CREST

Columbia River Estuary Study Taskforce

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Department of the Army
Walla Walla District, Corps of Engineers
201 North Third Avenue
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District Engineer:

Thank you for the opportunity to provide comments on the U.S. Army Corps of Engineers Draft Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement (DEIS).

The Columbia River Estuary Study Taskforce (CREST) is a bi-state council of governments working for counties, cities, and port districts surrounding the Columbia River Estuary in both Oregon and Washington. Earlier this year CREST staff was directed by its governing council to review the DEIS and provide formal comments. Our review focuses on potential impacts and concerns as they may relate to the Columbia River estuary and its natural resources.

Development of the Columbia River basin hydropower system has altered the character and function of the Columbia River estuary by increasing flow regulation and providing conditions that promote production and entrainment of phytoplankton biomass (within associated reservoirs). Today, river flow is less variable than it was historically. Extremes in annual high and low flows have lessened. The altered flow regime has changed historic salinity intrusion patterns, sediment transport and distribution patterns, and increased estuarine hydraulic residence time. Additionally, production of large quantities of phytoplankton biomass in upriver reservoirs and its subsequent transport to the estuary has altered the estuarine food web and is now considered to be the primary source of organic matter to the estuary. This is in contrast to historic conditions where the estuarine food web was based on detritus originating from tidal marshes and swamps, that now exist at a much reduced state (Thomas 1983; NMFS 1999).

CREST firmly believes that any successful salmon and steelhead restoration plan for the Snake River system must consider the biological requirements of all phases of the salmonid life cycle, as well as the varied life history strategies of all concerned stocks. CREST also believes that a plan with the least risk of mortality and the highest chance of restoring salmonid stocks is one that attempts to restore the historic natural conditions and functions of all critical components of the system. Alternative 4, which requires breaching the four Lower Snake River dams, is one that best endeavors to achieve this goal. We also recognize that given the diversity of limiting factors dam breaching alone will not likely lead to full recovery. Other considerations including changes in hatchery practices, harvest management, and habitat restoration must also be addressed. However, CREST believes that a plan that does not include dam breaching as a component is much less likely to be successful, regardless of the intensity of work in other areas.

Habitat Issues

CREST perceives three significant flaws in the DEIS's approach to habitat issues. The first is that nearly all discussion related to 'habitat' is biased towards tributary spawning and tributary rearing habitat. While this bias is understandable, and to a certain extent justified, it does not allow for the adequate characterization of the importance of rearing habitat in the estuary. As described below, the quality and quantity of estuarine habitats can act to control salmonid abundance in the Columbia River basin. The second flaw is that the presented modeling schemes (PATH and CRI) typically lump the effects of estuary conditions together with ocean conditions. In reality estuarine productivity is linked more to conditions in the estuary itself and in its associated drainage basin rather than variability in ocean conditions. Thirdly, discussion related to the estuary usually focuses on its role as a source of smolt mortality - especially as it relates to avian predation. While this appears to be a valid concern it should not overshadow the importance of maintaining estuarine habitat for rearing salmonid smolts.

Salmonid Use of the Estuary

Estuaries have been shown to provide critical rearing habitat for the pre-smolt life stage of various Pacific Northwest anadromous salmonid stocks (*Oncorhynchus* spp.) (Aitkin 1998; Levy et al. 1979; Levy and Northcote 1981; Simenstad 1996; Sims 1975 unpublished). Subyearling chinook salmon (*O. tshawytscha*) rear in the estuary for periods ranging from weeks to months and juvenile chum salmon (*O. keta*) have been shown to take residence in estuaries for a period of days to weeks. These fish have been shown to hold a high degree of attachment to estuarine habitats prior to entering the ocean environment. While chum tend to spend less time in the estuary than subyearling chinook they still depend on the detritus based food webs that estuaries (including the Columbia River estuary) support (Sibert et al.1977). Optimal estuarine conditions are critical for anadromous salmonid stocks that have evolved a dependence on the estuary for juvenile rearing. If food availability is limited during rearing periods, juveniles could be forced to prematurely enter the ocean environment resulting in slowed growth and reduced fitness. Higley et al. (1983) emphasizes the importance of understanding the relationship of the timing of estuarine occupancy by different stocks of juvenile salmon (and other marine fishes) and the availability of food resources.

It is plausible that estuarine conditions are a significant controlling factor on the number of salmon the Columbia River Basin can support. Given that subyearling smolts typically require rearing time in the estuary, Snake River Fall chinook are most likely to be affected by estuarine conditions and therefore stand to gain the most from estuary habitat enhancement and restoration. Critical elements that estuaries provide include: "1) Refugia, 2) sufficient and appropriate habitat for the physiological transition to saltwater [and freshwater], and 3) habitat supporting the necessary food production and retention of organic matter" (NMFS 1999). Over the past 100+ years human activities have significantly altered the character of the Columbia River estuary. Thomas (1983) estimates that nearly 65 percent of tidal swamps and marshes (habitat critical to rearing juvenile salmonids) have been lost due to human activities such as diking, jetty construction, and dredging.

NFMS (1999) has determined that in the Lower Columbia River and estuary the "biological requirements of the listed species are currently not being met under the environmental baseline condition. The species status is such that there needs to be significant improvement in the current environmental baseline conditions, including the conditions of any designated critical habitat…A primary goal of habitat recovery in the Columbia River estuary should be to increase the survival and recovery of salmon by restoring the spatial and temporal diversity and connectivity of habitats available that provide these biological requirements."

Impacts to Estuarine Productivity

Appendix C of the DEIS describes the likely shift in food web dynamics in the Lower Snake River under the dam breaching alternative. Today, primary productivity in the Lower Snake River is dominated by phytoplankton production. After dam breaching, attached benthic algae would likely dominate primary production.

As described above, the historic loss of certain estuarine habitat types, in conjunction with the development of the upriver hydropower system, has resulted in a system that depends largely on microdetrital inputs (phytoplankton) from upriver reservoirs (NMFS 1999). This is in contrast with the historical condition that depended on macrodetrital inputs from tidal marshes and swamps.

The DEIS does not quantify or discuss the contribution of organic matter (microdetritus) from the four Lower Snake River reservoirs to the estuary, nor is there any discussion regarding potential impacts to estuarine secondary production if that contribution were lessened. This information is necessary to describe potential impacts to secondary productivity of the estuary and the resultant impacts to its carrying capacity with regards to juvenile salmonids. Given this, it becomes increasingly important that any options that potentially will decrease detrital inputs to the estuary include significant estuary habitat restoration. These issues are especially important when considering Snake River fall chinook that emigrate as subyearlings.

Even if the contribution of organic matter by the Lower Snake River reservoirs is determined to be insignificant and given the dependence of subyearling chinook on estuarine rearing habitats, CREST believes that estuarine habitat is a necessary component of any plan designed to restore Snake River chinook salmon.

CREST believes that restoration of ESA listed Columbia River basin salmonids is of vital importance and will require making some very difficult choices. We also believe that any successful approach must be multi-faceted in nature and address all identified contributing factors. In light of the growing body of evidence characterizing the importance of estuarine habitat to certain salmonid stocks it is important that this habitat receive its due consideration.

Thank you again for the opportunity to comment on this important issue.

Sincerely,

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