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REF 90281

State of California
The Resources Agency
Department of Fish and Game

**MOKELUMNE RIVER FISH INSTALLATION
ANNUAL REPORT FOR 1975-76 SEASON**

by

**Philo F. Jewett
Region 2, Inland Fisheries**

**Anadromous Fisheries Branch
Administrative Report No. 78-8**

1978

MOKELUMNE RIVER FISH INSTALLATION
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ABSTRACT

This report describes the operation of the Mokelumne River Fish Installation from July 1, 1975 through June 30, 1976. The installation consists of a spawning channel, hatchery, and rearing ponds.

Seventy-nine female king salmon (Oncorhynchus tshawytscha) spawned in the channel, depositing an estimated 378,641 eggs. We released a minimum of 68,000 fingerling salmon from the channel, plus 49,542 yearling salmon from the rearing ponds.

The steelhead (Salmo gairdnerii gairdnerii) brood stock program was discontinued because of repeated theft of fish being held at the installation. We planted approximately 14,600 fingerling and 57,957 yearling steelhead in 1975-76.

^{1/} Anadromous Fisheries Branch Administrative Report No. 78-8.
Submitted December 1976.

INTRODUCTION

This is the twelfth annual report of the Mokelumne River Fish Installation. It covers the period of operation from July 1, 1975, through June 30, 1976. Copies of previous annual reports are available upon request from the Anadromous Fisheries Branch, Sacramento.

The Mokelumne River Fish Installation is located on the south bank of the Mokelumne River at the base of Camanche Dam in San Joaquin County (Figure 1). Camanche Dam is presently the upper limit of anadromous fish migration in the river. The Mokelumne River enters the San Joaquin River about 98 river km (61 miles) downstream from the dam.

The installation was constructed to compensate for the loss of fall-run king salmon and steelhead trout spawning and rearing areas blocked by Camanche Dam. It is operated by the California Department of Fish and Game. The East Bay Municipal Utility District paid construction costs and also pays the annual operating and maintenance costs.

The installation is made up of two parts: (1) a spawning channel for natural spawning and rearing of fall-run king salmon, and (2) hatchery and rearing pond facilities for artificial spawning and rearing of steelhead and salmon. The salmon spawning channel is 2,073 m (6,800 ft) long by 6 m (20 ft) wide at the bottom. It consists of two loops of equal length, each containing two channels with spawning sections and resting pools. The rearing pond facilities have a capacity to rear 100,000 yearlings. A detailed description of the facility appears in the first annual report (Groh 1965).

WATER TEMPERATURES

Water temperatures were recorded continuously throughout the reporting period near the spawning channel entrance. Maximum and minimum recorded temperatures were 15.6 C (60 F) and 8.9 C (48 F), respectively (Appendix).

COPPER AND ZINC ANALYSIS

In only two of the twelve years of operation copper and zinc concentrations in the Mokelumne River became high enough to cause significant mortalities of our juvenile fish. This year, there were no mortalities attributed to this cause. The highest concentrations of zinc reached 0.09 ppm on June 26, 1976 (Appendix). Copper never exceeded 0.01 ppm.

DISEASE

We had no significant disease problems in this fiscal year.

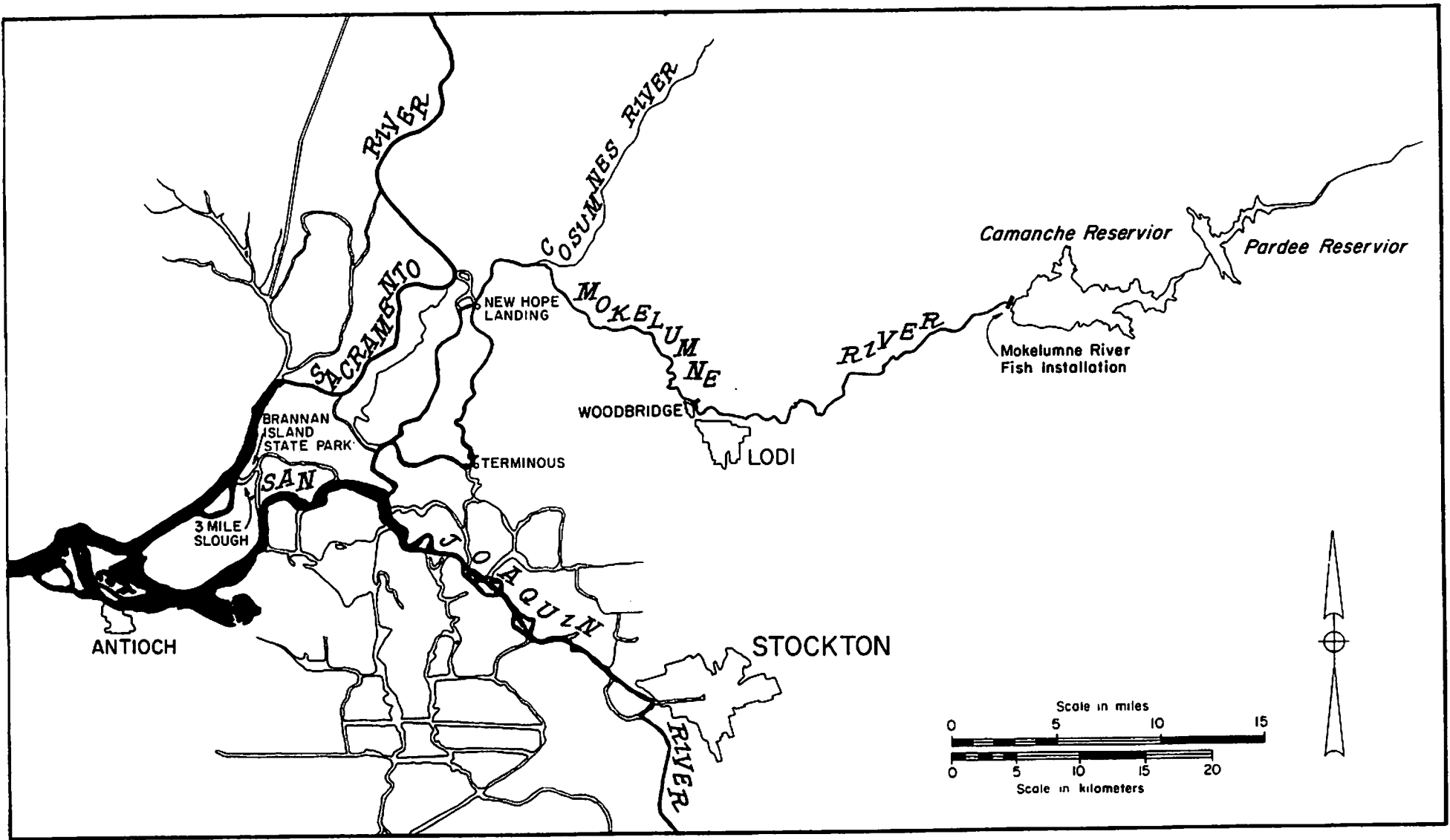


Figure 1. Map showing location of the Mokelumne River Fish Installation

PUBLIC RELATIONS

During the 1975-76 fiscal year, an estimated 17,000 people visited the installation. Tours were conducted for many special interest groups, and talks were given to sportsman clubs and civic organizations.

PRODUCTION SUMMARY

King salmon production during 1975-76 was increased over the previous year, but was still among the lowest of the last decade (Table 1). Steelhead production was the lowest on record (Table 2).

KING SALMON TAGGING PROGRAM

This was the second year of a three-year experimental program to evaluate the timing and location of release of yearling king salmon raised at the installation from eggs obtained from Nimbus Hatchery. This year's production was marked with adipose clips, received coded wire nose tags and released into the Sacramento River at Brannon Island--24,492 (code 6-2-3) in November 1975 and 25,050 (code 6-2-4) in February 1976.

KING SALMON MAINTENANCE

History of the 1975 Run

The spawning channel was in good condition at the start of the 1975 season; no gravel cleaning was required. Gravel berms were rebuilt before the first fish was received. These berms are of uniform size, 0.3 m (1 ft) higher in elevation than the channel bottom, perpendicular to the sides of the channel, 4.6 m (15 ft) wide, and 45.7 m (150 ft) apart. Their purpose is to reduce superimposition of redds.

Water was released into the spawning channel October 6, 1975. The flow was maintained between 1.6 and 1.7 m³/s (55-60 cfs) throughout the spawning season.

From October 7, 1975 through January 9, 1976 399 salmon entered the holding pond and were examined for marks, sex, and condition. We released 211 (81 females, 68 adult males, and 62 grilse^{2/}) of these into the spawning channel. Of the remaining 188 grilse, 172 were marked by clipping the tip of the caudal fin and returned to the river, and sixteen Ad-CWT grilse were sent to the laboratory for tag identification.

Mark Recoveries - 1975 Season

Seventeen marked salmon were recovered this season (Table 3).

^{2/} Male king salmon less than 61 cm (24 inches) FL are considered grilse.

Table 1. King Salmon Spawning Channel Summaries--Mokelumne River Fish Installation
1966-67 through 1975-76 Seasons

Season	Number of females released in channel	Number females prespawning mortality	Potential number of eggs	Estimated egg deposition	Fingerling production	Yearling production	Number of eggs received
1966-67	85	4	399,758	387,562	76,796		
1967-68	93	0	490,186	487,220	177,542		
1968-69	159	38	568,984	557,326	37,866		
1969-70	314	77	1,183,953	1,164,430	497,130		
1970-71	305	36	1,352,125	1,328,178	564,670		
1971-72	539	183	1,951,639	1,900,022	560,506*		
1972-73	30	0	141,344	137,006	40,417*		
1973-74	128	21	617,106	597,342	176,216*		100,800
1974-75	37	5	177,411	144,566	7,216	54,948**	101,640
1975-76	81	2	388,146	378,641	68,070***	49,542	197,500

* Computed from average production for years 1964-65 through 1970-71.

** Includes 12,788 yearlings which failed to migrate the previous year.

*** Minimum estimate. Trap was not in place during one week of emigration.

Table 2. Steelhead Hatchery Annual Summaries--Mokelumne River Fish Installation
1966-67 through 1975-76 Seasons

Season	Number native fish received	Number females spawned	Number eggs taken	Number eggs from Nimbus	Total eggs	Number planted as fingerlings	Number planted as yearlings
1966-67	17	3	13,534	164,600	178,125	94,520	74,630
1967-68	103	13	34,869	331,200	366,069	0	82,203
1968-69	24	4	25,580	301,240	326,820	125,760	101,207
1969-70	134	14	33,300	300,810	334,110	137,695	122,822
1970-71	215	39	167,158	251,550	418,708	152,862	107,972
1971-72	4	0	0	296,800	296,800	82,180	111,926
1972-73	13	97*	251,360	304,360	555,360	38,864	154,344*
1973-74	18	58*	252,800	0	252,800	286,590	48,285*
1974-75	2	70*	182,100	50,310	232,410	46,400	77,985
1975-76	0	0	0	94,640	94,640	14,600	57,202

* Includes brood stock production.

Table 3. Summary of Marked Salmon Recoveries,
Mokelumne River Fish Installation,
1975-76

Mark	Brood year	Number recovered	Average FL (cm)	Release data				
				Date	Area	Number	Average wt (g)	Origin
Ad	1970?	1	92.7	?	?	?	?	?
Ad	1973	2	50.0	10/74	Brannon Island	27,710	53	MRFI
Ad	1973	14	50.3	2/75	Brannon Island	14,450	103	MRFI

Carcass Recovery

Dead salmon were removed daily and measured to aid in making egg deposition estimates. The condition of the gonads was recorded, and the eggs retained in each female were counted.

Of the 211 salmon entering the spawning channel, 185 carcasses (78 females and 107 males) were recovered. Of the 78 females, 2 (2.6%) had died without spawning.

Estimated Egg Deposition

Potential egg deposition based on the 76 spent females recovered was estimated using the length-fecundity relationship: $Fecundity = 350.24 FL - 4,983.99$ (Jewett 1972). Total fecundity of the 78 females (388,146) minus the unspawned eggs (9,505) produced an estimate of 378,641 eggs deposited in the channel.

King Salmon Fingerling Production

On January 5, 1976 the flow in the spawning channel was reduced to $0.708 m^3/s$ (25 cfs) where it remained for the duration of the season. At this time water was released into channels three and four for added nursery area.

A trap was installed on January 5 and all outmigrants were counted until June 11 when the trap was removed. During this period 29,670 1975 broodyear (BY) fingerlings were physically counted. From June 11 to June 18 an unknown number of fingerlings migrated out of the channel of their own volition.

On June 18, 1976 we drained the spawning channel and seined out 38,400 1975 BY salmon which were planted into the river.

STEELHEAD MAINTENANCE PROGRAM

History of the 1975-76 Run

No adult steelhead entered the installation this season.

Brood Stock Spawning

The brood stock program was discontinued because of recurring thefts and the few remaining adult fish were released to the river without being counted.

Production

During 1975-76 we planted 57,202 yearling and 14,600 fingerling steelhead (Tables 4 and 5).

Table 4. Summary of Steelhead Production, 1975-76

Brood year	Female brood stock spawned	Eggs taken	Eggs received from Nimbus	Adults planted	Yearlings planted	Fingerlings planted	On hand 6/30/76
1972				*			
1973				*			
1974					6,910		
1975					50,292	14,600	4,960
1976		0	94,640				72,000
TOTALS					57,202	14,600	76,960

* Number not recorded.

Table 5. Steelhead Planting Data, Mokelumne River Fish Installation, 1975-76 Fiscal Year

Pounds	Number	Size	Release location	Date
<u>1974 Brood Year Production</u>				
1,200	2,160	1.8/lb	Mokelumne River	7/75
2,375	4,750	2.0/lb	Mokelumne River	8/75
<u>1975 Brood Year Production</u>				
365	14,600	40/lb	Mokelumne River	8/75
2,000	7,400	3.7/lb	Mokelumne River	12/75
1,200	3,240	2.7/lb	Brannon Island	1/76
1,200	2,760	2.3/lb	Brannon Island	1/76
7,249	13,773	1.9/lb	Brannon Island	2/76
4,000	7,200	1.8/lb	Brannon Island	3/76
4,750	9,975	2.1/lb	Brannon Island	3/76
165	297	1.8/lb	Mokelumne River	3/76
1,070	1,712	1.6/lb	Mokelumne River	4/76
600	960	1.6/lb	Mokelumne River	5/76
700	1,050	1.5/lb	Mokelumne River	5/76
1,050	1,470	1.4/lb	Mokelumne River	6/76
350	455	1.3/lb	Mokelumne River	6/76

REFERENCES

Groh, Frederick H. 1965. Annual report Mokelumne River Fish Installation from January 1, 1964 to June 30, 1965. Calif. Dep. Fish and Game, Inland Fish. Admin. Rep. 65-21. 28 p.

Jewett, Philo F. 1972. Mokelumne River Fish Installation annual report for 1970-71 season. Calif. Dep. Fish and Game, Anad. Fish. Admin. Rep. 72-9. 20 p.

Appendix

Water Temperatures and Zinc Concentrations,
Mokelumne River Fish Installation, 1975-76 Season

Date	Water temperature (C)		Zinc ppm	Date	Water temperature (C)		Zinc ppm
	Max.	Min.			Max.	Min.	
July 1	12.2	11.1	0.02	Aug. 1	12.8	12.2	
2	12.2	11.1	0.04	2	12.8	12.2	
3	12.2	11.7	0.02	3	12.8	12.2	
4	12.2	11.7	0.02	4	12.8	12.2	
5	12.2	11.7	0.05	5	12.8	12.2	
6	12.2	11.7	0.02	6	12.8	12.2	
7	12.2	11.7	0.02	7	13.3	12.2	
8	12.2	11.7	0.02	8	13.3	12.2	
9	12.2	11.7	0.02	9	13.3	12.2	
10	12.8	12.2	0.03	10	12.8	12.2	
11	12.8	12.2	0.07	11	12.8	12.2	
12	12.8	11.7	0.03	12	12.8	12.2	
13	12.8	11.7	0.03	13	12.8	12.2	
14	12.8	11.7	0.03	14	12.8	12.2	
15	12.2	11.7	0.03	15	12.8	12.2	
16	12.2	11.7	0.03	16	12.8	12.2	
17	12.2	11.7	0.02	17	12.8	12.2	
18	12.2	11.7	0.03	18	12.2	12.2	
19	12.8	12.2	0.04	19	12.8	12.2	
20	12.8	12.2	0.04	20	12.8	12.2	
21	12.8	12.2	0.03	21	13.3	12.8	
22	12.8	12.2	Terminated	22	13.3	12.8	
23	12.8	12.2		23	13.3	12.8	
24	12.8	12.2		24	12.8	12.2	
25	12.8	12.2		25	12.8	12.2	
26	12.8	12.2		26	12.2	12.2	
27	12.8	12.2		27	12.2	12.2	
28	12.8	12.2		28	13.3	12.2	
29	12.8	12.2		29	13.3	12.2	
30	12.8	12.2		30	13.3	12.2	
31	12.8	12.2		31	13.3	12.2	

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Water Temperatures and Zinc Concentrations,
Mokelumne River Fish Installation, 1975-76 Season

Date	Water temperature (C)		Zinc ppm	Date	Water temperature (C)		Zinc ppm
	Max.	Min.			Max.	Min.	
Sept. 1	13.3	12.2		Oct. 1	13.9	13.3	
2	13.3	12.2		2	13.9	13.3	
3	13.3	12.8		3	14.4	13.3	
4	13.3	12.8		4	13.9	13.3	
5	13.3	12.8		5	14.4	13.3	
6	13.3	12.8		6	13.3	13.3	
7	13.3	12.8		7	13.9	13.3	
8	12.8	12.8		8	13.9	13.3	
9	12.8	12.8		9	13.9	13.3	
10	12.8	12.8		10	No record		
11	12.8	12.8		11	" "		
12	12.8	12.8		12	" "		
13	12.8	12.8		13	" "		
14	12.8	12.8		14	" "		
15	12.8	12.8		15	14.4	13.9	
16	12.8	12.8		16	14.4	13.9	
17	12.8	12.8		17	14.4	14.4	
18	12.8	12.8		18	15.0	14.4	
19	12.8	12.8		19	15.0	14.4	
20	12.8	12.8		20	15.0	14.4	
21	12.8	12.8		21	15.0	14.4	
22	12.8	12.8		22	14.4	14.4	
23	13.9	13.3		23	15.0	14.4	
24	14.4	13.3		24	15.0	14.4	
25	14.4	13.3		25	15.0	14.4	
26	14.4	13.3		26	15.0	14.4	
27	13.9	13.3		27	15.0	14.4	
28	13.9	13.3		28	15.0	14.4	
29	13.9	13.3		29	15.6	15.0	
30	13.9	13.3		30	15.6	15.0	
				31	15.6	15.0	

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Water Temperatures and Zinc Concentrations,
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Date	Water temperature (C)		Zinc ppm	Date	Water temperature (C)		Zinc ppm
	Max.	Min.			Max.	Min.	
Nov. 1	15.6	15.0		Dec. 1	13.3	12.8	
2	15.6	15.0		2	13.3	12.8	
3	15.6	15.0		3	12.8	12.2	
4	15.6	15.0		4	12.8	12.2	
5	15.6	15.0		5	12.8	12.2	
6	15.6	15.0		6	12.8	12.2	
7	15.6	15.0		7	12.8	12.2	
8	15.6	15.0		8	12.8	12.2	
9	15.6	15.0		9	12.2	12.2	
10	15.6	15.0		10	12.2	12.2	
11	15.6	15.0	0.01	11	12.2	12.2	0.06
12	15.0	15.0	0.01	12	12.2	12.2	0.03
13	15.6	15.0	0.01	13	12.2	12.2	0.04
14	15.6	15.6	0.01	14	11.7	11.7	0.06
15	15.6	15.6	0.01	15	11.7	11.1	0.01
16	15.0	15.0	0.01	16	11.7	11.1	0.02
17	15.0	14.4	0.01	17	11.7	11.1	0.02
18	14.4	14.4		18	11.7	11.1	0.01
19	14.4	14.4		19	11.7	11.1	0.01
20	14.4	13.9		20	11.7	11.1	0.02
21	14.4	13.9		21	11.7	11.1	0.02
22	14.4	13.9		22	11.1	11.1	0.06
23	13.9	13.3		23	11.1	11.1	0.01
24	13.9	13.3		24	11.1	11.1	0.03
25	13.9	13.3		25	11.1	11.1	0.01
26	13.9	13.3		26	11.1	11.1	0.01
27	13.3	13.3		27	11.1	10.6	0.02
28	13.3	13.3		28	11.1	10.6	0.01
29	13.3	13.3		29	11.1	10.6	0.01
30	13.3	12.8		30	11.1	10.6	0.07
				31	10.6	10.0	0.01

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Water Temperatures and Zinc Concentrations,
Mokelumne River Fish Installation, 1975-76 Season

Date	Water temperature (C)		Zinc ppm	Date	Water temperature (C)		Zinc ppm
	Max.	Min.			Max.	Min.	
Jan. 1	10.6	10.0	0.01	Feb. 1	9.4	8.9	0.01
2	10.6	10.0	0.02	2	10.0	8.9	0.01
3	10.6	10.0	0.01	3	9.4	9.4	0.04
4	10.6	10.0	0.01	4	9.4	9.4	0.02
5	10.0	10.0	0.01	5	9.4	9.4	0.04
6	10.0	9.4	0.01	6	9.4	9.4	0.03
7	10.0	9.4	0.01	7	10.0	9.4	0.01
8	10.0	9.4	0.01	8	9.4	9.4	0.01
9	10.0	9.4	0.01	9	10.0	9.4	0.01
10	10.0	9.4	0.01	10	10.0	9.4	0.02
11	9.4	9.4	0.01	11	10.0	9.4	0.01
12	9.4	9.4	0.01	12	10.0	9.4	0.01
13	9.4	9.4	0.01	13	10.0	9.4	0.01
14	9.4	8.9	0.01	14	10.0	9.4	0.01
15	9.4	8.9	0.01	15	10.0	9.4	0.01
16	9.4	9.4	0.01	16	10.0	9.4	0.01
17	9.4	8.9	0.01	17	10.0	9.4	0.01
18	9.4	8.9	0.01	18	10.0	9.4	0.01
19	9.4	8.9	0.01	19	10.0	9.4	0.01
20	9.4	8.9	0.01	20	10.0	9.4	0.01
21	9.4	8.9	0.01	21	10.0	9.4	0.01
22	9.4	8.9	0.01	22	10.0	9.4	0.01
23	9.4	8.9	0.01	23	10.0	9.4	0.01
24	9.4	8.9	0.02	24	10.0	9.4	0.01
25	9.4	8.9	0.01	25	10.0	9.4	0.01
26	9.4	8.9	0.01	26	10.0	9.4	0.01
27	9.4	8.9	0.01	27	10.0	10.0	0.01
28	10.0	8.9	0.01	28	10.0	10.0	0.01
29	10.0	8.9	0.01	29	10.0	9.4	0.01
30	10.8	9.4	0.01				
31	10.0	9.4	0.01				

Appendix

Water Temperature and Zinc Concentrations,
Mokelumne River Fish Installation, 1975-76 Season

Date	Water temperature (C)		Zinc ppm	Date	Water temperature (C)		Zinc ppm
	Max.	Min.			Max.	Min.	
Mar. 1	10.0	9.4	0.01	April 1	12.2	11.1	0.01
2	10.0	9.4	0.01	2	11.7	11.1	0.01
3	10.0	10.0	0.01	3	11.7	11.1	0.01
4	10.0	10.0	0.01	4	11.1	11.1	0.06
5	10.6	10.0	0.01	5	11.1	11.1	0.02
6	10.6	10.0	0.01	6	11.7	11.1	0.01
7	10.6	10.0	0.01	7	12.2	11.7	0.01
8	10.6	10.0	0.01	8	12.2	11.7	0.01
9	10.6	10.0	0.01	9	11.7	11.1	0.03
10	11.1	10.0	0.01	10	11.7	11.1	0.01
11	11.1	10.1	0.01	11	11.7	11.1	0.02
12	11.1	10.0	0.01	12	11.7	11.1	0.02
13	11.1	10.0	0.01	13	12.2	11.7	0.01
14	11.1	10.0	0.01	14	12.2	11.7	0.01
15	11.1	10.0	0.01	15	12.2	11.7	0.02
16	11.1	10.0	0.01	16	12.2	11.7	0.02
17	11.7	11.1	0.01	17	12.2	11.7	0.02
18	11.7	11.1	0.01	18	12.8	12.2	0.01
19	11.7	11.1	0.02	19	13.3	12.8	0.02
20	11.7	11.1	0.01	20	13.3	12.8	0.01
21	11.7	11.1	0.01	21	13.3	12.2	0.02
22	11.7	11.1	0.01	22	12.2	11.7	0.01
23	11.7	11.1	0.01	23	12.2	11.7	0.03
24	11.7	11.1	0.01	24	12.2	11.7	0.03
25	11.7	11.1	0.01	25	12.2	11.7	0.01
26	11.7	11.1	0.01	26	12.2	11.7	0.04
27	11.7	11.1	0.01	27	13.3	12.2	0.01
28	11.7	11.1	0.03	28	12.8	12.2	0.01
29	12.2	11.7	0.01	29	12.8	12.2	0.01
30	12.2	11.7	0.01	30	13.3	12.2	0.24*
31	12.2	11.1	0.02				

* Sample may have been contaminated.

Appendix

Water Temperatures and Zinc Concentrations,
Mokelumne River Fish Installation, 1975-76 Season

Date	Water temperature (C)		Zinc ppm	Date	Water temperature (C)		Zinc ppm
	Max.	Min.			Max.	Min.	
May 1	12.8	12.2	0.02	June 1	13.3	12.8	0.04
2	12.8	12.2	0.01	2	13.9	12.8	0.01
3	13.2	12.2	0.01	3	13.9	12.8	0.01
4	13.2	12.2	0.01	4	13.9	12.8	0.02
5	13.3	12.2	0.01	5	13.9	12.8	0.01
6	13.3	12.2	0.02	6	13.3	12.8	0.01
7	13.3	12.2	0.01	7	13.3	12.8	0.01
8	13.3	12.2	0.01	8	13.9	12.8	0.01
9	13.3	12.2	0.01	9	13.3	13.3	0.02
10	13.3	12.2	0.01	10	13.9	13.3	0.01
11	13.3	12.2	0.01	11	13.9	13.3	0.06
12	13.3	12.8	0.01	12	13.9	13.3	0.01
13	13.9	12.8	0.01	13	13.9	13.3	0.01
14	13.3	12.8	0.01	14	14.4	13.3	0.01
15	13.3	12.8	0.01	15	14.4	13.3	0.01
16	13.3	12.8	0.01	16	14.4	13.3	0.01
17	13.3	12.8	0.01	17	14.4	13.3	0.01
18	13.3	12.8	0.01	18	14.4	13.3	0.01
19	13.3	12.8	0.01	19	14.4	13.3	0.01
20	13.3	12.8	0.01	20	13.9	13.3	0.01
21	13.3	12.8	0.01	21	13.9	13.3	0.01
22	13.3	12.8	0.01	22	14.4	13.3	0.02
23	13.3	12.8	0.01	23	14.4	13.9	0.02
24	13.3	12.8	*	24	14.4	13.9	0.01
25	13.3	12.9	0.02	25	14.4	13.9	0.02
26	13.9	12.8	0.01	26	14.4	13.9	0.09
27	13.3	12.8	0.02	27	14.4	13.9	0.02
28	13.3	12.8	0.02	28	14.4	13.3	0.01
29	13.3	12.8	0.02	29	14.4	13.9	0.02
30	13.3	12.8	0.02	30	14.4	13.3	0.01
31	13.3	12.8	0.01				

* No sample taken this date