

## A PROGRESS REPORT ON THE RUSSIAN RIVER FISH POPULATION STUDY: 1954 - 1956 1/

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## INTRODUCTION

This report is part of the evaluation of a habitat improvement program for the Russian River.

The Russian River is an important coastal stream 70 miles north of San Francisco. The river rises in northern Mendocino County, flows south for a number of miles, then flows due west and empties into the Pacific Ocean in Sonoma County. Its total length is approximately 110 miles. Summer flows range from 100 to 150 c.f.s. Winter flows range from 200 c.f.s. to 88,400 c.f.s. at Guerneville, which is fifteen miles upstream from the ocean. The lower 30 miles of the stream are considered warmwater fish habitat. This section, in the coastal redwood forest, is deep and slow flowing. The upper parts, passing through agricultural valleys, are shallow and moderate in flow. This section is ideal smallmouth bass (Micropterus dolomieu) habitat and contains excellent steelhead (Salmo gairdneri) nursery grounds.

The river and its tributaries are under an intensive fish management program. The program is aimed at improving the steelhead fishery. Habitat Improvement, in the form of rough fish control, was accomplished by rotenoning in the period 1952 through 1954. This was carried on in all the important steelhead spawning tributaries and in the main river from its source to Healdsburg. The rotenoning of the main river extended accidentally below the proposed cutoff point and consequently killed many fish in the lower reaches of the river. This report presents data on the status of the fish population in the lower river before and after chemical treatment, as well as data on the entire fish population of the river in 1956. This information will prove useful in determining when game fish populations become materially harmed by rough fish populations. These data can also be used to determine need for rough fish control.

The data on the fish population of the lower river below Healdsburg were scant. Therefore, in the summer of 1954 and 1955, a survey of this population was made. In 1956, the survey was extended to include the upper part of the river. This involved sampling the population three times during the year -- late spring, summer, and fall -- to determine if seasonal changes take place. The first survey was made prior to the treatment of the river; thus, data before and after chemical treatment for the area below Healdsburg are available.

## METHODS

In 1954 and 1955, the survey was made by a crew of three men using seines and a boat in the uppermost area to be sampled. The crew seined suitable beaches every one and one-half to two miles. Sites for seining were numerous but, in many cases, impossible to use because of the multitude of swimmers using the beaches. A vehicle was placed at a point downstream a number of miles to return the seining crew to its starting point. Thirty-two stations were sampled during the 1954-55 surveys. The sampling was done in the lower river between Mirabel Park and Jenner. Six of the sampling stations were in the estuary.

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In 1956, the boat and equipment were brought by a vehicle to a designated station. The fish population was sampled and the crew then moved by vehicle to the next station. This method of sampling was faster but not as intensive as in earlier surveys. The river was checked between Ukiah and Jenner. There were six stations between Ukiah and Healdsburg, three between Mirabel and Duncan Mills, and five in the estuary.

The surveys all consisted of seining each selected station three to four times to collect the sample for the station. The individual stations and the tabulated catches are presented in Appendix II, Figure 1 contains the locations of the 14 stations sampled in 1956. Table 1 is a summary of the data collected at these stations.

The equipment used in these surveys were a fifty-foot beach seine, ½-inch stretch mesh, six feet deep; a bobbinet brail; and a two hundred-foot beach seine, 1½-inch stretch mesh, six feet deep at the ends and tapered to fifteen feet in the middle. The two hundred-foot seine was used only in 1956.

Sampling was done by setting the seine out by boat. The seine was payed out as the boat headed upstream at approximately a forty-five degree angle. When the seine was completely payed out, the boat was then headed downstream and into shore at a forty-five degree angle. This allowed the seine to be parallel to the bank. The seine was then landed.

The catch was then separated by species, and the individual fish were measured. If more than twenty-five fish of one species were caught, a random sample of twenty-five was selected for measurement after they had been counted. On occasions where a cutoff pool or small bay existed, the bobbinet brail was used to catch small fish. This, of course, provided qualitative data only. Physical and other field data were collected at each station.

In 1955 and 1956, the Department was fortunate in having three boys from the Sonoma County Mobile Youth Camp assist with this project.

## RESULTS

These surveys have provided qualitative data on the fish population. These data are realized to be inadequate in some respects, due to the fact that only pool habitat was sampled. Our equipment was found to be unsuitable to sample riffles.

Tables 1 and 2 show the results. The river was broken into three ecological niches, as shown. These habitat situations were fixed on factors of flow, gradient, and depth. The area between Ukiah and Healdsburg, as previously described, is of low gradient and relatively shallow. The area between Mirabel Park and Duncan Mills has an even lower gradient and deep pools. The area between Duncan Mills and Jenner is the river's estuary and is brackish in part. The tables show the species in the population and the average size of the fish caught. These figures illustrate the shifts in dominance of one species of fish over another, before and after chemical treatment. Appendix I presents the water temperature and flow of the river.

The steelhead is considered to be the most important game fish in the drainage. Juvenile steelhead were found to make up a small percentage (2.08 percent) of the fish population before chemical treatment in the lower river.

TABLE 1

## FISHES COLLECTED IN SEINING THE RUSSIAN RIVER FROM UKIAH TO JENNER, 1956

	MAY (7 - 16)			JULY (9 - 13)			OCTOBER (9 - 17)		
	NUMBER COLLECTED	PER- CENTAGE	SIZE RANGE (INCHES)	NUMBER COLLECTED	PER- CENTAGE	SIZE RANGE (INCHES)	NUMBER COLLECTED	PER- CENTAGE	SIZE RANGE (INCHES)
UKIAH - HEALDSBURG- (TOTAL FOR 6 STATIONS)									
RAINBOW TROUT • STEELHEAD	104	43.7	1.6 - 7.1	42	3.89	2.7 - 4.7	28	3.71	3.1 - 7.3
SMALLMOUTH BASS	2	0.8	4.1 - 6.3	10	0.09	1.8 - 2.2	32	4.24	4.3 - 7.5
SQUAWFISH ( <u>PTYCHOICHEILOS GRANDIS</u> )	47	19.8	5.0 - 6.8	76	7.04	4.9 - 6.5	70	9.29	2.8 - 11.1
SUCKERS ( <u>CATOSTOMUS SP.</u> )	18	7.5	3.0 - 10.5	900	83.55	0.9 - 3.3	64	8.49	3.0 - 10.5
CARP ( <u>CYPRINUS CARPIO</u> )	0			0			243	32.23	3.4 - 6.1
TULE PERCH ( <u>HYSTEROCARPUS TRASKI</u> )	6	2.5	3.0 - 4.5	2	0.01	3.0 - 3.1	54	7.16	2.3 - 3.4
OTHER FISHES	61	25.7	0.9- 8.3	55	5.09	0.8 - 5.2	263	34.88	1.6 - 7.5
TOTAL	238			1,085			754		
MIRABEL PARK - DUNCAN MILLS (TOTAL FOR 5 STATIONS)									
RAINBOW TROUT - STEELHEAD	51	13.60	1.7- 9.1	1	0.01	7.1	6	0.04	8.6 - 14.2
SMALLMOUTH BASS	68	15.46	3.4 - 5.5	114	18.38	2.0 - 6.2	138	10.26	3.2 - 10.1
SQUAWFISH	18	4.85	6.0 - 14.5	1	0.01	8.6	11	0.09	4.6 - 11.0
SUCKERS	16	4.27	4.1 - 19.1	16	2.58	1.9 - 14.6	92	6.92	4.5 - 16.4
CARP	27	7.20	15.5- 22.0	6	0.09	16.2- 26.0	7	0.05	18.4- 29.1
SHAD ( <u>ALOSA SAPIDISSIMA</u> )	2	0.53	5.3 - 17.2	445	72.73 **	1.9 - 21.0	968	73.62	3.4* 21.5
TULE PERCH	73	19.47	4.3 - 5.4	3	0.05	4.3 - 5.3	5	0.03	3.0 - 4.7
OTHER FISHES	120	32.02	1.2- 5.4	34	5.48	1.0 - 5.8	109	8.09	1.3 - 7.4
TOTAL	375			620			1,336		
DUNCAN MILLS - JENNER (TOTAL FOR 5 STATIONS)									
RAINBOW TROUT - STEELHEAD	15	5.88	4.0 - 7.1	0			0	***	
SILVER SALMON ( <u>ONCORHYNCHUS KISUTCH</u> )	8	3.14	4.6 - 4.9	0			0	***	
SMALLMOUTH BASS	0			0			0		
SQUAWFISH	3	1.18	6.0 - 10.5	0			0		
SUCKERS	5	1.96	7.8 - 10.8	0			0		
CARP	0			5	0.09	19.0- 26.0	0		
SHAD	9	3.53	5.5 - 8.0	1	0.01	7.6	518	57.28	3.5 - 6.1
TULE PERCH	1	0.39	4.4	0			0		
ESTUARINE FISHES	214	83.92	4.1 - 10.3	564	98.90	1.6 - 11.4	388	42.82	3.0 - 14.5
TOTAL	255			570			906		

\* 4 ADULT CHAD FOUND AT BROWN'S POOL, MOUTH OF AUSTIN CREEK

\*\* 101 ADULT CHAD FOUND AT BROWN'S POOL, MOUTH OF AUSTIN CREEK

\*\*\* A FEW FRESH RUN ADULT SILVER SALMON AND RAINBOW TROUT - STEELHEAD WERE CAUGHT BY ANGLERS IN THIS AREA DURING THE SEINING OPERATION.

In the summer following chemical treatment, juvenile steelhead were found to make up almost nineteen percent (18.84 percent) of the total fish collected. Sampling the same area in 1956 revealed a drastic decline in the percentage of steelhead collected, as compared with other fishes. These facts are illustrated in Tables 1 and 2.

The 1956 survey, however, showed that the upper river, in late spring, produced a sizeable percentage (43.2 percent) of steelhead, compared to other fishes collected.

Smallmouth bass do not appear to have been "eliminated" by the chemical treatment, as some sportsmen have believed. Table 2 illustrates the fact that the smallmouth bass population, compared with other fishes, had changed very little before and after chemical treatment in the lower river. The 1956 survey shows that the smallmouth bass has re-established itself in the upper river. Appendix II illustrates that no smallmouth bass were collected above the Squaw Rock station.

Squawfish, in 1954, were found to be in the minority (14.37 percent) in the lower river, as compared with other species collected. Table 2 illustrates this fact. The chemical treatment program, or some other inimical factor, reduced the percentage of this fish in relation to other fishes collected in 1955 by two-thirds (4.79 percent). The 1956 sampling showed that squawfish in the lower river comprised less than five percent of the total fish sampled. The sampling in the upper river in 1956 illustrates that squawfish are present, but are not the dominant fish in the habitat.

The seining surveys have established that shad are an important fish in the lower river. Table 2 illustrates that more shad were collected than any other species of fish. A small increase was noted in 1955, but Table 1 illustrates that a large increase took place in 1956 in relation to other fishes. The possible reason for this increase could have been the lack of juvenile steelhead in the lower river in 1956, or a particularly strong year class of shad. Table 1 shows a very small number of shad collected in May of 1956. The reason for this is that shad usually do not spawn until May and are not normally big enough to be captured in our nets until July. The Healdsburg Recreation Dam appears to be a barrier to shad. No shad were collected in 1956 in the upper river, despite the fact that the dam was washed out during the December flood of 1955.

Two-thirds fewer suckers, percentage-wise, were collected in 1955 and 1956.

Table 1 shows the presence of carp and tule perch in the upper river, where it was presumed they had been removed by chemical treatment. This might have been influenced by the absence of the Healdsburg dam barrier.

#### DISCUSSION

The data collected on the fish population do not show the actual number of fish in a particular situation, but give the fisheries manager an idea of the ratio of one species to another. The study also shows the presence of a particular species of fish at a sampling station.

The data presented have illustrated the effects of the chemical treatment on the fishery of the lower river by presenting sampling data before and after treatment. The upper river was not sampled before treatment, so similar comparisons cannot be made.

The 1956 survey sampled the upper and lower river three times a year to see if any fluctuation in species relationship existed. This report illustrates that seasonal

Table 2

## FISK COLLECTED IN SEINING THE RUSSIAN RIVER FROM MIRABEL PARK TO JENNER, 1954-55

	July, 1954			July, 1955		
	Number collected	Percentage	Size range	Number collected	Percentage	Size range
<u>Mirabel Park - Duncan Mills</u> (total for 26 stations)						
Rainbow trout - Steelhead	7	2.08	2.5 - 7.2	154	18.84	1.9 - 8.0
Smallmouth bass	55	16.46	2.1 - 6.5	98	15.28	1.3 - 16.4
Squawfish	48	14.37	2.6 - 6.1	37	4.79	3.1 - 7.4
Suckers	50	14.97	1.2 - 4.1	56	7.25	1.5 - 8.1
Carp* adult				0		
Shad	144	42.11	2.2 - 3.5	396	50.18	1.9 - 3.1
Tule perch	3	0.89	4.2 - 4.8	0		
Other fishes	37	10.08	0.6 - 4.5	31	4.01	2.1 - 6.3
Total	344			772		
<u>Duncan Mills - Jenner</u> (total for 6 stations)						
Rainbow trout - Steelhead	0			18	13.74	1.7 - 4.2
Smallmouth bass	0					
Squawfish	0					
Suckers	0					
"Carp* adult						
Shad	0			26	19.84	2.0 - 2.7
Tule perch	1	1.00	4.2 - 4.6			
Estuarine fishes (see Appendix II)	91	99.00	1.0 - 8.2	87	66.42	2.4 - 10.1
Total	92			131		

\*Schools of carp were seen but, in most cases, eluded capture by seine.

fluctuations in fish species relationships do exist. It is planned that future surveys extend over the described sampled area and be done three times a year.

The steelhead decline after the second year of chemical treatment in the lower river could have been the result of the severe winter flooding. The rough fish in the lower river had shown no rapid recovery to cause a possible steelhead decline.

The smallmouth bass were considered to have been eliminated in the upper river, where intensive chemical treatment took place. No replantings were made, so it is suspected that the smallmouth bass migrated upstream to reinhabit the upper river. The falls at Squaw Rock appear to be a barrier to smallmouth bass, since none were found above it; Carp found in the upper river also must have migrated upstream.

The problem of possible retreatment of the upper river must be considered. The "trout" (Juvenile steelhead) fishing in 1955 was excellent in the river, according to creel census data and warden reports. In 1956, trout fishing was fair to poor, according to warden reports and creel census data. These reports on angling success are, to some workers, sufficient reason to re-treat the river.

Rough fish are re-established in the upper river in unknown numbers. Only a ratio of rough fish to steelhead is available. More factual data are needed before any re-treatment can be considered. Data now available show that if retreatment is done the smallmouth bass fishery will be seriously affected and, if the rotenone should contaminate the lower river, a possible year class of shad will be lost. The survey data showed that there are fewer steelhead in the river in the summer and fall than in the spring. If a retreatment of the river is ever scheduled, it should be done in late September, since the 1956 sampling showed fresh-run salmonids entering the river in October.

The facts indicate that a retreatment of the river is unnecessary at the present time.

#### CONCLUSION

This report illustrates that the chemical treatment program carried on in 1954 affected the population dynamics of the whole river. The game fish populations showed improvement as the result of the chemical treatment program. The species that received the most benefit were steelhead and possibly shad. The numbers of steelhead declined sharply after the first year of treatment in the lower river. The smallmouth bass were not "eliminated" in the lower river by chemical treatment. The survey showed that rough fish are quickly re-establishing themselves in the upper river; however, rough fish in the lower river are still at a lower level than before treatment.

#### RECOMMENDATIONS

1. This survey should be continued to keep abreast of the changes in species composition in the river.
2. The seining equipment should be adapted to sample riffle areas of the river, or means should be taken to sample this part of the river by some other method, e.g., shocking.
3. Additional means should be taken to collect fish. Catfish are known to be present in the lower river, but none was taken while seining. Fyke netting or

Appendix II

Summary of Fish Collections, Russian River, 1954-1956

	<u>Rt-Sh</u>	<u>SMB</u>	<u>Squaw- fish</u>	<u>Suckers</u>	<u>Hard- head</u>	<u>Hitch</u>	<u>Roach</u>	<u>Shad</u>	<u>B.G.</u>	<u>GSF</u>	<u>Carp</u>	<u>Tule perch</u>	<u>Stickle- back</u>
<u>Vichy Springs Bridge</u>													
May, 1956	62						1						
July, 1956	2		4	484			32						
October, 1956	5		2	8	1	40							
<u>Cal Dri Ice</u>													
May, 1956	7												
July, 1956	36			76			5						
October, 1956	8		8	31			87						
<u>Vicinity of Squaw Rock</u>													
May, 1956	19			11									
July, 1956				4									
October, 1956		2	5	1	1		26		3	5	1		
<u>Cloverdale Beach and Mouth of Big Sulphur Creek</u>													
May, 1956	16		15	1									
July, 1956	3			250									3
October, 1956	12	2	8	20			21		1	238	32		
<u>Vicinity Geyserville Bridge Crossing</u>													
May, 1956		2	29	6	19	2	5					6	5
July, 1956	1	10	17	30			1						
October, 1956		19	25	2	15		13					8	
<u>Vicinity Soda Rock -Alexander Valley Bridge</u>													
May, 1956			3				22						1
July, 1956			54	56	6		6					2	
October, 1956	3	9	22	2	14	2	39					4	12

Appendix II (Cont'd) ½ mi. below Mirabel Park (inc. Hollydale)

	<u>Rt-Sh</u>	<u>SMB</u>	<u>Squaw- fish</u>	<u>Suckers</u>	<u>Hard- head</u>	<u>Hitch</u>	<u>Roach</u>	<u>Shad</u>	<u>B.G.</u>	<u>GSF</u>	<u>Carp</u>	<u>Tule perch</u>	<u>Stickle- back</u>
<u>½ mi. below Mirabel Park (inc. Hollydale)</u>													
July, 1954			15	10									
July, 1955	11		2	7				38					
May, 1956		17	3	1			79		10	1			2
July, 1956		42					6	1	1				17
October, 1956		9	6	9			24		7				
<u>Forest Hills (Upper Beach)</u>													
July, 1954				5			4	7					
<u>Just above Hacienda Bridge Crossing</u>													
July, 1954			5	5								2	
July, 1955	2							18					
<u>Russian River Terrace</u>													
July, 1955	4			2				29					
<u>Summer Home Park</u>													
July, 1954				12									
July, 1955			3	2				6					
<u>Hilton (Odd Fellows Park)</u>													
July, 1955	2			2				23					
<u>Korbel</u>													
July, 1954		1	1					8					
July, 1955	5	5		2				59					7
May, 1956	2	3		9			5			10			1
July, 1956		2						269	2	1	4		
October, 1956		19	4				24	33		1	1		
<u>Rio Nido</u>													
July, 1954				4				7			1		
July, 1955			5	4				46					
May, 1956								-- No station --					
July, 1956		2		1				40		2			
October, 1956			---				---						



Appendix II (Cont'd)

	<u>Rt-Sh</u>	<u>SMB</u>	<u>Squaw- fish</u>	<u>Suckers</u>	<u>Hard- head</u>	<u>Hitch</u>	<u>Roach</u>	<u>Shad</u>	<u>B.G.</u>	<u>GSF</u>	<u>Carp</u>	<u>Tule perch</u>	<u>Stickle- back</u>
<u>Roland Beach (between Rio Nido and Guerneville)</u>													
July, 1954										5			
<u>Guerneville (Johnson's Beach)</u>													
July, 1955			2										
<u>Guerneville (200 feet he low Summer Dam)</u>													
July, 1954			3					4					
/ July, 1955		2	2	11									
<u>Guerneville Park</u>													
July, 1954								5					
July, 1955	3							17					
<u>Vacation Beach</u>													
July, 1955		5						3					
<u>Hatcher's Beach</u>													
July, 1954		7						4					
July, 1955	14	2	6					8					
<u>Vicinity Northwood Slimmer Dam</u>													
July, 1954	4	3	15	7									
July, 1955	30	7	6	12			2	18			1		
<u>3 mi. above Monte Rio</u>													
July, 1954		5	5					8					
<u>Bohemian Grove</u>													
July, 1954		16						3					
July, 1955	2	8						83					
May, 1956	14	7	2						4				
July, 1956		13		2				32			2		
October, 1956		18	1	9				330		1			

Appendix II (Cont'd)

	<u>Rt-Sh</u>	<u>SMB</u>	<u>Squaw- fish</u>	<u>Suckers</u>	<u>Hard- head</u>	<u>Hitch</u>	<u>Roach</u>	<u>Shad</u>	<u>B. G.</u>	<u>GSF</u>	<u>Carp</u>	<u>Tule perch</u>	<u>Stickle- back</u>
<u>½ mi. below Bohemian Grove</u>													
July, 1955	9	9						2					
<u>Green Gables (Mr. Sitten)</u>													
July, 1955			5					3					
<u>Monte Rio Bridge</u>													
July, 1954		5						10				1	
July, 1955	3	12		4				3					
<u>¼ mi. below Monte Rio Bridge</u>													
July, 1955	19	16		1				22	3				
<u>Villa Grande</u>													
July, 1954				5									
July, 1955	19							3					
<u>St. Joseph's Boys' Camp</u>													
July, 1954		7						3					
July, 1955		4	2	1				14					
<u>Vicinity of Brown's Pool (above riffle)</u>													
July, 1954	3	11	4	4			5	7					9
July, 1955	22	18	3										5
May, 1956	35	68	13					2			27	64	
July, 1956	1	38		1				100					
October, 1956		37		28			11	18					
<u>Brown's Pool (below riffle)</u>													
July, 1955	19	16						22	3				
July, 1956		17	1	12				3				3	
October, 1956	6	36		33				511			1	5	
<u>Above Duncan Hills Bridge</u>													
July, 1955	1	5											
October, 1956		19		13				76			5		

Appendix II (Cont'd)

ESTUARY

	<u>Rt-Sh</u>	<u>Squaw</u> <u>-fish</u>	<u>Sucker</u>	<u>Shad</u>	<u>Carp</u>	<u>Tule</u> <u>perch</u>	<u>Flounder</u>	<u>Shiner</u> <u>perch</u>	<u>Pipe-</u> <u>fish</u>	<u>Cottids</u>	<u>Jack</u> <u>smelt</u>	<u>Osmerids</u>	<u>Goby</u>	<u>Salmon</u>	<u>Anchovies</u>
<u>Lone Pine</u>															
July, 1955	11			6			2								
<u>Sheep Ranch</u> (1 mi. below Duncan Mills)															
July, 1954						1		4							
July, 1955				18			3			17					
May, 1956						--no station--									
July, 1956						--no station--									
<u>Vicinity of Sawmill Gulch</u>															
July, 1954								8	1						
July, 1955				2			30	1	3	6					
May, 1956	11	1	5	2		1	5			2				2	
July, 1956					5		14	26	3	16	3				
October, 1956				227			253	21	8	7					
<u>State Highway Bridge #1</u> (1 mi. above Jenner)															
July, 1954								21							
July, 1955								26							
<u>½ mi. above Jenner</u>															
July, 1954								7							4
July, 1955						--no station--									
May, 1956	4			4				188		7				1	9
July, 1956				1				150		10	1	3			
October, 1956				257			28	30	5		25				
<u>Jenner-by-the-Sea</u> (Penny Island)															
July, 1954								44					1		
July, 1955						--no station--									
May, 1956				3			7	276	8	2	51			2	
July, 1956								300		2					
October, 1956				34							11				