

California Department of Fish and Game
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SIZE OF THE 1955 SALMON RUNS IN THE FEATHER, YUBA
COSUMNES, AND MOKELUMNE RIVERS

Feather River

The 1955 fall salmon run in the Feather River was the largest ever observed in this stream by the salmon survey crew. The bulk of the run spawned on the riffles from the mouth of Honcut Creek upstream to Sutter Butte Dam. Between Oroville and Sutter Butte Dam salmon were not so numerous, although most riffles were adequately populated.

From mid-October to mid-December a total of 8,167 dead salmon were recovered in the Feather River between Oroville and Live Oak. It is estimated that the survey crew recovered 10 percent of the salmon which spawned and died in the stretch of river between Oroville and Sutter Butte Dam, 10 percent between Sutter Butte Dam and Gridley and 7 percent in the section between Gridley and Live Oak. From this data it is calculated that 86,000 salmon spawned in the Feather River below Oroville. The following table shows the distribution of the salmon population by river section.

River Section	No. Dead Salmon	Estimated Recovery Rate	Estimated Population
Oroville to Sutter Butte Dam	595	10%	6,000
Sutter Butte Dam to Gridley	6,369	10%	63,000
Gridley to Live Oak	1,203	7%	<u>17,000</u>
		Total	86,000

It is suspected that a part of the large salmon run in the Feather River consisted of salmon from the Yuba and possibly the American River runs. Since the Yuba River was dry below Daguerre Point Dam until late November, it seems reasonable to assume that the salmon which ordinarily enter this stream in October and early November would proceed on up the Feather to find a place to spawn. High water temperatures and poor water quality in the American River could have caused some of the run destined for this stream to go elsewhere. The Feather was the nearest river to the American affording excellent spawning conditions.

Salmon tagged at the Fremont Weir on the Sacramento River appeared in good numbers in the Feather River. A total of 58 salmon with tags or tag scars were found downstream from Oroville. One tagged fish was recovered in the West Branch of the North Fork.

As in the past it was impossible to gain much information from dead salmon recovery on the numbers of salmon spawning in the forks of the Feather. The carcasses of 35 dead spring run salmon were examined in the Middle Fork. However, bears patrolled the canyon much more thoroughly than the creamer chopping crew and cleaned up the carcasses as fast as the fish died. From counts of live fish, it

is estimated that between 1,000 and 1,500 spring run salmon spawned in the Middle Fork. Fair numbers of fall run fish were observed in the Middle Fork in late October. It was impossible to do much checking on the size of this population because of weather and water conditions.

On the North Fork a few live spring run salmon (possibly 10 or 12) were seen in the pool at the base of the intake dam for the Los Plumas power house. The fact that no salmon were located upstream from the dam probably reflects the condition and design of the fish ladder. No salmon were seen during one trip in the Big Bend section of the North Fork.

Low flows in the West Branch of the North Fork made it difficult for salmon to enter this tributary until late in the season. Early in October about 30 spring run fish were observed in two pools near the mouth of the stream. On November 1, approximately 200 fall run fish were attempting to spawn in the shallow riffles immediately upstream from the mouth.

No spring run salmon were observed in the South Fork during October. The flow in this stream was too low most of the season to attract fall run fish from the Middle Fork.

It is regrettable that salmon counting facilities have not been established at Sutter Butte Dam. In 1954 and again in 1955 flows at the dam were such that every fall run salmon passing that point could have been counted. It is only through such counts that accurate figures can be obtained on the numbers of salmon which will be affected by the proposed Feather River Project.

Mokelumne River

The annual count of Mokelumne River salmon was conducted again in 1955 at Woodbridge Dam. A fish counter was assigned to this station on September 26 following a report that a few salmon had arrived below the dam.

Despite every effort to operate the old fishway, salmon were not able to use the facility. This condition was caused by extremely low flows in the river which exposed the rubble below the dam and made it impossible for salmon to reach the entrance of the ladder. During the entire month of October and the first two weeks in November low flows prevailed and salmon continued to pile up below the dam. Many were caught by anglers, others died and drifted downstream, a few attempted to spawn on the mud and hardpan riffle near the highway crossing below the dam.

It was not until November 15 that sufficient water was released to allow the salmon to enter the old ladder. A total of 575 salmon made their way over the dam on that day. Thirteen salmon which had become stranded in the lower portion of the new ladder were rescued by a crew from the Central Valley Hatchery and released above the dam.

On November 16, the boards in the dam were pulled and counting was then accomplished at the lower portion of the new ladder for the remainder of the season. The station was closed on December 23 when it was evident that the run was over.

The total count through the fish ladders during the 1955 season was 2,180 salmon and 30 steelhead. With the addition of the 13 rescued fish the entire salmon run numbered 2,193.

Yuba River

The 1955 salmon run in the Yuba River was very poor. During the latter part of October and early November when salmon usually enter the river the Yuba was virtually dry. In fact there was not even standing water in the stream beyond some distance below Daguerre Point Dam. It seems reasonable to assume that many of the Yuba River salmon which were blocked from their native stream continued on up the Feather River to spawn.

It was late November before there was an adequate flow in the river for salmon. At this time a small run was observed on the spawning beds. During December 1955 carcasses were recovered on the Yuba and it was estimated that 10 percent of the run was examined. The entire run then was calculated to number 1,500 salmon.

Cosumnes River

Low flows plagued the Cosumnes River salmon run during the early part of the 1955 season. Fish entering the stream at this time experienced great difficulty in getting over the shoal areas. On December 2, 1955 a crew from the Central Valley Hatchery constructed a webbing weir near the mouth of the river to prevent salmon from starting upstream and becoming stranded. On the same day the crew rescued 16 salmon from the shallow areas and released them at Michigan Bar where there was ample water. The weir was removed on December 3 following an increase in river flow.

The 1955 salmon run in the Cosumnes was not as large as the 1954 run. A total of 253 dead salmon were recovered before the flood hit just before Christmas. From this data the entire 1955 run is calculated to number about 2,500 salmon.

1955 Salmon Population Estimates for Stanislaus,
Tuolumne and Merced Rivers

The 1955 dead salmon recovery figures for the Tuolumne, Stanislaus and Merced Rivers certainly are not impressive. While the runs in these streams were somewhat below what are considered average runs, they were not as far below as the carcass recovery data appears to indicate.

Creamer chopping operations during the 1955 season were hampered by high muddy water and miserable weather. In addition, the runs were quite late and the Christmas floods hit just at the time the crew expected peak dead salmon recoveries. The rivers were patrolled in January after the crest of the flood run-off had passed, but little additional information was gained on these trips. The rivers were still too high and muddy to assess the damage to the spawning areas and most of the salmon carcasses had disappeared.

The following estimates, while probably not as reliable as those of past years, are submitted as the best that can be made under the circumstances.

Stanislaus River

No. of carcasses recovered - 535

Estimated size of run - 7,000

Tuolumne River

No. of carcasses recovered - 1,851

Estimated size of run - 20,000

Merced River

No. of carcasses recovered - 24

Estimated size of run - under 500

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THE SIZE OF THE 1955 SALMON RUN SPAWNING IN THE AMERICAN RIVER
DOWNSTREAM FROM NIMBUS HATCHERY

The California Department of Fish and Game continued its annual survey to determine the numbers of salmon spawning naturally in the American River during the fall of 1955. With Nimbus Dam blocking salmon from the most important spawning riffles in the river, it was expected that the bulk of the run would be handled in the new Nimbus salmon and steelhead hatchery. However, for effective management of the salmon resources of the American River it is important to know what portion of the run utilized the riffles downstream from Nimbus Dam.

Salmon population figures for the Sacramento-San Joaquin system are usually calculated by counting the dead salmon carcasses on each river and then estimating what percentage of the total number was observed. Factors such as physical characteristics of the stream, turbidity, volume of flow and number of survey trips are considered in making the estimates. This method has been used for a number of years on the American River and was adopted again in 1955.

An experienced three-man crew conducted the dead salmon recovery work. Each salmon carcass was picked up with a gaff and examined for tags and marks and then cut in two with a machete. Such a procedure prevented recounting the same fish on subsequent trips over the same area and enabled the observer to determine if the fish was spent, part spent or ripe. The sex of the salmon could likewise be established in case of doubt.

Ideal conditions for carcass recovery existed on the American River throughout the 1955 salmon spawning season. Instead of flash floods and long periods of high water which had hampered the survey crews in the past, stable flows prevailed all season. The river was exceptionally clear except for short distances downstream from the Haggin Gravel Company and the Del Paso Rock Company where gravel extraction operations discolored the water.

The river below Nimbus Dam was divided into two areas for the purpose of estimating the salmon population. The portion of the river from the fish racks at Nimbus Dam downstream to the Haggin Gravel Company, a distance of about six miles, was considered as one unit since a uniform high rate of carcass recovery occurred throughout this section. The river between Haggin Gravel Company and Sacramento was treated as a second unit. Here a somewhat lower rate of carcass recovery was experienced. Fewer riffles, longer deeper pools, and slightly turbid water below the gravel plants was the reason for this.

The spawning area was inspected frequently in late September and early October, but little spawning activity was observed until after the middle of October. Between October 13 and December 15 each section of the river was patrolled eight times. A total of 2,965 dead salmon were found from Nimbus downstream to the Haggin Gravel Plant and 110 were recovered between the gravel plant and Sacramento. The portion of the total run which was examined in the upper section was estimated at 35 percent. An estimated 20 percent of the total number of salmon spawning in the lower section of the river was recovered.

From the above data it would ordinarily be a simple matter to estimate the total salmon run spawning downstream from Nimbus Hatchery. Unfortunately, two events occurred which made it more difficult to arrive at a population figure.

The first was that several thousand salmon squeezed through the racks at Nimbus Hatchery and spawned or attempted to spawn in the limited gravel area between the racks and the dam. Had the racks been fish tight these salmon would have undoubtedly entered the hatchery. The salmon survey party chopped 326 salmon upstream from the racks. In addition, 2,293 dead salmon which had washed up on the racks were counted and thrown over into the river downstream by hatchery personnel. Through an oversight these fish were not cut in two and many of them were subsequently recovered by the survey crew along with the salmon which had spawned and died below the racks.

To separate the fish from above the racks from the fish spawning below the racks, it was assumed that both groups were recovered at the same rate. It was further assumed that all recoveries of dead salmon which had been thrown over the racks were made in the section of the river between Nimbus Hatchery and the Haggin Gravel Company. Accordingly, the following calculations were made:

- A. 2,293 (number of uncut salmon thrown over racks)
x 35% (estimated recovery rate between Nimbus and Haggin Gravel Co.)
= 803 (estimated number of salmon thrown over racks which were recovered downstream)
- B. 2,965 (number of carcasses recovered between Nimbus and Haggin Gravel Co.)
- 803 (estimated number of carcasses recovered from those thrown over racks)
= 2,162 (carcasses of salmon which had died between Nimbus Hatchery and Haggin Gravel Co.)

Another situation which complicated the process of estimating the salmon population in the river below Nimbus Hatchery was the unusually large number of dead, unspawned salmon which were picked up. Of the 3,075 carcasses recovered on the river 352, or over 11 percent, were classified as ripe, unspawned fish. Usually, much less than 1 percent of the dead fish recovered on a stream are found to have died before spawning.

Whether these fish were killed by unseasonably high water temperatures, poor water quality or a combination of both has not been proved. However, we do know that maximum daily water temperatures during November 1955 averaged over 4 degrees higher than the 1954 readings. In addition there is evidence that decaying submerged vegetation in Folsom Reservoir adversely affected the water discharged into the river below the dam.

The high pre-spawning mortality rate in the 1955 salmon run in the American River raises the question of where these fish would have spawned had conditions been suitable for survival. The entire group of unspawned fish certainly should not be assigned to the population utilizing the natural spawning areas downstream from the hatchery.

Had they lived, it seems reasonable to assume that these fish would have been distributed between hatchery and river at the same ratio as the salmon which did survive. After eliminating the estimated number of ripe fish thrown over the racks, 809 salmon are calculated to have died before spawning in the river below Nimbus Hatchery.

For the purpose of estimating the effective spawning population the ripe fish are disregarded. This leaves a figure of 1,912 carcasses recovered in the upper section of the spawning area and 91 carcasses examined in the lower section. On the basis of a 35 percent recovery rate, an estimated 5,500 salmon spawned between Nimbus Hatchery and Haggin Gravel Company. With a 20 percent recovery rate, 450 salmon are estimated to have utilized the riffles downstream from the gravel plant. Thus a total of approximately 6,000 salmon are estimated to have spawned naturally in the American River downstream from Nimbus Hatchery in 1955.

While the primary purpose of the dead salmon survey is to estimate the salmon population in the American River downstream from Nimbus Hatchery, it is desirable also to estimate the number of salmon which escaped through the racks. We know that 2,293 dead salmon washed up on the racks and 326 were recovered above the racks by the survey crew. Thus, 2,619 is the minimum number of salmon which attempted to spawn between the hatchery and the dam. It seems certain that some additional dead fish settled to the bottom of the deep pool below the dam and were never recovered. Accordingly, the population above the racks is estimated to be in the neighborhood of 3,000 salmon.

In past years the portion of the run which spawned above the Nimbus Dam site was calculated from the dead salmon recovery records. From 1944 through 1952 these estimates ranged all the way from 62.2 to 80.4 percent with an average of 72.5 percent. To continue this estimate in 1955, all fish entering the hatchery plus those getting by the racks would correspond to the population "above Nimbus."

The total number of salmon handled at Nimbus Hatchery as of December 19, 1955 was 7,570. Add to this the estimated 3,000 salmon which passed through the racks and we have a total of 10,570 salmon representing the population above Nimbus. By adding the 6,000 fish estimated to have spawned downstream we arrive at a run of 16,570 salmon. Thus the estimated portion of the run "above Nimbus" in 1955 is $\frac{10,570}{16,570}$ or 63.8 percent.