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Summary Report:
Hoko and Skokomish River Coho Salmon
Spawning Escapement Evaluation Studies

1986-1990

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SUMMARY REPORT: HOKO AND SKOKOMISH RIVER COHO SALMON SPAWNING ESCAPEMENT EVALUATION STUDIES 1986-1990

Prepared by

LAWRENCE C. LESTELLE
Mobrand Biometrics, Inc.

and

CHRISTOPHER WELLER
Point No Point Treaty Council

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POINT NO POINT TREATY COUNCIL
7999 N.E. Salish Lane
Kingston, Washington 98346

ABSTRACT

In 1986 the Point No Point Treaty Council (PNPTC) initiated two studies to evaluate the redd enumeration methodology for assessing coho salmon escapements in the Hoko and Skokomish rivers. The studies were performed over a period of five spawning seasons. Their purpose was to investigate how the methodology should be applied to the two rivers and to attempt to quantify sampling variance and associated confidence limits. We summarize and synthesize the results of the studies in this report. We also present results of a new analysis that compares abundance estimates derived with the redd count methodology to those obtained using the live spawner count, area-under-the-curve (AUC) approach.

We found that the extent of some potential sources of error could not be sufficiently defined to compute total sampling variance. We summarize study findings related to four categories of potential error that affect results of the redd enumeration approach. These categories are sampling design, surveyor variability in counting, redd visibility, and expansion of redds to adult fish. The live spawner count, AUC methodology is subject to some of these same sources of error in addition to one other, stream residency time of adult fish. We discuss aspects of these sources of error as related to the AUC approach.

Our observations from this study suggest the AUC approach likely will estimate lower spawner abundance than the redd count method at relatively low to moderate spawner densities and, conversely, the AUC method likely will estimate higher spawner abundance at higher spawner densities. We therefore infer that the AUC approach will tend to underestimate the actual spawner abundance at low to moderate densities: coho spawners are generally more difficult to spot during surveys at these densities, whereas individual redds are more easily spotted and a more accurate accounting may be achieved with the redd count method. The situation appears reversed at much higher densities: the redd count method is more likely to underestimate actual spawner abundance because of the difficulty of distinguishing overlapping redds and the greater likelihood of redd superimposition. Thus, the AUC method may better represent actual spawner abundance at higher densities.

We conclude that the redd enumeration methodology would be more effective at monitoring escapements in western Washington at the current, generally low to moderate levels of spawner abundance. However, because the currently used fish count methods are often associated with long-term databases, it would be undesirable to lose continuity of such databases by switching to the redd count method. In such cases, it would be preferable to use the redd count method in conjunction with fish counts to give alternative measures of abundance and provide a means of checking accuracy.

On-going or future escapement assessment programs that use either estimation methodology should include efforts to understand the various sources of potential error well enough to manage and control it. We provide several recommendations for improving escapement assessment programs.

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PREFACE

There was a limited distribution of this report in 1995. However, it was decided to ask several biologists (see below) to review and comment on the report. As a result of this review, the report was modified to improve clarity and correct minor errors, but its substance remained the same. Owing to the press of other business and to neglect, the modified report languished. Recent requests led to its resurrection and distribution at this time. This report would not have been possible without the contributions of the following people.

The project biologists who supervised field crews, participated in data collection, and compiled, summarized and made initial assessments of the data included: Dan Dougherty, Don Gruber, Greg Volkhardt and Tim Willson of the Hoko River studies; and Ted Arnold, Ken Keller, Gregg Martenson and Murray Schuh of the Skokomish River studies. Ken Newman assisted with project planning and early assessments of study results. Chuck Baranski and Tim Flint provided comments on project planning and coordinated the WDFW cooperation and data exchange. Chuck Baranski, Scott Chitwood and Bob Hayman provided comments on an early version of this report that substantially improved this final version. Gary Graves helped coordinate the report review. Katie Mobrand typed the report and organized the physical preparation and integration of the text, tables and figures.