TUOLUMNE FISH POPULATION SURVEY - 1985[1]

INTRODUCTION

This report summarizes field survey work accomplished on June 11-12 and 18-20, 1985. The methods and scope of this study were established in consultation with Jody Hoffman, fisheries biologist, of the U.S. Fish and Wildlife Service. It includes estimates of fish population abundance determined by snorkeling in the Tuolumne River. The study area extended from O'Shaughnessy Dam to Early Intake. Fish populations in this area were previously studied in 1970 and 1977 by the U.S. Fish and Wildlife Service (Tuolumne River Flow Study, 1981). The purpose of this study is to compare current population levels with 1970 and 1977 levels.

METHODS

The study area between O'Shaughnessy Dam and Early Intake was subdivided into five reaches by the U.S. Fish and Wildlife Service in 1970 (Tuolumne River Flow Study, 1981). The reaches were: (1) O'Shaughnessy Dam to the Poopenaut Valley (O'Shaughnessy"), (2) Poopenaut Valley, (3) Tuolumne Gorge, (4) Preston Falls to Tuolumne Gorge ("Preston Falls"), and (5) from Early Intake to Preston Falls ("Early Intake"). We used the same subdivisions to stratify our sampling in this study.

We characterized the fish populations using snorkeling surveys in each of the five reaches. Within each reach sampling was stratified by habitat and each available habitat was surveyed by two to four snorkelers. The team of snorkelers worked in an upstream direction. When possible, we selected survey sites that had an obstacle at the upper end which the fish were reluctant to pass. This facilitated our surveys by forcing the fish to pass downstream in view of the snorkelers. At two sites in the Poopenaut Valley we could not find a suitable hydraulic barrier. Instead, we positioned two snorkelers at a constriction in the river while two snorkelers moved upstream in the usual manner. Fish that moved past the constriction were counted by the stationary snorkelers.

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[1] Bruce Vondracek, Ph.D., Fishery Consultant, 21 June, 1985.

The estimated standard length (SL) of each fish observed was recorded. Our surveys were not quantitative for cryptic fishes, therefore, sculpins are not reported. Although we have included fishes less than 5 mm SL in this report, we did not survey the shallow, near-shore margins of the river as completely as the deeper portions and, therefore, the abundance of small fishes is most likely underestimated. The density of brown trout may also be underestimated relative to rainbow trout because of their cryptic behavior (i.e., brown trout seek cover and remain hidden, while rainbow trout tend to remain in the water column).

In general, habitats that were too deep and the bottom was not visible or were too steep in gradient to safely survey were bypassed. Only two survey sites where the bottom was not visible at all times to all snorkelers were included. These two surveys were in pool habitat in the Poopenaut Valley. These surveys, however, are included because the bottom was visible near the head of the pools where trout typically congregate.

During each survey we measured the length of each habitat. We surveyed a total of 3,831.9 meters of river (19.7% of the study area), which included 1,569.3 meters of pool habitat, 1,782.7 meters of run habitat and 479.9 meters of riffle habitat (see Table 1). We surveyed 866.7 meters of river in the Early Intake reach, 633.1 meters in the Preston Falls reach, 368.6 meters in the Tuolumne Gorge reach, 1,032 meters in the Poopenaut Valley reach and 933.1 meters in the O'Shaughnessy reach.

RESULTS AND DISCUSSION

We observed five fish species during our surveys: rainbow trout (Salmo gairdneri), brown trout (S. trutta), Sacramento sucker (Catostomus occidentalis), California roach (Lavinia symmetricus), and a sculpin (Cottus sp.). Both species of trout were observed in almost every survey in all river reaches. Sacramento sucker were only found in the river below Preston Falls. Six California roach were sighted in the Early Intake reach and one other individual was noted in the O'Shaughnessy reach. The only sculpin observed was in the Early Intake reach.

Table 1. Length (m) of each habitat (pool, run, and riffle) surveyed per reach in the Tuolumne River in 1985.

POOL		
REACH	LENGTH	NUMBER
Early Intake	87.0	1
Preston Falls	290.0	1
Tuolumne Gorge	88.4	1
Poopenaut Valley	483.2	3
O'Shaughnessy	620.7	5
Total	1569.3	11

RUN		
REACH	LENGTH	NUMBER
Early Intake	510.9	10
Preston Falls	343.1	9
Tuolumne Gorge	255.9	8
Poopenaut Valley	548.8	7
O'Shaughnessy	124.0	1
Total	1782.7	35

RIFFLE		
REACH	LENGTH	NUMBER
Early Intake	268.8	9
Tuolumne Gorge	24.3	1
O'Shaughnessy	186.8	6
TOTAL	479.9	16

Rainbow trout were the most abundant species in four of the five reaches. We observed a total of 595 rainbow trout (see Tables 2 and 3) of which 233 were classified as subcatchable (less than 150 mm SL) and 362 as catchable (greater than 150 mm SL). This corresponds well with the divisions used in the Tuolumne River Flow Study (1981) in which fishes below 6.5 inches fork length (FL) were classified as subcatchable and fishes over 6.5 inches FL were classified as catchable.

The number of catchable and subcatchable trout varied with location and habitat type. Based on the estimates for number of catchable rainbow trout per mile of river in each reach, the highest abundance was found in the Tuolumne Gorge and was followed in order by Early Intake reach, Preston Falls reach, O'Shaughnessy reach and the Poopenaut Valley (Table 2). The estimated number for catchable brown trout was slightly different. They were in highest abundance in the Tuolumne Gorge followed by the Early Intake reach, O'Shaughnessy reach, Preston Falls reach and the Poopenaut Valley (Table 2).

The estimated number of subcatchable rainbow trout per mile did not follow the same trend as catchables. The highest abundance was found in the Early Intake rach followed by the Preston Falls reach, Tuolumne Gorge, Poopenaut Valley and the O'Shaughnessy reach (see Table 3). The estimates for subcatchable brown trout was highest in the Early Intake reach followed in decreasing order by the O'Shaughnessy reach; Tuolumne Gorge, Preston Falls reach and the Poopenaut Valley (Table 3).

The number of fish per mile of both rainbow and brown trout was highest in riffle habitat, intermediate in runs or pocket water, and lowest in pools. The highest number of fish in the pool habitats were apparently concentrated near the head of the pools, although the snorkelers may have been responsible for concentrating fish in this area of pools.

The estimated number of catchable trout by reach is presented in Table 4 using the categories and lengths of each reach in the Tuolumne River Flow Study (1981). The estimated number of rainbow trout in the 1985 study area was 2,326, while the estimated number of brown trout was 1,257 for a combined total of 3,583 trout.

Table 2. Actual number and estimated number per mile of catchable trout by reach using snorkeling techniques in 1985 in the Tuolumne River.

Reach	RAINBOW		BROWN		TOTAL	
	actual	#/mile	actual	#/mile	actual	#/mile
O'Shaughnessy	29	50	63	109	92	159
Poopenaut Valley	27	42	18	28	45	70
Tuolumne Gorge	92	402	37	162	129	564
Preston Falls	62	158	26	66	88	224
Early Intake	108	201	62	115	170	316

Estimate 2326 257 3583

Table 3. Actual number and estimated number per mile of subcatchable trout by reach using snorkeling techniques in 1985 in the Tuolumne River.

REACH	RAINBOW		BROWN		TOTAL	
	actual	#/mile	actual	#/mile	actual	#/mile
O'Shaughnessy	19	33	53	92	72	125
Poopenaut Valley	45	70	25	39	70	109
Tuolumne Gorge	24	105	12	52	36	67
Preston Falls	47	119	19	48	66	167
Early Intake	145	269	127	235	272	504
Total Estimate		3255		2844		6099

Table 4. Estimated population of catchable trout by reach using snorkeling techniques in 1985 in the Tuolumne River.

REACH	RAINBOW	BROWN	TOTAL	LENGTH
O'Shaughnessy	90	196	286	1.8
Poopenaut Valley	71	48	119	1.7
Tuolumne Gorge	1045	421	1466	2.6
Preston Falls	316	132	448	2.0
Early Intake	804	460	1264	4.0
Total	2326	1257	3583	12.1

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O'Shaughnessy	59	166	225
Poopenaut Vly	119	66	185
Tuolumne Gorge	273	135	408
Preston Falls	238	96	334
Early Intake	1076	940	2016
TOTAL	1765	1403	3168

O'Shaughnessy	149	362	511
Poopenaut	196	114	310
Tuolumne	1318	546	1864
Preston	554	228	782
Early Intake	1880	1400	3280
TOTAL	4091	2660	6751

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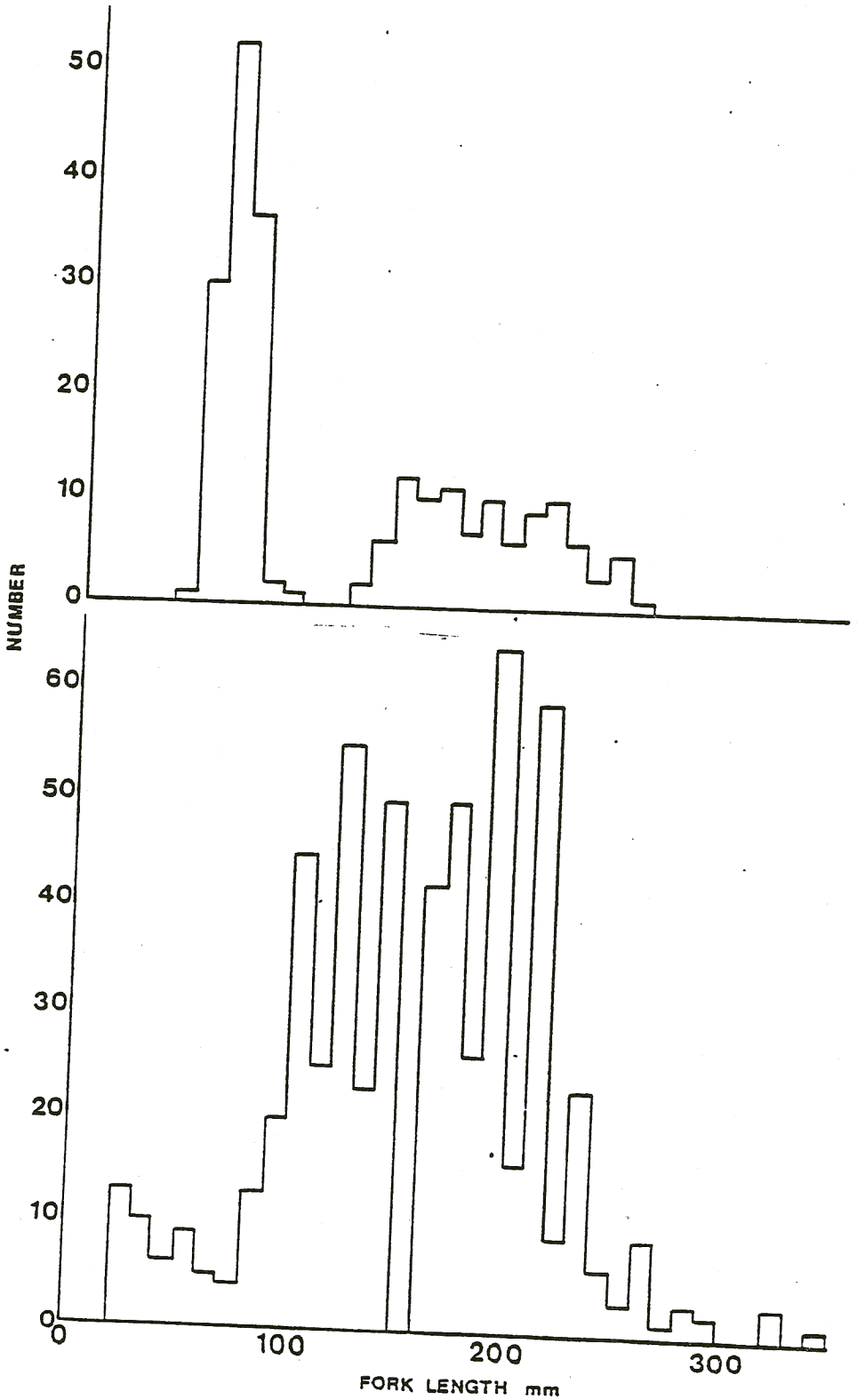

Figure 1. Length frequency distribution of rainbow trout in the Tuolumne River in 1970 (upper) and 1985 (lower).

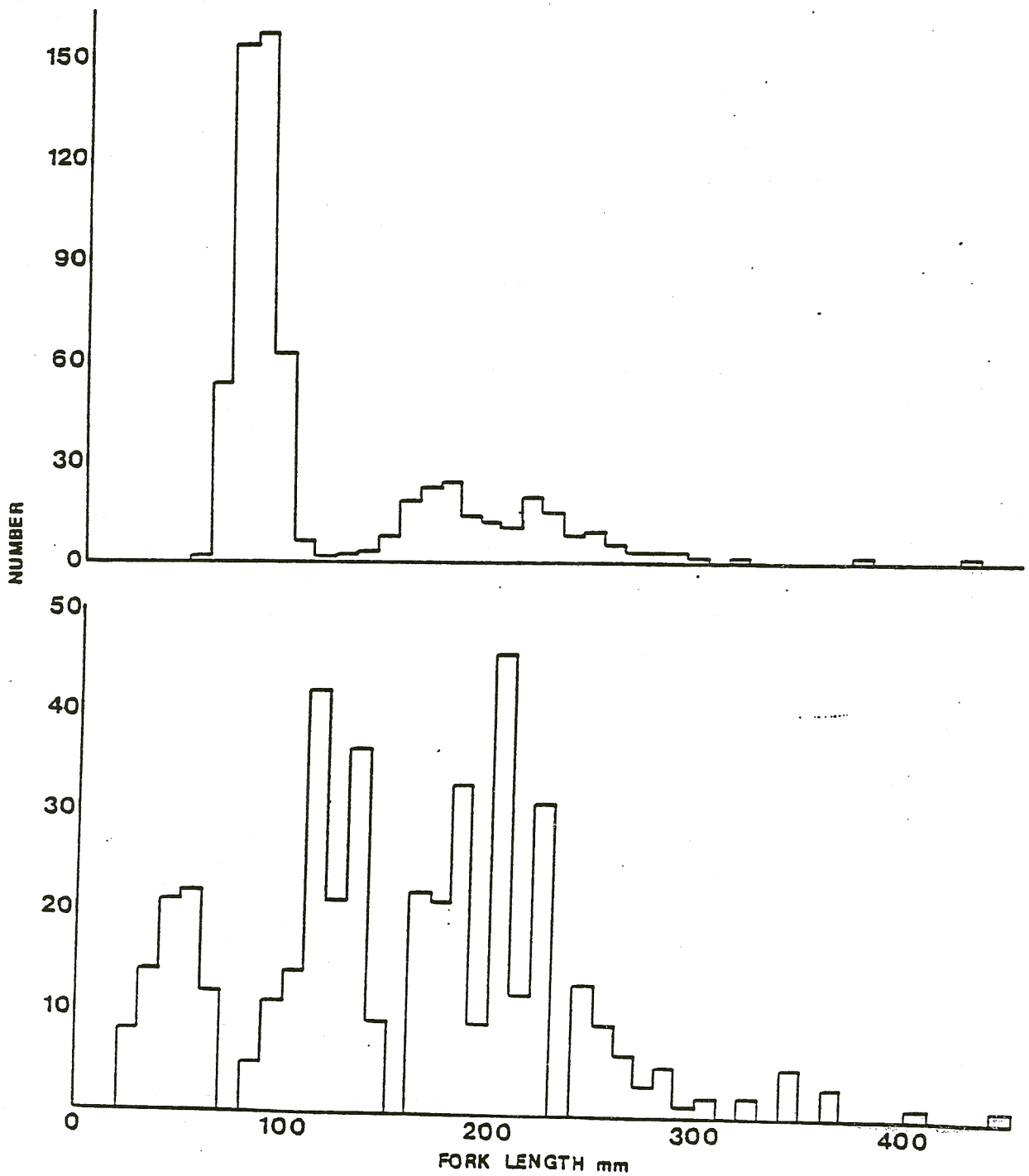

Figure 2. Length frequency distribution for brown trout in the Tuolumne River in 1970 (upper) and 1985 (lower). Note difference in number scale on Y-axis.

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