

**Washington LSRCP Salmon Program**  
 Washington Department of Fisheries  
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Washington Department of Fisheries' role in the LSRCP is to produce sufficient fall chinook smolts to return 18,300 adults to the Project Area, and sufficient spring chinook smolts to return 1,152 adults (Table 1). The fall chinook program uses Snake River stock at Lyons Ferry Fish Hatchery (FH), and comprises 100% of the LSRCP mandate for fall chinook. The spring chinook program uses Tucannon River stock, and comprises 2% of the overall LSRCP mandate for this race. This program is run jointly at Tucannon and Lyons Ferry FH. We began our LSRCP program in 1985 with the completion of Lyons Ferry FH.

Table 1. Fall and spring chinook production objectives for Lyons Ferry and Tucannon Fish Hatcheries.

Facility	Race	Smolts produced	Pounds produced	Adult returns	Return rate (%)
Lyons Ferry	Fall	9,162,000	101,800	18,300	0.20
Tucannon	Spring	132,000	8,800	1,152	0.87

Snake River Fall Chinook

Prior to completion of Lyons Ferry FH, Snake River fall chinook were maintained through the Snake River Eggbank Program. Broodstock derived through this program were used as the initial egg source for Lyons Ferry. The first release was yearlings released on-station in 1985. Survival of this release was exceptional: 7.01% contributed to fisheries or escapement, and 1.34% returned to the Snake River. This strong year class provided a large part of the broodstock to Lyons Ferry from 1986 to 1989. Other releases from Lyons Ferry FH (yearlings and subyearlings) have not fared as well, but approach the LSRCP mandate for returns (0.20%; Figure 1). In general, yearlings survived better than subyearlings. From 1985 to 1990, escapement to the Project Area averaged 3,990 adults, 22% of the LSRCP goal. Not all these returns can be attributed to the LSRCP program, however.

Insufficient escapement for broodstock limits our program's success; Lyons Ferry has operated at 12 to 52% of smolt capacity. We took advantage of this shortage by producing some yearlings in lieu of subyearlings, which was not in the initial design for the hatchery. Lyons Ferry's poundage production has been 62 to 114% of capacity, and reflects this yearling program (Figure 2).

Insufficient escapement is the result of: 1) downstream migrant mortality (primarily for subyearlings), 2) high seas and Columbia River harvest (Figure 3), and 3) adult and juvenile fish culling to remove stray Upriver Brights. Stray Upriver Bright fall chinook comprised 7.4% of the returns to Lyons Ferry FH in 1987, 16.0% in 1988, and 43.5% in 1989. To mitigate genetic dilution, we cull stray adults during spawning, and separately mark progeny of adults suspected to be strays. The progeny can then be identified by origin when returning as adults.

Lower Monumental and Ice Harbor Dams presently do not have submerged travelling screens (STS); fish guidance efficiency at these dams is 2- 4%. We annually request spill at these two dams to protect smolts released from Lyons Ferry FH. Congress recently appropriated monies to install STS at these dams in 1992; fish guidance efficiency is expected to increase to 63- 88% for yearling salmon and 40- 60% for subyearling salmon.

Manganese oxide particles are suspended in the water at Lyons Ferry FH. These particles become lodged in the gill lamellae of rearing salmon. Fall chinook salmon, particularly subyearlings, suffer gill hyperplasia as a result, and hence increase their susceptibility to bacterial gill disease. We have no means to control this recurring problem.

Natural production of Snake River fall chinook occurs in Hells Canyon, and the lower Grande Ronde, Imnaha, Clearwater, Tucannon, and Palouse Rivers. Redd density is quite low in all streams except the Tucannon. We know little about incubation and rearing of fall chinook in the Clearwater and mainstem Snake Rivers, but believe they are adversely affected by fluctuating flows from Dworshak and Hells Canyon Dams. High flows in November impact spawning success in these reaches.

In summary, five factors limit the LSCRCP fall chinook program in Washington:

- 1) Insufficient broodstock escapement.
- 2) Stray Upriver Brights entering the Snake River.
- 3) Poor outmigration conditions.
- 4) Particulate manganese in Lyons Ferry FH wellwater.
- 5) Hell Canyon Flows.

To improve performance of the LSCRCP fall chinook program, we recommend five strategies:

- 1) Improve fish passage in lower Snake and Columbia Rivers.
- 2) Build a yearling rearing pond at Lyons Ferry FH.
- 3) Rectify the stray Upriver Bright problem.
- 4) Isolate particulate manganese source at Lyons Ferry FH.
- 5) Modify Hells Canyon and lower Clearwater River flows.

#### Tucannon River Spring Chinook

Broodstock were collected for the spring chinook program in 1985 by taking adults off the spawning grounds. Survival of their progeny released as yearlings was 0.29%. We have incomplete returns data for subsequent releases, but they appear to be similar to the 1985 brood in performance. In 1990, 428 adults returned to the Tucannon River, 37% of the LSCRCP mandate.

Presently, we collect broodstock by trapping adults in the Tucannon River, and met smolt production objectives in 1986, 1987, and 1988. For these three broods, we exceeded the loading capacity of the acclimation pond (8,800 pounds; Figure 4), yet remained within acceptable standards for hatchery rearing densities. Given existing conditions at Lyons Ferry FH, we cannot produce smolts smaller than 10 fpp for release, because of constant incubation and rearing temperatures (design standard is 15 fpp). To retard fish growth, hatchery staff feed at, or near maintenance ration. We believe this dilemma limits this program's success. Fish have had chronic infestations of viral

erythrocytic inclusion body syndrome (EIBS) during acclimation, possibly a manifestation of the stressful acclimation conditions (high density and maintenance ration). We monitor outmigration of these releases; smolts leave the Tucannon River immediately after release. We have no information on outmigration success from the Snake and Columbia Rivers, but suspect it would be similar to yearling fall chinook success.

Natural production of spring chinook in the Tucannon River ranges from 36,600 to 58,200 smolts (n= 3); our preliminary estimate of smolt-to-adult survival is 0.60%. Production is limited by: 1) prespawning mortality, due to poaching, human harassment, and unknown diseases, and 2) quality and amount of spawning, incubation, and rearing habitat. The lower Tucannon River, and virtually all of the Touchet River and Asotin Creek are not suitable for spring chinook because of high water temperatures in summer, gravel embeddedness, and low pool: riffle ratios.

In summary, four factors limit the LSRCP spring chinook program success in Washington:

- 1) Poor acclimation conditions.
- 2) Poor outmigration conditions.
- 3) In-river prespawning mortality.
- 4) Natural spawning, incubation, and rearing conditions.

To improve the LSRCP spring chinook program in Washington, we recommend three interim and four long-term strategies:

Interim strategies

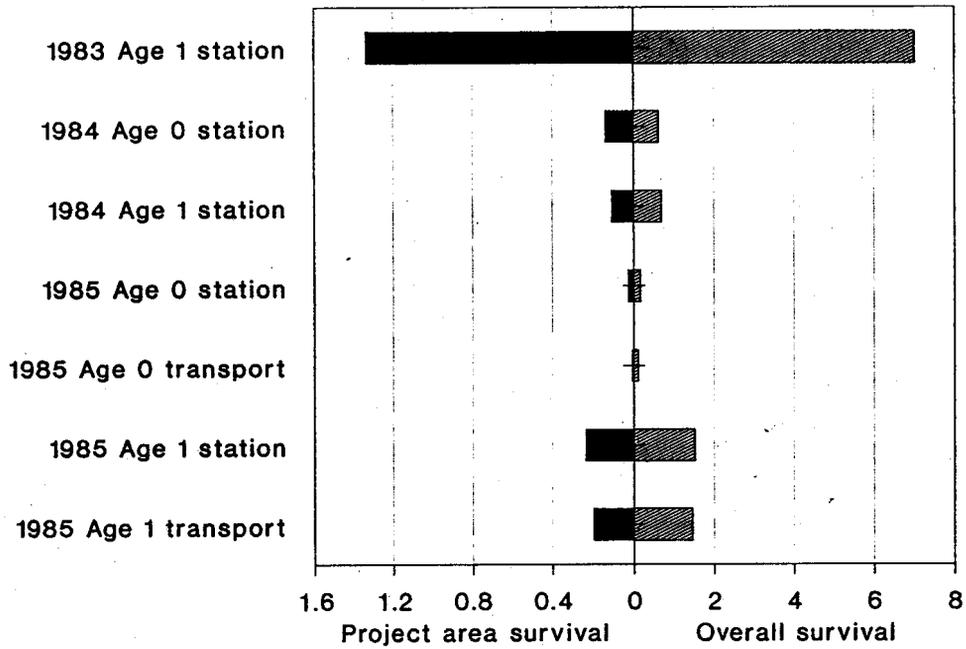
- 1) Refine fish cultural practices.
- 2) Reduce eggtake to meet density standards.
- 3) Increase acclimation water temperature.

Long-term strategies

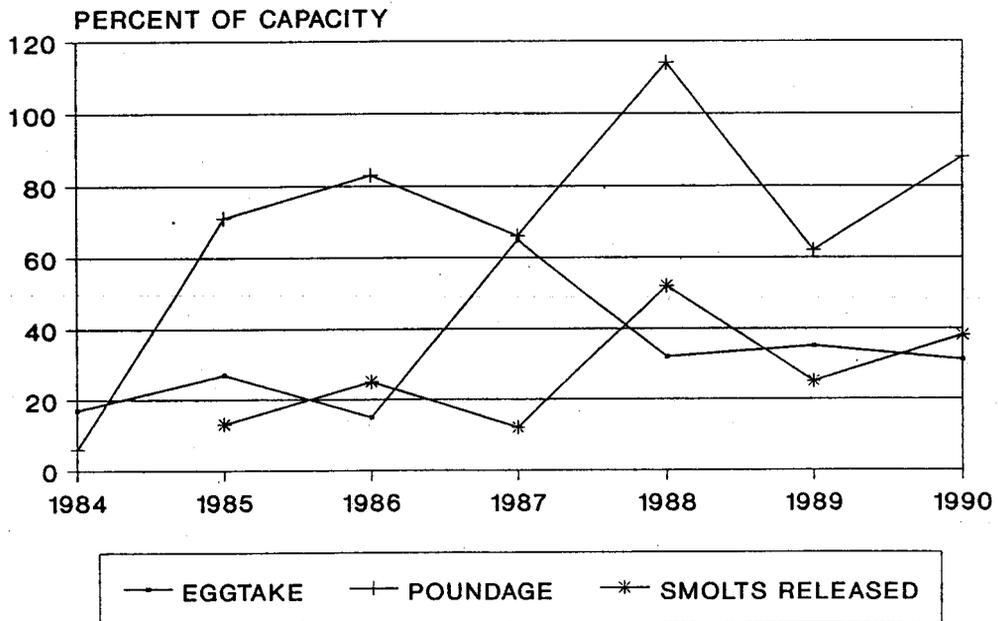
- 1) Chill water to retard incubation.
- 2) Use starting troughs in conjunction with chilled water to retard fry growth and increase survival.
- 3) Increase law enforcement on rivers to protect adults.
- 4) Provide incentives to protect streamside habitat.

# LYONS FERRY FALL CHINOOK SURVIVAL RATES

1985 brood data is preliminary



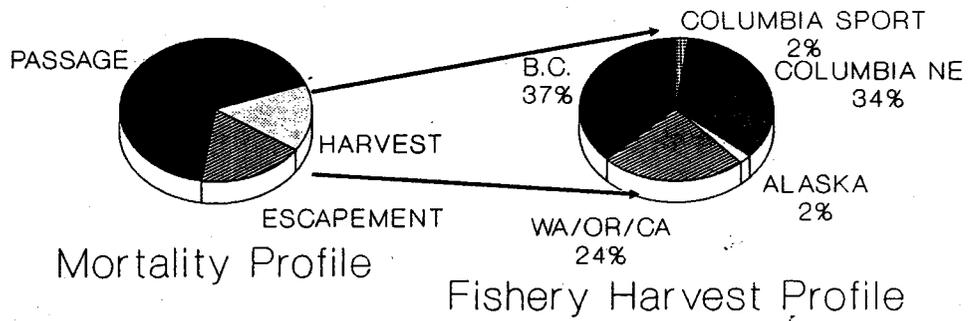
## FALL CHINOOK PRODUCTION AT LYONS FERRY



1990 EGGTAKE IS PROJECTED

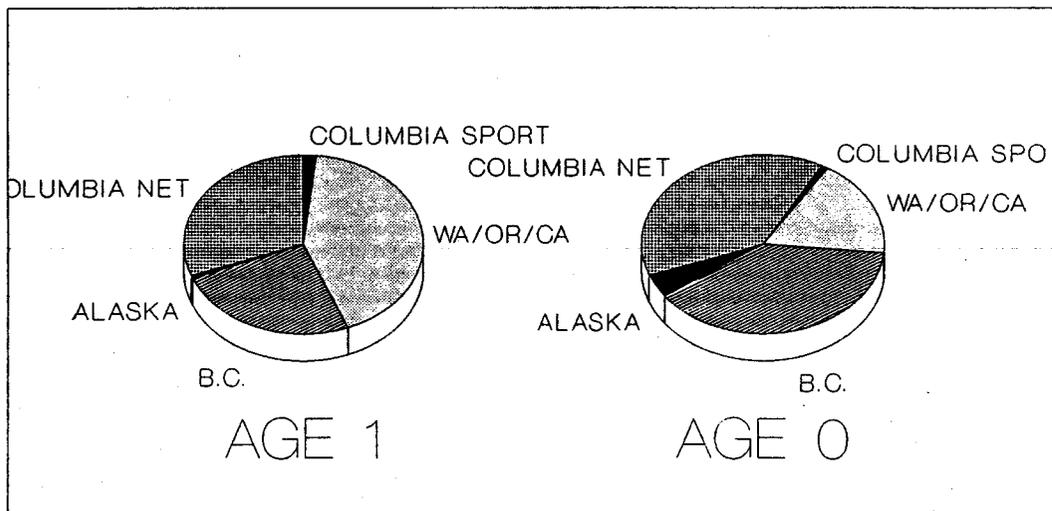
# SNAKE RIVER FALL CHINOOK

## Harvest, Passage, & Escapement Mortality



PRELIMINARY ONLY - SUBJECT TO REVIEW

## FALL CHINOOK HARVEST CONTRIBUTION AGE CLASS COMPARISON



# SPRING CHINOOK PRODUCTION AT TUCANNON

