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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**

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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.

TABLE OF CONTENTS

ABSTRACT	i
LIST OF FIGURES	v
LIST OF TABLES	vi
PREFACE	ix
1. INTRODUCTION	1
2. DESCRIPTION OF STUDY AREAS	3
3. METHODS	6
3.1 APPROACH	6
3.2 SAMPLING DESIGN FOR SPAWNING SURVEYS	7
3.2.1 Hoko River	7
3.2.2 Skokomish River	7
3.3 SURVEY PROCEDURES	8
3.4 ESCAPEMENT ESTIMATION WITH SURVEY DATA	10
3.4.1 Estimates based on redd counts	10
3.4.2 Estimates based on fish counts	13
3.5 VALIDATION OF ESTIMATES	14
3.6 ASSESSMENT OF SURVEYOR VARIABILITY	16
4. RESULTS	18
4.1 HOKO RIVER	18
4.1.1 Extent of survey coverage	18
4.1.2 Escapement estimation with survey data	19
4.1.3 Validation	21
4.2 SKOKOMISH RIVER	28
4.2.1 Extent of survey coverage	28
4.2.2 Escapement estimation with survey data	29
4.2.3 Validation	32
5. DISCUSSION	40
5.1 SAMPLING DESIGN	40
5.2 SURVEYOR VARIABILITY	41
5.3 REDD VISIBILITY	41
5.4 EXPANSION OF REDDS TO ADULT SPAWNERS	43

5.5	VALIDATION	44
5.6	UTILITY OF AUC VS. REDD COUNT METHODOLOGY	47
5.7	RECOMMENDATIONS	49
	REFERENCES	50
	APPENDICES	55

LIST OF FIGURES

Figure 1.	The Hoko River system.	4
Figure 2.	The Skokomish River.	5
Figure 3.	Comparison between total adult coho salmon spawner abundance estimates of redd count and AUC method in the Hoko River, 1986-87 through 1989-90. Redd count expansion to adult abundance assumes a 1:1 sex ratio.	22
Figure 4.	Relationships between total redd counts and AUC estimates of adult coho salmon in index survey reaches in the Hoko River system, 1986-87 through 1990-91. .	25
Figure 5.	Comparison between total adult coho salmon spawner abundance estimates of redd counts and the AUC method in the Skokomish River, 1986-87 through 1990-91. Redd count to adult abundance expansion assumes a 1:1 sex ratio.	33
Figure 6.	Relationships between total redd counts and AUC estimates of adult coho salmon in index survey reaches in the Skokomish River system, 1986-87 through 1990-91.	36
Figure 7.	Relationship between estimated total redd abundance and AUC estimates of coho salmon for the Hoko and Skokomish River systems, 1986-87 through 1990-91. The line where estimates are equal for both methodologies is also shown.	48