

## **2006 Salmon River Wild Young-of-Year Chinook Salmon Seining Program**

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Seasonal base flows mandated by the Federal Energy Regulatory Commission hydroelectric licensing agreement (FERC 1996) have resulted in a dramatic increase in natural reproduction of Chinook salmon in the Salmon River since 1997. A cooperative index seining program was initiated in the spring of 1999 by the U.S. Geological Survey (USGS) and the New York State Department of Environmental Conservation (NYSDEC). The purpose of the surveys is to assess spatial and temporal aspects of relative abundance, size structure, and distribution of wild young-of-year (YOY) Chinook salmon in the river. The initial work in 1999 served as a pilot study to establish sampling techniques and sites. The 2000 survey was hampered by high flows which prevented sampling during peak emergence. The surveys conducted from 2001 through 2006 were relatively seamless and provide consistent data for useful comparisons.

### **Methods**

Seine hauls were conducted weekly at four sites (Altmar, Pineville, CO. RT. 2A, and Douglaston, Figure 1) from 4 May through 22 June. The bag seine was 20 feet wide by 6 feet deep with 1/8 inch bar mesh. Hauls were made by stretching the seine perpendicular to the current and sweeping downstream toward one bank to a suitable landing area. A sample consisted of one seine haul per site. Obstacles on the river bottom and differences in the lengths of the hauls prevented the use of catches per unit of effort as precise density estimates but the range

of numbers captured between sites and dates do provide a relative estimate of abundance.

All species captured were counted and a sample of Chinook was measured (total length) for each haul. Mean lengths of Chinook captured for each date and site were compared using a pairwise t-test multiple comparison procedure (SAS Proc GLM, SAS Institute 1999). The relative strength of year classes, measured by the mean catch per haul for the three consecutive weeks with the highest catches for each year, are compared with mean flows during the previous October using a logarithmic regression (Microsoft Excel 2000). Salmon River flow records are available from the Brookfield Power Company on the internet at: <http://www.h2online.com/365123.asp>

### **Results**

The 2006 year class appears to be the most abundant year class that we have monitored to date with a combined mean catch of 334 YOY Chinook per haul on 17, 23 and 31 May. Mean numbers of YOY Chinook captured per haul for each week sampled are presented in Figure 2. The peak catches at a single site were 651 Chinook at Pineville which occurred on both 17 and 23 May.

Sizes of YOY Chinook sampled in 2006 were similar to those sampled in previous years. Fish were approximately 1.7 inches long in early May and exceeded 2 inches by the later half of June. Results of the ANOVA comparing mean lengths by site and date are presented in Table 1.

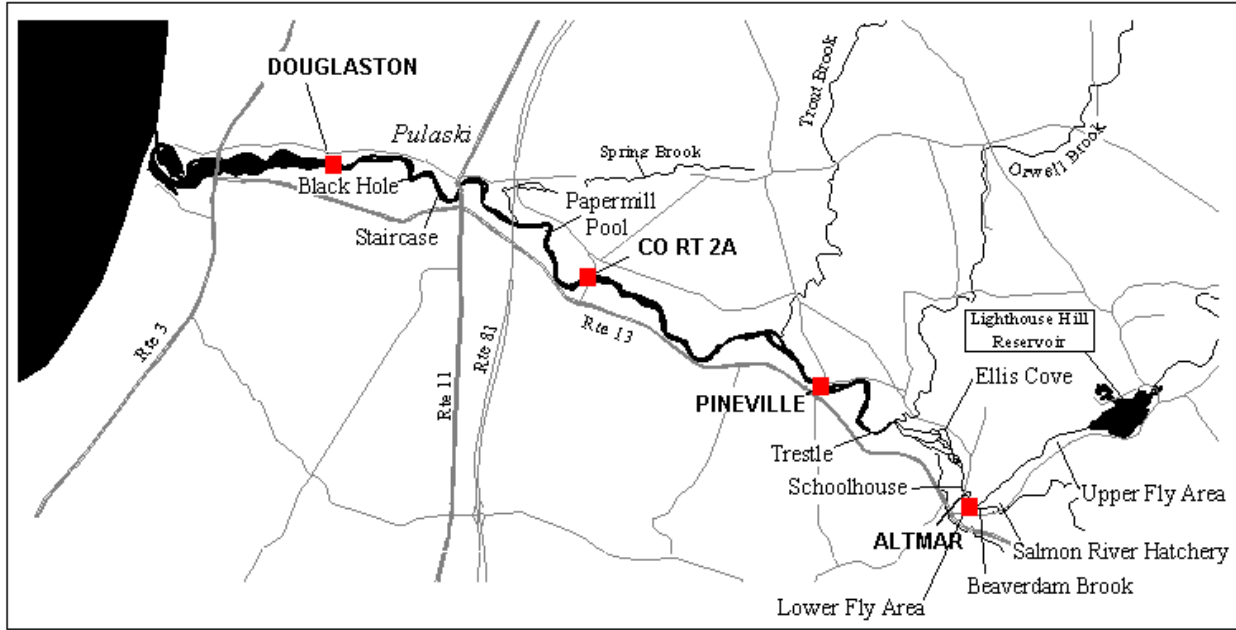


Figure 1. Sampling sites for the USGS/DEC Salmon River seining program.

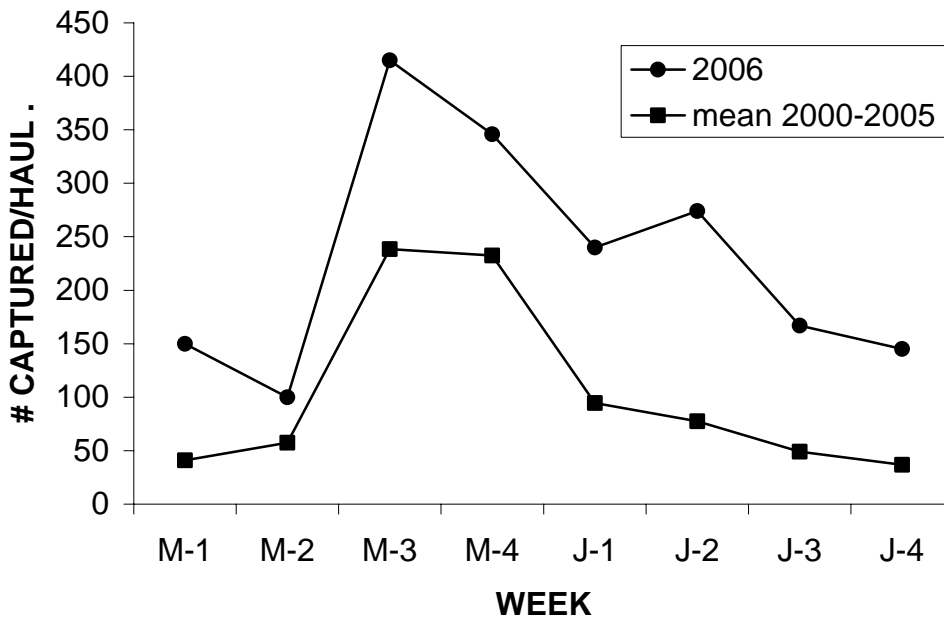


Figure 2. Mean numbers of young-of-year Chinook salmon captured per seine haul by week in the USGS/DEC Salmon River seining program for 2000-2005 and 2006 (M=May, J=June).

Table 1. Multiple range comparisons (pairwise t-tests,  $\alpha = 0.05$ ) of mean lengths of wild young-of-year Chinook salmon by site and date from the 2006 USGS/DEC Salmon River seining program.

SITE	DATE	NUMBER MEASURED	MEAN LENGTH (inches)	STANDARD DEVIATION	T-GROUPING - 1							
DOUGLASTON	22 JUNE	30	2.3	0.3					A			
ALTMAR	22 JUNE	30	2.2	0.3					A			
DOUGLASTON	14 JUNE	30	2.2	0.4	B			A	C			
ALTMAR	8 JUNE	30	2.1	0.3	B			D	C			
ALTMAR	31 MAY	30	2.1	0.3	B	E		D	C			
DOUGLASTON	23 MAY	30	2.1	0.3	F	E		D	C			
DOUGLASTON	8 JUNE	30	2.0	0.2	F	E		D	G			
CO RT 2A	22 JUNE	30	2.0	0.3	H	F	E	D	G			
PINEVILLE	22 JUNE	30	2.0	0.2	H	F	E		G			
ALTMAR	14 JUNE	30	1.9	0.4	H	F		I	G			
CO RT 2A	14 JUNE	30	1.9	0.2	H			I	G			
CO RT 2A	8 JUNE	30	1.9	0.2	H	J		I				
DOUGLASTON	31 MAY	30	1.9	0.3		J		I	K			
ALTMAR	23 MAY	30	1.8	0.4		J	L	I	K			
PINEVILLE	8 JUNE	30	1.8	0.2	M	J	L	I	K			
PINEVILLE	31 MAY	30	1.8	0.2	M	J	L	N	K			
DOUGLASTON	4 MAY	13	1.8	0.2	M	J	L	N	K	O		
DOUGLASTON	17 MAY	30	1.8	0.2	M	J	L	N	K	O		
PINEVILLE	14 JUNE	30	1.8	0.2	M	P	L	N	K	O		
CO RT 2A	23 MAY	30	1.8	0.3	M	P	L	N	Q	K	O	
CO RT 2A	31 MAY	30	1.8	0.2	M	P	L	N	Q	K	O	
DOUGLASTON	10 MAY	18	1.7	0.2	M	P	L	R	N	Q	K	O
ALTMAR	17 MAY	30	1.7	0.2	M	P	L	R	N	Q		O
PINEVILLE	23 MAY	30	1.7	0.2	M	P	L	R	N	Q		O
PINEVILLE	4 MAY	30	1.7	0.2	M	P		R	N	Q		O
ALTMAR	4 MAY	30	1.7	0.1		P		R	N	Q		O
CO RT 2A	4 MAY	30	1.7	0.2		P		R		Q		O
PINEVILLE	10 MAY	30	1.7	0.2		P		R		Q		O
CO RT 2A	10 MAY	30	1.7	0.2		P		R		Q		O
ALTMAR	10 MAY	30	1.7	0.1		P		R		Q		
CO RT 2A	17 MAY	30	1.7	0.2				R		Q		
PINEVILLE	17 MAY	30	1.6	0.1				R				

1-Means with the same letter are not significantly different.

We have been doing the surveys long enough now to have adequate variability in year class strength and flows from the prior Octobers (spawning seasons) to study that relationship. We found that we could explain 69% of the variability in year class strength with flows from the preceding October (Figure 3). The larger year classes were produced generally when October flows were higher. This is probably a result of more successful spawning occurring in years with higher flows. The higher flows create more difficult fishing conditions and provide more protection to the spawning fish.

The numbers of spawning fish or redd counts in the river are other variables that could be

considered for similar analyses. Despite lacking these data, October flows appear to be the dominant factor in resulting year class strength at the densities of spawning fish experienced by the Salmon River from 2000-2006.

**References**

Federal Energy Regulatory Commission (FERC). 1996. Order issuing original license (Major Project). Washington, D.C.: Federal Energy Regulatory Commission. FERC Project No. 11408, New York.

SAS Institute Inc., 1999. Release 8.0 TS level 00M0. Cary, NC, USA.

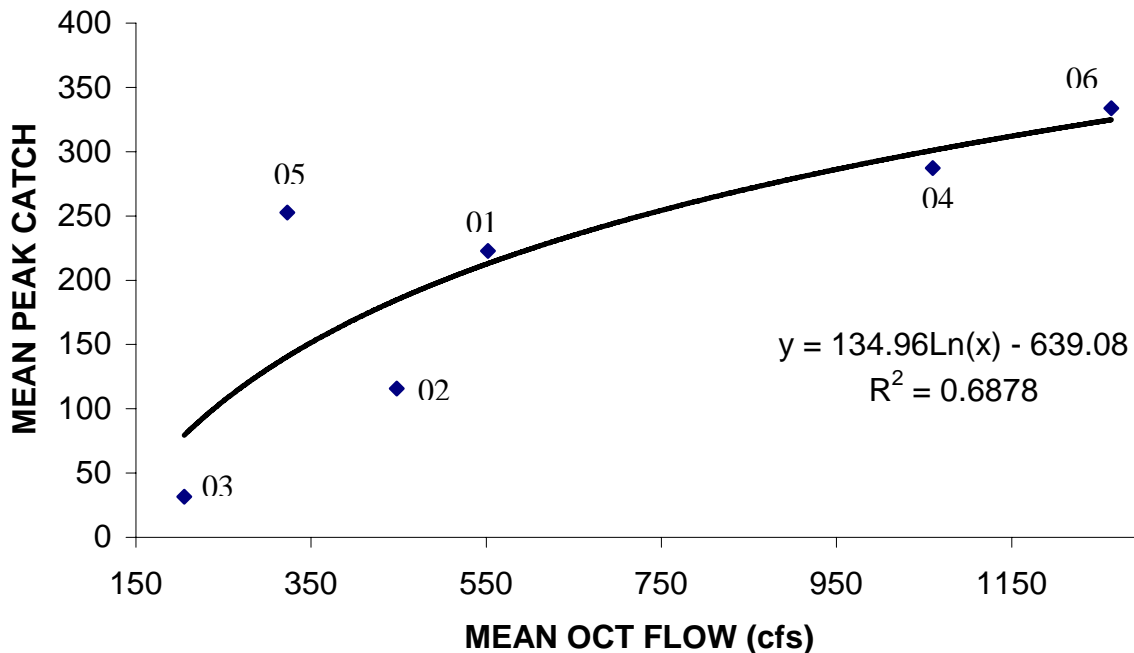


Figure 3. Relative year class strength (2001-2006) and mean flows from the prior October from the USGS/DEC Salmon River seining program.