Assessment of three alternative methods of nutrient enhancement (salmon carcass analogs, nutrient pellets and carcasses) on biological communities in Columbia River tributaries

45-minute presentation + 15 minutes for questions

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Abstract

Marine-derived nitrogen, phosphorous and carbon once delivered to the rivers of the Columbia Basin by spawning salmonids are a critical part of Pacific Northwest ecosystems. Because many of the streams in which salmon spawn and rear are inherently nutrient poor, the delivery of marine-derived nutrients by returning salmon carcasses may be crucial to survival of juvenile salmon and recovery of depleted salmon populations. The recovery of Columbia Basin salmonids is contingent on the existence of fully functioning ecosystems with adequate productivity to support viable populations of salmonids. While a number of enhancement strategies for increasing the ability of streams to support salmonids exist, few studies have evaluated the methodology for enhancing stream productivity. This project takes the critical first steps of a program designed to experimentally evaluate the effects of marine derived nutrients on populations of Snake River spring/summer chinook and steelhead salmon. We are beginning field experiments to evaluate the response if these fish and their foods to alternative methods of fertilization: (1) carcasses additions, (2) carcass analog additions (from Bio-Oregon) and (3) inorganic nutrient addition. This research is novel in that we (1) address basic questions regarding the methodology of nutrient-based techniques to enhance salmon production; (2) use a replicated before-after study design, (3) begin to distinguish between the importance of direct consumption of carcasses by juvenile salmonids from the indirect effects of bottom-up fertilization; and (4) employ a combination of economics and ecology and ask which fertilization technique provides the greatest increase in salmon performance (growth, survival, population growth) per unit dollar. Such analyses should provide a simple, intuitive method for determining which fertilization method is most cost-effective and how fertilization in general compares in cost-effectiveness to other management schemes.

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An extensive baseline database has been produced.

We have run into some snags in fully implementing this project.
We will be providing more information about implementation problems and will be requesting additional funds in FY2005 to complete the study.
A within-year request for funds is being prepared for FY2004.