

February 23, 2015

To: Jim Ruff and Patty O'Toole
From: Dan Rawding
Subject: Ocean Forum

Jim and Patty thanks for putting this draft together. Marc great job on the edits and I agree we need addition references to support many statements. However, I think it is a great start. I have some specific comments regarding the outline and the first question management question.

MANAGEMENT QUESTIONS COMMENTS

First, your work fleshed out our questions, the logic path for me became less clear than it was in previous meetings as we struggled with developing questions and trying to tell a logical and cohesive story. As I thought some more about the questions there was considerable overlap between some of the questions and some of the questions seemed to be vague and open ended. To this end I have tried to focus our questions that make more sense at least to me. This is not the only way to proceed but I hope this would to get some consideration from the group. So the questions focus on: 1) physical and chemical processes, 2) mechanisms that changed physical and chemical processes, 3) changes in ecosystem and biological process as a result of changes in chemical and physical process, and 4) management actions to change chemical, physical, and biological process to improve ecosystem function and salmon survival.

Below are the original questions and my suggested modification of the questions in track changes.

Management question #1: What physical and chemical changes have occurred in the estuary, plume and near ocean ecosystems ~~functions, processes and relationships~~?

Proposed Outline for report/Management Question 1.

1. Introduction
 - a. Background changes in salmon abundance
 - b. Purpose
 - c. Approach – define estuary, plume, ocean
 - d. Management questions
2. Management question #1
 - a. Introduction
3. Physical Changes
 - a. Estuary
 - b. Plume
 - c. Ocean
4. Chemical Changes
 - a. Estuary
 - b. Plume
 - c. Ocean

Management question #2: ~~Why or how have~~ What has caused the physical and chemical changes in estuary, plume, and near ocean ecosystems ~~functions and process occurred~~ (mechanisms of change)? (emphasis should be on human-induced changes and be specific about the mechanism)

Proposed Outline for Management Question 2.

1. Introduction

2. Mechanisms for Physical Changes
 - a. Estuary
 - b. Plume
 - c. Ocean
3. Mechanisms for Chemical Changes
 - a. Estuary
 - b. Plume
 - c. Ocean

Management question #3: What has been the effect of physical and chemical changes in estuary, plume and near ocean ecosystem functions and biological processes? (Take a species-specific approach – should be salmon).

Proposed Outline for Management Question 3.

1. Introduction
2. Effect of Physical and Chemical Changes on ecosystem function & biological process?
 - a. Estuary
 - b. Plume
 - c. Ocean
3. Direct Changes in Biological Processes
 - a. Estuary
 - b. Plume
 - c. Ocean

Management question #4: What management actions can be taken to change altered physical, chemical, and biological process to improve ecosystem function and salmon survival in these altered and changing environments and ~~management effectiveness based on knowledge of estuary, plume and near ocean ecology and dynamics?~~

Proposed Outline for Management Question 4.

1. Introduction
2. Management Action to restore physical, chemical, and biological process to improve ecosystem function and salmon survival?
 - a. Estuary
 - b. Plume
 - c. Ocean

I know this is not the only way to proceed but I think it is critical that the outline and questions be nailed down. For example, it may make more sense to combine questions 1 and 2: What are the physical and chemical changes that have occurred in the estuary, plume, and ocean ecosystems and the mechanisms that have caused these changes? In my proposed outline it may make more sense to address physical and chemical progress by geographic area rather by topic. Or I could have completely missed the mark regarding the questions.

DRAFT DOCUMENT/MANAGEMENT QUESTION #1 COMMENTS

Section 2 includes the river, plume, and ocean. I think we need to clearly define river, estuary, plume, and near ocean and possibly include a map early in the document (e.g. introduction). I know there are likely to be different definitions for these but we need to settle on one that makes sense from science

and policy perspective. Also, the draft addresses the ocean and not so much what I think of as the near shore ocean. So what is the difference and does it matter given our direction? In addition, the proposed outline describes an estuary section but the estuary is missing from the entire document.

In the estuary section, we need to discuss changes in the estuary including change in physical habitat 1) loss of shallow salmon rearing habitat due mechanisms such as dredging, diking, reduced and altered flows, and 2) creation and expansion of islands from dredging, changes in temperature and turbidity. In addition, there have been changes estuary chemical habitat – location and variation in the freshwater/saltwater transition zone due to altered and reduced flows. These have led to changes in ecosystem function, food web, and salmon survival due to predation, reduced travel time, etc. Yes, I understand that the dredging is a COE action but the results (predation) have impacted survival on the Council’s program and I think it would be remiss not to include this.

Biological Changes (section 2.4) focuses on ocean. If we follow my above recommendations biological changes should be described in the estuary, plume, and ocean. This will allow for the Council and others to focus on specific critical uncertainties and restoration opportunities in the estuary and plume that may be easier to relate to. However, I think the biological process are better addressed in question 3.

Chemical changes were again focused on the ocean not estuary and plume.

The Columbia River ESA recovery plan module for salmon and steelhead is a start for the estuary and is available at:

http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/estuary-mod.pdf. Since I do not want to re-invent the wheel I copied the text describing the estuary module (page ES-1, 2) and it has already accomplished some of the same things we say we are trying to. It makes sense to build off of this work, right?

“What is the Estuary Recovery Module?”

This estuary recovery plan module complements other recovery plans in the region. The planning area for the module is all tidally influenced areas of the Columbia River. The upstream boundary of this area is Bonneville Dam, at River Mile 146, and the downstream boundary includes the Columbia River plume. Figure ES-1 shows the 13 listed ESUs in the Columbia River basin grouped by region. The regions include the Lower Columbia, Upper Willamette, Middle Columbia, Snake, and Upper Columbia River ESUs. Within each of the regions, the ESUs have unique geographical boundaries that are based on similarities among populations.

This estuary recovery plan module complements other recovery plans in the region. The planning area for the module is all tidally influenced areas of the Columbia River. The upstream boundary of this area is Bonneville Dam, at River Mile 146, and the downstream boundary includes the Columbia River plume. With few exceptions, the module’s focus is limited to habitat conditions and processes in the Columbia River estuary and plume, rather than hatchery or harvest practices, hydroelectricity production, or tributary habitats in the Columbia River basin. The goal of the module is to identify and prioritize management actions that, if implemented, would reduce the impacts of limiting factors, meaning the physical, biological, or chemical conditions that impede salmon and steelhead survival during their migration through and rearing in the estuary and plume ecosystems. To accomplish this, changes in the physical, biological, or chemical conditions in the estuary are reviewed for their potential to affect salmon and steelhead. Then, the underlying causes of limiting factors are identified and prioritized based on the significance of the limiting factor and each cause’s contribution to one or more limiting factors. These causes are referred to as threats and can be either human or environmental in origin. Finally, management

actions are identified that are intended to reduce the threats and increase the survival potential of salmon and steelhead during estuarine rearing and migration. Costs are developed for each of the actions using an estimated level of effort to implement actions.

This estuary recovery plan module is intended to help answer questions about the degree to which the estuary and plume can contribute to salmon and steelhead recovery efforts throughout the Columbia River basin. The state of the science surrounding the estuary and plume is such that quantitative answers to questions about estuarine ecology are not necessarily available at this time. This is true in part because of the complexity of the ecological processes in the estuary and plume. However, it is also true because the Columbia River estuary and plume are only now being studied at a level of detail that allows knowledge about this portion of the Columbia River ecosystem to be integrated into the understanding of life history patterns that have been well documented in the upstream portions of the basin.

This estuary recovery plan module is a synthesis of diverse literature sources and the direct input of estuary scientists. The module was developed by the Lower Columbia Estuary Partnership and a private consultant, PC Trask & Associates, Inc. The primary author was PC Trask & Associates, Inc., with significant involvement from Lower Columbia River Estuary Partnership staff. The author used several key documents as a platform for the module. One of those documents is the “Mainstem Lower Columbia River and Columbia River Estuary Subbasin Plan,” which the Lower Columbia River Estuary Partnership developed, along with its supplement, for the Northwest Power and Conservation Council’s *Columbia River Basin Fish and Wildlife Program* (Northwest Power and Conservation Council 2004). In 2005, the Northwest Fisheries Science Center of NOAA’s National Marine Fisheries Service (NMFS) produced two important technical memoranda for the estuary: *Salmon at River’s End* (Bottom et al. 2005) and *Role of the Estuary in the Recovery of Columbia River Basin Salmon and Steelhead* (Fresh et al. 2005). The author used these two memoranda extensively and consulted other sources as well, including many primary sources. Area experts from the NMFS Northwest Fisheries Science Center and Northwest Regional Office, the Lower Columbia River Estuary Partnership, and the Lower Columbia Fish Recovery Board provided input and advice on scoring and evaluation processes. Additionally, the author briefed the Northwest Power and Conservation Council, Mid-Columbia Sounding Board, Upper Willamette Recovery Planning Stakeholder Team, and Lower Columbia River Recovery Planning Stakeholder Team and took their feedback into account when refining the module. Lastly, PC Trask & Associates, Inc., and Lower Columbia River Estuary Partnership staff worked with NMFS Northwest Regional Office staff to revise the module in response to comments received during the public comment period.”