State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

MOKELUMNE RIVER FISH INSTALLATION
ANNUAL REPORT FOR 1974-75 SEASON

by

Philo F. Jewett
Region 2, Inland Fisheries

Anadromous Fisheries Branch

Administrative Report No. 78-7

1978

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ABSTRACT

This report describes the operation of the Mokelumne River Fish Installation from July 1, 1974 through June 30, 1975. The installation consists of a spawning channel, hatchery, and rearing ponds.

Thirty-two female king salmon (Oncorhynchus tshawytscha) spawned in the channel, depositing an estimated 144,566 eggs. We released approximately 20,004 yearling and fingerling salmon from the channel, plus 42,160 yearling salmon from the rearing ponds.

We also released 424 adults, 77,985 yearling, and 46,400 fingerling steelhead trout (Salmo gairdnerii gairdnerii).

1/ Anadromous Fisheries Branch Administrative Report No. 78-7. Submitted May 1976.

INTRODUCTION

This is the eleventh annual report of the Mokelumne River Fish Installation. It covers the period of operation from July 1, 1974, through June 30, 1975. 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 temperatures recorded were 15.6 C (60 F) and 8.3 C (47 F), respectively (Appendix).

COPPER AND ZINC ANALYSIS

In two of the eleven 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 0.14 ppm on May 16, 1975 (Appendix). Copper never exceeded 0.01 ppm.

DISEASE

We had no significant disease problems in this fiscal year.

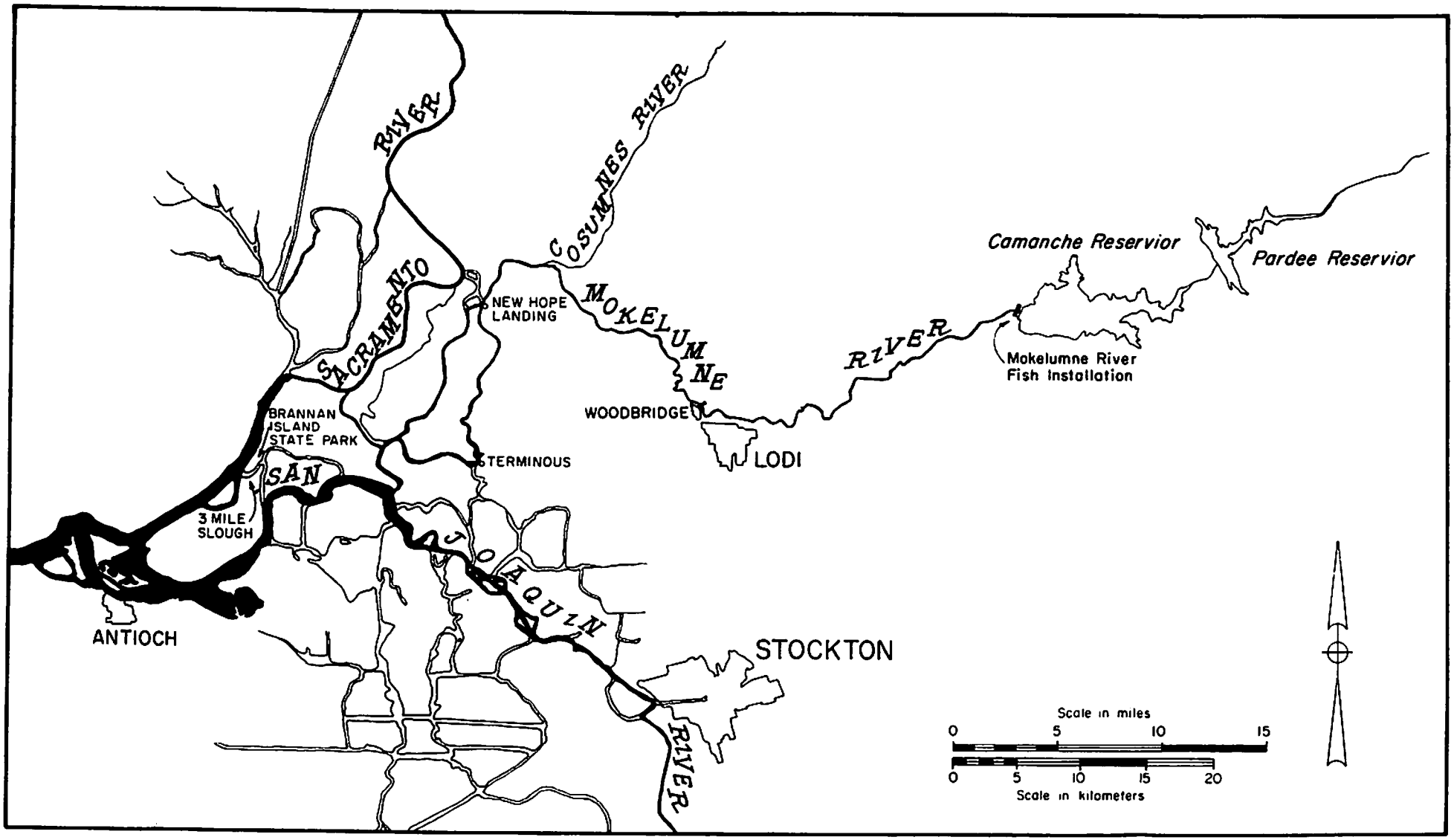

Figure 1. Map showing location of the Mokelumne River Fish Installation

PUBLIC RELATIONS

During the 1974-75 fiscal year, an estimated 15,000 people visited the installation. Tours were conducted for many special interest groups, and talks were given to sportsman clubs and civic organizations.

PRODUCTION SUMMARY

Utilization and production of the Mokelumne River Fish Installation in 1974-75 was down considerably from the previous year and one of the lowest in the last ten years (Tables 1 and 2).

KING SALMON TAGGING PROGRAM

A three-year experimental program was initiated 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 yearlings, from eggs obtained in 1973, were released into the Sacramento River at Brannon Island--27,710 in October 1974 and 14,450 in February 1975. All were marked with adipose clips and tagged with coded wire nose tags.

KING SALMON MAINTENANCE

History of the 1974 Run

The spawning channel was in good condition at the start of the 1974 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 2, 1974. The flow was maintained between 1.6 and 1.7 m^3/s (55-60 cfs) throughout the spawning season.

From October 6, 1974 through January 5, 1975 220 salmon entered the holding pond and were examined for marks, sex, and condition. We released 177 (37 females, 49 adult males, and 91 grilse[2/]) of these into the spawning channel. The remaining 43 grilse were marked by clipping the tip of the caudal fin and returned to the river.

Mark Recoveries - 1974 Season

One Ad-RV-marked salmon, 67.5 cm (26.5 inches) FL, was recovered this season. This fish was probably part of a plant of 400,000 fingerlings planted March 1971 at Rio Vista by Coleman National Fish Hatchery.

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

Table 1. King Salmon Spawning Channel Annual Summaries--Mokelumne River Fish Installation 1965-66 through 1974-75 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
1965-66	33	1	157,043	150,883	76,435		
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

* Computed from average production for years 1964-65 through 1970-71.
** Includes 12,788 yearlings which failed to migrate the previous year.

Table 2. Steelhead Hatchery Annual Summaries--Mokelumne River Fish Installation 1965-66 through 1974-75 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
1965-66	30	8	30,970	331,400	362,370	131,420	84,410
1966-67	17	3	13,524	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	304,000	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

* Includes brood stock production.

Carcass Recovery

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

Of the 177 salmon entering the spawning channel, 163 carcasses (32 females and 131 males) were recovered. Of the 32 females, 5 (15.6%) had died without spawning.

Estimated Egg Deposition

Potential egg deposition based on the 32 spent females recovered was estimated using the length-fecundity relationship: Fecundity = 350.24 FL - 4,983.99 (Jewett 1972). Total fecundity of the 32 females (177,411) minus the unspawned eggs (32,845) produced an estimate of 144,566 eggs deposited in the channel.

King Salmon Fingerling Production

On January 7, 1975, the flow in the spawning channel was reduced to 0.481 m^3/s (17 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 7 and all outmigrants were counted until June 10 when the trap was removed and the channels closed to outmigration. During this period we counted 12,132 1973 broodyear (BY) and 4,396 1974 BY salmon leaving the channel.

The unusually low number of 1974 BY outmigrants was probably a result of predation by 1973 BY salmon which were allowed to remain in the channel the previous year (Jewett, 1975).

On June 17, 1975 we drained the spawning channel and seined out the remaining king salmon. We recovered 656 1973 BY and 2,820 1974 BY fish which were planted into the river.

Production of king salmon fingerlings during the years 1964-65 through 1970-71 averaged 29.5% of estimated egg deposition (Jewett 1972). Assuming the same egg-to-fingerling production rate for the 1974 brood year, the production should have been 42,646, considerably more than the 7,216 actually counted.

STEELHEAD MAINTENANCE PROGRAM

History of the 1974-75 Run

Only two adult male steelhead entered the installation this season. One was 64.8 cm (25.5 inches) FL and entered on November 2; the other was 64.5 cm (25.75 inches) and entered on December 7.

Brood Stock Spawning

Seventy 1972 BY females produced approximately 182,100 eggs (2,601/female). Spawning began November 11, 1974 and by December 29 we had taken enough eggs to meet our requirements.

Production

During 1974-75 we planted 424 surplus brood stock adults, 44,505 yearlings and 79,880 fingerlings (Tables 3 and 4).

Table 3. Summary of Steelhead Production, Mokelumne River Fish Installation, 1974-75

Brood year	Female brood stock spawned	Eggs taken	Eggs received from Nimbus	Adults planted	Yearlings planted	Fingerlings planted	On hand 6/30/75
1971				44			
1972	70			380			
1973					5,947		
1974					72,038		7,000
1975		182,100	53,310			46,400	84,600
TOTALS	70	182,100	53,310	424	77,285	46,400	91,600

Table 4. Steelhead Planting Data, Mokelumne River Fish Installation, 1974-75

Pounds	Number	Size	Release location	Date
		1971 Brood Year (brood stock)		
220	44	5 lb each	Mokelumne River	7/74 10/74
		1972 Brood Year (brood stock)		
368	184	2 lb each	Mokelumne River	7/74
588	196	3 lb each	Mokelumne River	6/75
		1973 Brood Year (production)		
2,194	5,485	2.5/lb	Mokelumne River	7/74
		1973 Brood Year (brood stock)		
210	462	2.2/lb	Mokelumne River	10/74
		1974 Brood Year (production)		
2,700	33,480	12.4/lb	Mokelumne River	7/74
3,000	14,700	4.9/lb	Brannon Island	1/75
5,500	21,010	3.8/lb	Brannon Island	2/75
200	340	1.7/lb	Mokelumne River	3/75
400	700	1.7/lb	Mokelumne River	4/75
500	970	1.9/lb	Mokelumne River	5/75
638	838	1.3/lb	Mokelumne River	6/75
		1975 Brood Year (production)		
100	46,400	464/lb	Mokelumne River	6/75

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.

Jewett, Philo F. 1975. Mokelumne River Fish Installation annual report for 1973-74 season. Calif. Dep. Fish and Game, Anad. Fish. Admin. Rep. 75-8. 19 p.

Appendix

Water Temperatures and Zinc Concentrations, Mokelumne River Fish Installation, 1974-75 Season

Date	Water temperature (C) Max.	Min.	Date	Water temperature (C) Max.	Min.
July 1	12.8	12.2	Aug. 1	13.3	12.2
2	12.8	12.2	2	13.3	12.2
3	12.8	12.2	3	13.3	12.2
4	12.8	12.2	4	13.3	12.2
5	12.8	12.2	5	13.3	12.2
6	12.8	12.2	6	13.3	12.2
7	12.8	12.2	7	13.3	12.2
8	12.8	12.2	8	13.3	12.2
9	12.8	12.2	9	13.3	12.2
10	12.8	12.2	10	13.3	12.2
11	12.8	12.2	11	13.3	12.2
12	12.8	12.2	12	13.3	12.2
13	12.8	12.2	13	13.3	12.2
14	12.8	12.2	14	13.3	12.2
15	12.8	12.2	15	13.3	12.8
16	12.8	12.2	16	13.3	12.8
17	12.8	12.2	17	13.3	12.8
18	12.8	12.2	18	13.3	12.2
19	13.3	12.2	19	13.3	12.2
20	12.8	12.2	20	13.3	12.2
21	12.8	12.2	21	13.3	12.2
22	13.3	12.2	22	13.3	12.2
23	13.3	12.2	23	13.3	12.2
24	13.3	12.2	24	13.3	12.2
25	13.3	12.2	25	13.3	12.2
26	13.3	12.2	26	13.3	12.2
27	13.3	12.2	27	13.3	12.2
28	13.3	12.2	28	13.3	12.2
29	13.3	12.2	29	13.3	12.2
30	13.3	12.2	30	13.3	12.2
31	13.2	12.2	31	13.3	12.2

Appendix (continued)

Date	Water temperature (C) Max.	Min.	Date	Water temperature (C) Max.	Min.
Sep. 1	13.3	12.2	Oct. 1	13.9	13.3
2	13.3	12.2	2	13.9	13.3
3	13.3	12.2	3	13.9	13.3
4	13.3	12.2	4	13.9	13.3
5	13.3	12.2	5	13.9	13.3
6	13.3	12.2	6	13.9	13.3
7	13.3	12.2	7	13.9	13.3
8	13.3	12.2	8	13.9	13.3
9	13.3	12.2	9	14.4	13.3
10	13.3	12.2	10	14.4	13.3
11	13.9	12.8	11	14.4	13.3
12	13.9	12.8	12	14.4	13.3
13	13.9	12.8	13	14.4	13.3
14	13.3	12.2	14	14.4	13.3
15	13.3	12.2	15	14.4	13.3
16	13.9	12.8	16	14.4	13.9
17	13.9	12.8	17	14.4	13.9
18	13.9	12.8	18	14.4	13.9
19	13.9	12.8	19	14.4	13.3
20	13.9	12.8	20	14.4	13.3
21	13.9	12.8	21	14.4	13.3
22	13.3	12.8	22	14.4	13.3
23	13.9	12.8	23	14.4	13.3
24	13.9	12.8	24	14.4	13.9
25	13.9	12.8	25	14.4	13.9
26	13.3	12.8	26	14.4	13.9
27	13.3	12.8	27	14.4	13.9
28	13.3	12.8	28	14.4	13.3
29	13.3	12.8	29	14.4	14.4
30	13.3	12.8	30	14.4	13.9
			31	14.4	13.9

Appendix (continued)

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

Appendix (continued)

Date		Water temperature (C) Max.	Min.	Date		Water temperature (C) Max.	Min.	Zinc (ppm)
Jan.	1	10.0	9.4	Feb.	1	8.9	8.9	
	2	10.0	9.4		2	8.9	8.3	
	3	10.0	10.0		3	8.9	8.3	
	4	9.4	9.4		4	8.9	8.3	
	5	9.4	9.4		5	8.9	8.9	
	6	9.4	9.4		6	8.9	8.9	.01
	7	9.4	9.4		7	8.9	8.9	.01
	8	10.0	8.9		8	8.9	8.9	< .01
	9	9.4	9.4		9	8.9	8.9	.01
	10	9.4	9.4		10	8.9	8.9	.02
	11	9.4	8.9		11	8.9	8.9	.01
	12	9.4	8.9		12	9.4	8.9	.01
	13	8.9	8.9		13	9.4	8.9	< .01
	14	9.4	8.9		14	9.4	8.9	< .01
	15	9.4	8.9		15	9.4	8.9	.01
	16	8.9	8.9		16	9.4	8.9	.01
	17	8.9	8.9		17	9.4	8.9	.01
	18	8.9	8.9		18	9.4	8.9	.01
	19	8.9	8.9		19	9.4	8.9	.01
	20	8.9	8.9		20	9.4	8.9	< .01
	21	8.9	8.9		21	9.4	8.9	< .01
	22	8.9	8.9		22	9.4	8.9	.01
	23	8.9	8.9		23	9.4	8.9	.01
	24	9.4	8.9		24	9.4	8.9	.01
	25	9.4	8.9		25	9.4	8.9	.01
	26	8.9	8.9		26	9.4	8.9	.01
	27	8.9	8.9		27	9.4	8.9	.01
	28	8.9	8.9		28	9.4	8.9	.02
	29	8.9	8.3					
	30	8.9	8.9					
	31	8.9	8.9					

Appendix (continued)

Date	Water temperature (C) Max.	Min.	Zinc (ppm)	Date	Water temperature (C) Max.	Min.	Zinc (ppm)
Mar. 1	9.4	8.9	.03	Apr. 1	10.0	8.9	.04
2	9.4	8.9	.04	2	10.0	9.4	.03
3	9.4	8.9	.04	3	10.0	9.4	.04
4	9.4	8.9	.03	4	10.0	9.4	.03
5	8.9	8.9	.06	5	10.0	9.4	.06
6	10.0	10.0	.40*	6	10.0	9.4	.06
7	10.0	10.0	.04	7	10.0	9.4	.08
8	10.0	10.0	.03	8	10.0	9.4	.07
9	10.0	10.0	.03	9	10.6	10.0	.09
10	9.4	8.9	.17	10	10.6	10.0	.08
11	10.0	10.0	.06	11	10.6	10.0	.07
12	10.0	9.4	.01	12	10.6	10.0	.08
13	10.0	9.4	.02	13	10.6	10.0	.08
14	10.0	9.4	.01	14	10.0	9.4	.09
15	10.0	9.4	.02	15	10.0	9.4	.07
16	10.0	9.4	.03	16	10.0	9.4	.08
17	10.0	9.4	.03	17	10.0	9.4	.07
18	10.0	9.4	.02	18	10.0	10.0	.08
19	10.0	9.4	.04	19	10.6	10.0	.07
20	10.0	9.4	.04	20	10.0	10.0	.06
21	10.0	9.4	.05	21	10.0	10.0	.06
22	10.0	9.4	.03	22	10.0	10.0	.06
23	10.0	9.4	.08	23	10.6	10.0	.06
24	10.0	9.4	.06	24	10.6	10.0	.05
25	10.0	9.4	.07	25	10.6	10.0	.10
26	10.0	8.9	.07	26	10.6	10.0	.06
27	10.0	8.9	.09	27	10.6	10.0	.06
28	10.0	8.9	.03	28	10.6	10.0	.08
29	10.0	8.9	.04	29	10.6	10.0	.06
30	10.0	8.9	.03	30	11.1	10.0	.06
31	10.0	8.9	.10				

* Sample probably contaminated.

Appendix (continued)

Date		Water temperature (C) Max.	Min.	Zinc (ppm)	Date		Water temperature (C) Max.	Min.	Zinc (ppm)
May	1	11.1	10.0	.08	June	1	12.2	11.1	.03
	2	11.1	10.0	.05		2	12.2	11.1	.03
	3	11.1	10.0	.05		3	12.2	11.1	.03
	4	11.1	10.0	.05		4	12.2	11.1	.03
	5	11.1	10.0	.08		5	12.2	11.1	.03
	6	11.1	10.0	.12		6	12.2	11.1	.03
	7	11.1	10.0	.07		7	12.2	11.1	.03
	8	11.1	10.0	.06		8	12.2	11.1	.03
	9	11.1	10.0	.05		9	12.2	11.1	.02
	10	11.1	10.0	.07		10	12.2	11.1	.03
	11	11.1	10.0	.09		11	12.2	11.1	.03
	12	11.1	10.0	.08		12	12.2	11.1	.03
	13	11.1	10.0	.09		13	12.2	11.1	.02
	14	11.1	10.0	.11		14	12.2	11.1	.03
	15	11.1	10.0	.05		15	12.2	11.1	.03
	16	11.1	10.0	.14		16	12.2	11.1	.03
	17	11.1	10.0	.05		17	12.2	11.1	.02
	18	11.1	10.0	.06		18	12.2	11.1	.03
	19	11.1	10.0	.08		19	12.2	11.1	.03
	20	11.1	10.0	.05		20	12.2	11.1	.03
	21	Malfunction		.05		21	12.2	11.1	.03
	22	"		.06		22	12.2	11.1	.03
	23	"		.07		23	12.2	11.1	.03
	24	"		.11		24	12.2	11.1	.02
	25	"		.05		25	12.2	11.1	.03
	26	"		.03		26	12.2	11.1	.03
	27	"		.04		27	12.2	11.1	.02
	28	12.2	11.1	.05		28	12.2	11.1	.03
	29	12.2	11.1	.03		29	12.2	11.1	.02
	30	12.2	11.1	.03		30	12.2	11.1	.02
	31	12.2	11.1	.04					