

California Department of Fish and Game
722 Capitol Avenue
Sacramento, California

1958 KING SALMON SPAWNING POPULATION
ESTIMATES FOR THE SACRAMENTO-SAN JOAQUIN RIVER SYSTEMS 1/

Marine Resources Branch

INTRODUCTION

The California Department of Fish and Game annually inventories the number of king salmon (Oncorhynchus tshawytscha) spawners utilizing streams in the Central Valley. These inventories are made to estimate the number of salmon spawning, their spawning success, physical condition, distribution on the streams, and to note barriers or adverse conditions affecting them.

Information obtained from the surveys aids in formulating fishery regulations and also provides data needed to evaluate proposed water project developments affecting the resource.

This report is for the 1958 season and includes salmon spawning population estimates for the streams of the Sacramento-San Joaquin River system.

METHODS

The survey was begun September 22, 1958 and concluded on January 16, 1959.

Population estimates are primarily for fall-run fish. Some overlap in spawning time between fall and spring-run salmon occurs on the upper Sacramento River; therefore, some spring-run salmon are included in the counts for this area. On Butte Creek, Chico Creek, and the Middle Fork of the Feather River the estimates are for spring-run fish. Mill Creek counts are for both spring-run and fall-run fish. No estimates are made of the size of the population of winter-run salmon.

The size of the salmon run on upper Mill Creek was determined by counting the fish as they passed through the fish ladder at Clough Dam. Similarly, the run on the Mokelumne was counted at the fish ladder on Woodbridge Dam.

Salmon taken from the Sacramento River and Battle Creek and spawned artificially at the U. S. Fish and Wildlife Service's Coleman Hatchery as well as those taken from the American River and spawned at Nimbus Hatchery are included in the totals.

1/ This work was performed in part by Dingell-Johnson Project California FWR, "Sacramento-San Joaquin Salmon and Steelhead Study," supported by Federal Aid to Fish Restoration Funds.

Population estimates for most of the streams were calculated by counting dead salmon carcasses, estimating the percentage of the run that had been counted and then computing the spawning population for the stream or stream section. Factors affecting carcass recovery such as the physical characteristics of the stream, turbidity, volume of flow and number of survey trips, as well as information obtained from previous surveys, were considered in making the estimates. No tagging or marked fish data were used in making the estimates.

Two and three man crews conducted the salmon recovery work. All salmon carcasses found were cut in half with a machete to prevent recounting the same fish on subsequent trips and also to determine the spawning success.

Aerial redd counts were used to estimate the spawning population in several sections of the Sacramento and Feather Rivers. All spawning areas were surveyed at least once during the season from the air so that the distribution of fish and presence of barriers could be noted.

Figures 1, 2 and 3 indicate the streams which were surveyed during the season.

PERSONNEL

The survey was conducted by 15 men in two and three-man crews. Marine Resources Branch provided seven, Marine Resources Operations two, Region 1 one, Region 2 three and Region 4 two.

SACRAMENTO RIVER

Spawning population estimates for the Sacramento River are based on both carcass counts and aerial redd counts. Aerial redd counts formed the basis for population estimates on the less utilized sections of the river. Counting trips varied from fourteen on the more heavily used spawning sections of the river to four on the less important.

Conditions for recovery of salmon carcasses were fair during the survey season except during the last two weeks when heavy rains fell resulting in increased flows and murkiness. Until this time a gradual decrease in flows was occurring with no fluctuations of the size that normally result in the flushing of pools and deposition of carcasses on the bars.

A total of 2,170 carcasses was counted on the Sacramento River between the A.C.I.D. Dam at Redding and Squaw Hill Bridge near Vina. Aerial redd counts were used to calculate spawning population estimates for the stream section between Squaw Hill Bridge and Ord Ferry located below Hamilton City.

The number of king salmon estimated to have spawned in the Sacramento River between the A.C.I.D. Dam and Ord Ferry is 127,753. This includes 7,853 fall-run salmon trapped at Keswick Dam and spawned at Coleman Hatchery. A summary of data pertaining to these estimates is presented in Table 1.

TABLE 1

King Salmon Carcass Recovery and Population
Estimates for the Sacramento River, 1958

| River Section | No. of counting trips | No. of salmon counted* | Estimated spawning population |
|---|-----------------------|------------------------|-------------------------------|
| Keswick Dam Fish Trap | -- | 7,853 | 7,853 |
| A.C.I.D. Dam to Highway 44 Bridge | 14 | 473 | 19,000 |
| Hwy. 44 Bridge to Upper Anderson Bridge | 14 | 571 | 28,500 |
| Upper Anderson Bridge to Ball's Ferry | 14 | 774 | 26,000 |
| Ball's Ferry to Jelly's Ferry | 14 | 144 | 14,400 |
| Jelly's Ferry to Iron Canyon | 4 | 19 | 3,800 |
| Iron Canyon to Red Bank Creek | 4 | 19 | 7,600 |
| Red Bank Creek to Tehama | 7 | 149 | 14,900 |
| Tehama to Squaw Hill Bridge | 4 | 21 | 4,200 |
| Squaw Hill Bridge to Highway 32 Bridge | -- | -- | 1,000** |
| Highway 32 Bridge to Ord Ferry | -- | -- | 500** |
| Totals | | 10,023 | 127,753 |

* Includes skeletons

** Estimates based on aerial redd counts

SACRAMENTO RIVER TRIBUTARIES NORTH OF BUTTE CREEK

Mill Creek

Five counting trips were made during the season between Clough Dam and the mouth of Mill Creek; a total of 358 carcasses was recovered. The king salmon spawning population estimate for this area is estimated to be 3,000.

The number of king salmon spawning in Mill Creek above Clough Dam was determined by counting the fish as they passed through the fishway on the dam. In 1958 1,140 fall-run and 2,213 spring-run fish were counted over Clough Dam.

Two hundred king salmon spawned in the experimental area of the U. S. Fish and Wildlife Service on the North Fork of Mill Creek.

It is estimated that 6,553 king salmon, fall and spring-run, spawned in Mill Creek in 1958.

Deer Creek

The area between Lower Deer Creek Falls and the Highway 36 crossing on the North Fork was examined in September to determine the distribution and size of the spring run. Three live salmon and two redds were observed approximately one mile below the Highway 32 bridge crossing. Lower sections of Deer Creek were examined from the air in an attempt to estimate the size of the spring run but the depth of the canyons and bottom characteristics made it impossible to count redds.

Six counting trips were made on Lower Deer Creek for fall-run fish. One hundred ninety-one carcasses were recovered. The total number of fall-run king salmon estimated to have spawned in Deer Creek is 1,300. No estimate was made of the spring run.

Battle Creek

The area from Coleman Station to the mouth was surveyed for carcasses 14 times during the season. Two counting trips were made between Coleman Power House and Coleman Station. A total of 3,591 salmon carcasses was recovered in Battle Creek. The estimated number of fall-run king salmon spawning in Battle Creek in 1958 is 29,243. This includes 14,643 which entered Coleman and were artificially spawned, 100 between Coleman Power House and Coleman Station, 14,300 between Coleman Station and the mouth, and 200 in Gover Ditch, a diversion of Lower Battle Creek.

An undetermined number of redds was destroyed in a one-quarter mile section of stream below the County Bridge when construction equipment was used to push gravel from the stream bed to form a levee.

Cow Creek

Cow Creek was surveyed for carcasses five times, 268 were recovered. The 1958 fall-run of salmon in Cow Creek is estimated to number 3,300.

Clear Creek

A total of 313 carcasses was recovered during six counting trips on Clear Creek. The spawning population estimate for Clear Creek is 1,600. The estimate is for the area between McCormick-Saeltzer Dam and the mouth. No carcasses or redds were found above McCormick-Saeltzer Dam.

Chico Creek

An additional 15 miles of spawning area were opened on Chico Creek during the summer of 1958 by removal of the Iron Canyon barrier. Three hundred spring-run salmon were trapped below the barrier in the spring and transported above the barrier during the period of construction and removal. Two counting trips were made in the fall from the upstream limit of migration at Higgins Hole, to below Iron Canyon. It is estimated that 1,000 spring-run salmon spawned in Chico Creek in 1958. This estimate is based primarily on counts of upstream migrants.

Flows in Chico Creek were extremely low during the fall of 1958. During most of the season fish were unable to reach spawning gravels. No estimate was made for the size of the fall-run spawning population.

Cottonwood Creek

Seven trips were made on Cottonwood Creek in search of carcasses. Flows were low and the main concentration of fish was between the mouth and the Highway 99 Bridge. The salmon run in Cottonwood Creek in 1958 was estimated to be 600.

Other Tributaries North of Butte Creek

Other tributaries surveyed and the king salmon spawning population estimates are: Bear Creek 200, Antelope Creek 400, Olney Creek 30, and Niles Canyon (China Gulch) 200.

The following streams were checked and found to have no spawning populations: Toomes Creek, Dye Creek, Spring Creek and Paynes Creek.

Churn Creek, Stillwater Creek, Ash Creek, Thomas Creek, Pine Creek and Stony Creek below the Glenn-Colusa Irrigation Ditch, streams which support king salmon when sufficient water is available, were dry during the spawning season.

Data on the tributary streams north of Butte Creek are summarized in Table 2.

TABLE 2

King Salmon Carcass Recovery and Population Estimates
for Sacramento River Tributaries North of Butte Creek, 1958

| Stream | No. of counting trips | No. of salmon counted* | Estimated spawning population |
|---|-----------------------|------------------------|-------------------------------|
| Mill Creek (above Clough Dam, fall run) | - | 1,140 | 1,140 |
| (above Clough Dam, spring run) | - | 2,213 | 2,213 |
| (below Clough Dam, fall run) | 5 | 358 | 3,000 |
| (North Fork, fall run) | - | 200 | 200 |
| Stream total | | | (6,553) |
| Deer Creek | 6 | 191 | 1,300 |
| Toomes Creek | 2 | 0 | 0 |
| Dye Creek | 2 | 0 | 0 |
| Clear Creek | 6 | 313 | 1,600 |
| Cow Creek | 5 | 268 | 3,300 |
| Churn Creek | 2 | 0 | 0 |
| Stillwater Creek | 2 | 0 | 0 |
| Ash Creek | 2 | 0 | 0 |
| Bear Creek | 3 | 15 | 200 |
| Thomes Creek | 2 | 0 | 0 |
| Antelope Creek | 3 | 22 | 400 |
| Cottonwood Creek | 7 | 58 | 600 |
| Spring Gulch | 3 | 0 | 0 |
| Olney Creek | 4 | 3 | 30 |
| Niles Canyon (China Gulch) | 4 | 18 | 200 |
| Pine Creek | 2 | 0 | 0 |
| Paynes Creek | 3 | 0 | 0 |
| Stony Creek | 1 | 0 | 0 |
| Chico Creek (spring run) | 2 | - | 1,000 |
| Battle Creek (Coleman Station) | - | 14,643 | 14,643 |
| (below Coleman Stn.) | 14 | 3,588 | 14,300 |
| (above Coleman Stn.) | 2 | 3 | 100 |
| (Gover Ditch) | 1 | 61 | 200 |
| Stream total | | | (29,243) |
| Totals | | 23,094 | 44,426 |

* Includes skeletons

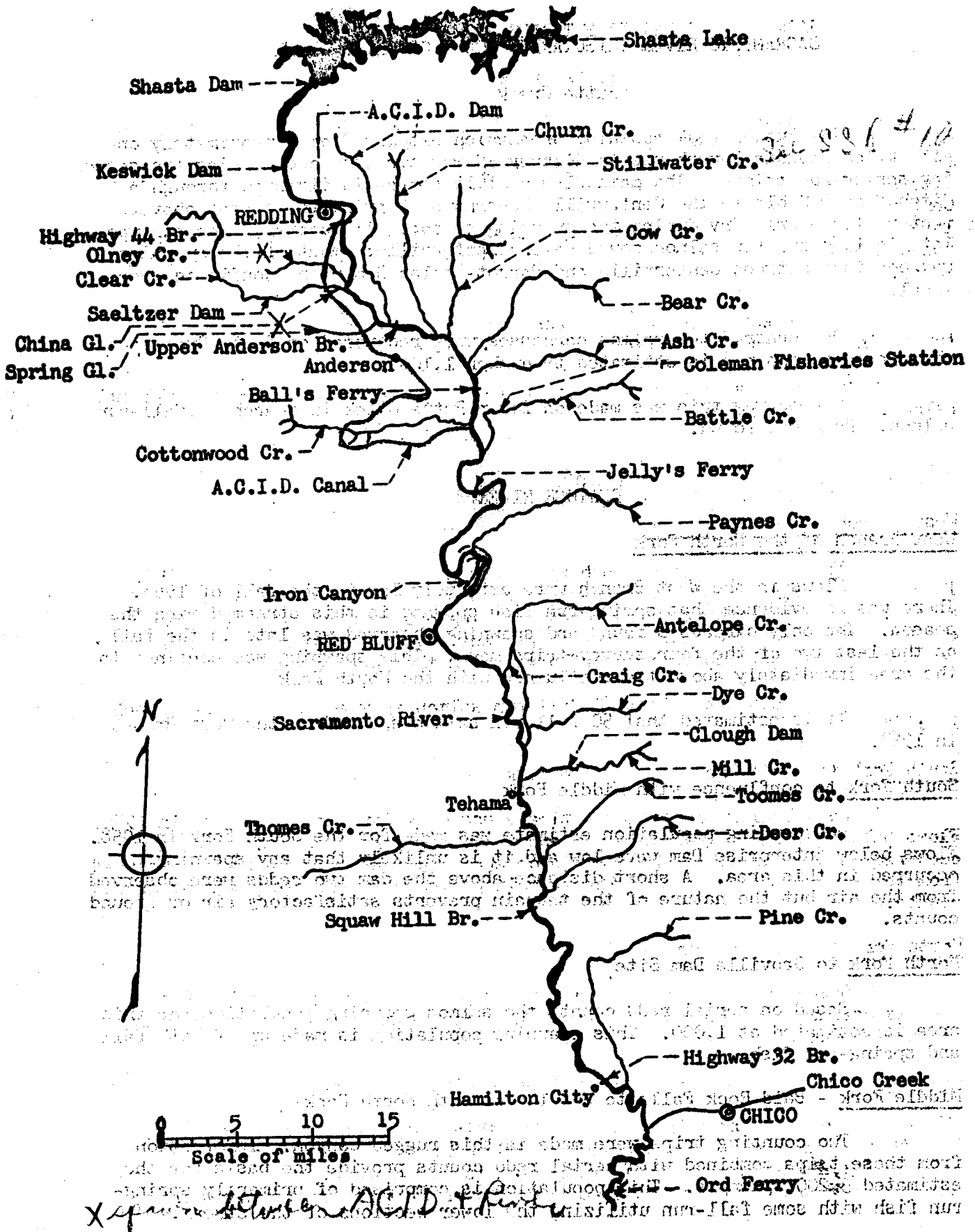


Figure 1. Upper Sacramento River and Tributaries Above Butte Creek Examined During the 1958 King Salmon Spawning Area Survey

SACRAMENTO RIVER TRIBUTARIES SOUTH OF CHICO CREEK

Butte Creek

The Butte Creek spawning area which extends from approximately one mile below DeSabra Powerhouse to Highway 99 was surveyed once during the season for spring-run salmon. The main flow of this stream is diverted through a ditch from DeSabra to the Centerville Powerhouse leaving the stream above Centerville nearly dry during the spawning season. Fortunately, the run was late in 1958 and few salmon moved beyond Centerville: most of the spawning was confined between Centerville and Parrot-Phelan Dam where conditions were ideal.

One hundred ten salmon carcasses were recovered on Butte Creek and the spring salmon run is estimated to number 1,100.

One survey trip was made on Lower Butte Creek in search of fall-run salmon. None was found.

FEATHER RIVER

West Branch of the North Fork

Flows in the West Branch were extremely low in the fall of 1958. There was no evidence that spring-run fish spawned in this stream during the season. The only carcasses found and spawning observed was late in the fall on the last two of the four survey trips made. This spawning was confined to the area immediately above the confluence with the North Fork.

It is estimated that 50 fall-run salmon spawned in the West Branch in 1958.

South Fork to confluence with Middle Fork

No spawning population estimate was made for the South Fork in 1958. Flows below Enterprise Dam were low and it is unlikely that any spawning occurred in this area. A short distance above the dam two redds were observed from the air but the nature of the terrain prevents satisfactory air or ground counts.

North Fork to Oroville Dam Site

Based on aerial redd counts the salmon spawning population for this area is estimated at 1,000. This spawning population is made up of both fall and spring-run fish.

Middle Fork - Bald Rock Falls to confluence with North Fork

Two counting trips were made in this rugged canyon. Information from these trips combined with aerial redd counts provide the basis for the estimated 3,200 spawners. This population is comprised of primarily spring-run fish with some fall-run utilizing the lower sections of the stream.

Main Section - Oroville to Oroville Dam Site

No estimate is made for this area. Several redds were seen from the air but suitable gravel is scarce and spawning is confined to areas adjacent to the shoreline.

Main Section - Oroville to Honcut Creek

Each of the three sections between Oroville and Honcut was covered eight times by survey crews during the season. Spawning conditions were excellent with little fluctuation in flows. Approximately two-thirds of the spawners were concentrated between Sutter-Butte Dam and the Gridley Bridge. The Oroville riffles were heavily utilized but a large number of salmon in the act of spawning were removed by fishermen. Two thousand ninety salmon carcasses were recovered by survey crews on the main section.

The spawning population estimate for this area of the Feather River is 30,400.

YUBA RIVER

Lack of water posed a great threat to the salmon run on the Yuba in 1958. A combination of rain and timely releases of water averted what could have meant the loss of most of the run. As it was, 114 of the 199 salmon carcasses recovered between Daguerre Pt. Dam and the Baldwin Gravel Plant, the area which suffered from low water, were of unspawned fish.

Survey trips on the stream sections varied from four to six. A total of 1,525 carcasses was recovered from the Yuba River. It is estimated that 7,900 king salmon spawned in the Yuba River in 1958.

AMERICAN RIVER

The American River from Nimbus Hatchery to the Del Paso Gravel Plant was surveyed 12 times during the spawning season. Some fluctuations in flow occurred but did not appear to be damaging to the redds. High water temperatures prevailed again as in the past three years during the early part of the season.

However, salmon taken at Nimbus during these periods of high water temperatures were moved for ripening to holding areas where temperatures were more suitable. Natural spawning is affected by these temperatures but the extent is not known.

A total of 10,210 king salmon entered Nimbus Hatchery. Of these 639 were planted in the Mokelumne River, the remaining 9,571 were spawned at Nimbus. A total of 4,798 salmon carcasses was recovered between Nimbus Dam and Nimbus Hatchery racks and 3,013 between the rocks and the Del Paso Gravel Plant.

The king salmon spawning population of the American River in 1958 is estimated to be 26,871. This includes the 9,571 salmon which entered Nimbus Hatchery.

TABLE 3

King Salmon Carcass Recovery and Population Estimates
for Sacramento River Tributaries South of Butte Creek, 1958

| Stream and/or stream section | No. of counting trips | No. of salmon counted* | Estimated spawning population |
|---|-----------------------|------------------------|-------------------------------|
| Butte Creek, DeSabra to Highway 99E | 2 | 110 | 1,100 |
| Bear River | 1 | 0 | -- |
| Feather River | | | |
| Middle Fork - Bald Rock to North Fork | 2 | -- | 3,200** |
| North Fork - To Oroville Dam Site | 1 | -- | 1,000** |
| South Fork | 2 | -- | -- |
| West Branch of North Fork | 4 | 2 | 50 |
| Main Section | | | |
| Oroville Dam Site to Oroville | 2 | -- | --** |
| Oroville to Sutter Butte Dam | 8 | 295 | 3,000 |
| Sutter Butte Dam to Gridley | 8 | 1,466 | 20,800 |
| Gridley to Honcut Creek | 8 | 329 | 6,600 |
| Stream Total | | | (34,650) |
| Yuba River | | | |
| Blue Pt. Mine to Highway 20 Bridge | 4 | 137 | 700 |
| Highway 20 Bridge to Parks Bar Afterbay Dam Site | 5 | 92 | 500 |
| Parks Bar Afterbay Dam Site to Daguerre Point Dam | 5 | 1,101 | 6,100 |
| Daguerre Point Dam to Baldwin Gravel Pl. | 6 | 195 | 600 |
| Stream Total | | | (7,900) |
| American River | | | |
| Nimbus Hatchery | - | 9,571 | 9,571 |
| Nimbus Dam to hatchery racks | - | 4,798 | 5,200 |
| Racks to Del Paso Gravel Plant | 12 | 3,013 | 12,100 |
| Stream Total | | | (26,871) |
| Totals | | 21,109 | 70,521 |

* Includes skeletons

** Based on aerial redd count

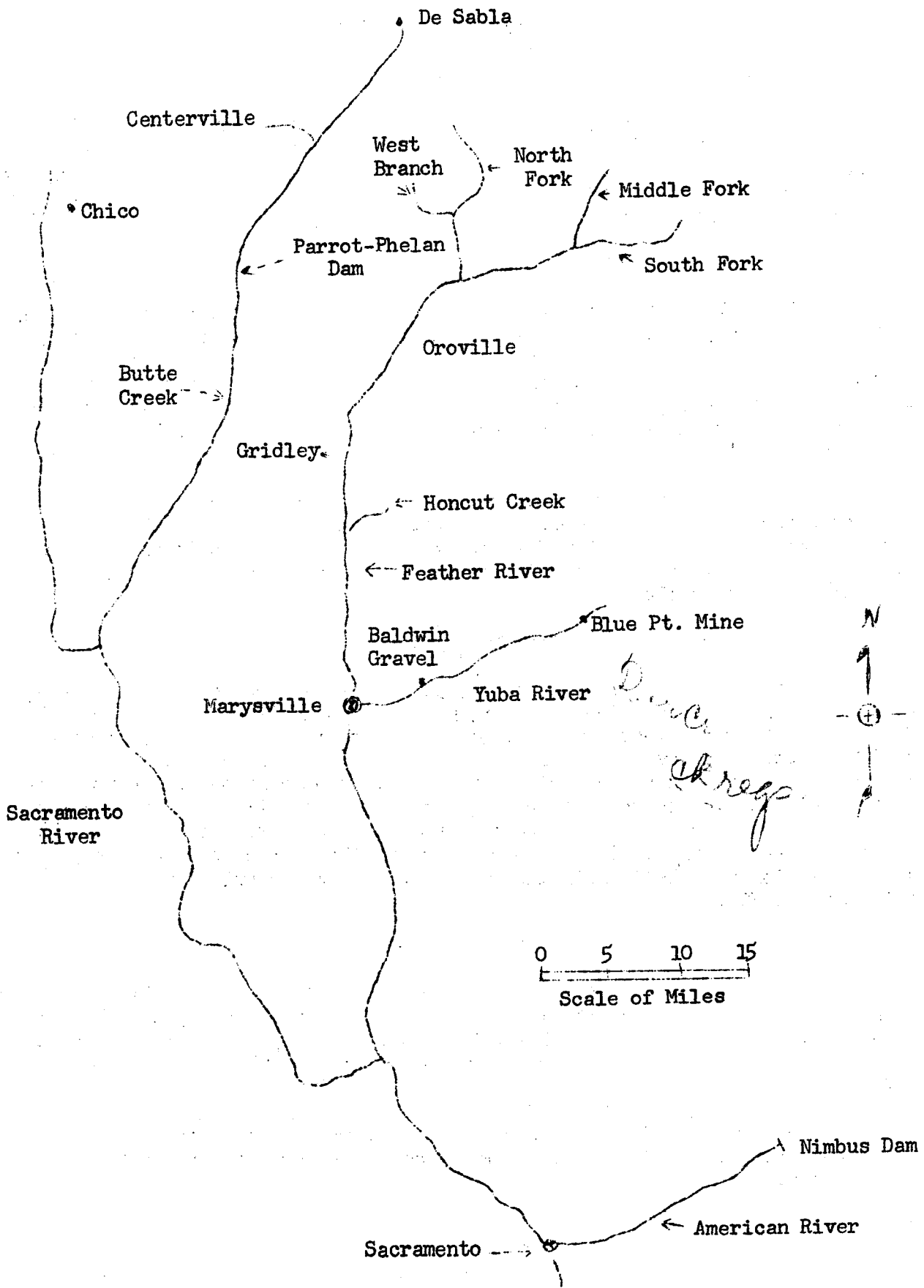


Figure 2. Sacramento River Tributaries South of Chico Creek Examined During the 1958 Spawning Area Survey

SAN JOAQUIN RIVER SYSTEM

Cosumnes River

Flows in the Cosumnes River remained low throughout the spawning season. Four survey trips were made between Michigan Bar and Sloughhouse. One hundred and seventy five salmon carcasses were recovered. It is estimated that 600 salmon spawned in the Cosumnes River in 1958 with most of the spawning occurring between Michigan Bar and Bridgehouse.

Mokelumne River

The size of the Mokelumne River salmon run was determined by counts made at Woodbridge Dam. The counting station was in operation from October 1 to January 8. A total of 6,940 king salmon was counted over the dam during that time. An additional 639 salmon were transferred from Nimbus Hatchery to the Mokelumne early in the season when American River water temperatures were too high for successful spawning, thus making the total number of king salmon spawners in the Mokelumne 7,579.

The 1958 run of king salmon on the Mokelumne was one of the largest recorded in recent years. However, pollution from several sources and reductions in flows combined to destroy much of the efforts of this run. Post season investigations have indicated that considerable egg mortality has resulted from pollution.

Stanislaus River

Five counting trips were made on the stream section between Goodwin Dam and Orange Blossom Bridge and four between Orange Blossom Bridge and Riverbank. Flows on those days the stream was surveyed varied from a high of 804 c.f.s. to a low of 159 c.f.s. These flows regulated at Goodwin Dam are considerably higher and varied more than those occurring in recent years during the spawning season. As a result of the fluctuations an undetermined number of redds were lost. An investigation of the losses is being carried on at the present time. Seven hundred seventy three carcasses were recovered on the Stanislaus. It is estimated that the spawning population of king salmon was 5,700.

Tuolumne River

Seven counting trips were made on the Tuolumne between La Grange and Rairden's Ranch and six on the lower sections between Rairden's and the Reed Rock Plant, located approximately one-half mile above the Waterford Bridge. The stream section between La Grange and Rairden's was the one most heavily utilized by spawners.

A total of 7,741 salmon carcasses was recovered on the Tuolumne. It is estimated that 32,500 king salmon spawned in the Tuolumne during the 1958 season.

Extreme flow fluctuations again plagued the Tuolumne in 1958. Flows ranged between 800 and 2600 c.f.s. on those days the stream was surveyed. Much of the spawning occurred at the higher flows which resulted in the exposure of a large number of redds at the lower flows.

Merced River

The Merced River, between Shaffer Dam and Cressey Bridge was examined for carcasses three times during the season. Flows during the season varied from a low of 35 c.f.s. to a high of 209 c.f.s. The latter flows are unusually high for the Merced, particularly when the scarcity of rainfall during the fall of 1958 is considered. These higher flows permitted movement of salmon above Shaffer Dam to the Snelling area. This area was partially surveyed but no population estimate was made.

Twenty-one carcasses were recovered on the Merced River. The king salmon spawning population in the area surveyed is estimated to be 500.

TABLE 4

King Salmon Carcass Recovery and Population Estimates
for San Joaquin River Tributaries, 1958

| Stream and/or stream section | No. of counting trips | No. of salmon counted* | Estimated spawning population |
|-------------------------------------|-----------------------|------------------------|-------------------------------|
| Cosumnes River | | | |
| Michigan Bar to Sloughouse | 4 | 175 | 600 |
| Mokelumne River | - | 7,579 | 7,579** |
| Stanislaus River | | | |
| Goodwin Dam to Knights Ferry | 5 | 14 | 300 |
| Knights Ferry to Orange Blossom Br. | 5 | 651 | 3,300 |
| Orange Blossom Br. to Oakdale | 4 | 82 | 1,600 |
| Oakdale to Riverbank | 4 | 26 | 500 |
| Stream Total | | | (5,700) |
| Tuolumne River | | | |
| La Grange to Rairden's Farm | 7 | 4,152 | 13,700 |
| Rairden's to Roberts Ferry Bridge | 6 | 1,875 | 9,400 |
| Roberts Ferry to Reed Rock Plant | 6 | 1,714 | 9,400 |
| Stream Total | | | (32,500) |
| Merced River | | | |
| Shaffer Dam to Cressey Bridge | 3 | 21 | 500 |
| Totals | | 16,289 | 46,879 |

* Includes skeletons

** Includes 639 fish transferred from Nimbus Hatchery

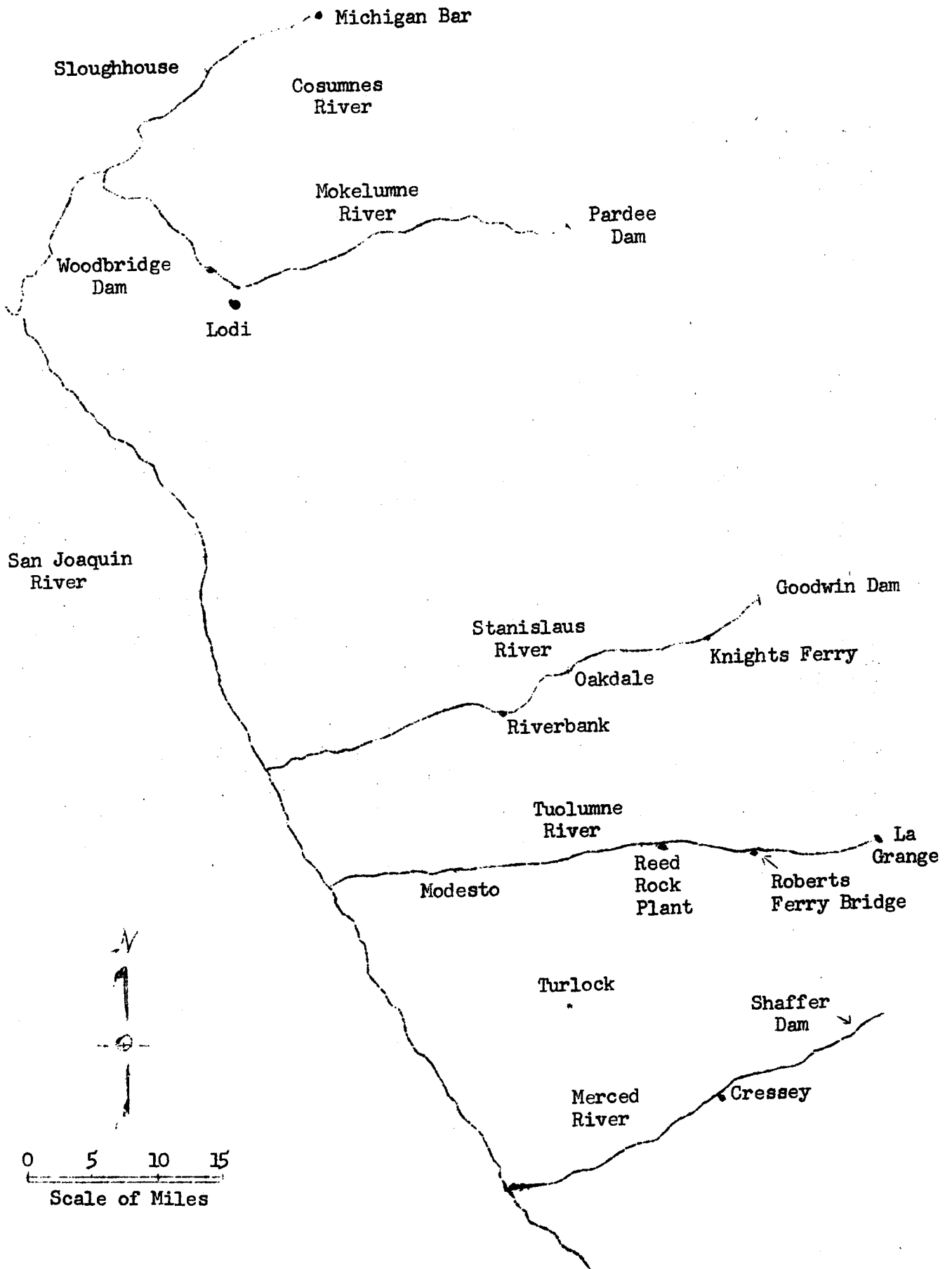


Figure 3. San Joaquin River Tributaries Examined During 1958 Spawning Area Survey

SILVER SALMON

The following counts and carcass recoveries of silver salmon (Oncorhynchus kisutch) were made during the season: Coleman Station, 667; Mill Creek, Clough Dam, 540; Mill Creek below Clough Dam, 17; Gover Ditch (Battle Creek), 7; Battle Creek, 48; Sacramento River, 2; Mokelumne River, 4; American River, Nimbus Hatchery, 9.

No estimates of the number of silver salmon spawners utilizing Central Valleys streams were made.

SUMMARY

The annual salmon spawning stock survey was again conducted by the California Department of Fish and Game in 1958.

Estimates of the salmon spawning population were obtained primarily by counting salmon carcasses, estimating the percentage of the run counted, then, using this data, calculating the total population for each stream or stream section. Live fish counts at salmon hatcheries and dams where counting stations were in operation and aerial redd counts were also used in preparing estimates.

During the survey 70,515 king salmon, both carcasses and live fish, were examined. It is estimated that 289,600 king salmon spawned in the Sacramento-San Joaquin River system during the 1958 season of which 242,700 spawned in the Sacramento River and tributaries and 46,900 in the San Joaquin tributaries.

The 1958 Central Valley total of 290,000 king salmon spawners is a healthy increase over the runs of the two previous years, 120,000 in 1957 and 170,000 in 1956, but well below the 400,000 of 1955 and 500,000 of 1954. It is estimated that 500,000 spawners are required annually to maintain the resource at a high level of production.