Workshop 3 panel discussion (W3 Panel)

Purpose of the W3 Panel. Several of the questions posed to the Science Panel by NOAA and DFO (in Appendix 1 of the draft Panel report) can be boiled down to the following two questions:

1) What is the strength of the evidence that changes in Chinook abundance **cause or do not cause** changes in SRKW vital rates (i.e., survival, reproduction and population growth rates)?; and

2) What is the strength of the evidence that changes in fisheries in the future **would cause or would not cause** changes in Chinook salmon abundance sufficient to affect SRKW vital rates?

The previous 2 workshops have included many different lines of evidence addressing these questions, including: field studies of the spatial and temporal distributions of Chinook and SRKWs during different seasons; studies of SRKW diets using a variety of techniques; genetic and tag-based identification of Chinook stocks; statistical analyses of association between indices of Chinook abundance and SRKW demographic parameters; bioenergetics analyses; analyses of harvest rates; and other types of evidence.

In response to the Science Panel's draft report, some participants commented that much of the evidence relating to question 1 is merely correlative, and does not indicate that changes in Chinook abundance actually cause changes in SRKW population dynamics. Other participants commented that existing evidence does indeed support a causal relationship. These two questions are distinct and need to be considered separately. It is possible for there to be strong evidence for question 1, and weak evidence for question 2 (i.e., large changes in Chinook abundance cause changes in SRKW vital rates, but the changes in abundance caused by fishing are insufficient to affect SRKW vita rates). The purpose of the Workshop 3 Panel discussion is to provide the Science Panel with a synthesis of evidence regarding the above two questions, including evidence presented or summarized at workshop 3.

Format of the W3 Panel.

The panel will first discuss question 1 (maximum 5 minutes / panelist), then discuss question 2 (also maximum 5 minutes / panelist), and finally discuss question 3 (maximum 2 minutes / panelist). No PowerPoint presentations are allowed, but panelists may distribute a handout with a point form summary of their responses to the 3 questions (maximum length 3 pages), primarily to serve as notes for the Science Panel members in their subsequent deliberations.

1) What is the strength of the evidence that changes in Chinook abundance **cause or do not cause** changes in SRKW vital rates (i.e., survival, reproduction and population growth rates)? Please consider the following types of evidence[1]:
   a. *Plausible mechanisms* (i.e., a causal relationship makes sense logically and scientifically). Consider the relative level of support (based on your knowledge, at a high level of synthesis) for alternative mechanisms potentially explaining changes in SRKW vital rates.
   b. *Exposure* to the causal factor or stressor, which in this case is low densities of Chinook or absence of Chinook (i.e., SRKW overlap in time and space with Chinook);
   c. *Correlation / consistency* (e.g., changes in SRKW vital rates are associated with spatial and temporal changes in Chinook abundance);
   d. *Thresholds* (e.g., SRKW vital rates decline whenever Chinook abundance for SRKW falls below biologically meaningful thresholds);
   e. *Experiments* (e.g., observations from captive killer whales, other experiments)

[1] This classification of types of evidence is derived from Burkhardt-Holm and Scheurer (2007).

2) What is the strength of the evidence that changes in fisheries in the future **would cause or would not cause** changes in Chinook salmon abundance sufficient to affect SRKW vital rates? Please consider the above-listed types of evidence, as well as the following issues:
   a. How the changes in Chinook harvest would affect the abundance of Chinook available to SRKWs.
   b. How the form of the relationship between Chinook abundance and SRKW vital rates (alternatives in Figure 1) and the current abundance of Chinook could affect responses of SRKW to changes in Chinook harvest; and
   c. How pinnipeds and other competitors for Chinook might affect the responses of SRKW to changes in Chinook harvest.

3) For questions 1 and 2, what are the most critical data needs and required analyses to reduce key uncertainties affecting management decisions? What further evidence could alter or strengthen the conclusions for questions 1 and 2?

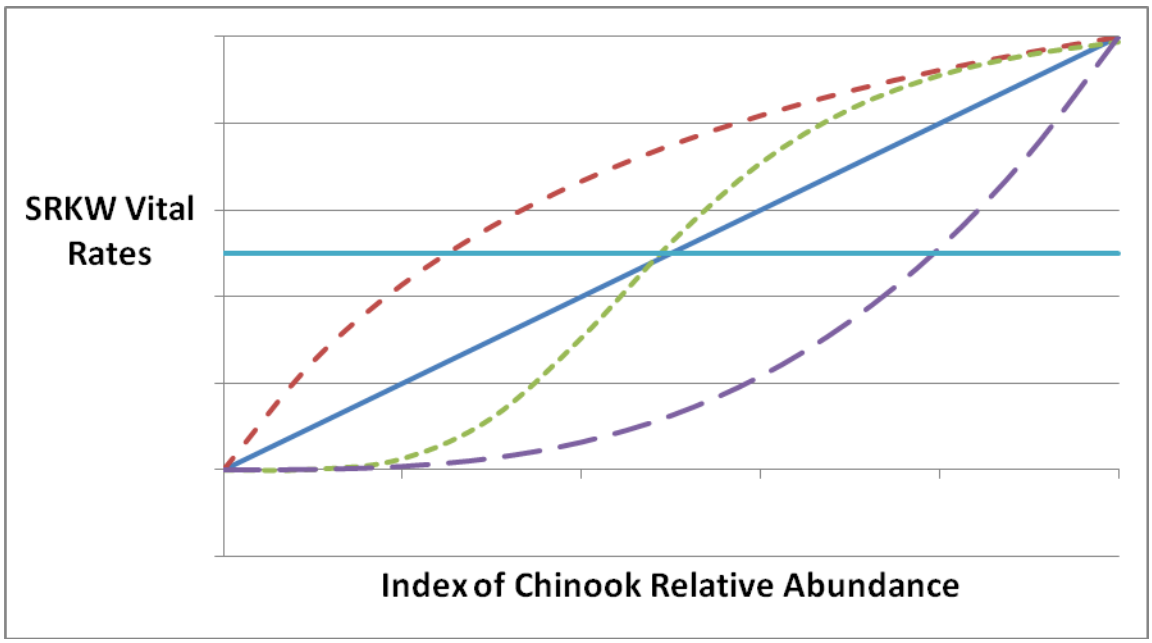

Figure 1. Examples of possible forms of the functional relationship between Chinook abundance and SRKW vital rates. Both the position on the x-axis (current abundance of Chinook) and the form of the relationship could affect the response of SRKW vital rates to changes in harvest rates.

References Cited

Burkhardt-Holm, P. and K. Scheurer. 2007. Application of the weight-of-evidence approach to assess the decline of brown trout (*Salmo trutta*) in Swiss Rivers. Aquatic Sciences. 69: 51-70.