

1956 FALL-RUN KING SALMON, ONCORHYNCHUS TSHAWYTSCHA,  
POPULATION ESTIMATES FOR THE SACRAMENTO RIVER  
AND TRIBUTARIES NORTH OF HAMILTON CITY 1/

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INTRODUCTION

The following salmon population figures were determined largely by counting salmon carcasses, estimating what percentage of the run had been counted, then computing a total population for each stream and/or stream section. Factors such as physical characteristics of the stream or stream section, turbidity of the water, volume of flow, weather and number of counting trips were considered in making the estimates. No tagging or tag recovery data has been used.

The size of the run in Mill Creek, above Clough Dam, was determined by counting fish as they passed through Clough Dam Fishway. The size of the run in Battle Creek, which would have migrated above Coleman Hatchery, was determined by numbers of fish diverted into Coleman Hatchery holding ponds and spawned artificially. The only other live fish counted were the salmon hauled from Keswick Dam to Coleman Hatchery. Aerial redd counts formed the basis for estimating numbers of salmon utilizing two sections of the Sacramento River, where salmon carcasses were not counted.

Salmon counts in 1956 were made cooperatively by the California Department of Fish and Game's Dingell-Johnson Project F7R, Marine Fisheries Branch, and the U. S. Fish and Wildlife Service. A total of eight men was used to make the counts; the Dingell-Johnson project furnished four, Marine Fisheries three, and the Fish and Wildlife Service one. Airplane flights by the Fish and Wildlife Service supplied valuable information on spawning areas being used by salmon, and location of concentrations of dead salmon. All salmon carcasses found were cut in half with a machete, to prevent recounting the same fish on subsequent trips. Carcasses were also examined for fin marks, tags, sex and to determine whether or not the salmon had spawned successfully.

The river sections and tributaries of the upper Sacramento River for which salmon population estimates were made are shown in Figure 1. A summary of the number of salmon carcasses examined, and the population estimates for the Sacramento River and tributaries north of Hamilton City is presented in Table 1.

SACRAMENTO RIVER

There are three peak spawning periods for salmon in the Sacramento River; the winter-run in May and June, the spring-run in September and early October, and the fall-run in November and December. There is some overlap between spring-run and fall-run spawning fish on the main stem of the Sacramento River, in both time and area. The population estimate made in this report is for fall-run fish only.

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Although salmon spawned from a short distance below the Hamilton City bridge to Redding, about 94 percent utilized the gravel beds upstream from Iron Canyon. It is estimated that the number of salmon spawning in the main stem of the Sacramento River during 1956 was only about 35 percent of the 1955 total. This is based on both aerial redd counts and carcass counts. Salmon were particularly scarce in riffles downstream from Red Bluff in 1956.

Stream conditions were fair for recovering salmon carcasses. There was a steady but gradual decrease in river flow during the entire carcass counting period. The water was slightly murky, except for a short while near the end of the counting period, when it cleared up. There were no sudden rises in stream flow to flush the deeper pools and deposit carcasses on the bars.

A total of 2,019 carcasses was counted between October 8, 1956 and January 3, 1957. The coverage ranged from 13 counting trips on some river sections to two on other the lower sections. The estimated percentage of the salmon population examined by survey crews varied between one and three percent in the different river sections. No salmon carcasses were counted between Jelly's Ferry and Iron Canyon, and between Vina and Hamilton City. Here, aerial redd counts formed the basis for determining the numbers of spawning salmon. The 1956 fall-run, utilizing the main stem of the Sacramento River between Hamilton City and Keswick Dam, is calculated to number 93,157 fish. This figure includes 2,641 fish trapped at Keswick Dam.

A summary of the fall-run king salmon trapped at Keswick Dam in 1956 by the U. S. Fish and Wildlife Service is presented in Table 2.

#### TRIBUTARIES

##### Mill Creek

The 1956 fall run of salmon in Mill Creek was considerably smaller than runs of three previous years. Clear water, together with very low stream flows, provided excellent stream conditions for counting dead salmon. The section of stream from Clough Dam to the mouth was covered three times during the season by a survey crew. In addition, two counting trips were made between U. S. Highway 99E and the mouth of the creek.

A total of 153 dead salmon was counted in Mill Creek below Clough Dam during the period November 14, 1956 through January 4, 1957. It is estimated that this number represents 20.0 percent of the salmon population spawning in Mill Creek below Clough Dam. The 1956 run of salmon in Mill Creek below Clough Dam is estimated to number 765 fish. Most of these salmon spawned in the stream section between U. S. Highway 99E and Ward Dam.

The size of the run in Mill Creek above Clough Dam was determined by counting fish as they passed through the fishway on Clough Dam. A summary of the data pertaining to these fish is presented in Table 3.

The total run in Mill Creek during the fall of 1956 was calculated to number 840 fish. This total includes the estimated 756 fish spawning below Clough Dam, and 131 fish spawning above Clough Dam.

##### Deer Creek

The 1956 fall-run of salmon in Deer Creek was small. A combination of clear water and extremely low flows provided excellent stream conditions for recovering dead salmon. The section of stream between Stanford-Vina Dam and the mouth was covered twice by a survey crew.

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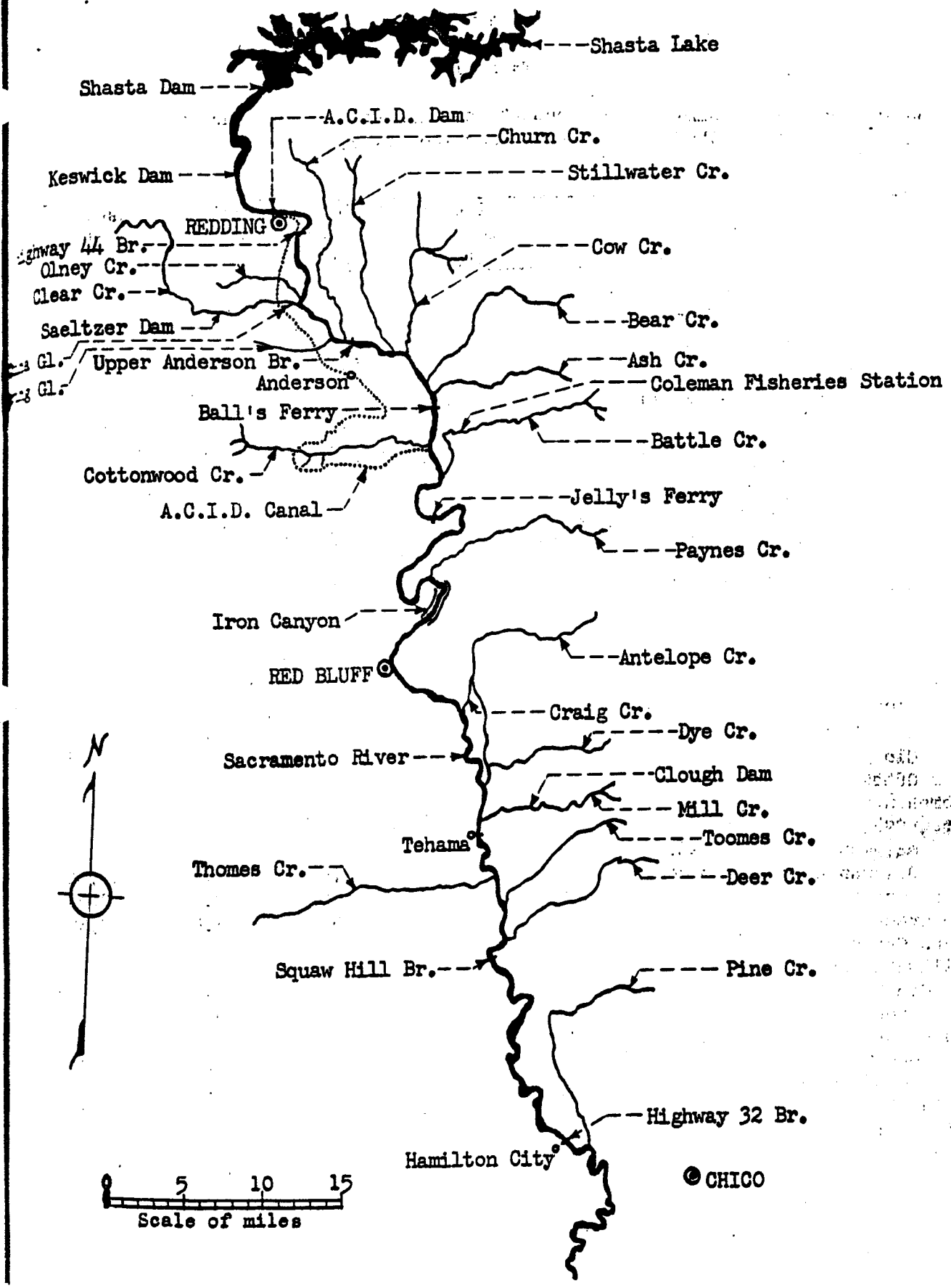


Figure 1. Upper Sacramento River and tributaries covered during king salmon spawning area survey.

TABLE 1

Salmon Carcasses Examined and Population Estimates for the Sacramento River and Tributaries North of Hamilton City, Fall, 1956

Area	Distance in river miles	Number of salmon counted**	Estimated percentage counted	Estimated salmon population
<u>Sacramento River</u>				
Keswick Dam Fish Trap	-	2,641*	-	2,641
A.C.I.D. Dam to Highway 44 Bridge	4.0	874	3.0	29,133
Highway 44 Bridge to Upper Anderson Bridge	9.1	643	2.0	32,150
Upper Anderson Bridge to Ball's Ferry	8.4	400	3.0	13,333
Ball's Ferry to Jelly's Ferry	8.5	54	1.0	5,400
Jelly's Ferry to Iron Canyon	15.0	-	-	4,500
Iron Canyon to Tehama	23.5	34	1.0	3,400
Tehama to Squaw Hill Bridge	11.0	14	1.0	1,400
Squaw Hill Bridge to Highway 32 Bridge	17.0	-	-	1,400
<b>Sacramento River totals</b>		<b>4,660</b>		<b>93,000</b>
<u>Tributaries</u>				
Mill Creek				
Clough Dam Counting Station		131*	-	
Clough Dam to mouth		153	20.0	
Deer Creek		18	15.0	
Toomes Creek		5*	-	
Dye Creek		0	-	
Battle Creek				
Coleman Hatchery holding pond		7,458*	-	7,458
Coleman Hatchery to mouth		3,414	25.0	13,656
Clear Creek		530	20.0	2,650
Cow Creek		256	8.0	3,200
Churn Creek		0	-	
Stillwater Creek		0	-	
Ash Creek		0	-	
Bear Creek		1	20.0	5
Thomes Creek		0	-	
Antelope Creek		49	15.0	327
Cottonwood Creek		33	5.0	660
Spring Gulch		756	80.0	945
China Gulch		50	13.0	385
Olney Creek		0	-	
Pine Creek		0	-	
Paynes Creek		0	-	
<b>Tributary totals</b>		<b>12,854</b>		<b>30,000</b>
<b>Sacramento River and tributary totals</b>		<b>17,514</b>		<b>123,000</b>

\* Live fish counts

\*\* Includes skeletons

\*\*\* Estimate based on redd counts

A total of 18 salmon carcasses was examined during the period, November 8 through December 18, 1956. It is estimated that the carcasses counted represent 15.0 percent of the total run, or that only 120 salmon spawned in Deer Creek.

Deer Creek was spot checked upstream from Stanford-Vina Dam as far as the canyon mouth, but no dead salmon were found. In the opinion of the survey crew, salmon were unable to migrate above this dam because of extremely low flows through the fishways, and a lack of deep pools at the fishway entrances. The county highway department used heavy equipment to clean out and straighten the stream channel below Stanford-Vina Dam during the spawning season, resulting in the destruction of several redds.

Battle Creek

The 1956 fall-run of salmon in Battle Creek was about as large as the previous year's run. However, in contrast to the 1955 season, in 1956 a much larger proportion of fish spawned in the creek below Coleman Station than entered the hatchery holding ponds.

Stream conditions were good for counting dead salmon. The water was fairly clear during most of the recovery period, and flows were comparatively low and stable.

A total of 3,414 dead salmon was counted on Battle Creek during the period, October 11, 1956 through January 22, 1957. It is estimated that the dead salmon counted represented 25.0 percent of the run spawning in Battle Creek below Coleman Hatchery. The 1956 fall-run of salmon in Battle Creek, below Coleman Station, is estimated to number 13,650 fish.

In addition to the salmon spawning in Battle Creek below Coleman Station, large numbers of salmon entered the holding pond at Coleman Station and were artificially spawned. A summary of the data pertaining to these fish is presented in Table 4.

The total run of salmon in Battle Creek during the fall of 1956 is estimated to number 21,108 fish. This total includes 13,650 fish which spawned below Coleman Station, and 7,458 fish taken at the hatchery.

Salmon spawned heavily in the section of stream from Coleman Station to the county bridge downstream. Very little spawning occurred between this county bridge and the mouth of the stream.

The Shasta County Highway Department used heavy equipment to clean out and straighten the stream channel from just below Coleman Station to some distance below the county bridge during the early part of October. The heavy silt load resulting from this work may have been responsible for the death of large numbers of ripe and partially spent female salmon that were found. Of the 526 dead females examined during the month of October, 174 (33.0 percent) were ripe, and 86 (16.3 percent) were partially spent.

The County Highway Department also worked three days on the stream channel just upstream from the county bridge during the period November 30 through October 2. It is estimated that this work destroyed 200 redds.

Clear Creek

Stream conditions were excellent for counting dead salmon on Clear Creek during the 1956 season. The water was clear, and the flow gradually diminished as the season

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TABLE 2

King Salmon Trapped at Keswick Dam, Fall, 1956

Sex	Number trapped
Male	
Over 26 inches in total length	1,034
Under 26 inches in total length (grilse)	440
Female	1,167
<b>Total</b>	<b>2,641</b>

TABLE 3

King Salmon Counted at Clough Dam, Fall, 1956\*

Sex	Oct.	Nov.	Dec.	Total
Male				
Over 26 inches in total length	1	53	14	68
Under 26 inches total length (grilse)	8	30	11	49
Female	0	10	4	14
<b>Totals</b>	<b>9</b>	<b>93</b>	<b>29</b>	<b>131</b>

\*These fish were counted during the period October 27 - December, 1956.

TABLE 4

King Salmon Examined at Coleman Fisheries Station  
on Battle Creek, Fall, 1956

Sex	Number examined
Male	
Over 26 inches in total length	2,547
Under 26 inches in total length (grilse)	1,769
Female	3,142
<b>Total</b>	<b>7,458</b>

progressed. The section of stream from McCormick-Saeltzer Dam to the mouth was covered by a survey crew four times during the season; three in November, and one early in January.

A total of 530 salmon carcasses was examined in Clear Creek between November 8, 1956 and January 10, 1957. This number represents an estimated 20.0 percent of the salmon population. The 1956 fall-run of salmon in Clear Creek is estimated to number 2,650 fish.

Spawning salmon were found fairly evenly distributed along the stream between U.S. Highway 99 and McCormick-Saeltzer Dam. A total of 228 redds was counted in this section of stream on November 27. Very little, if any spawning occurred between U.S. Highway 99 and the mouth of the creek.

#### Cow Creek

Stream conditions were fair for counting dead salmon. Although stream flows were low and the water clear, there were many long, deep pools that could not be adequately covered.

A total of 256 salmon carcasses was examined in Cow Creek during the period November 9, 1956 through January 9, 1957. A survey crew made five counting trips on this creek. It is estimated that eight percent of the salmon spawning in Cow Creek was examined. The 1956 fall-run of salmon in Cow Creek is estimated to number 3,200 fish.

Most of these fish spawned in an area extending from about three miles below State Highway 44 to the first county road bridge upstream from Highway 44 bridge.

#### Antelope Creek

Stream conditions were excellent for counting dead salmon in Antelope Creek. Stream flows were low and the water was clear during the carcass recovery period.

A total of 49 salmon carcasses was examined in Antelope Creek during the period November 9 through November 28, 1956. A survey crew made three counting trips on this creek. It is estimated that the total number of salmon carcasses counted represents 15 percent of the total run. The 1956 fall-run of salmon in Antelope Creek is estimated to number 327 fish.

Most of the fish spawned in the section of stream between the Cone Company Diversion Dam and the first county road bridge downstream. One redd and two live salmon were observed between the Cone Company Diversion Dam and the gauging station upstream at the canyon mouth.

On November 9, Antelope Creek was practically dry, from a few miles above U.S. Highway 99E bridge to the mouth. This was due to stream clearance crews putting up a temporary gravel dam and diverting the flow into Craig Creek. Water was diverted from the lower end of Antelope Creek so that the channel could be cleaned out and straightened. This condition persisted for a period of about two weeks.

#### Cottonwood Creek

The 1956 fall-run salmon population estimate for Cottonwood Creek is based on a limited amount of carcass counting, spot checks made by a survey crew, and an aerial

survey made by the Fish and Wildlife Service. The small numbers of salmon spawned in this creek were distributed over such a large area that complete coverage was practical.

The survey crew made two counting trips on this creek. A total of 33 salmon carcasses was counted between November 7 and November 16. It is estimated that the total number of salmon carcasses examined represents five percent of the total and the population of salmon spawning in Cottonwood Creek during the fall, 1956 totaled 660 fish.

#### Spring Gulch

As a result of low rainfall in the fall of 1956, the Anderson-Cottonwood Irrigation District Dam at Redding was left in place later than usual. While the dam was full head of water was carried in the canal, and the excess water released into streams such as Spring Gulch, China Gulch and Olney Creek for return to the Sacramento River. Stream flow in Spring Gulch consisted entirely of water from this canal.

Salmon in Spring Gulch could have entered from the A.C.I.D. canal, or they could have passed through the fishway at the mouth of the creek. However, it appeared difficult for salmon to ascend the fish ladder because of its poor condition.

Stream conditions were only fair for recovering dead salmon in Spring Gulch, because the water was slightly murky and very swift. The water was eventually shut off completely, enabling the survey crew to cover the stream bed thoroughly on the counting trip. A survey crew made five counting trips on this creek.

A total of 756 salmon carcasses was examined during the period December 8 through December 21, 1956. It is estimated that 80 percent of the salmon population was examined by the survey crew. The 1956 fall salmon run in Spring Gulch is estimated at 950 fish. In addition to the estimated population, there were plenty of signs which indicate that poachers had taken a fairly large number of salmon.

#### China Gulch

The flow in China Gulch consisted entirely of water released from the A.C.I.D. canal. Salmon could enter the stream from A.C.I.D. canal, or they could swim upstream to the point where China Gulch empties into Clear Creek. A total of 50 salmon was counted on January 10 in Clear Creek at the mouth of China Gulch. This number represents 13.0 percent of the estimated total run. The total run in China Gulch is estimated to number 385 fish.

#### Olney Creek

The flow in Olney Creek consisted entirely of water released from the A.C.I.D. canal. Spot checks failed to reveal any salmon.

#### Toomes Creek

Toomes Creek was a live stream from just above U.S. Highway 99E to the mouth.

The water in Toomes Creek was being released into the creek from the North Stanislaus Irrigation Canal, and therefore was Deer Creek water. Two redds and five salmon were observed in Toomes Creek on November 15.



Bear Creek

There was practically no fall salmon run in Bear Creek although it had a fairly good flow. Only one dead salmon and two redds were found.

Other Tributaries

The following tributaries were checked and found to be completely dry during the fall of 1956. Consequently, they had no runs: (1) Ash Creek (2) Stillwater Creek (3) Dye Creek (4) Thomas Creek (5) Pine Creek. Churn Creek and Paynes Creek had a little water in some pools, but they had no salmon runs.

SUMMARY

During 1956, population estimates were made for fall-run king salmon in the Sacramento River and tributaries north of Hamilton City. These estimates were made largely by counting salmon carcasses, estimating what percentage of the run had been counted, then computing a total population for each stream and/or stream section. Aerial redd counts formed the basis for estimating numbers of salmon utilizing two sections of the Sacramento River. Live salmon counts were made on the Sacramento River at Keswick Dam, Mill Creek at Clough Dam and Battle Creek at Coleman Fisheries Station.

The 1956 salmon counts were made cooperatively by the California Department of Fish and Game and the U. S. Fish and Wildlife Service.

A total of 17,514 salmon was examined, including live and dead counts. It is estimated that the 1956 fall-run of salmon spawning in the upper Sacramento River and tributaries north of Hamilton City totaled 123,463 fish. Of this total, 93,157 spawned in the main stem of the Sacramento River, while 30,306 spawned in the 19 tributaries surveyed. It is estimated that the number of salmon spawning in the main stem of the Sacramento River during 1956 was only about 35 percent of the 1955 total. Ninety-four percent of the 1956 run utilized the gravel beds upstream from Iron Canyon.