

**Population Characteristics of Pacific Salmonines
Collected at the Salmon River Hatchery 2005**

D.L. Bishop and S.E. Prindle
*New York State Department of Environmental Conservation
Cortland NY 13045*

Spawning populations of Lake Ontario Chinook and coho salmon (fall) and steelhead rainbow trout (spring) have been monitored annually since the mid-1980s at the Salmon River Hatchery. This report documents the biological characteristics of these populations.

Methods

Hatchery Sampling

Staff at the Salmon River Hatchery processed 2,546 steelhead during the spring 2005 spawning operations (Everard 2006a). Marked (LV or LVAD) Washington strain (Chamber's Creek) fish originally stocked in the Salmon River system comprised 62% of the run. The remainder of the run were Skamania strain fish marked LPAD (6%), and unmarked fish (32%). The unmarked fish were assumed to be Washington steelhead that were stocked at other sites but had imprinted on the hatchery since they had fin erosion and no other unmarked rainbow trout were stocked or raised at Salmon River.

A total of 2.11 million Washington steelhead eggs were taken from 557 females. The Skamania egg total was 145,800 from 37 females. Biological data were collected from 443 Washington strain steelhead.

Fall returns to the hatchery included 8,132 Chinook salmon and 2,541 coho salmon. The egg totals were 3.2 million Chinook from 644 females and 1.6 million coho from 522 females (Everard 2006b). Biological data were collected from 754 Chinook and 210 coho.

All statistical analyses were done with PC-SAS rel. 8.0 (SAS Institute 1999). ANOVAs of all weight at age comparisons over a series of years were done with the SAS PROC GLM-LSD (least squared distance) multiple comparison procedure

(pair-wise t-tests with the comparisonwise error rate set at $\alpha = 0.05$).

Results and Discussion

Chinook Salmon

Growth

Age-1 Chinook males (jacks) sampled in 2005 were the second lightest on record but not significantly heavier than the record low observed in 2003 (Figure 1). Weights of age-2 males and age-3 males and females fell to record low levels in 2005, but not significantly lighter than the previous record (Figure 2). Age-2 females were the third lightest on record but significantly heavier than those sampled in 2004. Mean lengths and weights at age for all species sampled in 2004 are provided in Table 1.

Wet weight condition of large Chinook was measured by predicting the weight of a 36" fish from linear regressions on natural log transformed lengths and weights. Condition of fish sampled in the hatchery dropped precipitously in 2005 to 14.9 lbs (Figure 3), over a pound lighter than the previous record low of 16.1 lbs in 2004. A similar analysis of fish caught in the lake during July and August, however, did not show the decline in condition (Eckert 2006). Reasons for this are unclear.

Age Structure

The estimated age structure of the 2005 Chinook salmon run to the Salmon River Hatchery was 2% age-1 males, 22% age-2, 75% age-3, and 1% age-4 (Figure 4). The 2004 year class (YC) returned 159 jacks to the hatchery in 2005. This was the third lowest return on record (Figure 5). Harvest per unit of effort of age-1 Chinook from the New York Lake Ontario

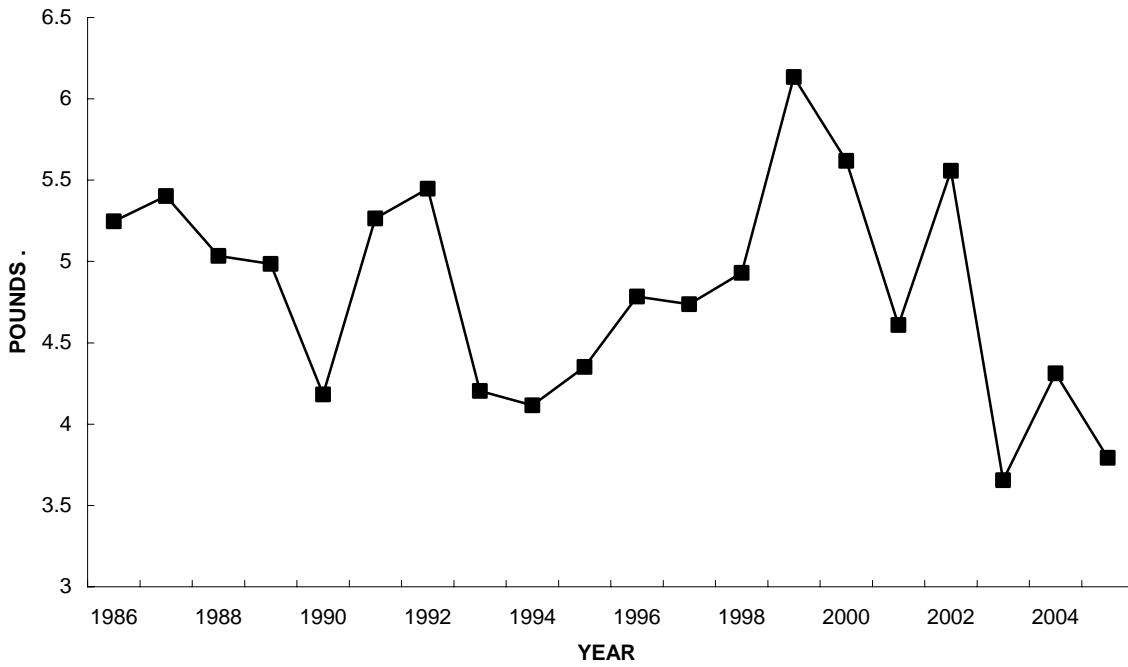


Figure 1. Mean weights of Chinook jacks at Salmon River Hatchery, 1986-2005.

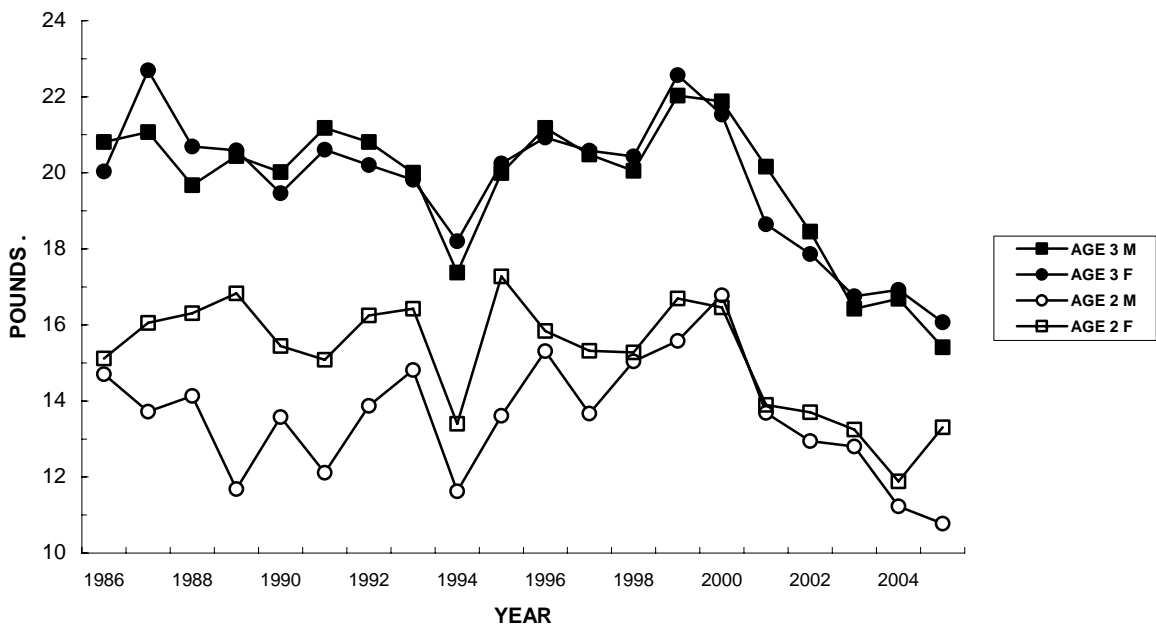


Figure 2. Mean weights of Chinook salmon ages 2-3 at Salmon River Hatchery 1986-2005.

Table 1. Mean lengths and weights of Chinook salmon, coho salmon and Washington steelhead at Salmon River Hatchery 2005. (STD= standard deviation).

AGE	SEX	N	MEAN LENGTH (in)	STD	MEAN WEIGHT (lbs)	STD
CHINOOK SALMON						
1	M	49	22.4	1.9	3.8	1.0
2	M	170	31.6	4.0	10.8	3.5
2	F	15	33.3	2.1	13.3	2.4
3	M	238	36.3	2.8	15.4	3.3
3	F	272	35.9	1.8	16.1	2.6
COHO SALMON						
1	M	66	15.0	1.9	1.2	0.5
2	M	57	28.0	4.2	7.7	3.3
2	F	87	28.6	1.6	8.5	1.8
WASHINGTON STEELHEAD						
3	M	125	25.4	1.7	5.6	1.1
3	F	50	24.4	1.3	5.3	0.9
4	M	55	29.6	2.4	8.9	2.2
4	F	160	29.4	1.7	9.4	1.7
5	M	9	31.7	2.9	10.5	2.3
5	F	29	31.1	1.5	11.0	1.5

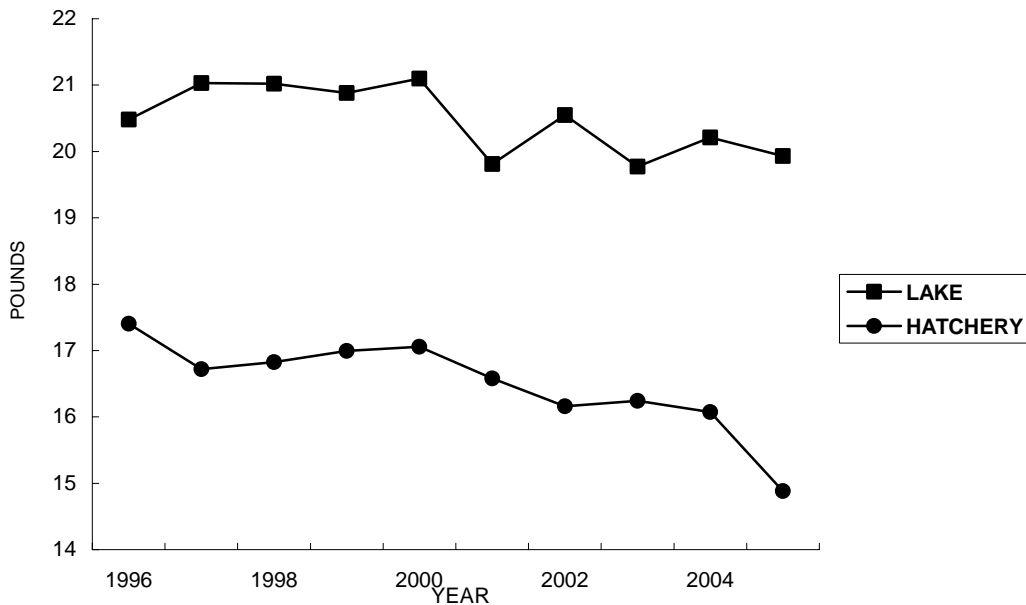


Figure 3. Estimated weights of 36 inch Chinook salmon from the New York Lake Ontario Fishing Boat Census (July and August) and the Salmon River Hatchery fall (October) collections 1996-2005.

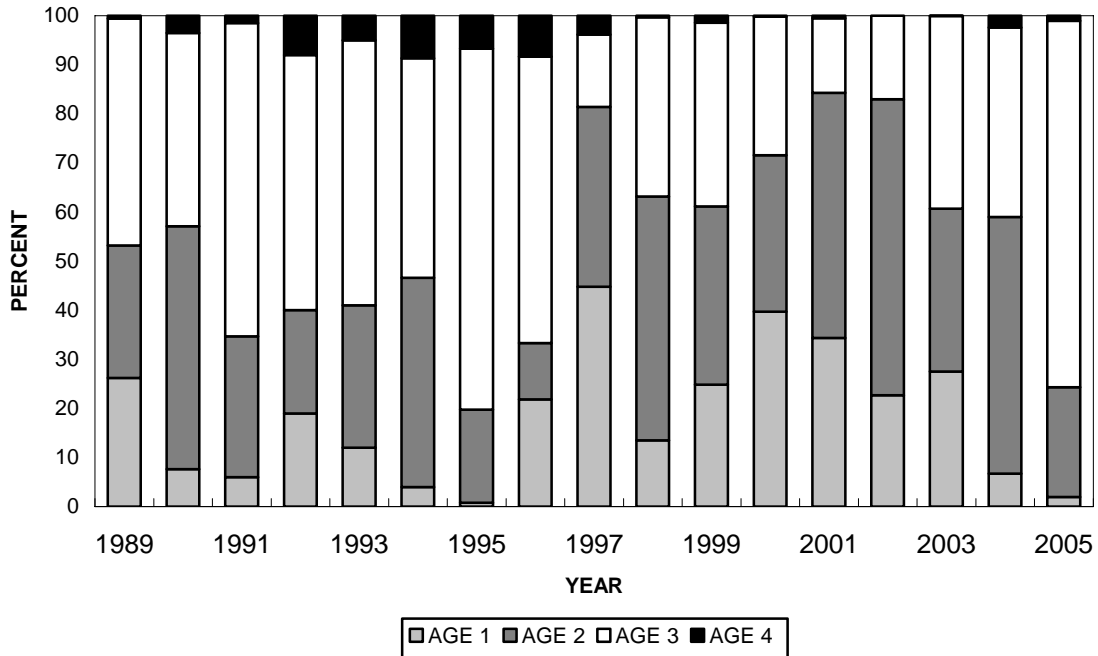


Figure 4. Estimated age structures of Chinook salmon runs at Salmon River Hatchery, 1989-2005.

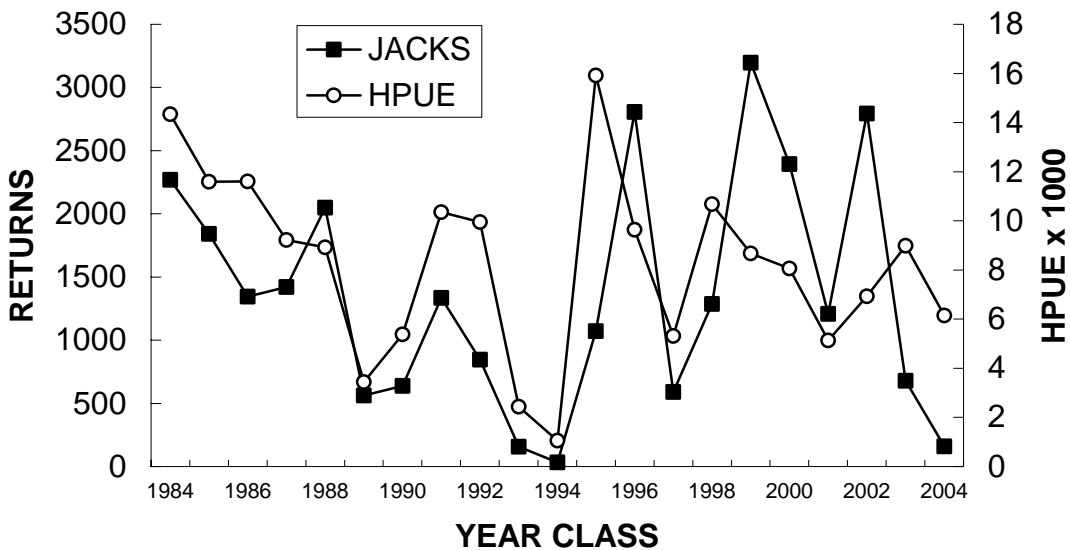


Figure 5. Chinook jack returns to Salmon River Hatchery and harvest per unit of effort (HPUE) of age-1 Chinook for the New York Lake Ontario Fishing Boat Census, yearclasses 1984-2004. HPUEs are estimated numbers of fish harvested per 150,000 boat trips.

Fishing Boat Census, however, was estimated at 6,150 fish per 150,000 boat trips, which was much closer to average (Eckert 2006). Based on these indicators, the 2004 YC of Chinook salmon is probably weak to moderate in strength.

Coho Salmon

Growth

Weights of age-2 coho salmon were intermediate among years sampled. (Figure 6).

Washington Steelhead

Growth

Steelhead are sampled in the spring and, unlike Chinook and coho salmon, do not reflect growth from the 2005 growing season. Sizes reported here reflect conditions prior to and including 2004. Weights of age-3 and 4 steelhead were near average in 2005 (Figure 7).

Age Structure

Similar to age structures observed in recent years, age-3 and age 4 steelhead dominated the run again

in 2005 (Figure 8). The age structure of the fish sampled was 39.5% age-3, 48.5% age-4, 8.5% age-5, and 3.5% age-6.

References

Eckert, T.H. 2006. 2005 Lake Ontario Fishing Boat Census. Section 2 in 2005 Annual Report, Bureau of Fisheries Lake Ontario Unit and St. Lawrence River Unit to the Great Lakes Fishery Commission's Lake Ontario Committee.

Everard, J. F. 2006a. Spring 2005, Steelhead egg collection: spawning through eyeup, Salmon River Hatchery. Altmar, NY.

Everard, J. F. 2006b. Fall 2005, Pacific salmon egg collection: spawning through eyeup, Salmon River Hatchery. Altmar, NY.

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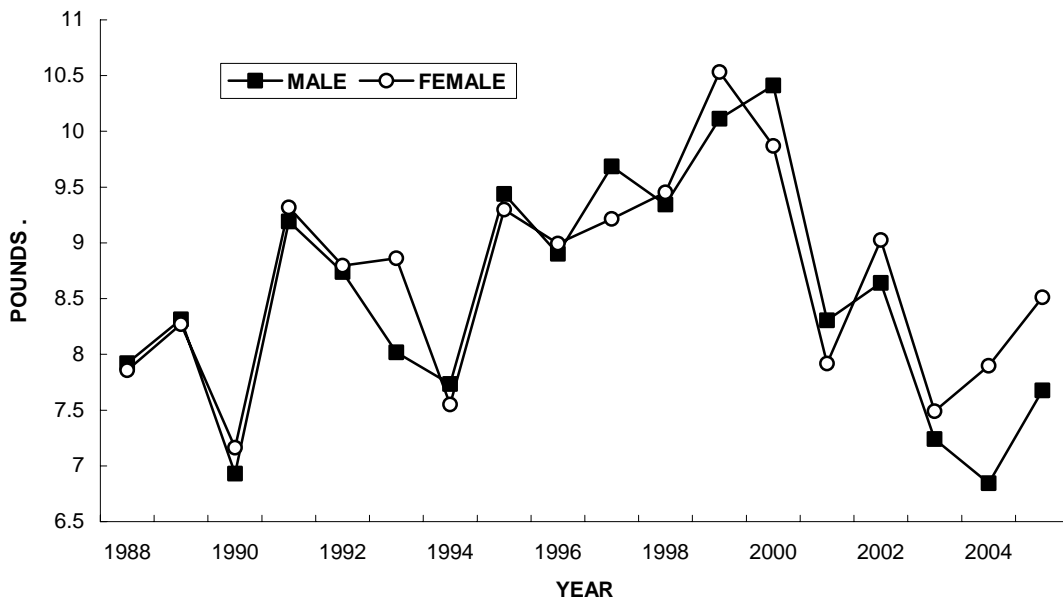


Figure 6. Mean weights of age-2 coho salmon at Salmon River Hatchery 1988-2005.

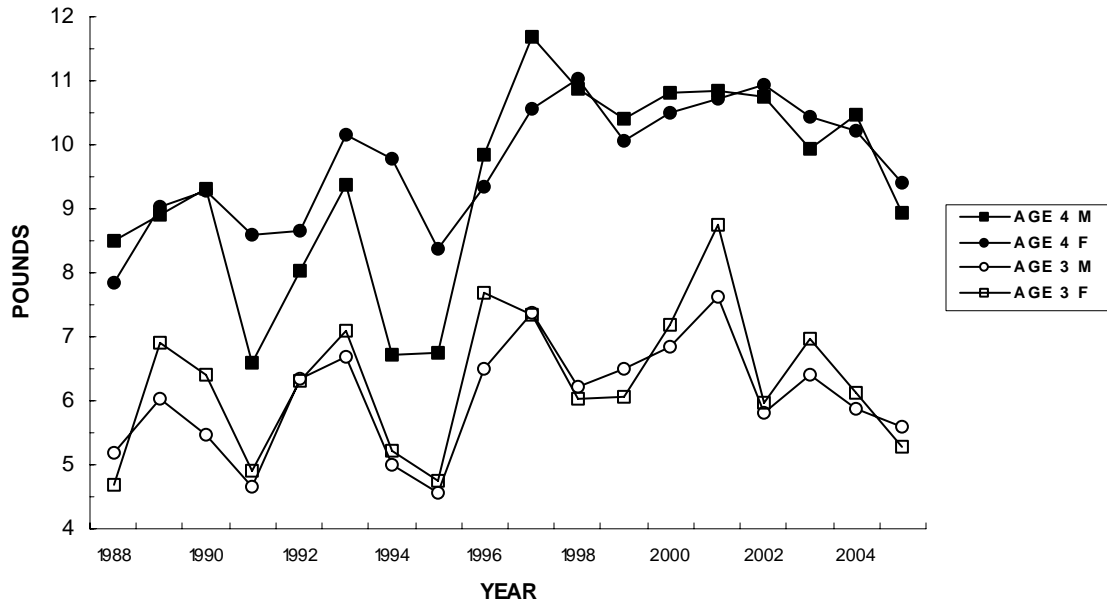


Figure 7. Mean weights of Washington steelhead ages 3-4 at Salmon River Hatchery 1988-2005.

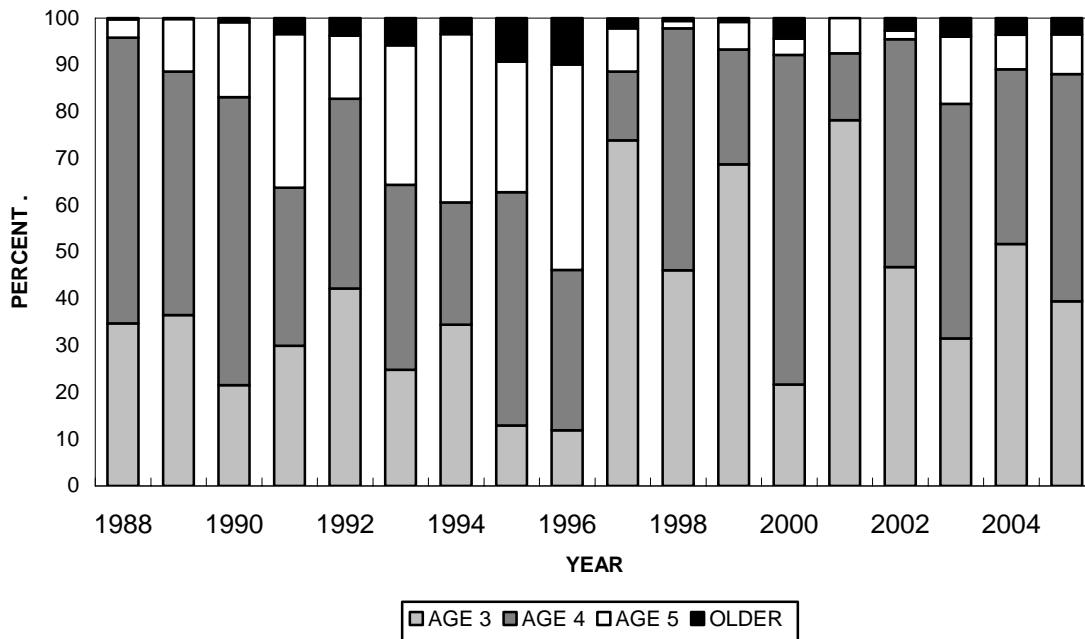


Figure 8. Age structures of Washington steelhead samples at Salmon River Hatchery 1988-2005.