actions in the Columbia River estuary for juvenile salmon be followed. That is, protective and restoration actions should be arrayed in shallow water habitats from the river mouth to Bonneville Dam and on both sides of the river. This will help ensure that all ESUs and populations benefit from habitat restoration actions. Further, a landscape approach to restoration where actions are spread through the landscape avoids the pitfalls that can arise from concentrating on only one part of the river. We know that populations and ESUs differ in where they enter the estuary, which likely affects how they use different portions of the estuary. For example, most Columbia River chum salmon enter the estuary in its lower portion whereas Snake River fall Chinook salmon pass through the entire estuary. Thus, for Snake River fall Chinook salmon to benefit from actions in the lower estuary (e.g., near the river’s mouth), they must be able to get to these lower river habitats. This requires protection and restoration of appropriate habitats in the upper and middle parts of the estuary. Therefore, protective restoration actions in the upper, tidal freshwater portion of the estuary will be particularly beneficial to the Snake River fall Chinook salmon ESU compared to other ESUs because of where these fish enter the estuary.

More ESU specific information, particularly for the Snake River fall Chinook salmon population, will become available as we increase our sampling program into the tidal freshwater regions

of the lower Columbia River in the next several years. In lieu of ESU specific information, we recommend a landscape approach to prioritizing actions in the lower Columbia River. If you have any questions, please do not hesitate to contact me at 206-860-3313 or Kurt Fresh at 206-860-6793.

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