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Dr. Jeff Louch
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Ms. Adrienne Dorrah
Washington State Department of Ecology
PO Box 47600
Olympia, Washington 98504-7600

Dear Ms. Dorrah:

The National Council for Air and Stream Improvement, Inc. (NCASI) is an independent, non-profit membership organization that provides technical support to the forest products industry on environmental issues. An important part of our mission is to ensure that regulatory decision making is based on sound science. In this capacity, NCASI has reviewed the August 1, 2012, Working Draft of Ecology's publication *Fish Consumption Rates Technical Support Document, A Review of Data and Information about Fish Consumption in Washington (Version 2.0)* (hereinafter the TSD) and the associated Technical Issue Papers (TIPs). Our comments on the material presented in these documents can be summarized:

1. Version 2.0 of the TSD inappropriately includes language with the potential to mislead the casual reader into thinking potential contaminant effects on fish and shellfish are relevant to setting a fish consumption rate (FCR) when, in fact, this potential is clearly a distinct issue that should be addressed when setting standards for protection of wildlife, not when setting standards for protection of human health (comment A below).

2. Even though the science clearly demonstrates that >95% of the contaminant body burden found in adult salmon is accumulated in the open ocean, Version 2.0 of the TSD and the TIP *Salmon Life History and Contaminant Body Burdens* contain inappropriate speculation and misleading language having the potential to obscure this reality (comments B through D below).

The following comments elaborate on these two points.

A. The TSD inappropriately addresses the potential effects of contaminants on fish and shellfish.

The potential for contaminants to have adverse effects on fish and shellfish is noted multiple times throughout the TSD and associated TIPs. Given that the subject of this document is fish consumption by human beings, discussion of this potential is, at best, irrelevant. At worst,

addressing this issue in this context is misleading in that it conflates two issues that are absolutely distinct in both scientific and regulatory senses. Ultimately, the appropriate venue for addressing potential effects on fish and shellfish is when setting criteria for the protection of wildlife, and Ecology should expunge all discussion of potential contaminant effects on fish and shellfish from the final version of this TSD and the associated TIPs.

B. The TIP addressing salmon summarizes numerous studies providing evidence that juvenile salmon pick up contaminants in freshwater and estuarine systems without making any effort to place these results in the proper scientific perspective.

A number of the studies summarized in Section II of the TIP *Salmon Life History and Contaminant Body Burdens* address the accumulation of contaminant burdens in juvenile salmon without also providing measures of contaminant burdens in returning adult salmon. The specific papers are:

Giesy et al. 1999
Meadoe et al. 2002
Hardy and McBride 2004
Sethajintanin et al. 2004
Fresh et al. 2005
Johnson et al. 2007a
Johnson et al. 2007b
Kelly et al. 2011
Yanagida et al.2012

The data presented in these papers serve to confirm that some bioaccumulation occurs in freshwater and estuarine systems, but provide no insight into what fraction of the ultimate body burden in adult salmon this represents. As a consequence, these data tell only a fraction of the story.

In order to place these results in the proper scientific context they need to be compared to the body burdens found in returning adult salmon. Without this comparison the experimental results presented in these papers are irrelevant to the central question of what fraction of the ultimate body burden in adult salmon is acquired in fresh or estuarine waters vs. the open ocean.

C. The TIP addressing salmon contains inappropriate speculation concerning the authority of selected peer-reviewed studies of salmon bioaccumulation.

Section II of the TIP *Salmon Life History and Contaminant Body Burdens* summarizes results from studies directly addressing the question of where salmon acquire bioaccumulative contaminants. Section III of the same TIP provides an overview of these results, and correctly concludes that the results from all relevant studies show that the dominant fraction of contaminant body burden in adult salmon is accumulated in the open ocean, and not in freshwater or estuarine waters. Thus, Section III of the TIP includes the following statement:

> *In fact, as a number of authors indicate, almost all salmonids accumulate the vast majority of their body burden at sea; accumulation at juvenile life stages in freshwater and estuarine habitats contributes a very limited proportion of the total accumulation.*

This is consistent with the interpretations offered by the various authors. However, Ecology goes on to speculate (second to last paragraph in Section III):

> *Another factor potentially relevant to this topic, briefly mentioned by a few authors but not investigated in detail, is the lack of understanding of whether there was a threshold response effect on juvenile salmonids exposed to contaminants while in freshwater and estuarine habitats. It is possible that the subadult and adult salmonids sampled for body burden analysis were those fish that did not experience behavioral and physiological abnormalities, post-exposure, that would have reduced their survival to adulthood. In other words, subadult and adult fish sampled may not be entirely representative of the naturally occurring juvenile population.*

Although Ecology's intent is unclear, this language appears to be directed specifically at O'Neill and West (2009). Regardless, this paragraph is nothing more than speculation and cannot be taken as a substantive comment affecting, in any way, the utility of the data or the conclusions offered by any of the original researchers.

A second example of inappropriate speculation is found in the summary of Cullon et al. (2009) on pg. 30 of the same TIP. The first paragraph on that page begins by noting that Cullon et al. (2009) concluded that 97% to 99% of the bioaccumulative chemicals found in adult Chinook salmon were acquired during their time at sea, not in freshwater or estuaries. However, Ecology goes on to speculate that the sample sizes (generally n=6) might have been too small to give an accurate comparison of juvenile to adult body burdens, and then implies that the pooling of hatchery and wild fish in the analysis might also impact the authority of the results. Again, all this is nothing more than speculation on the part of Ecology, and has absolutely no impact on the interpretations offered by the original researchers.

Ultimately, the fact remains that every single study looking at the issue of where salmon acquire contaminants has concluded that >95% of the body burden of bioaccumulative chemicals found in adult salmon is acquired in the open ocean, and not in fresh or estuarine water.

D. Ecology repeatedly misrepresents the science informing where salmon acquire bioaccumulative contaminants.

Sprinkled throughout the TSD and associated TIPs are statements to the effect that there is much uncertainly regarding where salmon accumulate bioaccumulative contaminants. As an example, the Executive Summary of the TSD contains the following statement addressing salmon:

> *Ecology recognizes the complexity of addressing this issue and acknowledges the uncertainty concerning where salmon obtain contaminants.*

However, as noted, the experimental data are anything but "uncertain," in that every single study looking at the issue of where salmon acquire bioaccumulative chemicals has concluded that >95% of the contaminant body burden found in adult salmon is acquired in the open ocean, and not in freshwater or estuarine water.

Please do not hesitate to contact me if you have any questions or concerns about these comments.

Sincerely,

JEFF LOUCH

Jeff Louch
Principal Scientist

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