

TASK 8. SALMONID REARING HABITAT BELOW WOODBRIDGE DAM

8.1 OBJECTIVE

Electrofishing and habitat surveys were conducted in the Lower Mokolumne River between Woodbridge Dam and Ray Road (tidal influence) to assess the suitability of chinook salmon rearing habitat. The surveys were conducted in April, June, and July during the out-migration period of chinook salmon smolts to assess predator populations and habitat conditions. This information relates to the necessity of meeting temperature and flow conditions below Woodbridge Dam for rearing salmon.

8.2 METHODS

To assess potential salmonid rearing habitat in the river downstream of Woodbridge Dam, qualitative electrofishing surveys were conducted in early spring 1990 (21-27 April) and early summer 1990 (28 June-1 July). Both physical characteristics (substrate and habitat composition) and biotic characteristics (predators) were used to assess potential salmonid habitat. During both electrofishing surveys three river sections were sampled: 1) an upstream section at the Woodbridge Golf Course, 2) mid-section at Peltier Road, and 3) a downstream section from DeVries Road to the estuary influence near Ray Road. The sites were defined by a combination of physical and aquatic characteristics (for example, site 1 started at logs across the river and ended upstream at a large pool). Since no information was required on population estimates, only one electroshocking pass per site was necessary to collect data on the relative abundance and distribution of salmonid predators below Woodbridge Dam. Since all steelhead and salmon were trapped at Woodbridge Dam and trucked to the Delta beginning on 6 April 1990, their distribution in the lower river could not be determined, nor could predator rates on out-migrating smolts be assessed during this study.

Electrofishing was conducted with a backpack shocker (Smith-Root Model 15A). Output ranged from 600 to 1,000 volts, depending on depth. The frequency used was 60 pulses/sec. During the pass, all fish were collected and placed in perforated holding bins in the river until electrofishing was completed. Fish were then counted and identified to species. Total length, live weight, and general condition of all fish was noted. After processing, all fish were released back into the river section in which they were captured. During the April sampling the stomach contents of some of the larger predators (mainly squawfish) were examined to investigate predation on smolts. Water was pumped through a small polyethylene tube (2-3 mm outer diameter) inserted into the cardiac section of the stomach to backflush the stomach contents through the esophagus into collecting bins. The buccal cavity was examined for remaining food items. All prey items were identified in the field for the presence of salmonid parts.

There was no attempt to map all potential habitats in the river section from Woodbridge Dam to Ray Road; however, river electrofishing sites were evaluated in terms of habitat

conditions. The length, average width, depth, relative substrate composition, and water temperature of each of the electrofished river sections was recorded. In addition, the percentage composition of various habitat types (runs, riffles, and pools) and relative abundance of cover found in each sampling site was described.

8.3 RESULTS

A total of 1,097 fish representing 23 species were collected in our electrofishing surveys, including bluegill (23.8%), smallmouth bass (15.4%), redear sunfish (6.1%), and other centrarchid species, primarily spotted bass (6.3%) (Table 8.1). Other frequently occurring species included Sacramento suckers, Sacramento squawfish, golden shiner (*Notemigonus crysoleucas*), mosquitofish, and hitch (Table 8.1). Steelhead rainbow trout comprised only 4.3 percent of the total catch (47 fish) and were more abundant in April than in June/July surveys. Few chinook salmon smolts were observed (0.2%), particularly during April when smolts were still being released directly into the river at Woodbridge Dam (Task 9) (Table 8.1).

During the April electrofishing survey, 40 squawfish were collected, mainly at the Woodbridge Golf Course site. The stomach contents of 11 squawfish were examined to investigate predation on out-migrating smolts; however, no smolts or fish parts were found. All 11 squawfish had few prey items present except for crayfish parts. The stomach contents of three largemouth and two smallmouth bass also were examined and, again, only crayfish parts were observed.

The length frequency and biomass of important predator and prey fish species were evaluated (Figure 8-1). The majority of steelhead rainbow trout were between 250 and 290 mm TL with a range of 64 to 377 mm TL. Smallmouth bass ranged from 30 to 310 mm TL and most were between 90 and 140 mm TL. Sacramento squawfish, an important predator of chinook smolts, ranged from 40 to 470 mm TL; most were in the size range from 300 mm to 360 mm TL. Suckers ranged from 50 to 470 mm TL and most were between 340 and 440 mm TL. Suckers and squawfish were not as numerous as centrarchids but they were much more important in terms of biomass. The total weight of bluegills, for example, which comprised 23.8 percent by number of all fish encountered in the electrofishing surveys, was 3,427 g. Suckers (6.4% by number), on the other hand, had a total biomass of 33,154 g.

River electrofishing sites at Woodbridge Golf Course, Peltier Road, and DeVries Road were used to characterize the aquatic habitats in the Woodbridge reach. The length of river habitat surveyed below Woodbridge Dam was 4,324 m, with an average length per habitat of 325 m. Approximately 30 percent of the river between Woodbridge Dam and Ray Road (4.7 km) was surveyed; the average river width was 13.1 m. River habitat conditions below Woodbridge Dam consisted mainly of run/pool habitat complexes with silt (43%) and sand substrates (45.5%). The proportion of habitat types during our surveys was 67 percent runs and 32 percent pools. Riffle habitat was minimal and accounted for <1 percent of the habitats identified. Pool habitats were typically less than 1.2 m in depth (51%). A few large pools were between 1.2 and 2.4 m in depth (30%) or deeper than 2.4 m (19%).

Table 8.1. Summary of fish caught during electrofishing surveys on the Lower Mokelumne River during April and June, 1990.

	WOODBIDGE GOLF COURSE (45,180 m ²)		PELTIER ROAD (53,861 m ²)		DEVRIES ROAD (66,536 m ²)		ALL SITES		
	APRIL	JUNE	APRIL	JUNE	APRIL	JUNE	APRIL	JUNE	TOTAL
SALMONIDS									
Steelhead rainbow trout	4.2%	0.0%	14.1%	1.4%	4.3%	0.0%	6.3%	0.3%	4.3%
Chinook salmon	0.0%	0.0%	0.0%	1.4%	0.4%	0.0%	0.1%	0.3%	0.2%
CENTRARCHIDS									
Smallmouth bass	12.2%	9.0%	27.6%	24.3%	8.5%	26.8%	14.2%	17.8%	15.4%
Bluegill sunfish	18.7%	21.9%	14.1%	17.1%	45.2%	10.6%	27.1%	17.3%	23.8%
Pumpkinseed	6.7%	0.1%	0.0%	0.0%	0.0%	0.0%	3.1%	0.0%	1.9%
Redear sunfish	10.31%	2.2%	2.1%	1.4%	5.6%	2.4%	8.8%	2.1%	6.1%
Spotted bass	8.0%	6.7%	1.0%	2.8%	3.5%	15.4%	5.4%	8.9%	6.3%
Largemouth bass	1.6%	7.3%	1.0%	0.0%	5.6%	3.2%	2.4%	4.6%	3.0%
Green sunfish	1.3%	1.1%	4.1%	4.3%	3.5%	0.8%	2.1%	1.6%	1.8%
CYPRINIDS									
Sacramento squawfish	9.7%	7.9%	6.4%	2.9%	0.0%	1.6%	5.5%	4.9%	5.3%
Hitch	5.1%	6.7%	7.1%	1.4%	2.7%	1.6%	4.7%	4.0%	4.5%
Golden shiner	1.0%	3.9%	9.6%	7.1%	7.0%	20.3%	5.0%	9.1%	6.4%
Goldfish	0.0%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.1%
ICTALURIDS									
Bullheads	0.0%	0.0%	0.0%	1.4%	0.0%	2.4%	0.0%	1.1%	0.4%
White catfish	0.0%	0.0%	3.9%	15.7%	1.5%	5.7%	1.4%	4.9%	2.6%
OTHER FISHES									
Sacramento sucker	7.4%	20.8%	5.8%	0.0%	0.0%	0.8%	4.4%	10.2%	6.4%
Sculpin	0.0%	0.0%	0.0%	0.0%	1.2%	0.0%	0.4%	0.0%	0.3%
Tule perch	3.9%	10.7%	0.6%	8.6%	0.0%	0.0%	1.8%	6.7%	3.5%
Mosquitofish	4.5%	0.0%	0.0%	8.6%	8.1%	8.1%	4.8%	4.3%	4.7%
Pacific lamprey	3.2%	0.0%	0.0%	0.0%	1.5%	0.0%	1.9%	0.0%	1.3%
TOTAL FISH COLLECTED	311	178	15	70	259	123	726	371	1,097

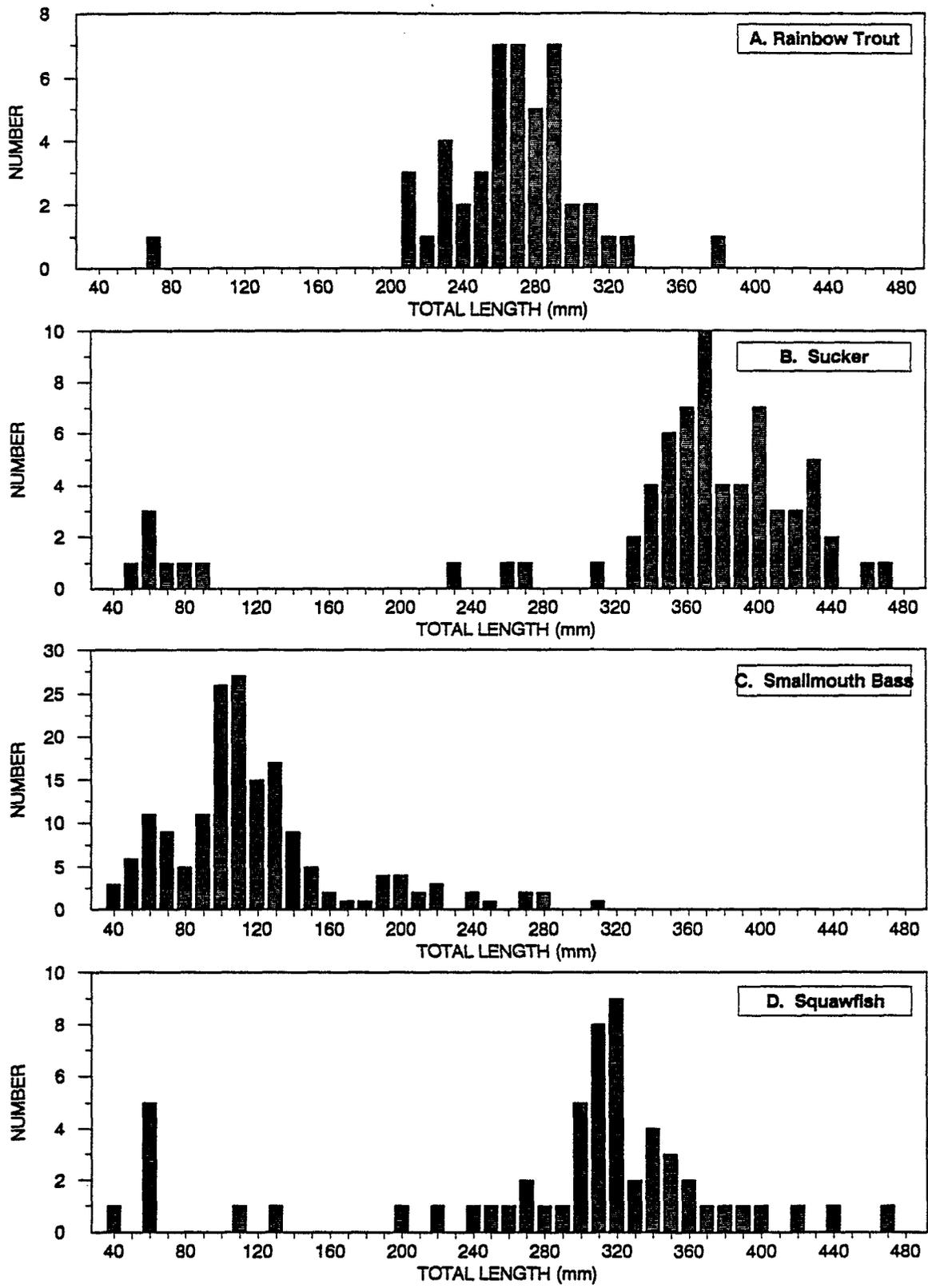


Figure 8-1. Length frequency distribution of abundant fish species collected during qualitative electrofishing surveys in the Mokelumne River below Woodbridge Dam.

Water temperatures at the upstream datapod, located near the Woodbridge Golf Course, ranged from 16.9° C on 26 April to 23.2° C on 28 June 1990. The mean daily recorded temperature was 19.2° C. Water temperatures from the downstream datapod, located near Ray Road, ranged from 18.5° C on 26 April to 29.6° C on 28 June, 1990, with a mean daily temperature of 23.0° C.