

REF 90228

ANNUAL REPORT
NIMBUS SALMON AND STEELHEAD HATCHERY
FISCAL YEAR OF 1958-59^{1/}

JAMES A. HINZE
Region 2, Inland Fisheries
California Department of Fish and Game

INTRODUCTION

This is the fourth annual report of the Nimbus Salmon and Steelhead Hatchery, operated by the California Department of Fish and Game under contract with the U. S. Bureau of Reclamation. The report summarizes information for the period July 1, 1958, to June 30, 1959, on the numbers of fish trapped and spawned, production of eggs and fish, and conditions of water quality and temperatures.

KING SALMON MAINTENANCE PROGRAM

History of the 1958 Salmon Run

The river bed at the weir site was inspected during the summer of 1958. It was found that the steel matting, used to prevent salmon and steelhead from digging under the weir, had been undermined.

The steel matting was removed in August. A bulldozer was used to level the river bed at the weir, dig a channel below the weir, and build a dyke above it to divert as much of the river flow as possible to the vicinity of the fish ladder.

The weir racks were placed in position on August 18.

The first king salmon (*Oncorhynchus tshawytscha*) arrived September 14 (3 days ahead of the first to arrive in 1957). A total of 15,041 king salmon migrated to the hatchery. This number was close to the average for the estimates of salmon spawning above the Nimbus Dam site prior to construction of Nimbus Dam. 10,210 of these fish entered the holding ponds and 4,831 escaped upstream through the weir and were later removed from the racks as they drifted downstream. Of these 4,831 salmon, 2,655 were males, 638 were females, and 1,538 were grilse. Seventy-nine salmon entered the holding ponds during September, 1,129 in October, 7,252 in November, 1,708 in December, and 42 in January. The last fish entered the holding ponds on January 26, 1959 (Figure 1).

Of the 10,210 fish to enter the holding ponds, 4,471 were males, 3,689 females, and 2,050 grilse. Thus, 64 percent were males, including grilse, and 36 percent females.

The total run of 15,041 king salmon consisted of 71 percent males and 29 percent females.

The results of transporting salmon to colder water during the 1957 salmon season were encouraging enough to warrant finding more suitable and larger facilities for holding adult salmon and incubating eggs taken from them. Bear River Fish Planting Base in Nevada County was selected. In all, 308 males and 1,037 females were transported to this base. Of these, 179 males and 601 females were spawned and produced an estimated 3,164,000 eggs. This operation has been described by Rice (1960).

^{1/} Submitted January 2, 1961.

Number of Fish

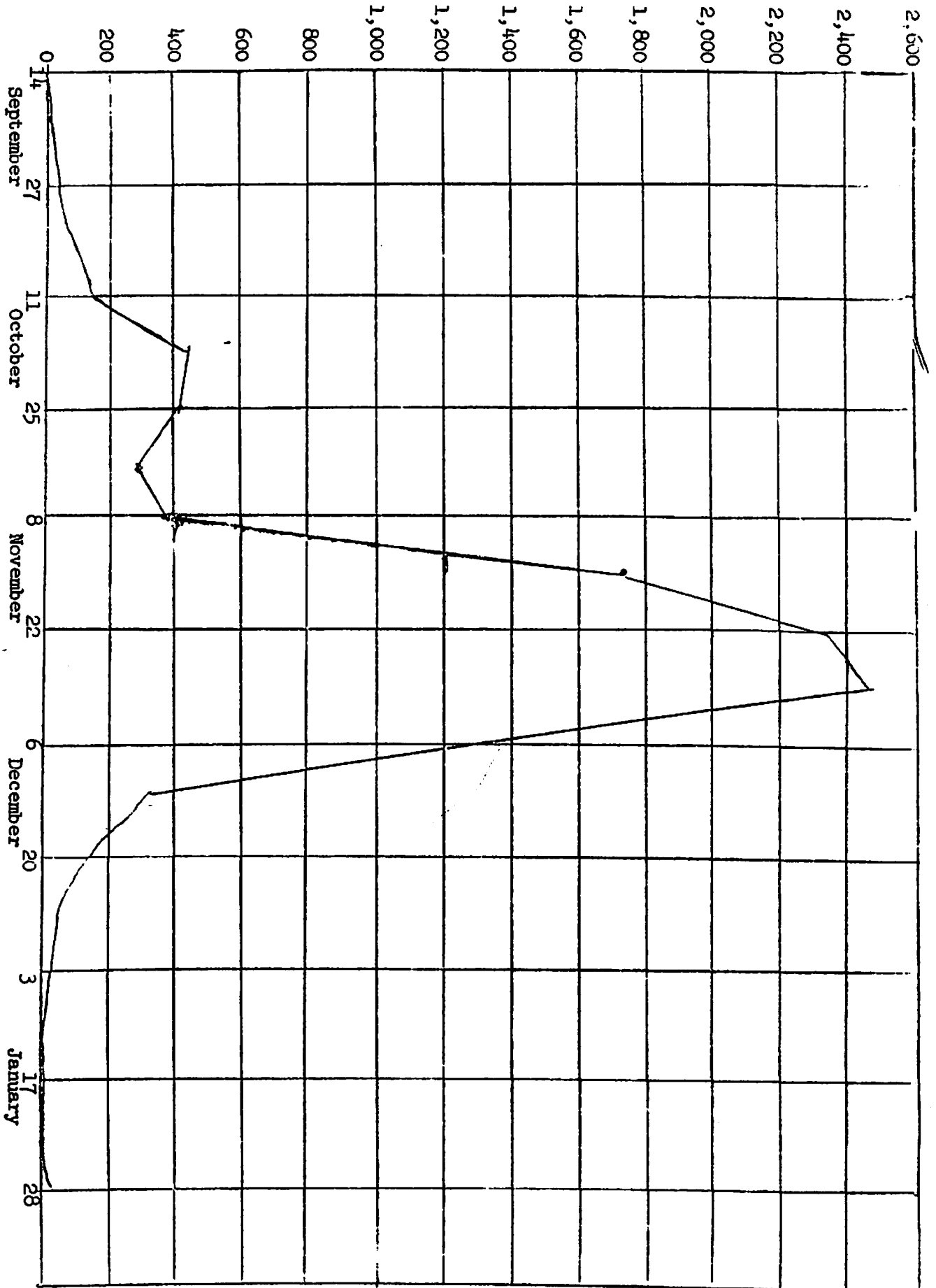


FIGURE 1. Nimbus Salmon and Steelhead Hatchery Fall King Salmon Run 1958.

Egg and Fry Production

The first king salmon eggs were taken on October 20 at the Bear River base and the last on January 22 at Nimbus.

Of the females that entered the holding ponds, 2,226 or 61 percent were spawned (including fish spawned at the Bear River base) and produced a total of 13,283,000 eggs, or an average of 5,967 eggs per female.

Water temperatures were above 56 degrees until the end of the first week in December. Seventy-five percent of all females were spawned prior to this date.

1,481,689 late-run Sacramento River king salmon eggs taken at the U. S. Fish and Wildlife Service Coleman Fisheries Station were received in March, 1959.

This was the second year that eggs have been received from late-run upper Sacramento River salmon, with the hope that fish from these eggs will establish a late king salmon run in the American River.

1955 Brood Year Marked King Salmon

A group of salmon selected from eggs taken late in December, 1955, were reared to yearlings; 20,579 were marked and released during January and February, 1957.

One hundred two of these, all small males, 13 to 16 inches long, returned during late November and December, 1957, as two-year-olds.

Three hundred fifty-eight returned during the 1958 season: 4 in October, 142 in November, 207 in December, and 5 in January. Of these, 133 were males and 225 were females. The males averaged 27 inches in length and the females, 26 inches.

One hundred seventy-four, or 77 percent, of these marked females were spawned.

Planting 1957 Brood Year King Salmon

On July 1, 1958, 39,465 king salmon from Nimbus eggs and 366,200 king salmon from Coleman eggs were on hand.

The Nimbus salmon were planted during August, September, and October.

The Coleman salmon were planted during August, September, October, November, and December of 1958 and January of 1959.

During November, December, and January, 52,657 Coleman salmon, averaging 8.3 fish per pound, were marked by the removal of both ventral fins and planted in the American River.

Planting 1958 Brood Year King Salmon

The first plant of the Nimbus 1958 brood year salmon fingerlings was made on February 19, 1959, when 225,120 fish at 67 per ounce, weighing 210 pounds, were released into the American River. The last of the Nimbus fingerling plant was made on May 6, 1959. In all, 7,183,188 salmon, weighing 8,438 pounds, were released. The smallest averaged 100 fish per ounce and the largest 13 fish per ounce.

Planting of the 1958 brood year Coleman king salmon fingerlings was started on May 21, 1959. The last plant during the period covered by this report was on June 17, 1959. In all, 635,194 fish weighing 1,153 pounds were released. The sizes varied from 57 to 16 fish per ounce.

On June 30, 1959, 497,000 Coleman king salmon fingerlings remained on hand.

SILVER SALMON

A few silver salmon (Oncorhynchus kisutch) grilse arrive at the hatchery each year with the king salmon. Only one female arrived during the fall of 1958, but the timing was such that no ripe males were on hand when her eggs were ready to be taken.

On March 10, 1959, 49,984 silver salmon, averaging 22 fish per ounce, were received from Coleman Fisheries Station. None were planted during the time of this report. 40,250, averaging 1.1 fish per ounce, were on hand June 30, 1959.

These fish had been on a meat diet at Coleman. Immediately upon arrival at Nimbus, they were placed on a complete dry food diet. They fed much better than the king salmon and compared very well with the steelhead. These fish did remarkably well on dry food.

STEELHEAD MAINTENANCE PROGRAM

History of the 1958-1959 Steelhead Run

A few steelhead rainbow trout (Salmo g. gairdnerii) were taken with the king salmon during October, November, and December, 1958. These fish were all returned to the river, since they would not mature for several months.

The steelhead holding pond was put into operation on January 8, 1959. During January, 41 males and 18 females entered the pond; during February, 21 males and 13 females; and during April, 3 males and 6 females. The total of 102 steelhead for the season thus consisted of 65 males and 37 females. The last steelhead was taken on April 23.

A total of 28 females was spawned and 54,581 eggs taken between February 3 and May 6, 1959. The females average 1,949 eggs per fish. This is less eggs per fish than in the past. In 1956, the average was 3,317; in 1957, 4,125; in 1958, 3,090.

The small number of steelhead taken may be due to the poor condition of the river bed at the weir, which permitted fish to go under the structure. However, most of the fish which entered the hatchery were small, 16 inches or less, and could have passed through the pickets, had they made the effort.

During the past two years, it was again necessary to import steelhead eggs from the Eel River to continue the maintenance of the American River steelhead population. A total of 1,137,520 eggs was received from the Snow Mountain Egg Collecting Station.

It was necessary to plant 29,764 of the Nimbus steelhead during June, 1959, to prevent overcrowding in the ponds. On June 30, 1959, 7,000 Nimbus steelhead and 595,000 Eel River steelhead were on hand.

Planting 1958 Brood Year Steelhead

On July 1, 1958, 11,770 Nimbus steelhead and 940,000 Eel River steelhead of the 1958 brood year were on hand. No planting of this year class was made prior to July, 1958.

Planting of the 1958 brood year steelhead was started in August, 1958, when 101,440 were released. Planting was continued through the remainder of the year.

11,200 American River steelhead and 337,500 Eel River steelhead were planted as fingerlings. The remaining 371,345 Eel River fish were held to yearling size and planted during January and February, 1959.

Returns of 1957 Brood Year Steelhead

Of the 100,218, 1957 brood year Eel River steelhead that were marked by the removal of the right ventral fin, 11 males from 14 to 20 inches long returned during the 1958-59 season.

DISEASE HISTORY

Steelhead were again more susceptible to disease and parasitic infections than were salmon. However, several infections of note were experienced among the king salmon, in contrast with past seasons.

Cytophaga columnaris was the principal bacterial disease. Contrary to past experience, king salmon were also affected, although much less than the steelhead. Outbreaks were numerous and were almost continuous during the period covered by this report, with little let-up during the period of cooler water.

Excellent results in control of columnaris were obtained with the use of sulfamerazine and sulphamethazine mixed with the feed. Levels of 8 to 10 grams of either drug per 100 pounds of fish were used to control infections.

Attempts were made to control early stages of columnaris with the use of copper sulfate. This treatment had a beneficial effect in the hatchery. However, it proved ineffective when used as a flush in ponds.

Parasitic infections were numerous during late summer and fall. In order of severity, these included Ichthyophthirius multifiliis, Gyrodactylus, and a minor amount of Epistylus.

Parasitic infections were readily controlled by lowering water levels and increasing flow through ponds, together with the use of acetic acid flushes.

Again, several infections of Saprolegnia were experienced, with both steelhead and king salmon affected. These infections were controlled with flushes of malachite green.

PUBLIC RELATIONS

During the period covered by this report, an estimated 65,650 persons visited the hatchery. 40,000 people were attracted during the salmon run in the months of October, November, and December.

Included in the estimated number of visitors were 1,690 people in organized groups which were conducted through the installation by hatchery personnel.

SUMMARY

The river bed at the weir site was repaired in early August, 1958, and the weir was installed on August 18.

The first salmon arrived on September 14, 1958, and the last on January 26, 1959. The peak of the run occurred during the week of November 29. A total of 10,210 salmon entered the holding ponds: 4,471 males, 3,689 females, and 2,050 grilse. 4,831 salmon escaped past the weir, bringing the total run to 15,041.

Of the fish entering the holding ponds, 308 males and 1,037 females were transplanted to the colder water of Bear River Fish Planting Base in Nevada County, where 3,164,000 eggs were taken.

In all, 2,226 females were spawned and 13,283,000 eggs taken.

Water temperatures were above 56 degrees during the period through December.

During March, 1959, 1,481,689 late-run upper Sacramento River king salmon eggs were received from the U. S. Fish and Wildlife Service Coleman Fisheries Station.

The 39,465 Nimbus king salmon and 366,200 Coleman king salmon on hand July 1, 1958, of the 1957 brood year were released from August through January; 52,657 of the Coleman salmon were marked by the removal of both ventral fins.

7,183,188 Nimbus salmon were planted between February and May and 635,194 Coleman salmon were planted during May and June, making a total of 7,818,382 king salmon planted during the 1958-59 fiscal year.

497,000 Coleman salmon were on hand June 30, 1959.

In March, 49,984 silver salmon, averaging 22 fish per ounce, were received from Coleman Fisheries Station. None were planted and 40,250 were on hand June 30, 1959.

The steelhead holding pond was in operation from January 8, 1959, to April 23, 1959, when the last steelhead arrived. During this period 102 steelhead entered the pond. Only 28 females, producing 54,581 eggs, were spawned.

1,137,520 Eel River steelhead eggs were received from Snow Mountain Egg Collecting Station.

29,764 Nimbus steelhead were planted in June. 7,000 Nimbus and 595,000 Eel River steelhead of the 1959 brood year were on hand June 30, 1959.

Planting of the 1958 brood year steelhead was started in August, 1958, and continued through February, 1959. 11,200 Nimbus and 337,500 Eel River steelhead were planted as fingerlings and 371,345 Eel River steelhead were planted as yearlings.

Eleven marked male steelhead of the 1957 brood year returned to the hatchery.

REFERENCE

Rice, Geoffrey V.

1960. Use of coldwater holding facilities in conjunction with king salmon spawning operations at Nimbus Hatchery. Calif. Dept. of Fish and Game, Inland Fisheries Admin. Rept. no. 60-3, 8 pp. (Mimeographed)

APPENDIX

SUMMARY

The river bed at the weir site was repaired in early August, 1958, and the weir was installed on August 18.

The first salmon arrived on September 14, 1958, and the last on January 26, 1959. The peak of the run occurred during the week of November 29. A total of 10,210 salmon entered the holding ponds: 4,471 males, 3,689 females, and 2,050 grilse. 4,831 salmon escaped past the weir, bringing the total run to 15,041.

Of the fish entering the holding ponds, 308 males and 1,037 females were transplanted to the colder water of Bear River Fish Planting Base in Nevada County, where 3,164,000 eggs were taken.

In all, 2,226 females were spawned and 13,283,000 eggs taken.

Water temperatures were above 56 degrees during the period through December.

During March, 1959, 1,481,689 late-run upper Sacramento River king salmon eggs were received from the U. S. Fish and Wildlife Service Coleman Fisheries Station.

The 39,465 Nimbus king salmon and 366,200 Coleman king salmon on hand July 1, 1958, of the 1957 brood year were released from August through January; 52,657 of the Coleman salmon were marked by the removal of both ventral fins.

7,183,188 Nimbus salmon were planted between February and May and 635,194 Coleman salmon were planted during May and June, making a total of 7,818,382 king salmon planted during the 1958-59 fiscal year.

497,000 Coleman salmon were on hand June 30, 1959.

In March, 49,984 silver salmon, averaging 22 fish per ounce, were received from Coleman Fisheries Station. None were planted and 40,250 were on hand June 30, 1959.

The steelhead holding pond was in operation from January 8, 1959, to April 23, 1959, when the last steelhead arrived. During this period 102 steelhead entered the pond. Only 28 females, producing 54,581 eggs, were spawned.

1,137,520 Eel River steelhead eggs were received from Snow Mountain Egg Collecting Station.

29,764 Nimbus steelhead were planted in June. 7,000 Nimbus and 595,000 Eel River steelhead of the 1959 brood year were on hand June 30, 1959.

Planting of the 1958 brood year steelhead was started in August, 1958, and continued through February, 1959. 11,200 Nimbus and 337,500 Eel River steelhead were planted as fingerlings and 371,345 Eel River steelhead were planted as yearlings.

Eleven marked male steelhead of the 1957 brood year returned to the hatchery.

REFERENCE

Rice, Geoffrey V.

1960. Use of coldwater holding facilities in conjunction with king salmon spawning operations at Nimbus Hatchery. Calif. Dept. of Fish and Game, Inland Fisheries Admin. Rept. no. 60-3, 8 pp. (Mimeographed)

TABLE 1

Nimbus Salmon and Steelhead Hatchery Weather and Flow Data,
July, 1958

Date	Temperature				Weather	American River flow at hatchery (c.f.s.)
	Air		Water			
	Maximum	Minimum	Maximum	Minimum		
1	87	62	59	56.5	Clear	3,586
2	88	60	60	57	Clear	3,574
3	95	72	59	57.5	Clear	3,576
4	99	73	60	57.5	Clear	3,554
5	99	76	59.5	58	Clear	3,543
6	99	74	60	57.5	Clear	3,528
7	96	64	60	58	Clear	3,563
8	100	62	60	58	Clear	3,587
9	98-	64	59	58	Clear	3,588
10	103	64	60	57.5	Clear	3,603
11	104	68	60	58	Clear	3,605
12	104	64	59.5	58	Clear	3,590
13	102	68	59.5	58	Partly cloudy	3,540
14	86	58	59.5	57.5	Clear	3,584
15	79	56	58.5	57	Clear	3,562
16	82	62	58	56.5	Partly cloudy	3,544
17	88	60	59	57	Partly cloudy	3,555
18	92	60	60.5	58	Clear	3,514
19	96	64	60	58	Clear	3,504
20	95	62	61	58	Partly cloudy	3,493
21	92	64	59.5	57	Clear	3,592
22	88	60	59	58	Clear	3,579
23	94	62	60	57.5	Partly cloudy	3,549
24	96	60	60	58	Clear	3,478
25	98	65	60	58.5	Clear	3,537
26	101	72	60	58.5	Clear	3,572
27	104	75	62	58	Clear	3,531
28	88	66	60	57	Clear	3,589
29	94	64	59.5	57.5	Clear	3,567
30	96	64	60	58.5	Clear	3,559
31	102	65	61	58.5	Clear	3,559

Water temperature recorded on thermograph at head of nursery ponds. Air temperatures were taken from maximum-minimum thermometer at northeast corner of processing building. River flow data furnished by Bureau of Reclamation. All temperatures are in degrees Fahrenheit.

TABLE 2
Nimbus Salmon and Steelhead Hatchery Weather and Flow Data,
August, 1958

Date	Temperature				Weather	American River flow at hatchery (c.f.s.)
	Air		Water			
	Maximum	Minimum	Maximum	Minimum		
1	104	69	61	59	Clear	3,569
2	96	64	62	59	Clear	3,577
3	98	63	61.5	58.5	Clear	3,532
4	101	64	63	59	Clear	3,541
5	102	66	61	59	Clear	3,637
6	103	63	61	59	Clear	3,621
7	96	63	60	59	Cloudy, light showers	3,649
8	96	63	61	59	Partly cloudy	3,609
9	96	68	61	59	Clear	3,613
10	98	63	61	59.5	Clear	3,199
11	100	64	64	59	Clear	3,599
12	102	65	62	60	Clear	3,661
13	103	63	62	59	Clear	3,638
14	104	64	61	59	Clear	3,625
15	104	69	62	60	Clear	3,576
16	96	74	62	61	Clear	3,528
17	98	72	61	60	Clear	3,587
18	98	65	61.5	60.5	Clear	3,597
19	100	66	61.5	61	Clear	3,501
20	100	67	62	61	Clear	3,508
21	98	65	61.5	61	Clear	3,552
22	97	64	62	61	Clear	3,532
23	94	65	62	60	Clear	3,519
24	96	62	63	61	Clear	3,521
25	96	58	61.5	60	Clear	3,547
26	99	66	61	60	Clear	3,383
27	94	68	60.5	59	Clear	3,534
28	90	61	61	59	Clear	3,557
29	92	62	61	60	Clear	3,556
30	99	61	61.5	60	Clear	3,553
31	102	64	61.5	60	Clear	3,575

The weir was put in place August 18, 1958.

TABLE 3
Nimbus Salmon and Steelhead Hatchery Weather and Flow Data,
September, 1958

Date	Temperature				Weather	American River flow at hatchery (c.f.s.)	King salmon taken
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	100	64	61.5	60	Clear	3,568	0
2	94	63	62.5	60	Clear	3,011	0
3	89	60	63	60.5	Clear	2,538	0
4	89	56	63	61	Clear	2,942	0
5	96	57	63	61	Clear	2,941	0
6	100	63	63	61.5	Clear	2,943	0
7	98	64	63	61.5	Clear	2,985	0
8	84	68	63	62	Clear	2,991	0
9	88	62	64	61	Clear	2,013	0
10	86	64	63	61	Clear	2,994	0
11	84	56	63	61	Clear	3,029	0
12	79	60	63	61	Clear	3,023	0
13	78	56	64	61.5	Clear	3,024	0
14	86	54	64	62	Clear	3,024	1
15	96	62	64	62	Clear	3,044	0
16	96	60	64	62.5	Clear	3,031	0
17	90	62	65	62	Clear	2,904	2
18	94	66	64	62.5	Clear	2,954	1
19	96	58	65	63	Clear	3,028	0
20	92	62	66	64	Clear	3,019	2
21	92	56	65	63	Clear	3,048	0
22	84	52	64	63	Rain	3,041	11
23	74	56	64	62.5	Clear	3,027	3
24	78	46	64.5	62	Clear	3,014	2
25	84	52	65	62.5	Clear	3,003	0
26	94	52	66	63.5	Clear	3,009	0
27	92	60	66	64.5	Clear	3,023	0
28	93	60	67	65	Clear	3,031	0
29	94	60	67.5	65.5	Clear	3,030	0
30	92	60	67	66	Clear	2,892	57

First salmon taken on September 14, 1958.

TABLE 4

Nimbus Salmon and Steelhead Hatchery Weather and Flow Data,
October, 1958

Date	Temperature				Weather	American River flow at hatchery (c.f.s.)	King salmon taken
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	94	66	67	65.5	Clear	1,728	0
2	94	56	67.5	65.5	Clear	1,728	0
3	93	54	68	66	Clear	1,723	18
4	92	58	68.5	66.5	Clear	1,747	0
5	80	50	68	66.5	Clear	1,714	0
6	74	54	67.5	66	Clear	1,715	0
7	74	50	68	65.5	Clear	1,705	96
8	87	54	68.5	65.5	Clear	1,723	0
9	91	54	69	66	Clear	1,746	0
10	90	56	69	67	Clear	1,662	24
11	87	58	69	67.5	Clear	1,540	0
12	86	52	69	66.5	Clear	1,500	99
13	86	52	69	66.5	Clear	1,515	51
14	86	52	69	67	Clear	1,524	130
15	88	51	69	66	Clear	1,531	18
16	90	54	69	66	Clear	Not available	26
17	90	57	69	67	Clear	1,523	0
18	88	68	68.5	66.5	Rain	1,536	83
19	74	58	68.5	66.5	Partly cloudy	1,548	50
20	74	57	68.5	66	Clear	1,580	98
21	74	46	67.5	65.5	Clear	1,232	49
22	72	50	67.5	65	Clear	1,523	53
23	73	52	67.5	65.5	Cloudy	1,527	88
24	77	52	68	66	Clear	1,532	65
25	73	52	67	66	Clear	1,550	0
26	74	52	67.5	65.5	Clear	1,539	0
27	74	50	68.5	66	Clear	1,516	86
28	74	49	68	66	Clear	1,505	41
29	76	48	67.5	65	Clear	1,321	0
30	78	48	67	65	Clear	1,505	54
31	74	52	67	65	Partly cloudy	1,509	0

TABLE 5

Nimbus Salmon and Steelhead Hatchery Weather and Flow Data,
November, 1958

Date	Temperature				Weather	American River flow at hatchery (c.f.s.)	King salmon taken
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	73	52	67	65	Clear	1,514	139
2	72	48	67	65	Clear	1,528	55
3	76	48	67	65	Clear	1,582	0
4	76	51	67	64.5	Clear	1,597	85
5	76	48	67	64	Clear	1,566	26
6	74	49	67	64	Clear	1,517	81
7	77	45	67	64	Clear	1,518	76
8	78	52	66.5	64.5	Clear	1,533	71
9	72	55	65	64	Cloudy, rain p.m.	1,536	104
10	72	48	65	63.5	Partly cloudy	1,548	184
11	72	40	64	62.5	Clear	1,553	114
12	64	40	63	61.5	Clear	1,555	246
13	66	40	63	61	Light rain	1,553	343
14	60	50	62	61	Rain	1,531	292
15	56	32	61.5	60.5	Rain	1,521	460
16	51	34	60	58.5	Clear	1,510	398
17	52	29	59	58	Clear	1,499	315
18	60	36	59.5	58	Cloudy	1,502	240
19	62	41	59	58	Clear	1,507	149
20	62	40	59.5	58	Clear	1,526	334
21	64	40	59.5	58.5	Clear	1,540	696
22	66	38	61	58.5	Clear	1,543	190
23	67	40	60	58.5	Clear	1,542	691
24	64	44	59	58	Cloudy	1,553	266
25	68	50	59	58	Cloudy	1,557	234
26	68	40	59	57.5	Cloudy	1,576	379
27	66	40	59	57.5	Clear	1,583	341
28	64	40	58.5	56	Clear	1,544	258
29	65	38	58.5	56	Clear	1,537	284
30	63	36	58	56.5	Clear	1,538	201

TABLE 6

Nimbus Salmon and Steelhead Hatchery Weather and Flow Data,
December, 1958

Date	Temperature				Weather	American River flow at hatchery (c.f.s.)	King salmon taken
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	65	38	57.5	56	Partly cloudy	1,591	277
2	63	42	57.5	56	Clear	2,041	250
3	65	42	58	55.5	Clear	2,054	214
4	66	42	57.5	55.5	Clear	2,068	231
5	65	42	57.5	55	Clear	2,051	102
6	63	43	58	56	Cloudy	2,049	96
7	62	38	57	55.5	Clear	2,061	85
8	63	42	56.5	55.5	Fog	2,044	33
9	62	39	57	55	Clear	2,027	80
10	64	41	56.5	55	Clear	2,034	22
11	64	44	56	55	Clear	2,012	26
12	64	38	56.5	55	Clear	2,021	44
13	64	40	56.5	55	Partly cloudy	1,531	45
14	68	38	56	54.5	Clear	1,535	34
15	68	38	56	54.5	Clear	1,039	15
16	66	39	56	54	Clear	1,030	16
17	64	40	55.5	54	Clear	1,020	7
18	63	39	55	53.5	Clear	886	14
19	60	38	54.5	53.5	Partly cloudy	1,044	0
20	56	39	54	53.5	Cloudy	988	37
21	50	48	53.5	53.5	Rain	1,031	0
22	54	44	53.5	53	Fog	1,526	24
23	55	42	53.5	53	Fog	1,520	0
24	54	46	53	52.5	Fog - light rain	1,023	22
25	61	48	54	52.5	Cloudy	1,007	0
26	58	44	53	53	Rain	1,018	15
27	59	50	54	53	Rain	1,013	0
28	55	42	54	53	Clear	1,017	10
29	54	36	53.5	52.5	Clear	1,033	0
30	56	36	54	52.5	Clear	1,045	9
31	56	38	54	52	Clear	1,037	0

Nimbus Salmon and Steelhead Hatchery Weather and Flow Data,
January, 1959

TABLE 7

Date	Temperature				Weather	American River King flow at hatchery salmon (c.f.s.) taken	Steel- head taken
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	54	47	52.5	51.5	Clear	1,003	0
2	49	34	53	51.5	Fog a.m., clear p.m.	1,006	17
3	48	28	52	51	Fog a.m., clear p.m.	1,038	0
4	52	31	51.5	51	Cloudy	1,041	0
5	49	46	51	51	Rain	1,028	6
6	57	48	51	50.5	Light rain	1,025	0
7	62	48	51	50.5	Light rain	1,028	0
8	65	52	51	50	Rain	1,031	5
9	61	50	52	51	Rain	1,033	4
10	63	57	52.5	52	Rain	1,033	0
11	66	52	53	52	Cloudy	1,033	0
12	60	50	52	51.5	Rain	1,031	2
13	60	42	53	51	Fog a.m., clear p.m.	1,012	0
14	58	46	53	52.5	Clear	1,018	5
15	56	48	53.5	53	Fog	1,043	0
16	50	44	53.5	53	Fog	1,069	0
17	50	44	53	52	Fog	1,033	0
18	50	42	52	51.5	Cloudy	1,032	0
19	52	51	48	41	Partly cloudy	1,037	0
20	55	36	51.5	50.5	Clear	1,030	0
21	57	34	50.5	49.5	Partly cloudy	1,027	1
22	56	39	50	49	Cloudy	1,033	0
23	63	38	51	49.5	Clear	1,021	0
24	51	38	50	50	Rain	1,056	0
25	63	50	50.5	50	Partly cloudy	1,068	0
26	54	40	52.5	50	Partly cloudy	1,023	2
27	52	46	52	51	Rain	1,005	0
28	58	42	52.5	51	Partly cloudy	1,009	0
29	58	32	51	50	Light rain	1,033	0
30	52	36	51	49.5	Clear	1,029	0
31	56	32	51	49	Clear	1,025	0

First steelhead held for spawning on January 9, 1959.
Last salmon taken on January 26, 1959.

TABLE 8

Nimbus Salmon and Steelhead Hatchery Weather and Flow Data
February, 1959

Date	Temperature				Weather	American River flow at hatchery (c.f.s.)	Steel- head taken
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	58	44	50.5	49	Clear	1,346	2
2	58	38	51	49	Clear	1,319	0
3	58	32	50	49	Clear	1,331	0
4	60	35	50.5	49	Clear	1,323	0
5	62	37	51	49.5	Clear	1,318	0
6	62	39	50.5	49.5	Clear	1,329	0
7	62	38	50	49.5	Partly cloudy	1,329	0
8	57	33	51	49	Partly cloudy	1,336	0
9	49	32	49.5	49	Cloudy-rain	1,360	1
10	50	42	49	48	Rain	1,345	0
11	52	40	48	47.5	Light rain	1,354	0
12	54	40	48	47.5	Partly cloudy	1,343	0
13	55	40	49	48	Partly cloudy	1,353	4
14	57	38	49	48.5	Partly cloudy	1,349	0
15	60	54	49	48.5	Rain	1,336	0
16	61	50	49	49	Rain	1,329	8
17	54	48	49	48	Rain	2,821	0
18	53	48	49	48	Rain	5,064	2
19	61	46	49	48	Partly cloudy	5,026	3
20	52	44	48.5	48	Rain	4,968	0
21	49	44	48	47.5	Rain	5,016	0
22	56	40	47.5	47	Partly cloudy	5,083	0
23	58	44	50	47	Partly cloudy	5,087	3
24	59	35	50	48	Clear	4,491	1
25	64	38	48.5	47	Clear	3,504	6
26	64	40	48.5	47	Clear	3,045	1
27	67	40	51	48	Clear	3,025	2
28	70	44	50	48	Clear	3,033	0

TABLE 9

Nimbus Salmon and Steelhead Hatchery Weather and Flow Data,
March, 1959

Date	Temperature				Weather	American River flow at hatchery (c.f.s.)	Steel- head taken
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	71	44	51	48	Clear	3,440	0
2	72	46	49	48.5	Clear	3,690	1
3	74	48	53	49	Partly cloudy	4,050	0
4	73	46	51.5	48	Clear	3,920	3
5	70	42	50	48	Clear	3,700	0
6	72	44	50	48	Clear	3,720	4
7	71	44	53	49	Clear	3,650	0
8	70	40	50.5	48.5	Clear	3,640	4
9	72	40	52.5	50	Clear	3,190	0
10	70	40	52	49	Clear	2,870	0
11	70	42	50.5	48.5	Clear	2,800	0
12	73	40	51	49	Clear	2,870	0
13	75	46	51.5	49	Clear	3,150	0
14	70	48	52.5	49	Clear	3,210	0
15	70	41	52	49.5	Clear	2,910	1
16	78	46	51.5	49.5	Clear	2,770	0
17	76	50	51.5	50	Partly cloudy	2,780	0
18	67	50	51	50	Partly cloudy	3,010	5
19	67	44	53	50	Clear	3,060	4
20	76	42	51.5	50	Clear	2,910	2
21	70	46	52	50	Partly cloudy	2,870	0
22	63	46	50	49	Rain	2,910	2
23	58	50	50	49.5	Rain	3,020	0
24	64	48	53	49	Clear	2,820	2
25	70	48	51	50	Cloudy	2,610	0
26	62	46	51.5	49	Clear	2,720	0
27	66	52	51.5	50	Clear	3,500	0
28	71	52	52	50	Cloudy	3,000	2
29	65	42	52	50	Cloudy	2,720	0
30	64	48	52	50.5	Rain	3,350	0
31	64	44	55	51	Clear	4,370	4

TABLE 10

Nimbus Salmon and Steelhead Hatchery Weather and Flow Data,
April, 1959

Date	Temperature				Weather	American River flow at hatchery (c.f.s.)	Steel- head taker
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	81	50	54	51.5	Clear	1,546	0
2	82	52	53.5	51.5	Partly cloudy	1,412	0
3	80	51	54	51.5	Partly cloudy	1,337	2
4	85	52	53.5	51	Clear	1,330	0
5	80	50	55.5	51	Clear	1,325	0
6	80	49	58	53.5	Clear	1,333	0
7	79	50	57	54	Clear	1,364	0
8	82	52	55.5	53	Clear	1,360	0
9	81	40	54.5	52.5	Clear	1,360	2
10	82	48	56	52	Clear	1,383	0
11	81	46	56	53.5	Clear	1,086	0
12	83	50	55.5	53.5	Clear	1,063	0
13	80	50	55.5	53.5	Clear	1,049	0
14	78	46	56	52.5	Clear	1,053	1
15	75	46	57	53	Clear	1,047	1
16	79	42	55.5	53	Clear	1,049	0
17	77	48	56	53	Clear	1,111	0
18	78	44	56	54	Clear	1,186	0
19	80	48	56	54	Clear	1,176	0
20	82	48	56	54	Clear	1,211	1
21	72	46	55	53	Partly cloudy	1,037	0
22	82	44	56	53	Partly cloudy	1,046	0
23	85	50	57.5	53	Partly cloudy	1,043	2
24	72	50	57	53.5	Clear	1,047	0
25	72	54	58	54.5	Rain	1,046	0
26	68	45	56	54	Partly cloudy	1,041	0
27	68	46	56	54	Clear	1,054	0
28	78	51	58.5	54.5	Clear	1,069	0
29	88	57	58	56	Clear	1,064	0
30	78	55	56	54	Cloudy	1,060	0

Last steelhead taken April 23, 1959.

TABLE 11

Nimbus Salmon and Steelhead Hatchery Weather and Flow Data,
May, 1959

Date	Temperature				Weather	American River flow at hatchery (c.f.s.)
	Air		Water			
	Maximum	Minimum	Maximum	Minimum		
1	68	50	55	53.5	Cloudy	1,050
2	68	44	58	55	Rain	1,044
3	69	43	57	55	Partly cloudy	1,036
4	74	43	57	56.5	Clear	1,026
5	76	48	59.5	55	Partly cloudy	1,050
6	80	45	60	56.5	Clear	1,060
7	86	52	59	57	Clear	1,060
8	88	54	57.5	55	Clear	1,076
9	82	50	60	55	Clear	1,049
10	90	51	60.5	59	Partly cloudy	1,048
11	92	57	59	57.5	Partly cloudy	1,071
12	84	59	57.5	55	Clear	1,053
13	82	59	61	55	Partly cloudy	1,029
14	77	56	59	56	Partly cloudy	1,008
15	77	54	61.5	56.5	Clear	1,018
16	88	59	59.5	57.5	Clear	1,011
17	77	56	57.5	55	Clear	1,018
18	74	46	60	56	Clear	1,049
19	79	51	60	58	Clear	1,051
20	84	54	60	57.5	Clear	1,042
21	87	54	59	57	Clear	1,051
22	80	57	59.5	56.5	Partly cloudy	1,055
23	78	50	59	56	Partly cloudy	1,051
24	79	53	60	56	Partly cloudy	1,051
25	78	54	59	57	Partly cloudy	1,057
26	76	52	59	56	Partly cloudy	1,048
27	80	48	59.5	56	Clear	1,030
28	80	50	59	51	Clear	1,020
29	83	50	61	57	Clear	1,032
30	90	52	60	58	Clear	1,041
31	92	55	60	56.6	Clear	1,042

TABLE 12

Nimbus Salmon and Steelhead Hatchery Weather and Flow Data,
June, 1959

Date	Temperature				Weather	American River flow at hatchery (c.f.s.)
	Air		Water			
	Maximum	Minimum	Maximum	Minimum		
1	88	53	60	56	Clear	1,045
2	89	53	60	56.5	Clear	1,036
3	88	54	62	57	Clear	1,269
4	92	56	62	58	Clear	1,276
5	92	62	60	58	Clear	1,515
6	80	58	61	57	Clear	1,503
7	86	52	61.5	57.5	Clear	1,497
8	86	54	60	57	Clear	1,493
9	83	52	61.5	56	Clear	1,507
10	92	50	59	57	Clear	1,509
11	97	58	58.5	56.5	Clear	1,674
12	96	62	58.5	56.5	Clear	1,764
13	91	60	59.5	57.5	Clear	1,764
14	90	56	61	58	Few clouds	1,783
15	88	56	59	57	Clear	1,796
16	88	54	61	57	Clear	1,787
17	102	54	61	58	Clear	1,788
18	102	56	60	58	Clear	2,033
19	102	62	62	57.5	Clear	2,041
20	108	68	61	59	Clear	2,234
21	108	72	62	59	Clear	2,230
22	105	69	62	59	Clear	2,271
23	106	76	61	59.5	Clear	2,518
24	96	67	60	57	Clear	2,493
25	82	62	60	57	Clear	2,792
26	86	62	60	57	Clear	3,237
27	86	58	61	56.5	Clear	3,519
28	90	58	59	57	Clear	3,523
29	94	62	58	57	Clear	3,521
30	100	60	58	55.5	Clear	3,550