State of California
The Resources Agency
Department of Fish and Game
Region 2, Inland Fisheries

MOKELUMNE RIVER FISH INSTALLATION ANNUAL REPORT FOR 1968-69 SEASON [1/]

by

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SUMMARY

This is the fifth annual report of the Mokelumne River Fish Installation. It covers the period of operation from July 1, 1968 to June 30, 1969.

Construction of the Installation was completed in 1964. The purpose of the project was to compensate for loss of spawning area of fall-run king (chinook) salmon, Oncorhynchus tshawytscha, and steelhead trout, Salmo gairdneri, blocked by Camanche Dam.

The Installation is made up of two parts: a spawning channel for natural spawning of salmon and a hatchery for artificial spawning and rearing of steelhead trout.

From October 21 to December 24, 1968, there were 954 adult salmon received at the Installation. Of this number, 551 were placed in the spawning channel. At the end of the season we had recovered 121 female carcasses. From these an estimated 557,326 eggs were deposited in the gravel, and 51,401 young salmon were counted out of the channel. An unknown (possibly large) number escaped uncounted through a disconnected pipe. Of the 51,401 salmon counted out of the channel, 12,610 died of Sacramento River Cold Water Disease and 925 died from mechanical or handling causes. The 37,866 remaining fish represent 6.8% of the 557,326 eggs deposited. Pre-spawning mortality at the Installation amounted to 38 female salmon.

Twenty-four adult steelhead were received from January 7 to February 4, 1969. Four females were spawned which resulted in 25,580 eggs or 6,395 eggs per female. An additional 301,240 steelhead eggs were received from Nimbus Hatchery for a total of 326,820 eggs from the 1969 brood year.

Young steelhead from the 1968 brood year were planted in the Mokelumne River, some as fingerlings and some as yearlings. From July 8 to October 24, 1968, 125,760 fingerlings were planted. Then in March of 1969, 101,207 yearlings were planted.

[1/] Anadromous Fisheries Administrative Report No. 71-5. Submitted March 1971.

INTRODUCTION

This is the fifth annual report of the Mokelumne River Fish Installation and covers the period of operation from July 1, 1968 to June 30, 1969. The Installation was first operated on January 1, 1964. A summary of results of each year's salmon and steelhead operation is presented in Tables 1a and 1b.

The Installation is located on the south bank of the Mokelumne River at the base of Camanche Dam in San Joaquin County. It is about 40 miles southeast of Sacramento (Figure 1). Camanche Dam is presently the upper limit of anadromous fish migration in the river. About 61 river miles downstream from the dam, the Mokelumne River enters the San Joaquin River.

The Installation was constructed to compensate for the loss of fall-run king salmon and steelhead trout spawning area which was inundated by the dam. The Installation is operated by the California Department of Fish and Game. East Bay Municipal Utility District paid construction costs and also pays the annual operating and maintenance costs.

DESCRIPTION OF INSTALLATION

A detailed description was given in the first annual report (1964-65 season). A summary of the operation is as follows:

The Installation is made up of two parts; (1) a spawning channel for natural spawning of fall-run king salmon, and (2) hatchery and rearing pond facilities for artificial spawning and rearing of steelhead trout. Fish enter the fishway at the base of Camanche Dam and ascend to the holding pond. A mechanical sweep crowds the fish to the upper end of the pond where they are mechanically lifted and deposited in an anesthetic tank to be sorted and counted. From there, steelhead are placed in a holding tank, salmon are released to the spawning channel, and any unwanted fish are returned to the river.

The steelhead are held until they are ready for artificial spawning. After they are spawned, they are returned to the river, and the eggs are hatched in incubators. When fry reach feeding stage they are transferred to hatchery troughs. After a short time in the troughs they are moved outside to rearing ponds. The fish are held for about one year and then released into the Mokelumne River. The hatchery and pond facilities have a capacity for rearing a maximum of 100,000 fish to yearling size.

The salmon spawning channel is 6,800 feet long by 20 feet wide at the bottom. It consists of two loops of equal length, each containing two channels with spawning sections and resting pools (Figure 2). Each loop can be operated independently. The upper loop, which is

TABLE 1-a

King Salmon Spawning Channel Annual Summaries
Mokelumne River Fish Installation 1964-65 through 1968-69 Seasons

Season	Number of Females Released In Channel	Potential Number of Eggs	Number Female Prespawning Mortality	Estimated Egg Deposition	Estimated Number of Outmigrants	Estimated Percent Production	
						Of Potential Eggs	Of Eggs Deposited
1964-65	178	947,100	3	927,300	73,540	07.8	07.9
1965-66	33	157,043	1	150,883	76,435	48.7	50.6
1966-67	85	399,758	4	387,562	76,796	19.2	19.8
1967-68	93	490,186	0	487,220	177,542	36.2	36.4
1968-69	159	568,984	38	557,326	37,866	6.7	6.8

TABLE 1-b
Steelhead Hatchery Annual Summaries --
Mokelumne River Fish Installation 1963-64 through 1968-69 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
1963-64	15	*	*	*	436,300	None	None
1964-65	30	Not Recorded	55,300	315,450	370,750	163,280	92,520
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

* Adult steelhead from Nimbus Hatchery and Mokelumne River Fish Installation were spawned together to obtain a total of 436,300 eggs.

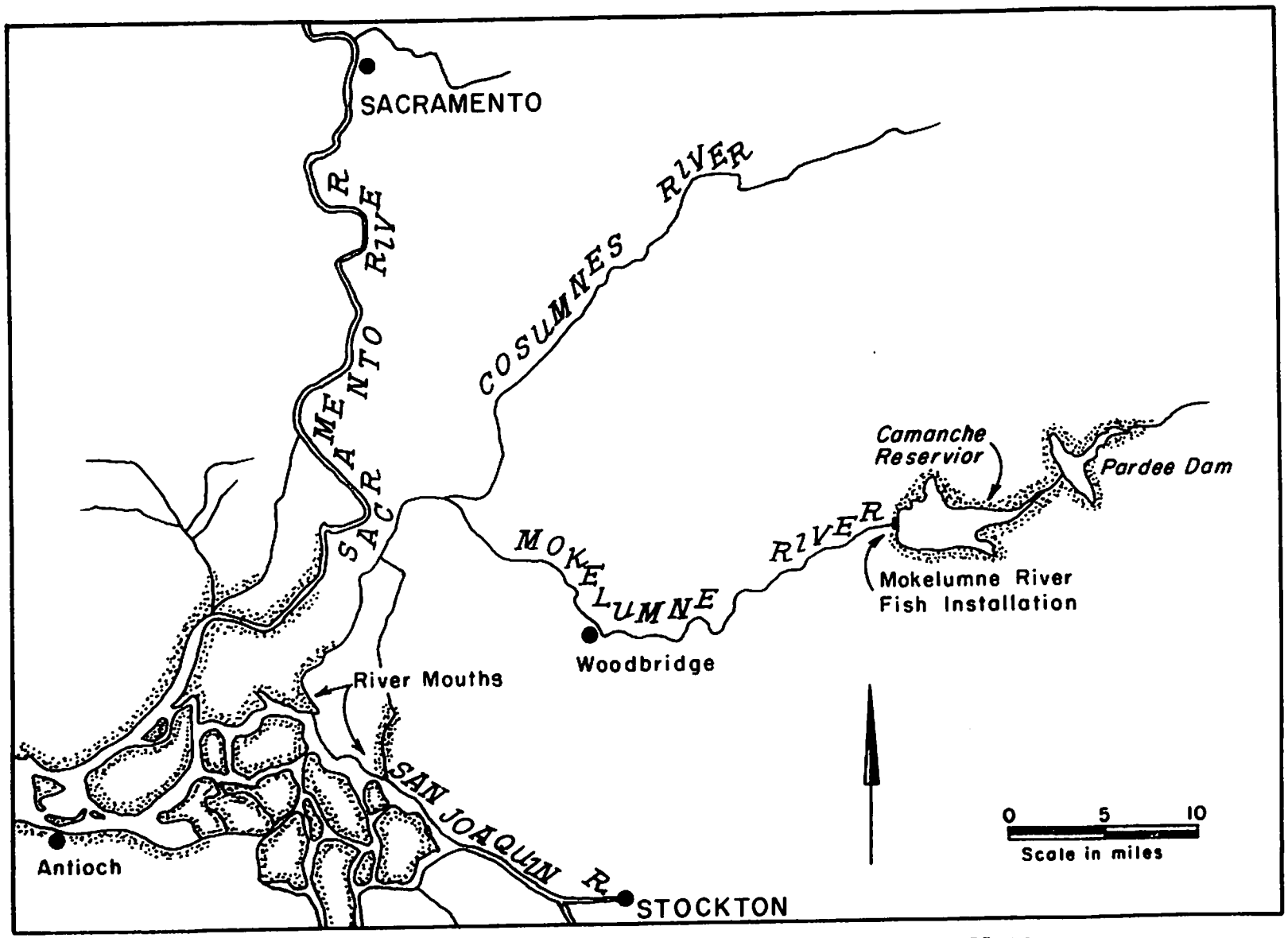

Figure 1. Map showing location of the Mokelumne River Fish Installation.

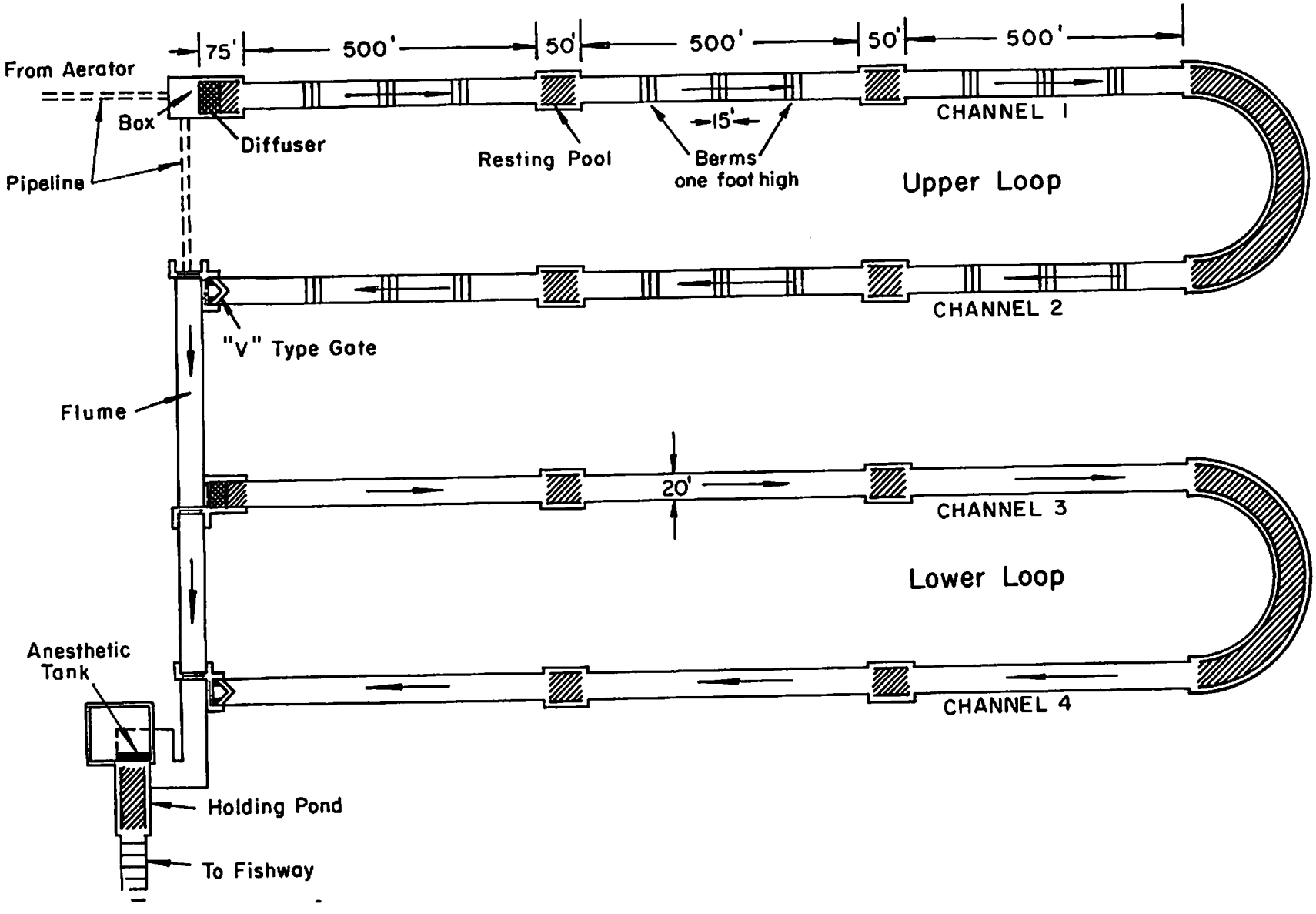

Figure 2. Diagram of the Mokelumne River Spawning Channel (not to scale).

3,400 feet long, is the only one which has been used for spawning since the channel was first operated in the fall of 1964. Not enough adults have been available to operate both loops. The channel is designed to operate with a spawning flow of 69 cfs. At this flow the average depth is 1.5 feet and average velocity is two feet per second.

After the fry emerge from the gravel, they are allowed to move into the lower loop for rearing. A migrant trap is installed at the end of the channel for enumeration purposes.

Aluminum bar racks, placed between the holding pond and the flume leading to the spawning channel, prevent predator fish from entering the channel from the river. Another set of racks is placed at the diffuser, where water first enters the channel, to prevent predator fish from entering the channel through the intake water supply from Camanche Lake. This is the first season that the upper racks have been used.

KING SALMON MAINTENANCE PROGRAM

Spawning Season 1968 Brood Year

In the summer of 1968 the U. S. Forest Service selected the spawning channel for testing their gravel cleaning machine, the "Riffle Sifter". The machine utilized high pressure underwater jets and a suction pump to remove intra-gravel sediment. They cleaned the upper loop only, and the machine did an excellent job of cleaning the gravel. After the cleaning operation 18 gravel berms were constructed in the upper loop. These berms were of uniform size, were one foot higher than the channel bottom, perpendicular to the sides of the channel, 15 feet wide, and 150 feet apart. We hoped to get better spawning distribution by using these berms, and thereby reduce the amount of redd superimposition.

On October 16, 1968, water was released into the spawning channel. The flow was maintained between 52 and 66 cfs during the spawning period. On December 18, 1968, the flow was reduced to 25 cfs during the embryo development period and later to ten cfs for trapping purposes.

The first salmon was received at the Installation on October 21 and the last one on December 24, 1968. During this period 954 adult salmon were received; 565 entered of their own volition, and 389 were hauled from the trap at Woodbridge Dam. All fish were given a cursory examination for marks, sex, and condition. Of the total, 593 were grilse 2/. Many surplus males including most of the grilse were given to charitable organizations. Altogether, 551 fish were placed in the flume where they

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2/ Males under 24 inches fork length.

had access to the channel. Many of the fish that were hauled would not leave the flume and had to be recaptured and placed directly in the channel.

When the adult salmon first entered the channel they moved from the lower end to the upper end; most of them then dropped back and stayed in the resting pools. This was especially true of the early arrivals, which had a period of waiting before they were ready to spawn. Many of the later arrivals, most of which were ready to spawn, would select a redd site almost immediately after entering the channel. Generally the fish were not seen in shallow water until they were ready to spawn. There was extensive use made of the gravel berms, and some areas between berms were also utilized for redd sites.

Carcass Recoveries 1968 Brood Year

Dead salmon were recovered daily. The majority were recovered near the V-trap at the lower end of channel two, some were recovered from the resting pools and sides of the channel. Ten female and three male salmon which had not spawned were recovered from the flume. It is doubtful if these had ever entered the channel. All carcasses were measured and cut open for examination. The condition of the gonads were recorded, and number of eggs retained in the females were counted.

Of the 551 salmon released into the spawning channel, we recovered 547 (159 females, 381 males, and seven of unidentifiable sex). Of the 159 females recovered, 38 died without spawning. Ten of these were recovered from the flume.

Estimated Egg Deposition 1968 Brood Year

Length-fecundity data from 18 females sampled in the 1966 run was used as a basis to estimate the number of eggs deposited in the gravel. Data were fitted to the linear model $y = a + bx$ by the least squares method where y = number of eggs, x = fork length in inches and a and b are constants. The regression line which represented this sample was $\hat{y} = -4,983.99 + 350.24x$. This equation was applied to the 121 females that spawned in the channel and resulted in an estimated potential of 569,189 eggs (Appendix A). Subtracting the unspawned eggs (11,863) 3/ gives a total of 557,326 eggs deposited.

Downstream Migrant Production 1968 Brood Year

An inclined plane screen and downstream migrant trap was installed at the end of channel number four. The screen was used to retain the migrants in the channel until they reached a size of 90 per pound or larger. The screen was provided with two four-inch diameter pipes so that the fish could migrate from the channel to the trap after they reached the

3/ This includes the eggs left in the body cavity of those females which spawned, it does not include the eggs in the 38 females which died prior to spawning.

desired size. Sometime during the migration period one of the pipes unknowingly became disconnected and allowed fish to leave the channel without going into the trap. This is discussed below.

During the early part of the outmigration there was a problem from small fish being impinged on the screen. The approach velocity was found to be 1.35 feet per second with a flow of 16 cfs. The impingement problem was solved by reducing the flow to 10 cfs which lowered the approach velocity to less than one foot per second.

On January 23, 1969, the migrant trap was operated for several hours to determine if the fish would leave the channel through the pipes. During this period 1,200 fish entered the trap and there did not appear to be any problems with fish finding the exit pipes. From this date until April 23, the trap was opened for a few hours each week to obtain growth information. The trapped fish were planted back into the channel. By April 19 many fish had reached 90 per pound (Figure 3). After this date the trap was operated continually, and the salmon were planted in the Mokelumne River. The final plant was made on June 25 when the fish averaged 46 per pound. During the season 51,401 migrants were counted out of the channel, which is 9.2% of the estimated number of eggs deposited in the gravel. This is a very minimal figure because some of the migrants are believed to have left the channel in two ways without being counted. As mentioned above, one of the two pipes leading to the migrant trap became disconnected. The size and placement of the two pipes was such that we would expect about the same number of fish to use each one, but we do not know when the pipe became disconnected. The number of migrants that escaped could be anything up to the same magnitude as the number counted. A second cause of loss of uncounted live fish resulted from unusually high releases from Camanche Dam (4,000 to 5,000 cfs). Such releases cause a venturi action in the water supply system to the channel and at times water in this system is actually sucked backwards into the dam outlet system. Many fish were found in the water supply system at the end of the season and it is not known how many escaped through the dam outlet.

Mortality of young salmon was higher than usual this season. This was the first time Sacramento River Cold Water Disease was observed in this river system, and 12,610 of the 51,401 outmigrants died from this disease. An additional 925 outmigrants died from mechanical or handling causes. This represents a mortality of 13,535 or 26.3% of the 51,401 outmigrants.

The method used to enumerate the outmigrants was to count the number of fish in a one-pound sample and multiply this by the total number of pounds trapped.

The outmigrants were planted in the Mokelumne River at two locations: (1) 10,170 about 1/4 mile downstream from the Installation and (2) 27,696 at New Hope Landing.

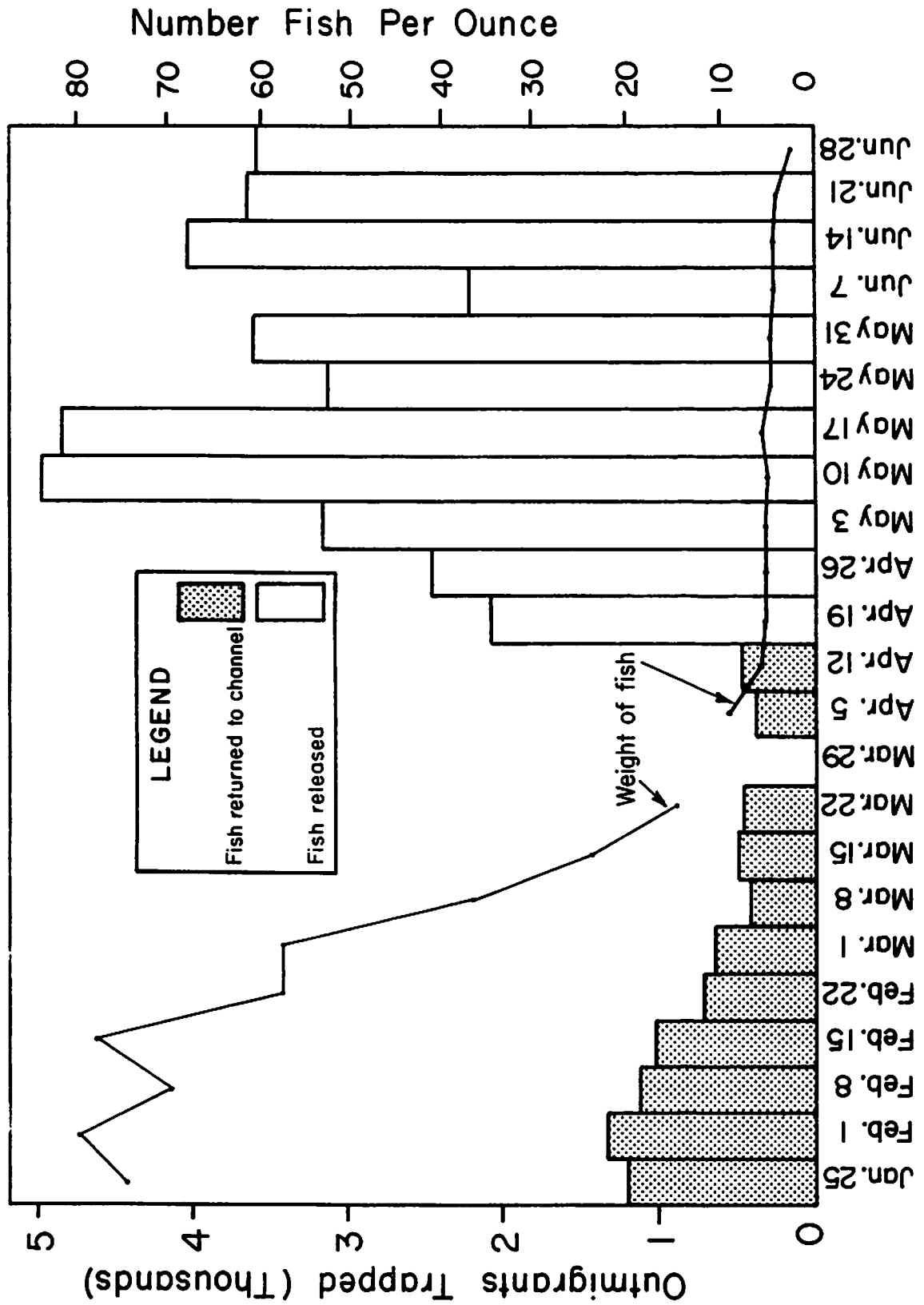

Figure 3. Weight and number of king salmon leaving channel by weekly periods Mokelumne River Spawning Channel, 1968-69 season.

Predators

This season predators occurred in such small numbers that they were considered to be of no significance in affecting total production.

Subsurface Water

Subsurface apparent velocity in the spawning channel was measured using the method described by Gangmark and Bakkala (1958). Briefly, it entails the use of plastic standpipes buried in the gravel. A salt solution is added to the standpipe water and a conductivity bridge measures the rate at which the water is being diluted.

Twenty-four standpipes were placed in the gravel after the channel was cleaned and before the start of the 1968 spawning season. They were buried about 15 inches deep in series of threes across the channel near locations 400, 800, 1,050, 1,350, 2,000, 2,500, 2,950, and 3,300 feet from the upper diffuser in the first loop.

Measurements of flow through the gravel at these locations were made at two different surface flows (Appendix B). Results show that at a flow of eight cfs subsurface flow is considerably lower than at 25 cfs. This shows the importance of maintaining the higher flow in the channel during the incubation period. The larger subsurface flow is necessary to remove waste products from the redds and assure adequate dissolved oxygen concentrations.

STEELHEAD MAINTENANCE PROGRAM

Hatchery Operation - 1969 Brood Year

The first steelhead this season entered the hatchery on January 7 and the last one on February 4, 1969. During this period 24 fish were received, 16 males and eight females. The males averaged 17.1 and the females 24.3 inches FL. Four of the females were spawned. From these, 25,580 eggs were taken, for an average of 6,395 eggs per female. The other four females were released in the river in an "overripe" stage of development. An additional 301,240 eggs were supplied from Nimbus Hatchery. This supplement was necessary to guarantee at least 100,000 fish would be raised to yearling size.

Planting - 1968 Brood Year

As the steelhead from this season's egg take grew and the capacity of the ponds was reached, some of the fingerlings had to be removed. From July 8 to October 24, 1968, 125,760 surplus fingerlings were planted in the Mokelumne River near the Installation. In March of 1969, 101,207 steelhead of "yearling size" were planted. All yearlings were represented by three marked groups: (1) 22,579, fish with adipose fin removed; (2) 40,951, fish with left ventral fin removed; and (3) 37,677, fish with right ventral fin removed. The first two groups were planted in Three-mile Slough at Brannon Island State Park, and the third group was

planted in the Mokelumne River at New Hope Landing. This marking experiment is designed to determine the best location for releasing yearling steelhead to obtain maximum returns.

Disease

There were no significant disease problems affecting steelhead during this report period.

WATER TEMPERATURES

Water temperatures were taken throughout the season by means of a continuous temperature recorder located near the entrance to the spawning channel. Water temperatures in the high 40's and mid-50's prevailed during the salmon spawning season. The temperatures dropped slowly after mid-December, and reached a low of 46 F in mid-February (Appendix C).

MARKING

No formal marking of salmon was done this season. Sixty-four salmon appeared to be marked as follows: One left ventral, 24 right maxillary, and 39 left maxillary.

The left ventral mark was from a group of 12,720 fish of the 1967 brood year.

The 24 right maxillary marks could have been from a release of 4,000 yearlings of the 1965 brood year released in 1967 but the apparent 39 left maxillary marks cannot be tied in with any marking program, and must be presumed to be the result of hook injuries. If this is true the 24 right maxillary marks could part or all be false and we have no way of knowing how many fish from the group of 4,000 yearlings actually did return to the hatchery.

No marked steelhead were recovered. As described on page ten all yearling steelhead were divided into marked groups as follows: 22,579 adipose, 40,951 left ventral, and 37,677 right ventral marks.

PUBLIC RELATIONS

During the 1968-69 fiscal year, an estimated 20,000 people visited the Installation. Tours of the Installation were conducted for many special interest groups.

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APPENDIX A

Potential Number of Eggs Contained in 121 Female Salmon Using the Mokelumne River Spawning Channel in 1968-69 Season

Length Inches	Estimated Number of Eggs per Female Based on Length	Number of Fish	Potential Number of Eggs Contained in Channel Fish
20.00	2,021	3	6,063
20.50	2,196	2	4,392
20.75	2,283	2	4,566
21.00	2,371	2	4,742
21.25	2,459	4	9,836
21.50	2,546	1	2,546
21.75	2,634	1	2,634
22.00	2,722	5	13,610
22.25	2,809	2	5,618
22.50	2,896	3	8,688
23.00	3,072	1	3,072
23.25	3,159	2	6,318
23.50	3,247	3	9,741
24.00	3,422	1	3,422
24.25	3,509	3	10,527
24.50	3,597	4	14,388
25.50	3,947	2	7,894
25.75	4,035	1	4,035
26.00	4,123	2	8,246
26.25	4,210	1	4,210
26.50	4,297	2	8,594
26.75	4,385	3	13,155
27.00	4,473	1	4,473
27.25	4,560	5	22,800
27.50	4,648	1	4,648
27.75	4,735	2	9,470
28.00	4,823	3	14,469
28.25	4,910	1	4,910
28.50	4,998	2	9,996
28.75	5,085	5	25,425
29.00	5,173	2	10,346
29.25	5,260	1	5,260
29.50	5,348	2	10,696
29.75	5,436	2	10,872
30.00	5,523	2	11,046
30.25	5,611	4	22,444
30.50	5,698	3	17,094
30.75	5,786	1	5,786
31.00	5,873	1	5,873
31.25	5,961	3	17,883
31.50	6,048	2	12,096

APPENDIX A (Continued)

Potential Number of Eggs Contained in 121 Female Salmon Using the Mokelumne River Spawning Channel in 1968-69 Season

Length Inches	Estimated Number of Eggs per Female Based on Length	Number of Fish	Potential Number of Eggs Contained in Channel Fish
31.75	6,136	3	18,408
32.00	6,223	3	18,669
32.25	6,311	1	6,311
32.50	6,399	6	38,394
32.75	6,486	1	6,486
33.00	6,573	1	6,573
33.25	6,661	1	6,661
33.50	6,749	1	6,749
33.75	6,837	1	6,837
34.25	7,012	1	7,012
34.50	7,099	2	14,198
34.75	7,187	1	7,187
35.00	7,274	5	36,370
35.50	7,450	1	7,450
	TOTAL	121	569,189

APPENDIX B

Velocity of Intra-gravel Water at Various Flows and Locations in the Mokelumne River Spawning Channel, 1968-69 Season

Station Number	Velocity of Intra-gravel Water (Feet per Hour) Dec. 23, 1968 Surface Flow 25 cfs	May 27, 1969 Surface Flow 8 cfs
01	1.34	.46
02	-	-
03	1.34	.82
04	-	1.41
05	-	3.39
06	-	2.15
07	1.25	.54
08	1.09	.62
09	1.52	1.42
10	2.19	2.09
11	2.10	1.32
12	2.50	1.87
13	1.76	.87
14	1.52	.57
15	1.49	.65
16	2.01	.94
17	2.46	1.24
18	1.79	1.50
19	-	.19
20	-	.21
21	-	.31
22	3.50	2.67
23	2.70	2.08
24	3.50	1.78

APPENDIX C

Water Temperature Data at Mokelumne River Fish Installation 1968-69 Season

Water Temperature (°F)

Date 1968		Max.	Min.	Date		Max.	Min.	Date		Max.	Min.
July	1	53	52	Aug.	11	53	53	Sept.	21	55	54
	2	53	52		12	53	53		22	55	54
	3	53	52		13	53	53		23	55	55
	4	54	52		14	53	53		24	56	55
	5	54	52		15	53	53		25	56	55
	6	53	52		16	54	53		26	56	55
	7	53	52		17	54	53		27	56	55
	8	53	52		18	54	53		28	56	55
	9	53	52		19	54	53		29	56	55
	10	53	52		20	54	53		30	56	55
	11	53	52		21	54	54	Oct.	1	56	55
	12	53	52		22	54	53		2	56	55
	13	53	52		23	54	54		3	56	55
	14	53	52		24	54	54		4	56	55
	15	53	52		25	54	54		5	56	55
	16	54	53		26	54	54		6	56	55
	17	54	53		27	54	54		7	56	55
	18	54	53		28	54	54		8	56	55
	19	54	53		29	54	54		9	56	55
	20	54	53		30	54	54		10	56	55
	21	54	53		31	54	54		11	56	56
	22	54	53	Sept.	1	55	54		12	56	56
	23	54	53		2	54	54		13	56	55
	24	54	53		3	54	54		14	55	55
	25	54	53		4	55	54		15	56	55
	26	54	53		5	55	54		16	56	55
	27	54	53		6	55	54		17	56	56
	28	53	52		7	55	54		18	56	56
	29	54	53		8	55	54		19	56	56
	30	54	53		9	55	54		20	56	56
	31	53	53		10	55	54		21	56	56
Aug.	1	53	52		11	55	54		22	56	55
	2	53	53		12	55	54		23	56	56
	3	53	53		13	55	54		24	56	56
	4	53	53		14	55	54		25	56	56
	5	53	53		15	56	54		26	56	56
	6	53	53		16	55	54		27	56	56
	7	53	53		17	56	54		28	56	56
	8	53	53		18	56	54		29	56	56
	9	53	53		19	55	54		30	56	56
	10	53	53		20	55	54		31	56	56

APPENDIX C (Continued)

Water Temperature Data at
Mokelumne River Fish Installation 1968-69 Season

Water Temperature (°F)

Date	Max.	Min.	Date	Max.	Min.	Date	Max.	Min.
Nov. 1	56	56	Dec. 11	54	53	Jan. 19	48	48
2	56	56	12	53	53	20	48	48
3	56	56	13	53	52	21	48	48
4	56	56	14	53	52	22	48	48
5	57	56	15	51	51	23	48	48
6	57	56	16	52	52	24	48	47
7	56	56	17	52	52	25	47	47
8	57	56	18	52	52	26	48	48
9	57	56	19	51	51	27	48	48
10	57	56	20	51	51	28	48	48
11	56	56	21	51	51	29	48	48
12	57	56	22	51	50	30	48	48
13	57	56	23	51	50	31	48	48
14	57	56	24	50	50	Feb. 1	48	48
15	58	57	25	50	50	2	48	47
16	58	57	26	50	50	3	48	47
17	57	57	27	50	50	4	48	47
18	58	57	28	50	50	5	48	47
19	58	57	29	50	49	6	48	47
20	58	57	30	49	49	7	48	47
21	57	57	31	49	49	8	48	47
22	57	57	1969			9	48	47
23	57	57	Jan. 1	49	49	10	48	47
24	57	57	2	49	49	11	48	47
25	57	57	3	49	49	12	48	46
26	57	57	4	49	48	13	47	46
27	57	57	5	48	48	14	48	46
28	57	57	6	48	48	15	48	48
29	56	56	7	48	48	16	48	47
30	56	56	8	48	48	17	48	47
Dec. 1	56	55	9	48	48	18	48	47
2	55	54	10	48	48	19	48	47
3	55	54	11	48	48	20	47	46
4	54	54	12	48	48	21	47	47
5	54	54	13	48	48	22	47	46
6	54	54	14	48	48	23	48	47
7	54	54	15	48	48	24	48	47
8	54	54	16	48	48	25	48	47
9	54	54	17	48	48	26	48	47
10	54	54	18	48	48	27	48	47
						28	48	47

APPENDIX C (Continued)

Water Temperature Data at
Mokelumne River Fish Installation 1968-69 Season

Water Temperature (°F)

Date	Max.	Min.	Date	Max.	Min.	Date	Max.	Min.
March 1	48	47	April 12	48	48	May 24	54	52
2	47	47	13	48	48	25	54	53
3	47	47	14	48	48	26	54	53
4	47	46	15	48	48	27	54	54
5	47	46	16	49	48	28	55	54
6	47	46	17	49	48	29	55	54
7	47	46	18	49	48	30	55	54
8	47	46	19	50	49	31	55	54
9	48	47	20	50	49	June 1	55	54
10	48	47	21	50	49	2	56	54
11	48	47	22	50	49	3	56	54
12	47	46	23	50	49	4	56	54
13	47	46	24	50	49	5	56	54
14	47	46	25	50	50	6	56	54
15	48	47	26	51	50	7	56	55
16	47	47	27	51	50	8	56	55
17	46	46	28	51	50	9	56	55
18	47	46	29	51	50	10	56	55
19	47	47	30	51	50	11	55	54
20	47	46	May 1	51	50	12	55	54
21	47	46	2	51	50	13	55	54
22	47	47	3	51	50	14	55	54
23	47	47	4	51	50	15	56	54
24	47	47	5	51	50	16	56	54
25	47	47	6	52	50	17	56	54
26	47	47	7	52	50	18	56	54
27	47	47	8	52	50	19	57	55
28	47	47	9	52	51	20	57	55
29	47	47	10	52	51	21	56	55
30	48	47	11	52	51	22	56	55
31	48	47	12	52	51	23	56	55
April 1	48	48	13	52	51	24	56	55
2	48	48	14	52	51	25	56	55
3	48	48	15	52	51	26	56	55
4	48	48	16	53	52	27	56	56
5	48	48	17	53	52	28	57	55
6	48	47	18	53	52	29	56	56
7	48	47	19	53	52	30	56	56
8	48	48	20	54	52			
9	48	48	21	54	52			
10	48	48	22	54	52			
11	48	48	23	54	52			