

WA
639.2
F532sna
r1
1989
c.1

WASHINGTON STATE LIBRARY
LIBRARY USE ONLY STATE DEPOSITORY COPY

THE SNAKE RIVER FALL CHINOOK SALMON EGG BANK PROGRAM:
THE FINAL CHAPTER

Robert Bugert
Bill Hopley
Washington Department of Fisheries
115 General Administration Building
Olympia, WA 98504

RECEIVED

DEC 19 2001

WA STATE LIBRARY

Overview

The Snake River Fall Chinook Egg Bank Program was established in 1976 with two goals: (1) provide an interim adult holding and juvenile rearing program for Snake River stock fall chinook until the Lyons Ferry Fish Hatchery (FH) could be constructed, and (2) maintain the genetic integrity of this stock during this interim period. The Egg Bank Program continued through the initial years of Lyons Ferry FH operation to assist in its broodstock building process.

Background

Legislation under the Water Resources Development Act of 1976 provided hatchery compensation for downstream passage mortality and loss of spawning habitat caused by construction and operation of the four lower Snake River hydropower projects (Figure 1). The compensation measures included provision for a hatchery and adult holding facility to produce 101,800 pounds of fall chinook salmon intended to return 18,300 adults to the project area. The salmon stock generally accepted as appropriate for the project area was the bright fall chinook of Snake River origin.

It was recognized early in the hatchery site selection and planning stages following the enabling legislation that Snake River fall chinook stocks were in a critically depressed status and, in fact, were under consideration for classification as an endangered species (Utter and Ebel 1981; Figure 2). Fish and wildlife agency biologists generally agreed that the Snake River fall chinook could disappear in the years between enabling legislation and the actual construction of the Snake River hatchery. The Snake River Fall Chinook Egg Bank Program resulted from concern that the stock would continue to decline during the hatchery construction period; in fact, the hatchery site had not even been identified. The egg bank concept entailed rearing and release of Snake River fall chinook in a lower river hatchery where the outmigrant juveniles and returning adults would avoid mortality associated with passage at Columbia and Snake River dams.

WASHINGTON STATE LIBRARY
STATE DEPOSITORY COPY

WASHINGTON STATE LIBRARY



A60004 768507

LIBRARY USE ONLY

Figure 1. Snake River Basin, showing locations of hydroelectric dams and fish hatcheries involved in the Snake River Fall Chinook Egg Bank Program.

Figure 2. Estimated number of fall chinook salmon entering the Snake River during the period 1940 to 1982 (from Fulton 1968, USACE 1964).

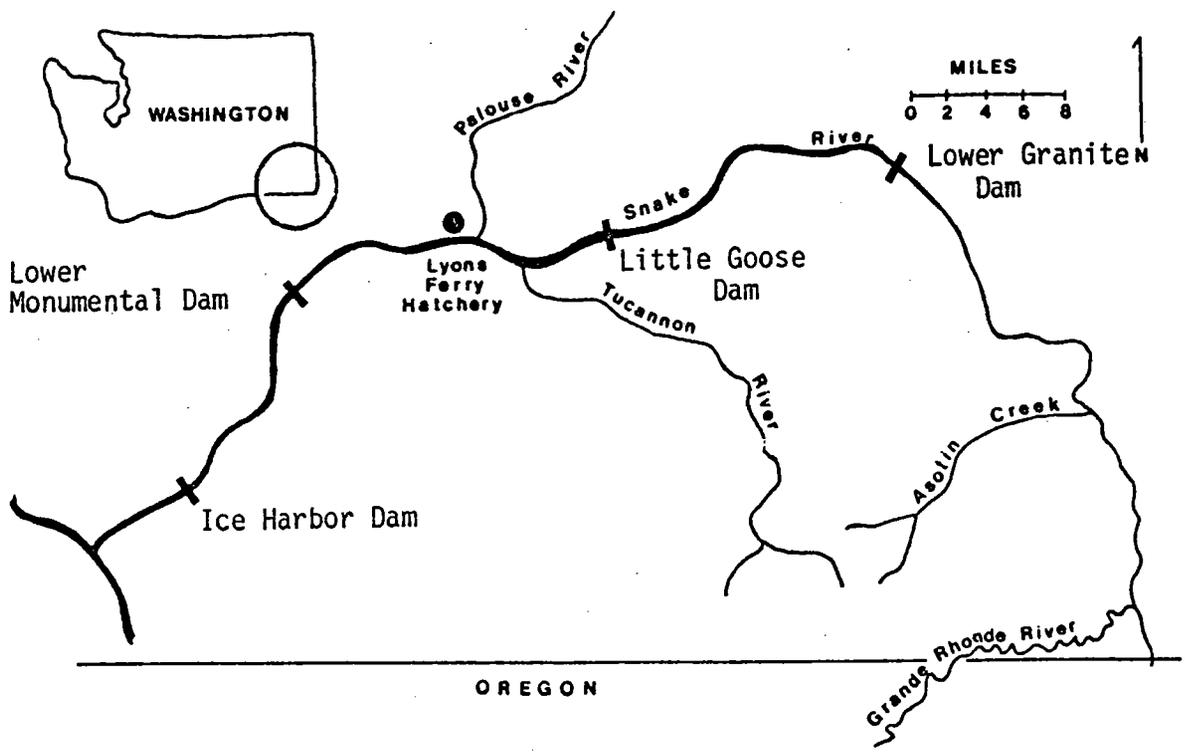


Figure 1. Snake River Basin, showing location of hydroelectric dams, and Lyons Ferry Fish Hatchery.

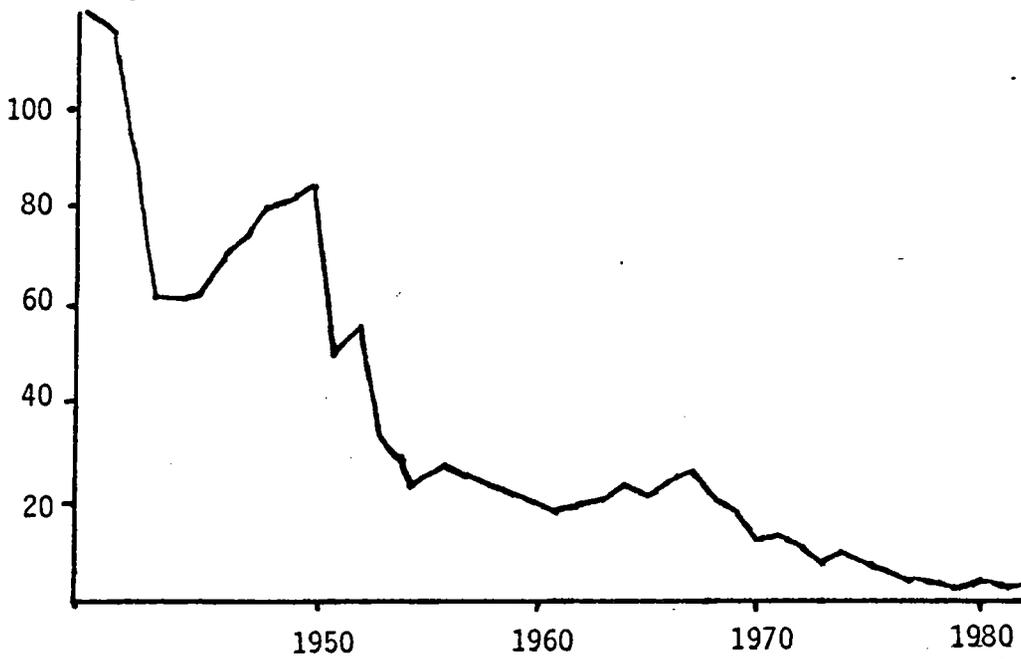


Figure 2. Estimated numbers of fall chinook salmon entering the Snake River during the period 1940 to 1980 (adapted from Fulton 1968, USACE 1964).

The first effort to establish an egg bank of Snake River fall chinook resulted from a National Marine Fisheries Service (NMFS) proposal presented to, and approved by the Columbia Basin Fish and Wildlife Council (Council). The project was funded by the Pacific Northwest Regional Commission for about \$66,700.

Adults were captured at Little Goose Dam by NMFS employees who incubated the eggs at Lower Granite Dam (Figure 1). Eventually, eggs were transferred to Bonneville FH (operated by Oregon Department of Fish and Wildlife; ODFW), and were hatched and reared there. After much deliberation, the fish were coded-wire tagged and sent to Kalama Falls FH (operated by Washington Department of Fisheries; WDF), and released. The results of this first egg bank effort were not rewarding but the concept had been established in practice.

By June 1977, the Council had discussed various problems with the trapping facility at Little Goose Dam and suggested Ice Harbor Dam as a potential trapping site. The Artificial Production Committee (APC), a standing committee of the Council, was assigned to develop an egg bank plan for 1977. The plan was provided by WDF and approved by the Council in July 1977. At that time the Idaho Cooperative Fish Research Unit (ICFRU) volunteered to conduct the trapping operation, based upon their previous experience trapping adults at hydropower projects. The NMFS was selected to do the adult transport and provide funding for hatchery rearing. The adult holding facility was first to be Klickitat FH (operated by WDF), but was later changed to Tucannon FH (Washington Department of Wildlife; WDW), because of logistical considerations. Klickitat FH was retained as the juvenile rearing facility, however, because of its adequate rearing area and water supply. Kalama Falls FH was again chosen as the release site. All Snake River stock fall chinook were marked (ventral-fin clip) to allow discernment from the Kalama River stock as adults. This strategy continued in 1978 and 1979 (Table 1). From 1979 to 1986, marked Snake River stock fall chinook returned to Kalama Falls FH, and were used in addition to the fish trapped at Ice Harbor for the Egg Bank Program. Return rates for these release groups, based upon the count of marked fish spawned at Kalama Falls FH, ranged from 0.07 to 0.16 percent.

In a 1978 Columbia Basin Fisheries Technical Committee (Tech. Comm.) meeting, the U.S. Fish and Wildlife Service (USFWS) proposed that Hagerman National Fish Hatchery be included in the Snake River Fall Chinook Egg Bank Program. Plans were to rear 100,000 subyearling smolts for release in the middle Snake River (upstream of Lower Granite Dam). The rationale for this decision was to maintain a second source of this stock in case a major disease outbreak, or some other factors, would decimate the primary source. The Hagerman FH plan was approved by the Tech. Comm. and by the APC; transfer of eyed eggs from Tucannon FH began in 1978. At about this time, the Council stipulated that the Egg Bank Program would trap 400 fish or 50% of the run, whichever was lowest. The APC recommended that the egg take

would be split evenly between the WDF (Kalama Falls FH) and the USFWS (Hagerman FH) programs. In 1980, Dworshak FH began receiving adults for the USFWS Hagerman FH program (Table 1).

Table 1. Adult holding, juvenile rearing, and smolt release locations for fall chinook salmon under the Snake River Egg Bank Program for the 1977 - 1985 brood years.

Brood year	Adult holding	Juvenile rearing	Smolt releases
1976	Little Goose Dam	Bonneville FH	Kalama River
1977	Tucannon FH	Klickitat FH	Kalama River
1978	Tucannon FH	Klickitat FH	Kalama River
		Hagerman FH	Middle Snake River
1979	Tucannon FH	Klickitat FH	Kalama River
		Hagerman FH	Middle Snake River
1980	Tucannon FH	Klickitat FH	Kalama River
	Dworshak FH	Hagerman FH	Middle Snake River
1981	Tucannon FH	Klickitat FH	Kalama River
	Dworshak FH	Hagerman FH	Middle Snake River
1982	Tucannon FH	Klickitat FH	Kalama River
	Dworshak FH	Hagerman FH	Middle Snake River
1983	Tucannon FH	Klickitat FH	Lower Snake River
	Dworshak FH	Hagerman FH	Middle Snake River
1984	Lyons Ferry FH	Lyons Ferry FH	Lower Snake River
		Hagerman FH	Middle Snake River
1985	Lyons Ferry FH	Lyons Ferry FH	Lower Snake River

Beginning with the 1980 brood year, two factors occurred which improved the future of the Snake River Egg Bank Program: (1) funding for the trapping operation was provided by the USFWS under the Lower Snake River Compensation Plan (LSRCP), and (2) construction of the Snake River fall chinook hatchery at Lyons Ferry was underway. The WDF Lyons Ferry FH was completed in time to handle the 1984 brood year adults, eliminating the necessity to handle adults at either Tucannon or Dworshak hatcheries. The ICFRU continued the trapping operation at Ice Harbor Dam, but was now supplying the adults directly to Lyons Ferry FH (Ringe and Bugert 1989; Table 1).

Lyons Ferry FH, located on the lower Snake River (Figure 1), then began the process of broodstock building. In 1984, during its first year of operations, Lyons Ferry FH began receiving all eyed eggs from the Snake River stock fall chinook spawned at Kalama Falls FH. This transfer would continue through 1986, the last year significant numbers of Snake River stock fall chinook returned to Kalama Falls FH. The 1982 brood was the last year the Snake River stock fall chinook were released from Kalama Falls FH (Table 2). Eggs supplied from Kalama Falls FH contributed 25%, 62%, and 56% to the Lyons Ferry FH eggtake in

1984, 1985, and 1986, respectively. Beginning in 1986, voluntary returns of the 1983 brood fall chinook released from Lyons Ferry FH added to the broodstock building process.

Table 2. Contribution of Snake River fall chinook adults and jacks to Lyons Ferry FH from 1984 through 1988.

Year	Collection point	Number collected	
		Adults	jacks
1984	Lyons Ferry FH	0	0
	Ice Harbor Dam	663	97
	Kalama Falls FH	220	10
1985	Lyons Ferry FH	0	4,070
	Ice Harbor Dam	589	90
	Kalama Falls FH	952	0
1986	Lyons Ferry FH	245	1,125
	Ice Harbor Dam	212	23
	Kalama Falls FH	576	0
1987	Lyons Ferry FH	1,654	543
	Ice Harbor Dam	1,613	47
1988	Lyons Ferry FH	327	1,053
	Ice Harbor Dam	1,076	6

Most of the 1979 through 1984 broods of Snake River stock fall chinook reared at Hagerman FH were planted at various locations in the middle Snake River between Hells Canyon Dam and Lower Granite Dam. Several groups were also transported for release below Bonneville Dam. A portion of each brood year, except the 1982 brood, was coded-wire tagged (Table 3). Adult survival and contribution rates ranged from 0.01 to 0.47 percent; return rates to the Snake River ranged from 0.01 to 0.24 percent.

Current Status

Trapping of fall chinook at Ice Harbor Dam continues, but is now conducted by WDF to supplement voluntary returns to the Lyons Ferry FH rack. All releases of Snake River stock fall chinook since 1985 have been from Lyons Ferry FH (Bugert et al. 1989).

Under contract of the USFWS, WDF geneticists collected and compared electrophoretic samples from the 1986 Snake River stock fall chinook that returned to Kalama Falls FH and those that returned to the Snake River. They found no evidence of genetic difference between these two groups, based upon examination of allele frequencies of 30 variable loci (Seidel et al. 1988).

We feel the Snake River Fall Chinook Egg Bank Program was successful because of two factors: (1) smolts released from Kalama Falls FH and into the middle Snake River from Hagerman FH contributed substantially to the broodstock building process during the first three years Lyons Ferry FH became operational, and (2) genetic integrity of a stock once considered for inclusion on the federal endangered species list was maintained as a result of cooperative ventures between several agencies, and careful broodstock management by several hatcheries.

Acknowledgments

Funding for the Lyons Ferry Hatchery operations and evaluations, and the adult trapping at Ice Harbor Dam is provided by the U.S. Fish and Wildlife Service, Boise Idaho, under the Lower Snake River Fish and Wildlife Compensation Plan.

References

- Bugert, R., P. Seidel, P. LaRiviere, D. Marbach, S. Martin, and L. Ross. 1989. Lower Snake River Compensation Plan, Lyons Ferry Hatchery Evaluation Program, 1988 Report to U. S. Fish and Wildlife Service. Cooperative Agreement 14-16-0001-88519. Washington Department of Fisheries, Olympia.
- Fulton, L.A. 1968. Spawning areas and abundance of chinook salmon (Oncorhynchus tshawytscha) in the Columbia River Basin--past and present. Special Scientific Report-Fisheries. Number 571, U.S. Fish and Wildlife Service, Washington, D.C.
- Ringe, R, and R. Bugert. 1989. Fall chinook trapping at Ice Harbor Dam in 1989. Completion Report to U. S. Fish and Wildlife Service. Cooperative Agreement 14-16-0001-87512. Washington Department of Fisheries, Olympia.
- Seidel, P., R. Bugert, P. LaRiviere, D. Marbach, S. Martin, and L. Ross. 1988. Lower Snake River Compensation Plan, Lyons Ferry Hatchery Evaluation Program, 1987 Report to U. S. Fish and Wildlife Service. Cooperative Agreement 14-16-0001-87512. Washington Department of Fisheries, Olympia.
- U.S. Army, Corps of Engineers. 1964. Annual fish passage report, North Pacific Division, Bonneville, The Dalles, McNary, and Ice Harbor Dams, Portland District, Oregon.
- Utter, F.M, and W.J. Ebel. 1981. Population structures of fall chinook salmon, Oncorhynchus tshawytscha, of the mid-Columbia and Snake Rivers. Unpublished Report, National Marine Fisheries Service, Northwest and Alaska Fisheries Center, Seattle, Washington.

Table 3. Location, size, and number of Snake River stock fall chinook salmon released by Hagerman National Fish Hatchery under the Snake River Fall Chinook Egg Bank Program. Data are presented by coded-wire tag mark and recovery rates.

Brood year	Tag code	Number tagged	Release location	Size at release (fpp)	Number of recoveries	Percentage recovered	Total release	Expanded recoveries
1978	05-04-20	52,577	Below Bonneville Dam	84	56	0.107	93,000	99
	05-04-21	45,361	Near Asotin Creek	92	6	0.013	45,361	6
1979	05-05-27	58,100	Near Asotin Creek	57	174	0.299	165,500	496
	05-05-28	56,000	Below Bonneville Dam	59	24	0.043	56,000	24
1980	10-22-10	55,400	Above Lower Granite Dam	34	174	0.314	120,157	377
	10-22-11	55,700	Below Bonneville Dam	51	156	0.280	61,134	171
1981	05-10-22	78,300	Near Asotin Creek	37	350	0.447	394,395	1,763
	05-10-23	80,421	Above Lower Granite Dam	37	375	0.466	80,721	376
1982	None	- -	Near Grande Ronde River	44	- -	- -	78,900	
1983	05-13-54	59,300	Near Grande Ronde River	53	113	0.191	427,191	814
1984	05-13-53	54,925	Near Asotin Creek and Grande Ronde River	44	96/a	0.175	128,229	224

a

Age 5 recoveries are not included.