

SUPPLEMENTATION: QUEETS RIVER COHO, A CASE STUDY

Rishi Sharma,
Columbia River Inter-Tribal Fish Commission,
729 NE Oregon St, Suite 200,
Portland, OR 97232.
shar@critfc.org

Gary Morishima
Quinault Management Center,
Mercer Island, WA 98040.

Shizhen Wang,
Quinault Management Center,
Mercer Island, WA 98040.

André Talbot,
Columbia River Inter-Tribal Fish Commission,
729 NE Oregon St, Suite 200,
Portland, OR 97232

Larry Gilbertson,
Quinault Fisheries Division,
Taholah, WA 98587

Extended Abstract Only- Do Not Cite

The Quinault Nation (QIN) has been conducting a study designed to produce fish to supplement spawning escapements of wild coho salmon on the Clearwater River, a tributary of the Queets River in western Washington. The study, initiated in 1984, involves the collection of wild broodstock, rearing in a combination of hatchery and natural environments, and volitional releases, combined with marking and sampling of wild fish.

QIN initiated the supplementation project as a means to try to increase stability in coho production. Queets coho are subjected to unstable environmental conditions that result in high variability in freshwater and marine survival rates. The chronically depressed condition of Queets coho has severely constrained both ocean and in-river fisheries since the early 1980s. Supplementation was

undertaken as a means to provide a stable source of smolts that can help compensate for variability in freshwater survival rates of naturally-produced juveniles.

Results of the QIN study to date indicate that smolts from supplemental production have marine survival rates that do not significantly differ from those experienced by smolts produced from natural spawning escapements (p -value = 0.16). It is unlikely that there are interactions between supplemental smolt releases and natural smolt populations; supplemental fish are released into natural and created pond environments that are not extensively utilized by naturally produced juveniles and the time of seaward migration is relatively brief.

A Beverton-Holt spawning stock-smolt production analysis performed on the data produced by the study to date indicates that the combined supplemental-wild escapement has a productivity of 116 smolts per adult spawner at low spawner densities ($r^2 = 0.86$). This estimate is comparative to other productive coho populations in the Pacific Northwest (Table 1). The stock-production analysis indicates that, on average, the Clearwater can at most be expected to produce 72,000 smolts (figure 1). The Clearwater has produced an average of 57,737 smolts, approximately 80% of carrying capacity, confirming that natural smolt production has not been at capacity levels.

Table 1: Clearwater productivity estimates compared to productivity estimates from other systems (Sharma and Hilborn 2001)

River system	Productivity, (smolts/spawner)
Clearwater River	116
Snow Creek	35
Big Beef Creek	73
Deschutes River, WA	25
S.F. Skykomish River	128

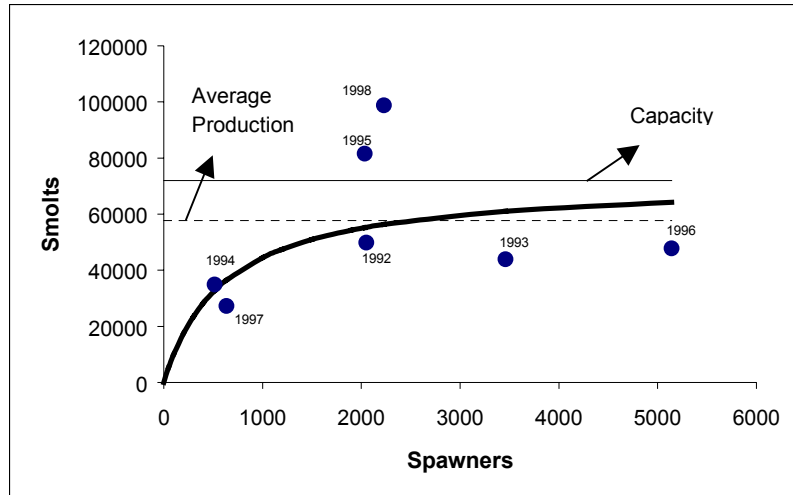


Figure 1: Beverton-Holt fit for the Clearwater natural run (includes supplemental fish spawning in the wild)

Since the fish taken for broodstock used for the supplementation project would otherwise have spawned, an obvious question is: “What is the expected increase in spawners resulting from supplementation compared to allowing those fish to spawn naturally? To address this question, we estimated a direct comparison of what the overall spawner to spawner return rates on the Clearwater would be if those fish taken for broodstock could have spawned naturally (Table 2).

Table 2: Hypothetical returns on Natural and Supplemented coho on the Clearwater

Brood Year	Females Spawned	Natural Spawner to Spawner return rate (observed)	Hypothetical Adult returns (BY+3)	Observed Supplemental Returns (BY+3)
1993	59	1.48	175	2785
1994	15	2.00	60	NA
1995	39	1.08	84	854
1996	46	0.54	50	519
1997	16	2.86	92	356
1998	33			
1999	34			

Table 2 indicates that the supplemental groups contributions are much better than if those fish that were taken for broodstock spawned in the natural environment (Note that the female spawner to adult spawner return rate will be double the return rate shown in table 2). In 1997, however no carcasses were sampled and as a result, the supplemental contribution could not be assessed. This data indicates that the objective of rebuilding and stabilizing the Clearwater coho population is being met through this boost in overall survival for the broodstock taken for supplementation.

These preliminary results indicate that supplementation can be a useful tool to help rebuild depressed naturally spawning populations of coho salmon if projects are designed to boost overall survival rate of artificially propagated fish without reducing the fitness of the naturally spawning stock.