

KING SALMON SPAWNING STOCKS IN CALIFORNIA'S CENTRAL VALLEY, 1963

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INTRODUCTION

This report covers the tenth annual Central Valley king salmon (Oncorhynchus tshawytscha) spawning stock enumeration. Estimates and counts were made principally of fall-run stocks. On a few streams, separate spring-run salmon stock estimates are included. Some spring-run salmon are included in the fall-run estimates for the Upper Sacramento and areas of the Feather River where an overlap in spawning period makes impractical the separation of fall- and spring-run stocks. Winter-run salmon start to enter the Upper Sacramento River about the time the surveys end. Winter-run salmon are almost entirely confined to the main stem of the Sacramento. No estimate has been made of their numbers, and presumably few if any are included in these counts. The total spawning stock estimate for this season was 303,000 (302,929) salmon.

METHODS

Most of the 1963 population figures were determined by counting dead salmon and estimating what percentage of the run was counted. These estimates were used to compute the total population for each stream or stream section -- the same method used for past assessments. Conditions such as flow, turbidity, and number of counting trips, which would affect each estimate were considered.

Carcasses recovered were examined for fin marks, tags, sex, and completeness of spawning, then cut in half with a machete to prevent recounting these fish on subsequent trips. Aerial redd counts were used as a basis of population estimates in some stream sections where carcasses were not counted. Some figures came from ladder counts and counts at hatcheries or egg-collection stations.

Some administrative changes went into effect beginning with the 1962 survey season. The revised procedure gave Regions 1, 2, and 4 the responsibility of performing all survey work and gave Marine Resources Branch the responsibility of coordinating the work to assure uniformity of survey methods and of combining all pertinent information into one annual report. Spawning stock surveys were conducted by twelve Department of Fish and Game personnel, as follows: Region 1, four; Region 2, six; and Region 4, two. This does not include personnel at counting stations.

MAIN STEM OF SACRAMENTO RIVER
(Figure 1 and Table 1)
by Curt Hiser - Region 1

The survey period began on October 1, 1963 and ended January 15, 1964.

Fall Run

During the spawning season, water releases from Keswick Dam were greater than usual (in excess of 6,000 cfs) and fairly constant. The water was fairly clear for most of the season, and carcass recovery conditions were considered to be twice as good as last year when high, muddy flows persisted through the entire survey period.

The methods used to estimate the population in various sections of the main Sacramento River were as follows: 1) From A.C.I.D. Dam to Tehama, the estimate was based on carcass recoveries. 2) From Tehama to Hamilton City, the estimate was based on aerial counts of redds and live fish on spawning riffles.

A survey was made between Keswick Dam and A.C.I.D. Dam from the ground and air, but because of insufficient data, no estimate was made. The boards at A.C.I.D. Dam were removed on December 3, 1963, allowing salmon to go over the dam. Spawning above A.C.I.D. Dam was observed for the first time on December 7, 1963, which is later than spawning usually takes place. Only seven carcasses were recovered.

There were 3,134 salmon carcasses examined on the main stem Sacramento River between Keswick Dam and Squaw Hill Bridge. The estimated number of spawners was 146,000 (145,681); this includes 3,681 fish trapped at Keswick Dam and spawned at Coleman hatchery.

Spring Run

No separate estimate was made. A small number of spring-run fish may have been included in the fall count.

SACRAMENTO RIVER TRIBUTARIES NORTH OF CHICO CREEK
(Figure 1 and Table 2)
by Curt Hiser and Terry Healey, Reg. 1

Clear Creek

Fall Run

Water releases into Clear Creek from Whiskeytown Reservoir were large during the spawning season. The flow in the spawning area was fairly steady, at about 1,200 to 1,600 cfs. This high flow attracted large numbers of spawners into Clear Creek. Spawning started early in October, and reached a peak in the third week of November. Some spawning continued into February. On Feb. 17 and 18, Region 1 biologists observed some live fish and freshly spawned-out carcasses on the spawning grounds.

In all, six survey trips were made and 1,169 carcasses were recovered on Clear Creek. The run was estimated at 10,000 fish between the mouth and McCormick-Saeltzer Dam. This was the largest run ever estimated for Clear Creek. No salmon went above the dam.

Spring Run

None.

Cottonwood Creek

Fall Run

Salmon were observed in the South, Middle, and North forks of Cottonwood Creek. The estimated spawning population of 3,500 fish was based on aerial observations. No ground surveys were made.

Spring Run

No estimate made.

Battle Creek

Fall Run

This year's run was estimated to be better than last. Recovery conditions were good all season, with constant flows and clear water.

There were 2,476 carcasses recovered. The total Battle Creek run was estimated at 17,500 (17,514) salmon.

Spring Run

No estimate made.

Antelope Creek

Fall Run

All of the fish spawned below Cone Grove this season. Last season, some fish spawned in the area above as well. Recovery conditions were considered good.

There were 42 carcasses recovered on Antelope Creek. The total run was estimated at 300 fish.

Spring Run

No estimate made.

Mill Creek

Fall Run

Recovery conditions were considered good this season. Fish spawned over a longer period this year, and a few were observed spawning as late as January. There was no well-defined peak in the run.

There were 62 carcasses recovered below Clough Dam on Mill Creek. The Clough Dam ladder count was 184 salmon. The Mill Creek fall run was estimated at 1,300 (1,286) fish.

Spring Run

The number counted over Clough Dam was 1,315. This was lower than the 1962 count.

Winter Run

A few winter-run salmon spawned below Clough Dam, but it was believed that high water temperatures prevented the eggs from hatching.

Deer Creek

Fall Run

The peak of the run occurred the first week in December. Flows were less than 200 cfs most of the time and resulted in good recovery conditions.

There were 117 salmon carcasses recovered on Deer Creek. The run was estimated at 1,200 (1,249) fish.

Spring Run

A counting station was installed at Stanford Vina Dam in time to count the spring run. The number counted was 1,702. An estimated additional 300 to 500 salmon died from low flows and high water temperatures below the dam in June.

Winter Run

A few winter-run salmon spawned below Stanford Vina Dam. Redd sampling indicated that high water temperatures resulted in complete egg mortality.

Other Tributaries North of Chico Creek

It was not known how many of the other tributary streams to the Upper Sacramento River had salmon spawning in them during the 1963 season.

Regional personnel were not available to make surveys in these streams; therefore, no estimates were made.

SACRAMENTO RIVER TRIBUTARIES, CHICO CREEK AND SOUTHWARD (Figure 2 and Table 3) by William White, Region 2

Carcass survey operations were carried out on the Sacramento River tributary streams from Chico Creek, south, from September 26, 1963 to January 23, 1964.

Chico Creek

Fall Run

None; there was not sufficient water to permit migration through the lower part of the stream.

Spring Run

Two survey trips were made on Chico Creek from Higgins Hole (near Ponderosa Way) downstream to Salmon Hole, a distance of about 14 miles. Survey conditions were very good. The water was clear and low. Most of the fish were in the upper area near Higgins Hole. However, twenty live salmon were also seen in the Iron Canyon area (located just above Salmon Hole) where the fishway was being constructed.

The population of spring-run king salmon in Chico Creek was an estimated 500 fish. This estimate was based on counts of carcasses, redds, and live fish.

Butte Creek

Fall Run

No estimate made.

Spring Run

Spawning took place between Centerville Powerhouse and the Paradise Highway Bridge. The flow from Centerville Powerhouse was constant at 150 cfs during the spawning season. Recovery conditions were good. Peak of spawning occurred about the beginning of the fourth week in September. This year's spawning population estimate in this section, as in the past three years, was based on a tag and recovery method.

There were 2,011 carcasses recovered on Butte Creek. The spawning run was estimated at 4,600 fish.

In addition, an estimated 1,500 salmon were stranded in the stream section between DeSabra and Centerville Powerhouses. Fish enter this area in the spring when water is high. In the summer, flows drop to about five cfs. Most of the salmon were caught by fishermen during regular trout season, and on Aug. 27, 1963, it was estimated that only 100 live salmon remained in this section. No survey trips were made during the spawning season to determine if any of these fish had spawned.

Feather River

South Fork

Fall Run and Spring Run. Two aerial surveys were made in this section, and no salmon or redds were seen. Water flows were very low.

Middle Fork

Fall Run. From junction of South Fork to junction of North Fork, only fall-run fish were observed. Based on aerial redd counts, the estimate was 1000 fish.

Spring Run. From Bald Rock to junction of South Fork, only spring-run fish were observed. Based on aerial redd counts, the estimate in this section was 600 fish.

West Branch of North Fork

Fall Run. Heavy October rains provided suitable water flows for salmon in this stream again this year. Based on an aerial survey conducted Oct. 21, 1963, the run was estimated at 300 fish.

Spring Run. One aerial survey was made and no fish were seen from Yankee Hill Bridge downstream to confluence with North Fork. Flows were probably too low and water temperatures too high to maintain salmon.

North Fork and Main Stream
Downstream to Oroville Bridge

Fall Run and Spring Run. The spawning population appeared to be considerably larger than last year's. Muddy water made counting extremely difficult in the lower section.

Based on aerial surveys, the spawning run was estimated to be 4,500 salmon; most of these were fall-run fish.

Tributaries to Natomas East
Drain and Natomas Cross Canal (continued)

Fall Run (continued). The combined estimate in these streams, based on carcass recoveries, live fish counts, and redd counts, was 460 fish.

Spring Run. None.

LOWER SAN JOAQUIN RIVER TRIBUTARIES
(Figure 3 and Table 4)
by William White, Region 2

The survey period was from October 22, 1963 to December 30, 1963.

Cosummes River

Fall Run

The best run in several years ascended the Cosummes River after heavy rains in October. Some spawning was observed for several miles upstream from Michigan Bar. Recovery conditions were good during most of the survey period.

Based on 273 carcasses recovered, the population was estimated to be 1,500 fish.

Spring Run

None.

Mokelumne River

Fall Run

The annual salmon count was taken over Woodbridge Dam from October 3 through December 20, 1963. Water flows were more than ample to provide fish transportation.

The number of salmon counted over the dam was 481. (A few fish were reported to have gone through the ladder before the trap was installed.)

Spring Run

None.

UPPER SAN JOAQUIN RIVER TRIBUTARIES
(Figure 3 and Table 4)
by Jerry Goertzen, Region 4

The survey period was from November 12, 1963 to January 15, 1964.

Stanislaus River

Fall Run

Water clarity was good except for one section below Oakdale where a gravel company caused heavy siltation. Flows were steady at about 150 cfs most of the time. Most of the spawning took place in the upper area.

Stanislaus River (continued)

Fall Run (continued)

Carcass recovery was poor, especially in the lower areas due to a heavy waterweed growth in the river. Some carcasses were washed under this weed growth, making them difficult to find. Water weeds also have been encroaching on the spawning areas, and silt has been settling out in these weed-beds, inundating the spawning riffles. There was no evidence of a late run occurring in January.

There were 37 carcasses recovered on the Stanislaus River. The spawning run was an estimated 200 fish, the smallest run yet reported.

Spring Run

None.

Tuolumne River

Fall Run

Flows in the river were very high and fluctuated between 900 and 2,200 cfs throughout the season. Recovery conditions were poor due to these turbid and high flows washing carcasses into dense willow growths.

There were nine carcasses recovered on the Tuolumne River. The fall-run estimate of 100 fish is also the smallest on record.

In early February when flows were reduced, the crew made another survey of the river to inspect the riffle areas. There was no evidence of any recent spawning. However, three spawned-out carcasses and one live fish were found in the upper section, indicating there was some spawning in January.

Spring Run

None.

Merced River

Fall Run

Flows were low again this season. Recovery conditions were fair to good in most sections.

There were no carcasses recovered in the Merced River. Based on live fish and redd counts, the run was estimated at 20 fish.

Spring Run

None.

TABLE 1

FALL-RUN* KING SALMON COUNTS AND POPULATION
ESTIMATES FOR THE MAIN STEM OF THE SACRAMENTO RIVER, 1963

River Section	Number counting trips	Number carcasses & skeletons counted	Estimated spawning population
Keswick Dam Fish Trap	-	-	3,681**
Keswick Dam to A.C.I.D. Dam	3	7	-
A.C.I.D. Dam to Hwy. 44 Bridge	14	1,214	34,000
Hwy. 44 Bridge to Upper Anderson Bridge	14	1,043	50,000
Upper Anderson Bridge to Ball's Ferry	14	432	15,000
Ball's Ferry to Jelly's Ferry	14	305	20,000
Jelly's Ferry to Iron Canyon	4	26	6,600
Iron Canyon to Red Bank Creek	4	57	9,600
Red Bank Creek to Tehama	4	50	5,200
Tehama to Squaw Hill Bridge	-	-	1,500
Squaw Hill Bridge to Hamilton City	-	-	100
TOTAL, SACRAMENTO MAIN STEM		<u>3,134</u>	<u>145,681</u>

* A few spring-run fish probably were included in the estimates.

** Trap counts. This count includes fish taken through February 19, 1964.

TABLE 2

KING SALMON COUNTS AND POPULATION ESTIMATES
FOR SACRAMENTO RIVER TRIBUTARIES NORTH OF CHICO CREEK, 1963

Stream and/or Stream Section	Number counting trips	Number carcasses & skeletons counted		Estimated spawning population	
		Sub-totals	Total	Sub-totals	Total
<u>Clear Creek</u> (fall run only)	6		1,169		10,000
<u>Cottonwood Creek</u> (fall run only)	-		-		3,500*
<u>Battle Creek</u> (fall run only)			2,476		17,514
Coleman Hatchery	-	-		5,114**	
Below Coleman Hatchery	12	2,436		12,000	
Gover Ditch	2	40		400	
<u>Antelope Creek</u> (fall run only)	1		42		300
<u>Mill Creek</u>			62		2,601
Fall run: Above Clough Dam	-	-		184***	
Below Clough Dam	1	62		1,000	
North Fork	-	-		102****	
Total Fall Run		62		1,286	
Spring run: Total, all above Clough Dam	-	-		1,315***	
<u>Deer Creek</u>			117		2,951
Fall run: Above Stanford Vina Dam	-	-		49*****	
Below Stanford Vina Dam	1	117		1,200	
Total Fall Run		117		1,249	
Spring run: Total, all above Stanford Vina Dam	-	-		1,702	
TOTAL, NORTHERN SACRAMENTO RIVER TRIBUTARIES			<u>3,866</u>		<u>36,866</u>

* Based on aerial fish counts.

** Trap counts from October 1, 1963 to January 31, 1964.

*** Ladder counts- spring run began on March 13, 1963 and ended on July 6, 1963; fall run began on October 14, 1963 and ended on Dec. 20, 1963.

**** Only four of these fish ran into North Fork, the others were transferred from a trap in Mill Creek.

***** Ladder counts- spring run began on Mar. 20, 1963 and ended on June 12, 1963; fall run began on Oct. 13, 1963 and ended on Jan. 19, 1964.

TABLE 3

KING SALMON COUNTS AND POPULATION ESTIMATES FOR SACRAMENTO
RIVER TRIBUTARIES - CHICO CREEK SOUTH, 1963

Stream and/or Stream Section	Number counting trips	Number carcasses & skeletons counted		Estimated spawning population	
		Sub-totals	Total	Sub-totals	Total
<u>Chico Creek</u> (spring run only) Higgins Hole to Salmon Hole	2		7		500
<u>Butte Creek</u> (spring run only) Centerville Powerhouse to Paradise Road Bridge	2		2,011		4,600*
<u>Feather River</u>			1,159		34,500
South Fork (fall & spring run)	2	-		-	
Middle Fork (fall run)	1	-		1,000**	
Middle Fork (spring run)	1	-		600**	
West Branch of N.Fork (all fall run)	1	-		300**	
N.Fork & Main Stream to Oroville Bridge (mostly fall run)	2	-		4,500**	
Main Stream (all fall run)					
Oroville Br. to Sutter Butte Dam	7	352		7,000	
Sutter Butte Dam to Gridley	7	659		16,500	
Gridley to Honcut Creek	7	148		4,600	
<u>Yuba River</u> (all fall run)			3,896		37,000
Blue Pt. Mine to Hwy. 20 Br.	6	297		3,700	
Hwy. 20 Br. to Daguerre Pt. Dam	6	1,576		13,100	
Daguerre Pt. Dam to Baldwin Gr.Pl.	6	2,023		20,200	
<u>American River</u> (essentially all fall run)			7,977		41,021
Nimbus Hatchery	-	-		3,211***	
Nimbus Dam to Hatchery racks	-	810		810	
Hatchery racks to Del Paso Gr.Pl.	9	7,167		37,000	
<u>Natomas Drainage</u> (fall run only)	1		7		460
TOTAL, SOUTHERN SACRAMENTO RIVER TRIBUTARIES			<u>15,057</u>		<u>118,081</u>

* Based on tag and recovery data (unpublished Butte Creek report).
 ** Based on aerial redd counts.
 *** Ladder counts are from Sept. 1, 1963 to Feb. 25, 1964.
 Some fish taken in gill nets at Nimbus Dam are included in this count.

TABLE 4

FALL-RUN* KING SALMON COUNTS AND POPULATION ESTIMATES FOR
SAN JOAQUIN RIVER TRIBUTARIES, 1963

Stream and/or Stream Section	Number counting trips	Number carcasses & skeletons counted	Estimated spawning population
<u>Cosummes River</u> Michigan Bar to Sloughhouse	7	273	1,500
<u>Mokelumne River</u>	-	-	481**
<u>Stanislaus River</u> Goodwin Dam to Riverbank	4	37	200
<u>Tuolumne River</u> La Grange to Reed Rock Plant	4	9	100
<u>Merced River</u> Shaffer Dam to McSwain Br.	3	-	20
TOTAL, SAN JOAQUIN TRIBUTARIES		<u>319</u>	<u>2,301</u>

* No spring-run fish entered any of these streams this year.

** Ladder counts. Count began October 3 and ended Dec. 20, 1963.
A few fish went over the dam before count began.

TABLE 5

SACRAMENTO-SAN JOAQUIN KING SALMON SPAWNING STOCKS, 1953-1963
(in thousands of fish)

Year	Sacramento Valley	San Joaquin Valley	GRAND TOTAL Central Valley	STATUS * (% of Base No.)
1953	513	84	597	119
1954	412	75	487	97
1955	369	31	400	80
1956	153	12	165	33
1957	102	15	117	23
1958	237	46	283	57
1959	421	52	473	95
1960	415	56	471	94
1961	247	2	249	50
1962	252	2	254	51
1963	301	2	303	61
11-year Avg:	311	34	345	69

Source: MRB, Salmon/Steelhead Program, Sacramento.

* Base number is 500,000 fall-run salmon. This quantity will fully utilize available spawning areas. Other runs spawn at different times.

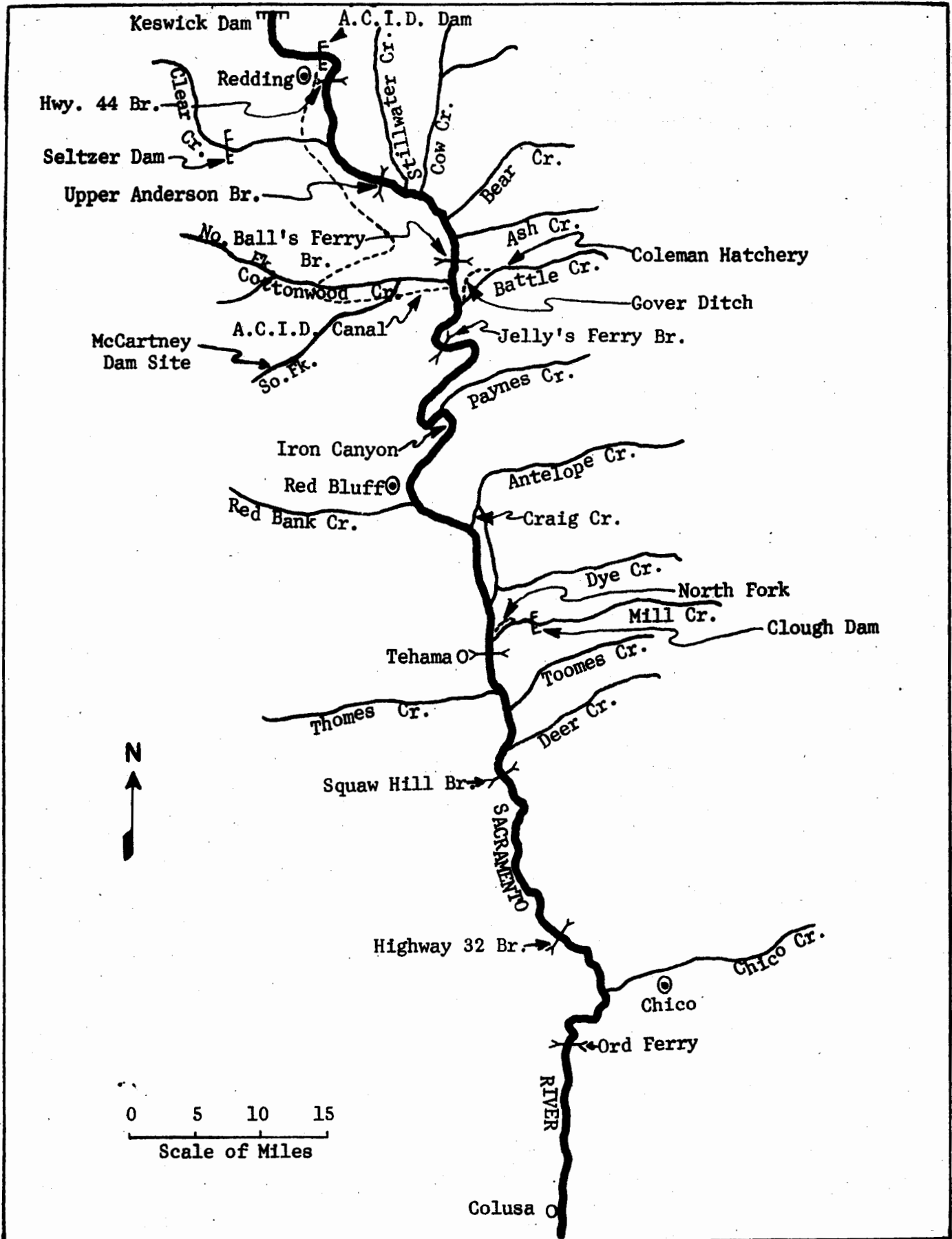


Figure 1. Upper Sacramento River and Tributaries above Chico Creek covered during the 1963 King Salmon Spawning Survey.

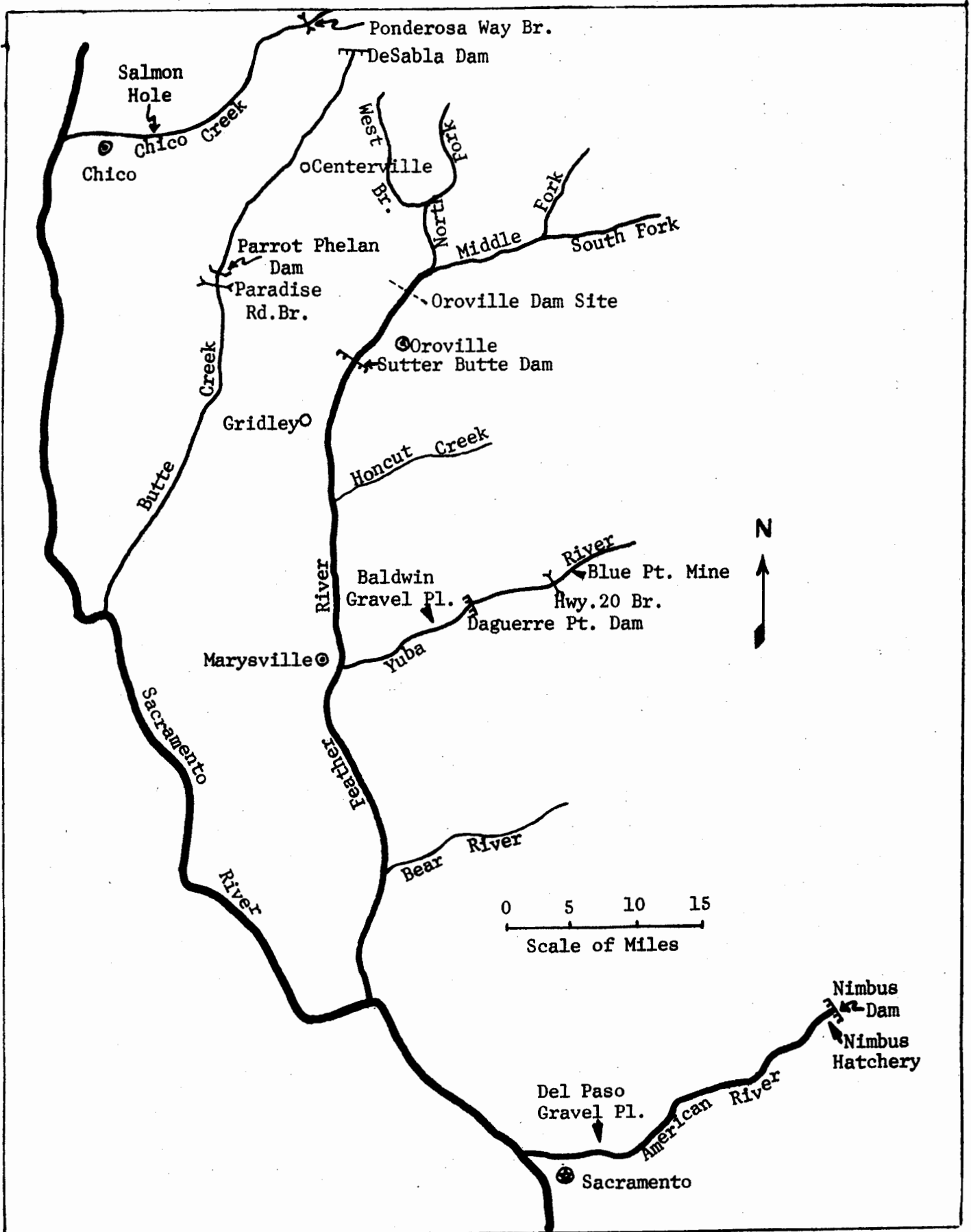


Figure 2. Sacramento River Tributaries from Chico Creek, south, covered during the 1963 Spawning Area Survey.

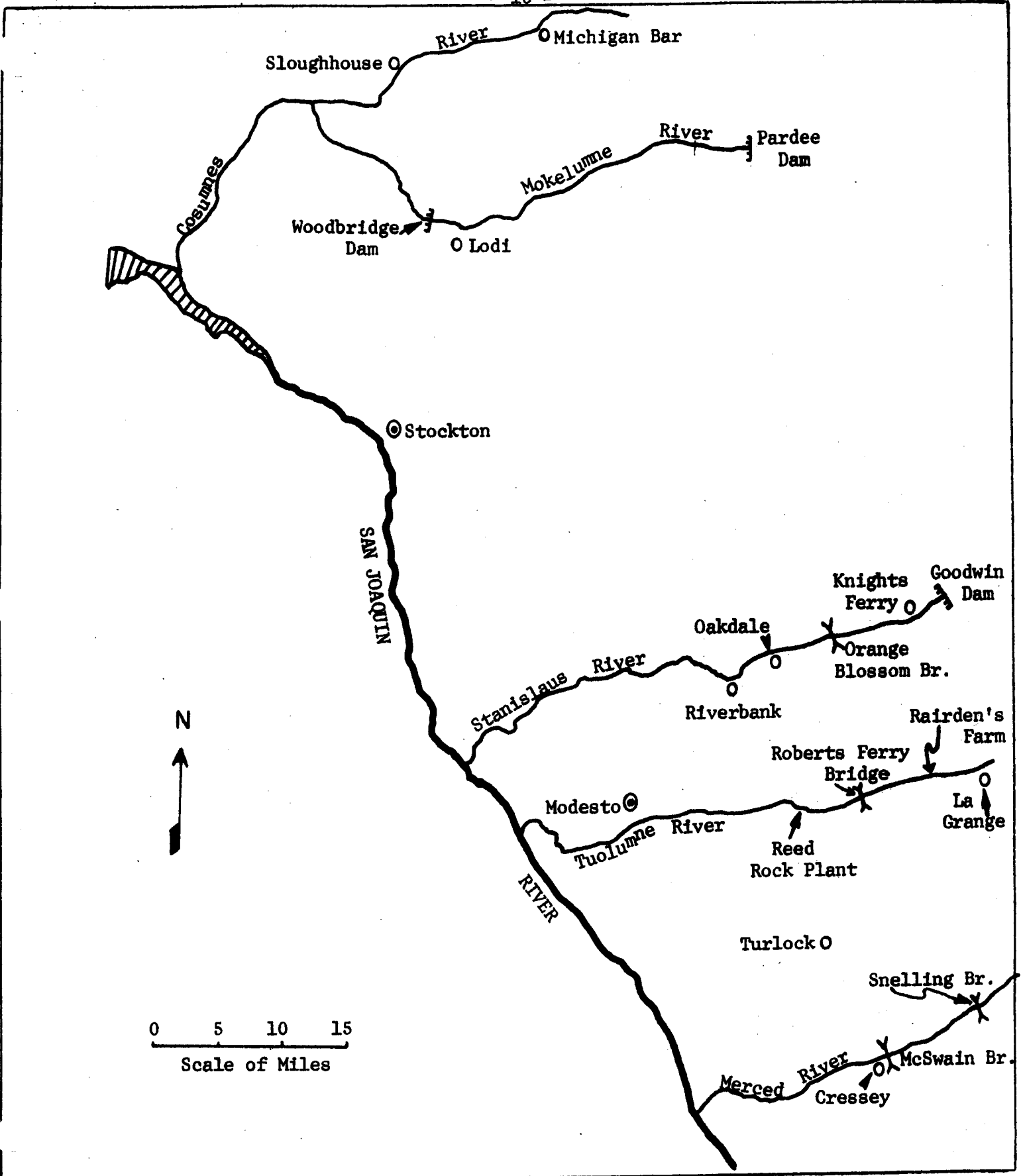


Figure 3. San Joaquin River Tributaries covered during 1963 Spawning Area Survey.