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KING SALMON SPAWNING STOCKS IN CALIFORNIA'S CENTRAL VALLEY, 1962 [1]/

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SUMMARY

During 1962, the California Department of Fish and Game conducted its ninth annual king salmon spawning stock assessment in the Sacramento-San Joaquin River system.

Counts of salmon carcasses, live fish, and redds were used as bases for spawning stock estimates. The salmon in these counts and estimates were primarily fall-run although a few spring-run fish are included, some in separate counts and some unavoidably mixed with the fall fish. No estimates were made of the numbers of winter-run salmon, and few if any are included.

During 1962, an estimated 258,000 (257,751) king salmon spawned in the Sacramento-San Joaquin River system. This is almost identical to last year's total. Of these, 256,000 (99 percent) utilized the main Sacramento River and its major tributaries such as the Feather and American rivers.

King Salmon Counts and Population Estimates
for the Sacramento-San Joaquin River system

Sacramento, Main Stem	138,810
Northern Sacramento River Tributaries (north of Chico Creek)	34,833
Southern Sacramento River Tributaries (Chico Creek and south)	82,353
San Joaquin River Tributaries	1,755

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by
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INTRODUCTION

This report covers the ninth annual Central Valley king salmon (Oncorhynchus tshawytscha) spawning stock enumeration. Estimates and some complete counts were made primarily of fall-run and some spring-run salmon stocks. In some streams, fall-run and spring-run are included together as the overlap in spawning time prevents them from being separated. Winter-run salmon start to enter the upper Sacramento River about the time the surveys end. Winter 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 258,000 (257,751) fish. This is almost identical with last year's total.

In most of the larger streams such as the Sacramento, Tuolumne, Feather and American, unusually heavy rainfall during the second week of October caused high and muddy water conditions to prevail for almost the entire spawning season. This resulted in very poor carcass recovery conditions as well as attracting king salmon into tributary streams earlier than usual. This might explain why many of the smaller tributary streams had a better than average run of fish this season. During most years, such streams are too low for fish to enter until late November or December.

METHODS

The 1962 population figures were determined by counting dead salmon, estimating what percentage of the run was counted, and using these factors 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 stream sections where carcasses were not counted.

The estimates in this report are primarily for fall-run fish. Some spring-run salmon are included in estimates for the Upper Sacramento and areas of the Feather River where an overlap in spawning period makes it impractical to make separate counts of fall- and spring-run salmon.

Some administrative changes went into effect beginning with the 1962 survey season. The new procedure gives Regions I, II, and IV the responsibility for coordinating the work to assure uniformity of survey methods as well as

combining all pertinent information into one annual report. Spawning stock surveys were conducted by twelve Department of Fish and Game personnel, as follows: Region I, five; Region II, five; and Region IV, two. This does not include personnel at counting stations.

MAIN STREAM OF SACRAMENTO RIVER
(Figure 1 and Table 1)

The survey period began on October 1, 1962 and ended January 16, 1963.

Fall Run

Water releases from Keswick Dam were greater than usual during this spawning season (in excess of 6,000 c.f.s. during most of the season). High and muddy water during the entire survey period resulted in poor carcass recovery conditions.

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 Red Bank Creek, the estimate was based on carcass recoveries. 2) From Red Bank Creek to Squaw Hill Bridge, the estimate was not based on carcass recoveries but on several observations of live fish on spawning riffles. This basis was used because the counts were not comparable to those made in previous years due to a change in the timing of the survey trips in relation to the timing of the salmon run. 3) From Squaw Hill Bridge to Colusa, no estimate was made. Past years' estimates in this area were based on aerial redd counts, but throughout the 1962 season muddy water prevented aerial counting.

During past years, no survey trips or population estimates were made between Keswick Dam and A.C.I.D. Dam. This season, on January 17, 1963, this area was surveyed by boat. A total of 44 spawned-out carcasses was recovered, and 34 redds were counted from one-half mile below Keswick Dam to A.C.I.D. Dam. These figures, however, were not used to estimate the total extent of spawning in this area. Some effort should be made in the future to determine the amount of spawning in this area.

There were 1,363 salmon carcasses examined on the main stem Sacramento River between A.C.I.D. Dam and Squaw Hill Bridge. The estimated number of spawners was 139,000 (138,810); this includes 14,810 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)

Clear Creek

Fall Run

Heavy rains in October attracted a small spawning run into Clear Creek. No carcass recoveries were made at this time, but spot checks indicated that a few-hundred fish spawned during this early period. A large run spawned during

December. A fluctuating water level increased recovery efficiency by stranding carcasses on gravel beds and along the banks. Two survey trips were made at that time, and there were 1,071 salmon carcasses recovered on Clear Creek. The run was estimated at 5,400 fish between the mouth and McCormick Saeltzer Dam. No salmon were observed above the dam.

Spring Run

No estimate made.

Cow Creek

Fall Run

At times from October through December, there were adequate flows to attract a fair number of spawners into Cow Creek. No carcass recovery trips were made. The estimated spawning population of 1,500 fish was based on aerial redd counts.

Spring Run

No estimate made.

Cottonwood Creek

Fall Run

Salmon took advantage of good transportation flows during the fall to spread out along many miles of Cottonwood Creek. Spawning fish were observed from the mouth to within five miles of old McCartney Dam on South Fork and up to the junction of the North and Middle Forks. No survey trips were made. The estimated spawning population of 6,000 fish was based on aerial redd counts.

Spring Run

No estimate made.

Battle Creek

Fall Run

The run in Battle Creek was considerably below that of the last few years. Recovery conditions were considered good most of the time. It is believed that a few fish spawned above Coleman Hatchery, but no estimate was made.

There were 1,298 salmon carcasses recovered on Battle Creek. The total run was estimated at 13,000 (13,057) fish,

Spring Run

No estimate made.

Antelope Creek

Fall Run

Most of the salmon spawned soon after the heavy October storm. Peak of spawning was estimated at first week in November. There were 115 salmon carcasses recovered on Antelope Creek; total run was estimated at 800 fish.

Spring Run

No estimate made.

Mill Creek

Fall Run

The run came in early due to heavy October rains. Recovery conditions were considered good during the recovery period. Peak of spawning occurred about first week in November.

There were 352 carcasses recovered on Mill Creek. The estimated run of 4,400 (4,384) fish is the best run in several years.

Spring Run

The number counted over Clough Dam was 1,692; this is slightly more than last year's count.

Deer Creek

Fall Run

A good run of salmon entered Deer Creek after heavy October rains. The peak of spawning occurred between the first and second week in November. Recovery conditions were good most of the time. Most of the spawning was between Stanford Vina Dam and Highway 99 Bridge. Some spawning took place upstream from the Irrigation Company Dam (upper diversion dam) on Deer Creek.

There were 610 salmon carcasses recovered on Deer Creek. The run was estimated at 2,000 fish.

Spring Run

No estimate made.

Other Tributaries North of Chico Creek

Most of the other tributary streams to the Upper Sacramento River had salmon spawning in them during the 1962 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)

Carcass survey operations were carried out on the Sacramento River from Chico Creek south, from September 19 to December 27, 1962.

Chico Creek

Fall Run

Water conditions in Chico Creek are seldom suitable to provide transportation flows for fall-run salmon. In 1962, however, heavy rainfall in early October caused a heavy runoff, and reports were received from the local warden and interested sportsmen that salmon were in the stream. These reports were not received in time to confirm by personal observation, and no estimate can be given as to numbers involved. It is apparent, however, that fall-run salmon will enter Chico Creek to spawn when stream conditions are suitable.

Chico Creek (continued)

Spring Run

Two survey trips were made on Chico Creek from Higgins Hole downstream to Salmon Hole, a distance of about 14 miles. The first trip was on September 19; one spent female was recovered and 13 live salmon were observed in the immediate vicinity of Higgins Hole. Survey conditions were very good. The water was clear and low.

The second trip, on October 10, was made under very adverse conditions. Heavy rain and rapidly rising and turbid water was cause to terminate the survey at Ponderosa Way, approximately one and one-half mile downstream from the start at Higgins Hole. Two carcasses were recovered, one female and one male, both spent. Thirteen live salmon were again observed in Higgins Hole.

The population of spring-run king salmon in Chico Creek was an estimated 200 fish. This figure is based on the estimate that the number of fish observed was about eight percent of the total number of fish in the stream.

Butte Creek

Fall Run

No estimate made.

Spring Run

Most of the fish spawned between Centerville Powerhouse and Parrot-Phelan Dam. The flow from Centerville Powerhouse was about 130 c.f.s. during most of the spawning season. Recovery conditions were good. Peak of spawning occurred about the beginning of the fourth week in September. A separate detailed report is being prepared for publication describing the 1962 Butte Creek study.

A few salmon were stranded in the stream section between DeSabla and Centerville Powerhouses again this year. Fish enter this area in the spring when water is high. In the summer, flows drop to about two c.f.s. On July 11 and 12, 1962, 48 live and 2 dead salmon were counted in pools. No survey trips were made during the spawning season to determine if any of these fish had spawned.

This year's spawning population estimate in this section, as in the past two years, was based on a tag and recovery method. There were 525 carcasses recovered on Butte Creek. The spawning run was estimated at 1,750 fish.

Feather River

South Fork

Fall Run: Heavy rains during October provided transportation flows for salmon to enter this area for the first time in several years. From an aerial survey on November 2, 1962, it was estimated that 300 salmon entered this stream. Spawning was probably unsuccessful as receding flows stranded most of the fish in unsuitable spawning areas.

Spring Run: An aerial survey was made on October 2, 1962. Water flows were very low and there was no evidence of any salmon.

Middle Fork

Fall Run and Spring Run: The estimate in the Middle Fork, based on aerial redd counts, was 300 fish. This is about one-third as large as last year's estimate. Most of these were fall-run fish.

West Branch of North Fork

Fall Run: Heavy October rains provided suitable water flows for salmon in this stream for the first time in several years. Based on an aerial survey on November 2, 1962, the run was estimated at 200 fish.

Spring Run: One survey trip was made from about one-mile above Yankee Hill Bridge downstream to the confluence with North Fork. No fish were seen. Flows appeared to be too low and temperatures too warm to maintain salmon.

North Fork and Main Stream Downstream to Oroville Dam Site

Fall Run and Spring Run: The spawning population was considerably lower than the last year's. Based on aerial surveys, the spawning run was estimated to be 800 fish. Most of these were fall-run. High and roily water made counting extremely difficult.

Main Stream, Oroville Dam Site to Oroville

Fall Run: Counting was extremely difficult because of high and roily water. Based on aerial redd counts, this spawning run was estimated at 50 fish.

Spring Run: No estimate made.

Main Stream, Oroville to Honcut Creek

Fall Run: This year's estimate is less than one-half as large as the last year's. Recovery conditions were poor throughout the spawning season. The river was at flood stage in October, and it remained high and roily for the entire season. Survey crews were able to make only five counting trips due to hazardous water conditions. Under normal conditions, nine counting trips are made on each section. Most of the spawning again occurred between the Sutter Butte Dam and Gridley.

There were 922 carcasses recovered (this is about one-quarter as many as recovered in 1961). The total Feather River run was estimated at 19,000 (19,050) fish.

Spring Run: Biologists working on the river near Sutter Butte Dam reported seeing some spring-run salmon during August. No spawning was reported and no estimate was made.

Yuba River

Fall Run

The river was at flood stage during part of October. The water remained high and roily throughout the entire season. Recovery conditions were poor and survey trips hazardous. Due to these conditions, recovery trips were reduced to less than one-half of normal. The main spawning activity again occurred between Daguerre Point Dam and Baldwin Gravel Plant.

In spite of adverse conditions 3,034 carcasses were recovered. This is almost twice the number examined last year under good recovery conditions. This year's estimate of 34,000 (34,300) fish is by far the largest estimated run in recent years.

Spring Run

No estimate made.

American River

Fall Run

Recovery conditions were poor throughout the spawning season. River flows ranged from 1,500 to 5,000 c.f.s. However, conditions were not as bad as those experienced on the Feather and Yuba rivers. Most of the fish spawned between the hatchery racks and Carmichael pumping plant.

The survey crew recovered 2,119 carcasses below the hatchery racks. A total of 27,000 (27,053) salmon was estimated to have spawned in the American River (slightly more than last year's estimate). Of this total, 12,653 fish entered the hatchery (this includes 3,342 grilse); from these fish, 17 million eggs were taken.

Spring Run

No separate estimate made.

Other Tributaries - Chico Creek, South

Bear River

Fall Run only

In November 1962, two live salmon and two redds were observed in Bear River, tributary to the Feather River. No estimate of the run was made.

Minors Ravine

Fall Run only

After heavy October rains, several reliable reports were received of live salmon present in Minors Ravine at Cavitt and Stallman Roads and in other sections of the Ravine near the town of Roseville. No estimate of the run was made.

SAN JOAQUIN RIVER SYSTEM
(Figure 3 and Table 4)

The survey period was from October 30, 1962 to January 11, 1963.

Cosumnes River

Fall Run only

Salmon were able to ascend the Cosumnes River during October for the first time in several years. This was due to suitable water flows caused by heavy rains early in October. Recovery conditions were fair during the survey period. From 133 carcasses recovered, the population was estimated at 900 fish.

Mokelumne River

Fall Run only

The annual salmon count was made at the Woodbridge fishway trap from September 29 through December 19, 1962. Water flows were more than ample to provide transportation, but roily water conditions prevailed through the season.

A count of 230 fish is the second lowest count ever recorded here. A few fish were reported to have gone through the ladder before the trap was installed.

Stanislaus River

Fall Run only

Flows were higher than during the 1961-62 season, but fluctuated between 69 and 918 c.f.s. Water clarity was good except for one section below Oakdale where a gravel company caused heavy siltation.

Carcass recovery was poor due to a heavy water weed growth in the river. It is believed that carcasses were washed under this weed growth making them difficult to find. The number of runs was reduced this year due to salmon arriving late and the lack of salmon. The peak of spawning was about November 30, 1962. There was no evidence of a late run occurring in January, as reported last season.

There were 13 carcasses recovered on the Stanislaus River. The spawning run was an estimated 315 fish, the smallest estimate on record.

Tuolumne River

Fall Run only

Flows in the river were high and stayed constant at about 500 c.f.s. for the first part of the 1962 season. From about the first week of December on, the water district fluctuated the flow daily from 500 to over 1,000 c.f.s.

Peak of the spawning run was about November 30, 1962. Recovery conditions were considered good in spite of turbid water at the higher flows. Carcasses were washed against established willows where they were recovered fairly easily. There were 26 carcasses recovered on the Tuolumne River. The population estimate of 250 fish is the smallest estimate on record.

Merced River

Fall Run only

Flows were low again this season. Recovery conditions were fair to good in most sections. There were two carcasses recovered in the Merced River.

Based on carcass recoveries, the run was estimated at 60 fish.

TABLE 1

FALL-RUN* KING SALMON COUNTS AND POPULATION ESTIMATES FOR THE MAIN STEM OF THE SACRAMENTO RIVER, 1962

River Section	Number counting trips	Number carcasses & skeletons counted	Estimated spawning population
Keswick Dam Fish Trap	-	-	14,810 **
A.C.I.D. Dam to Hwy. 44 Bridge	15	436	23,000
Hwy. 44 Bridge to Upper Anderson Bridge	15	503	45,000
Upper Anderson Bridge to Ball's Ferry	13	189	14,000
Ball's Ferry to Jelly's Ferry	12	107	16,500
Jelly's Ferry to Iron Canyon	6	33	11,000
Iron Canyon to Red Bank Creek	5	22	6,000
Red Bank Creek to Tehama	7	54	6,500
Tehama to Squaw Hill Bridge	5	19	2,000
Squaw Hill Bridge to Hwy. 32 Bridge)			
Hwy. 32 Bridge to Ord Ferry)		No estimates made	
Ord Ferry to Colusa)			
TOTAL, SACRAMENTO MAIN STEM		1,363	138,810

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

** Trap counts -- 2,473 late spawners taken from February 1 through February 27, 1963 are included in this figure.

TABLE 2

KING SALMON COUNTS AND POPULATION ESTIMATES
FOR SACRAMENTO RIVER TRIBUTARIES NORTH OF CHICO CREEK, 1962

Stream and/or Stream Section	Number counting trips	Number carcasses & skeletons counted	Estimated spawning population
Clear Creek (fall-run only)	2	1,071	5,400
Cow Creek (fall-run only)	-	-	1,500 *
Cottonwood Creek (fall-run only)	-	-	6,000 *
Battle Creek (fall-run only)			
Coleman Hatchery	-	-	4,857**
Below Coleman Hatchery	12	1,277	8,000
Gover Ditch	2	21	200
TOTAL, BATTLE CREEK		1,298	13,057
Antelope Creek (fall-run only)	2	115	800
Mill Creek			
Fall-run: above Clough Dam	-	-	768***
below Clough Dam	3	352	3,500
North Fork	-	-	116****
Fall-run Total		352	4,384
Spring-run " : all above Clough Dam	-	-	1,692***
TOTAL, MILL CREEK		352	6,076
Deer Creek (fall-run only)	3	610	2,000
TOTAL, NORTHERN SACRAMENTO RIVER TRIBUTARIES		3,446	34,833

* Based on aerial redd counts.

** Trap counts from October 1, 1962 to January 31, 1963. (In November, 23 male king salmon were trucked from Coleman hatchery and placed into Clear Creek fish ladder. These fish are included in Coleman hatchery counts.)

*** Ladder counts - spring run began on March 31, 1962 and ended June 30, 1962; fall run began on October 22 and ended Feb. 17, 1963.

**** Only 13 of these fish ran into North Fork; the others were planted from Ward and Clough Dams.

TABLE 3

KING SALMON COUNTS AND POPULATION ESTIMATES FOR SACRAMENTO RIVER TRIBUTARIES - CHICO CREEK SOUTH, 1962

Stream and/or Stream Section	Number counting trips	Number carcasses & skeletons counted		Estimated spawning population	
Chico Creek (spring-run only)					
Higgins Hole to Ponderosa Way	2	3		200	
Ponderosa Way to Salmon Hole	1	0		0	
TOTAL, CHICO CREEK			3		200
Butte Creek (spring-run only)					
DeSabla Dam to Centerville Power House	1	2		50	
Centerville Power House to Paradise Road Bridge	5	523		1,700*	
TOTAL, BUTTE CREEK			525		1,750
Feather River					
South Fork (mostly fall-run)	2	-		300**	
Middle Fork (mostly fall-run)	2	-		300**	
West Branch of North Fork (all fall-run)	1	-		200**	
North Fork and Main Stream to Oroville Dam Site (mostly fall-run)	2	-		800**	
Main Stream (all fall-run)					
Oroville Dam Site to Oroville	2	-		50**	
Oroville to Sutter Butte Dam	5	123		1,500	
Sutter Butte Dam to Gridley	5	525		10,500	
Gridley to Honcut Creek	5	274		5,400	
TOTAL, FEATHER RIVER			922		19,050
Yuba River (all fall-run)					
Blue Pt. Mine to Hwy. 20 Br.	4	507		5,100	
Hwy. 20 Br. to Daguerre Pt. Dam	4	976		9,800	
Daguerre Pt. Dam to Baldwin Gravel Plant	2	1,551		19,400	
TOTAL, YUBA RIVER			3,034		34,300
American River (essentially all fall-run)					
Nimbus Hatchery	-	-		12,653***	
Nimbus Hatchery to Hatchery racks	-	3,706		3,800	
Hatchery racks to Del Paso Gravel Plant	9	2,119		10,600	
TOTAL, AMERICAN RIVER			5,825		27,053
TOTAL, SOUTHERN SACRAMENTO RIVER TRIBUTARIES			10,309		82,353

* Based on tag and recovery data.

** Based on aerial redd counts.

*** Ladder counts started on Sept. 1, 1962 and ended March 2, 1963.

TABLE 4

FALL-RUN* KING SALMON COUNTS AND POPULATION ESTIMATES FOR SAN JOAQUIN RIVER TRIBUTARIES, 1962

Stream and/or Stream Section	Number counting trips	Number carcasses & skeletons counted		Estimated spawning population	
Cosumnes River					
Michigan Bar to Bridgehouse	6	91		600	
Bridgehouse to Sloughhouse	5	42		300	
TOTAL, COSUMNES RIVER			133		900
Mokelumne River	-		-		230**
Stanislaus River					
Goodwin Dam to Knights Ferry	4	0		5	
Knights Ferry to Orange Blossom Br.	4	4		130	
Orange Blossom Br. to Oakdale	4	1		20	
Oakdale to Riverbank	4	8		160	
TOTAL, STANISLAUS RIVER			13		315
Tuolumne River					
La Grange to Rairden's Farm	4	5		30	
Rairden's Farm to Roberts Ferry Br.	4	12		100	
Roberts Ferry Br. to Reed Rock Plant	4	9		120	
TOTAL, TUOLUMNE RIVER			26		250
Merced River					
Shaffer Dam to Snelling Br.	3	0		20	
Snelling Br. to McSwain Br.	3	2		40	
TOTAL, MERCED RIVER			2		60
TOTAL SAN JOAQUIN TRIBUTARIES			174		1,755

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

** Ladder counts - count began September 29 and ended December 19. A few fish went over the dam before count began.

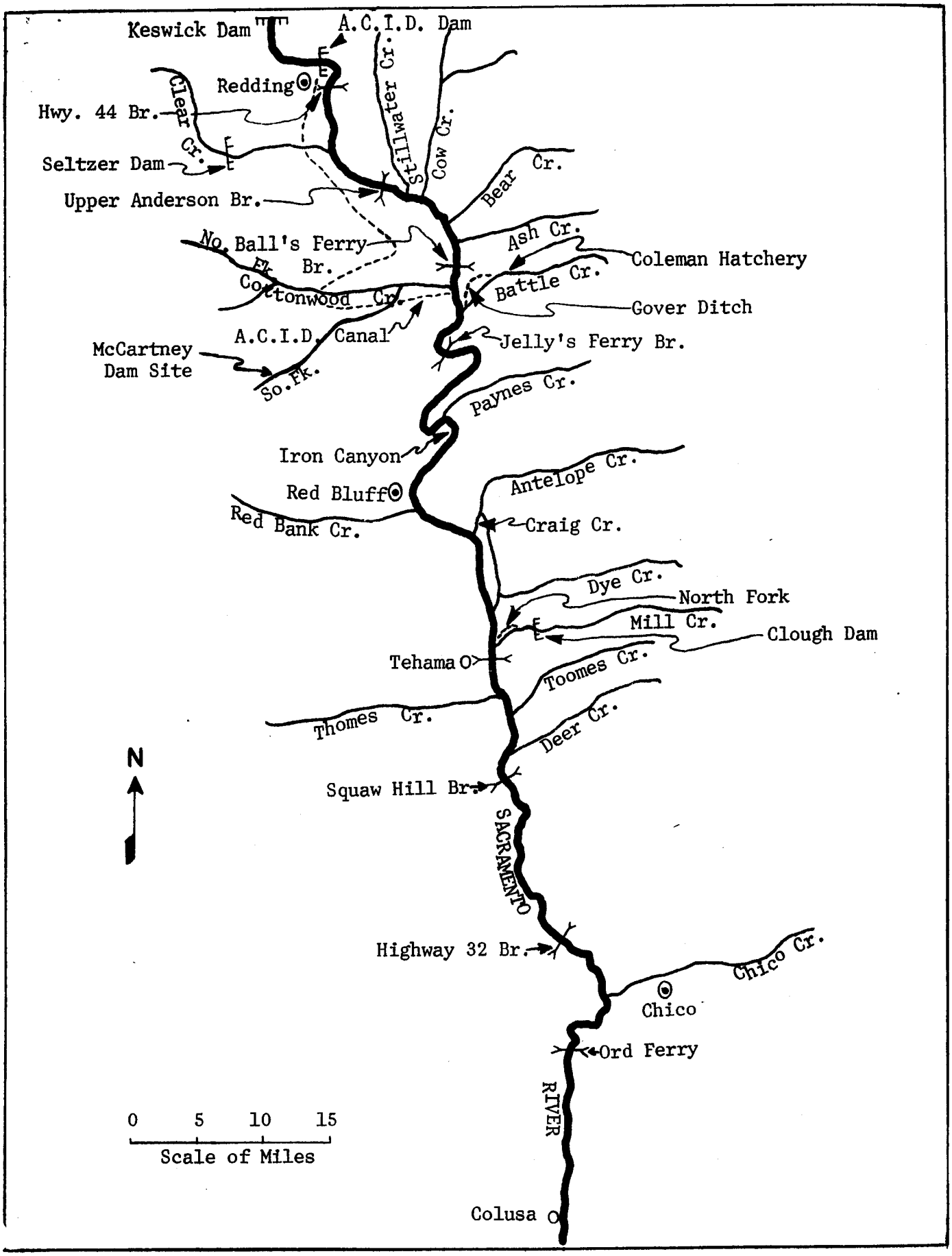

Figure 1. Upper Sacramento River and Tributaries above Chico Creek covered during the 1962 King Salmon Spawning Survey.

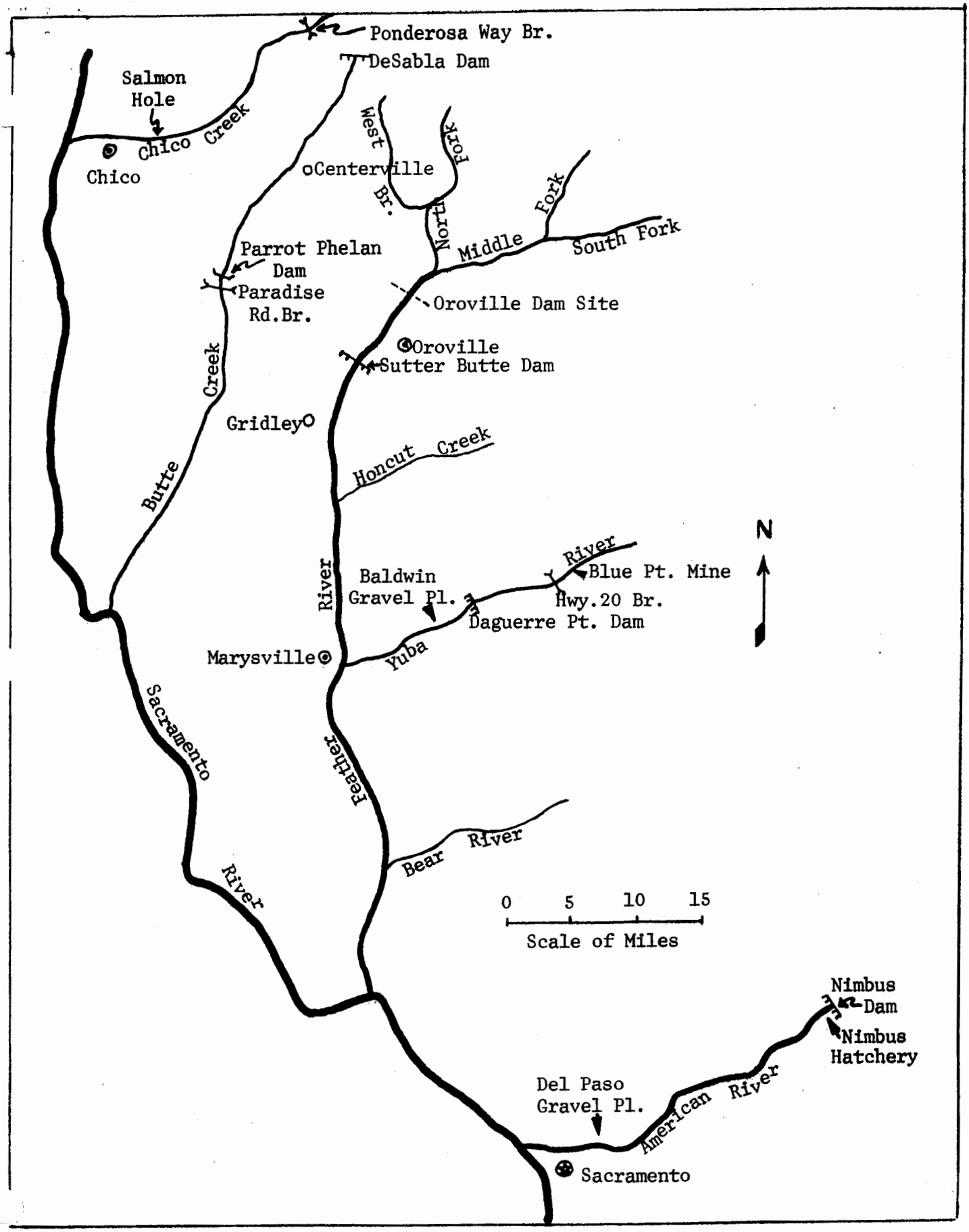

Figure 2. Sacramento River Tributaries from Chico Creek, south, covered during the 1962 Spawning Area Survey.

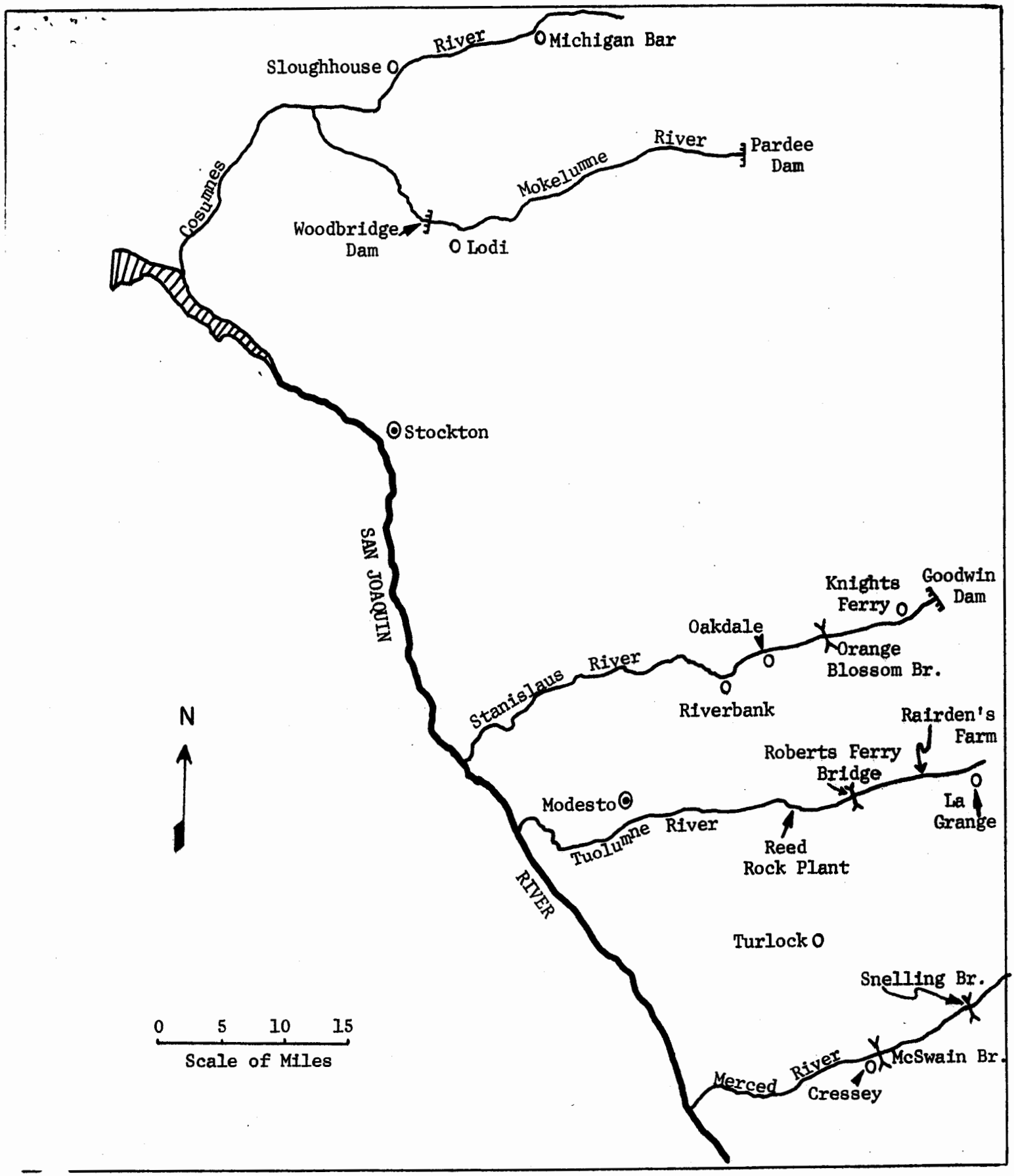

Figure 3. San Joaquin River Tributaries covered during 1962 Spawning Area Survey.