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THE SALMON MIGRATION IN THE SHASTA RIVER (1930-1934)¹

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This report is a preliminary account of the general salmon investigation being conducted on the Shasta River by the California Division of Fish and Game and under the direct supervision of the Bureau of Fish Conservation.

As part of the general investigation the Division has conducted an annual census of the spawning migration of king salmon, *Oncorhynchus*



FIG. 18. The Shasta River in the Upper Shasta Valley.

tshawytscha, in the Shasta River, and this paper is a summary of the data collected during the fall months of 1930 to 1934, inclusive.

The Shasta River, a tributary of the Klamath drainage system, was chosen as a site suitable to carry on these investigations regarding the king salmon for the following reasons:

1. It is a river of suitable size for investigation and control.
2. It is a representative river of the Klamath system in that the usual obstacles, such as irrigation dams, ditches, etc., are found along its course.
3. It is a natural spawning stream of the king salmon, and even now the salmon spawn there in considerable numbers.

¹ Submitted for publication, November 19, 1937.

4. No artificial propagation of salmon has been conducted in the Shasta River.

5. The stream is accessible along its entire course.

The Shasta River (fig. 17) originates from Lake Dwinell Reservoir and from several large springs located in the upper Shasta Valley, just north of Mt. Shasta. Thence it meanders in a generally northwesterly direction the length of the Shasta Valley until it drops suddenly into



FIG. 19. Large spawning area found in the Shasta Canyon.

the Shasta Canyon, five miles north of the town of Yreka. In the valley the stream, for the most part, is sluggish and for long stretches the bottom is covered with silt and mud. Suitable areas for spawning are found only in the vicinity of Big Springs and in the tributaries known as the Little Shasta River and Parks Creek. In the canyon, however, a considerably different situation is found. Here, the stream is a typical and ideal spawning area in that it possesses gravelly riffles and bars with intermittent waterfalls and deep pools.

As mentioned before, one feature of the salmon investigation is an accurate census of the salmon entering the Shasta River from the Klamath on their spawning migration. For this reason, all fish were allowed to proceed upstream as they entered the mouth of the Shasta.

In order to secure this accurate census of the spawning migrants a counting rack (fig. 20), similar to those used by the United States Bureau of Fisheries, was constructed across the Shasta, just above its confluence with the Klamath.

The construction of this counting rack, as now in use on the Shasta is as follows: A strongly constructed weir is built across the stream. Built into this weir are two sliding gates which can be raised or lowered to any desired position. Before each gate is placed a broad strip of white canvas or white painted galvanized sheeting. These white aprons are so placed that migrating fish must swim over them, and as they do this the observer can easily distinguish and count the different species as they pass upstream.

By the use of this counting rack an accurate enumeration of migrating fish is made possible. The relative number of grilse or small males, the time and other particulars of the migration are also determined.

During the seasons under discussion (1930-1934), the salmon commenced their migration from the Klamath and up the Shasta, as a rule, during the first two weeks of September. Frequently they appeared considerably in advance of the arrival of fish at the Klamath Egg Taking Station, located but a few miles up the Klamath from the junction of the Shasta River. As the season advances, the run increases in a series of higher mounting successive waves until the peak is reached, generally between the second and third weeks of October, after which the run decreases rapidly until the end is reached during the latter part of November.

It was interesting to note that most of the fish migrated during the afternoon. But few fish were counted through the gates in the morning, and at night the migration was always at a standstill.

However, it was noticeable that a rise in the stream level, with resultant muddy water, invariably resulted in a sudden rush of salmon into the Shasta from the Klamath, where the fish had been loating in a large pool just below the confluence of the two rivers.

The magnitude of the spawning migrations or escapements for the years 1930 through 1934 are shown, by weekly totals, in table 1. Upon examination of this table and also of figure 21, it can be seen that the run of 1930 was small, totaling 19,362 fish of which 12,082 or 63.5 per cent were grilse. In contrast to 1930, the migration of 1931 was large, totaling 81,848 kings, 20,037 or 24.48 per cent being young males. The



FIG. 20. Shasta counting rack.

outstanding feature of the 1932 escapement, which totaled 35,592, was the fact that only 5058 or 14.21 per cent of the salmon were grilse. In 1933 the count was noticeably small. Only 11,586 fish went upstream. However, 6886 or 59.43 per cent of the upstream migrants were young males. The census of 1934 showed that 48,421 immigrants traveled up the Shasta, 21,807 or 45.05 per cent of which were the precocious males.

TABLL

Weekly Escapements of King Salmon up the Shasta River, 1930-1934

Date	1930			1931			1932		
	Adults	Grilse	Total	Adults	Grilse	Total	Adults	Grilse	Total
August 30				7		7	3		3
September 6				12	1	13	20		20
September 13				37	33	70	23		23
September 20	54	204	258	5,506	4,607	6,003	1,512	180	1,701
September 27	102	363	465	5,503	3,170	12,673	6,104	800	6,973
October 4	431	1,586	2,107	16,480	4,817	21,297	2,056	1,221	3,277
October 11	2,052	2,474	4,526	22,160	7,800	29,960	12,661	1,133	13,794
October 18	2,262	3,315	5,577	5,652	1,881	7,533	4,808	542	5,350
October 25	2,082	3,760	5,842	2,136	473	2,609	2,027	50	2,077
November 1	234	240	474	808	128	936	557	45	602
November 8	43	68	111	391	37	428	54	9	63
November 15	14	32	46	10		19	3		3
November 22	2	8	10						
November 29	1	4	5						
December 6		16	16						
December 13		1	1						
Totals	7,280	12,082	19,362	61,811	20,037	81,848	30,534	5,058	35,592

Date	1933			1934			Average		
	Adults	Grilse	Total	Adults	Grilse	Total	Adults	Grilse	Total
August 30							2.0		2.0
September 6				2		2	6.8	0.2	7.0
September 13				5		5	13.6	9.0	22.6
September 20	11	10	21	126	73	199	1,201	434	1,636
September 27	1,443	2,554	3,997	6,024	3,578	9,602	4,635	2,106	6,742
October 4	1,593	2,635	4,428	5,846	4,057	9,903	5,461	2,863	8,324
October 11	987	1,080	2,067	9,904	6,630	15,534	9,352	4,023	13,376
October 18	526	362	878	4,127	5,042	9,169	3,435	2,226	5,661
October 25	113	53	166	1,319	2,178	3,497	1,595	1,342	2,938
November 1	27	2	29	235	229	464	372	128	501
November 8				14	19	33	100	28.6	123
November 15				3		3	7.4	4.4	11.8
November 22				3		3	2.2	1.6	3.8
November 29				8		8	1.8	0.8	2.6
December 6								3.2	3.2
December 13								0.2	0.2
Totals	4,700	6,886	11,586	26,614	21,807	48,421	26,187	13,174	39,361

the grilse count for any given season, we possibly could predict the size of future migrations. But until more figures are assembled it is not possible to draw definite conclusions. Further summaries will be presented from time to time in *California Fish and Game*.

FIG. 22. Weekly escapements of king salmon up the Shasta River, 1933 and 1934, and average for 1930-1934.

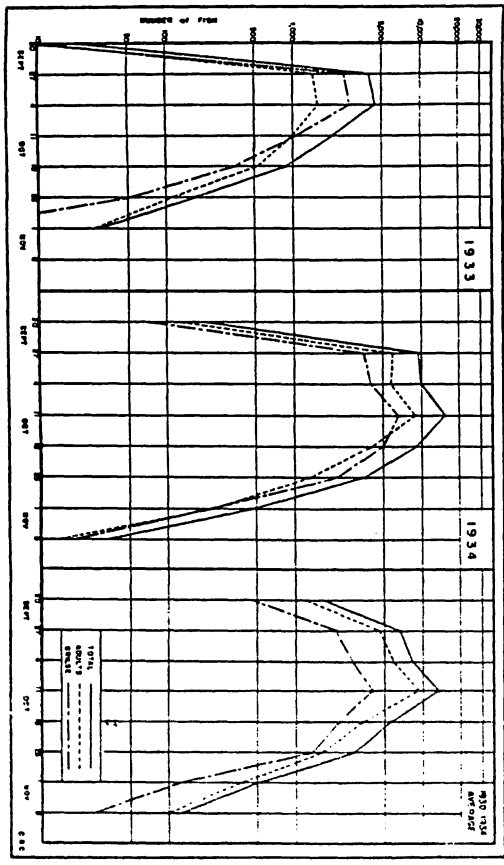
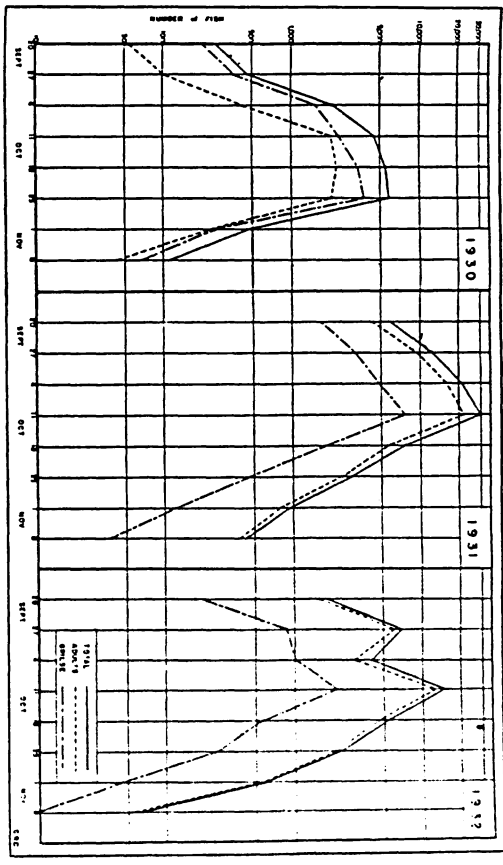


FIG. 21. Weekly escapements of king salmon up the Shasta River, 1930-1932.



Until additional data, now on hand, have been correlated and future counts of the migration are obtained, I do not deem it wise or possible to draw any conclusions from the results of the salmon census as shown in this report. There is an indication, however, that knowing