Leonard Fisk

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ANNUAL REPORT
NIMBUS SALMON AND STEELHEAD HATCHERY
FISCAL YEAR OF 1956-57 1/

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INTRODUCTION

This is the second annual report of the Nimbus Salmon and Steelhead Hatchery, operated under contract with the Bureau of Reclamation by the California Department of Fish and Game to maintain the populations of salmon and steelhead which formerly spawned in that area of the American River above Nimbus and Folsom dams.

The assembled data summarize information for the period July 1, 1956, to June 30, 1957, on the numbers of fish trapped and spawned, progress of eggs and fry, and conditions of water quality and temperatures.

KING SALMON MAINTENANCE PROGRAM

History of 1956 Salmon Run

Late in August of 1956, the Teichert Construction Company completed restoration of the river bed at the weir site. Some 5,000 cubic yards of gravel had been washed out during the previous winter storms, causing the weir to be inoperative.

On September 11, 1956, the weir was installed and the holding ponds were put into operation. The first salmon arrived September 17. The numbers increased rapidly, and the peak was reached during the week of November 5 (Figure 1). There were 21 salmon taken in September; 720 in October; 754 in November; 42 in December; and 6 in January. The last fish was taken January 18, 1957.

A total of 1,543 fish entered the pond. Of this number, 267 were males, 502 females, and 774 grilse.

The number of females spawned was 412, or 82 percent of the 502 which entered the holding ponds. Most of the loss of females occurred during the first two months of the run, when water temperatures were above 60 degrees Fahrenheit.

The average number of eggs produced by each females as 5,862, an increase of 515 eggs over the average number of eggs produced per female last year.

Egg, Alevin, and Fingerling Production

The total king salmon egg take was 2,415,356 eggs. The first eggs were taken October 26, 1956 and the last on January 18, 1957. Eggs taken during the warmwater period were very poor; some lots were a complete loss.

Water temperatures were consistently above 56 degrees until November 26. After this date, when water temperatures dropped, the quality of the eggs increased. The correlation between temperature, time of arrival of the salmon, and time of spawning with the quality of the eggs and fry is very definite.

Of the 502 females that entered the holding ponds, 469 (93 percent) arrived before November 26. Ninety percent of the females were spawned before November 26 and these fish produced 90 percent of the eggs, of which only 22 percent reached the eyed stage. Of the eggs taken after November 26, 88 percent reached the eyed stage.

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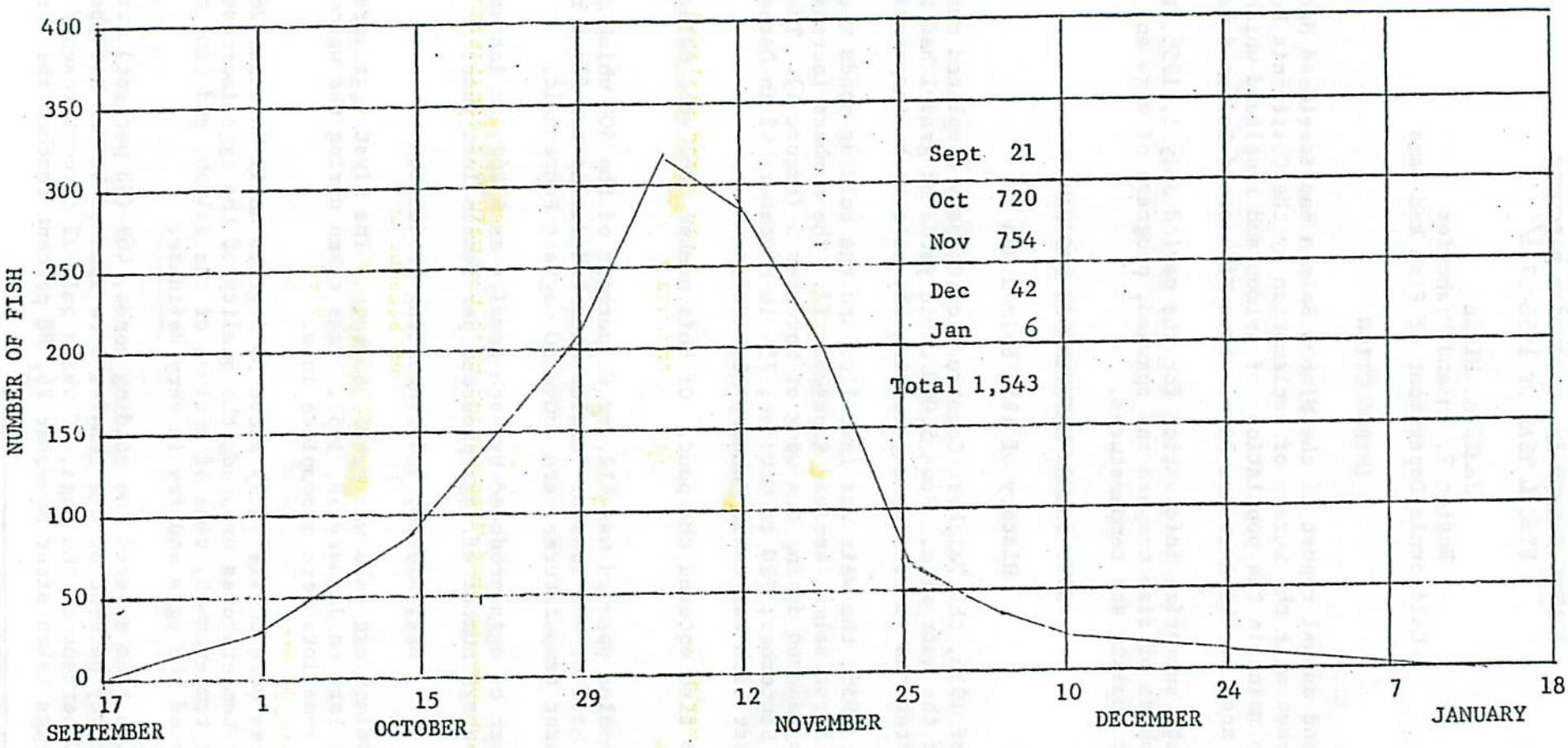

FIGURE 1. Nimbus Salmon and Steelhead Hatchery Fall King Salmon Run, 1956

Coagulation in the egg sac, most numerous in those fish from the early eggs, caused heavy losses up to the time of feeding.

Planting 1956 Brood Year King Salmon Fingerlings

During the month of May, 1957, 162,930 salmon averaging 2 fish per ounce were planted, and during July and August the balance of 47,686 fish averaging 1.6 fish per ounce were released. It had been planned to mark the latter lot of salmon; however, the scales became loose and fungus was beginning to form. Therefore, the fish were planted without marking.

1955 Brood Year King Salmon

There were 30,750 yearling salmon of the 1955 brood year on hand at the start of the fiscal year. These fish were held until March and April of 1957 before planting in the American River. At this time, there remained 20,579 fish averaging 8.1 fish per pound which had been marked by the removal of the adipose and left ventral fins. An attempt was made to mark these fish in October, 1956. The scales were very loose. After marking 1,800, the operation was stopped. Within a few days fungus was prevalent and over 1,000 of the fish had died. The scales remained deciduous until late in December, when the marking was completed with little mortality. The looseness of the scales may have been due to warm water (67.5 degrees F.) when marking was attempted or it may have been the age of the fish (10 months). These fish were from eggs taken in late December, 1955.

STEELHEAD MAINTENANCE PROGRAM

History of the 1956 Steelhead Run

Due to the high water releases from Folsom and Nimbus dams through the winter months, the fish weir was removed three times. The weir was first removed on February 26 and replaced on March 2. It was again removed on March 4 and replaced on March 12. It was removed for the last time on May 19 and was not replaced for the remainder of the fiscal year.

The weir removal resulted in the moving of large amounts of gravel at the base, making it extremely difficult, if not impossible, to determine if the weir was fish tight when replaced. Because of the small number of steelhead entering the holding pond and the large number taken by fishermen between the weir structure and Nimbus Dam, it was assumed that escapement past the weir was considerable.

Because of the difficulty in keeping steelhead alive over a long period of time in the holding pond, due to fungus infection, no attempt was made to hold fish until early February.

A total of 115 steelhead was taken between early February and June 26, 1956. Of the 115 fish received, 41 males and 48 females were spawned, producing 198,029 eggs. Of these, 184,768 or 93.3 percent reached the eyed stage. These eggs hatched during the months of April and May and produced very satisfactory fry.

When it became apparent that the number of steelhead eggs taken at Nimbus Hatchery would be insufficient to cover planting needs, eggs were imported to cover the expected deficiency. A total of 1,077,153 steelhead eggs was imported from the Department's Snow Mountain Egg Collecting Station on the Eel River. Of the eggs received, 1,002,153 or 93 percent were eyed successfully. These eggs hatched during April and May. Fry from these eggs were satisfactory, although losses were somewhat higher than in Nimbus fry.

Steelhead Feeding Experiment

An experiment to determine the feasibility of feeding dry pelletized food to steelhead was started in late April.

One lot of fish was divided into three groups and two commercial brands of dry food were fed from the first feeding to two of these groups. Another lot of fish was divided into three groups and the standard diet of beef liver and ocean fish was fed until the fish reached 60 fish per ounce. Two of the groups were then changed to pelletized food. The third group of each lot was used as a control group and fed the standard diet of beef liver and ocean fish.

Results of the experiment were variable. The pelletized particles of one of the dry foods was very hard and, for this reason, it is possible that it was not taken either by the fish starting to feed or those at 60 per ounce.

The other pelletized food was softer and slightly smaller in size and was taken readily by both groups of fish. These groups of fish started growing slower than the control group but after four weeks had passed the control group in size and vigor.

Planting 1956 Brood Year Steelhead

At the beginning of the fiscal year, there were 105,000 steelhead fingerlings from eggs taken at this hatchery, 28,500 fingerlings from Coleman Fisheries Station eggs, and 326,000 fingerlings from Snow Mountain Egg Collecting Station eggs.

At the request of the Bureau of Reclamation, only fish from those eggs taken from the American River steelhead were planted in the American River; all steelhead from other sources were released in streams other than the American River. The Bureau of Reclamation did not wish to be held responsible for the cost of increasing the number of steelhead in the American River by the importation of fish or eggs from other sources. Therefore, the Nimbus steelhead, 34,328 fish averaging 19 fish per pound, were planted in the American River and the steelhead from other sources, 194,430 averaging 45 fish per pound, were planted in the Mokelumne River.

DISEASE HISTORY

Disease outbreaks at Nimbus Hatchery during the year were frequent and, at times, of considerable proportions.

Discernable and known bacterial diseases were Cytophaga columnaris, gill disease, fin rot, and peduncle disease. Columnaris was by far the most common and persistent bacterial disease, while gill disease and peduncle disease were minor and of localized character.

Parasitic diseases were many and varied. These, in order of their severity, were Ichthyophthirius multifiliis, Gyrodactylus elegans, Epistylis, Hexamitus, Chilodon, and Costia. Of the above, Ichthyophthirius, Gyrodactylus, and Epistylis were constantly recurring. Steelhead were most commonly infected; king salmon were relatively immune.

Diseases common to king salmon fingerlings, in addition to white spot (coagulated egg yolk), were peduncle disease, Gyrodactylus, and Trichodina, all of which yielded to treatment, or were not severe enough to require treatment. The only disease of consequence to yearling king salmon was fungus, which was readily controlled with malachite green.

Losses of less consequence were from fatty degeneration of the liver during late fall nd early winter. This was probably due to over-feeding as water temperatures dropped. This occurred in both salmon and steelhead.

Due to the almost constant reinfection of the fish by some parasites, it was necessary to work out a simple manner of treatment.

For the external bacterial diseases, copper sulphate was used by pouring the solution in at the head of the trough or pond to be treated and allowing it to flow through the trough or pond. In the hatchery, 125 cc. of a solution of one pound of copper sulphate dissolved in one gallon of water were used for each trough, with a 15-gallon per minute flow of water.

For the ponds, both nursery and raceways, the ponds were drawn down to approximately 12 inches of water, and the flow was adjusted to about one cubic foot per second. One pound of dissolved copper sulphate was poured in at the head of the pond.

The external parasites were treated with glacial acetic acid in much the same manner as copper sulphate was used in treating bacterial diseases. When water temperature was below 50 degrees F., two gallons of acetic acid were poured into the head of the pond to be treated. When temperatures were above 50 degrees F., one gallon of acetic acid was used with good results.

Columnaris was treated by adding sulphamerazine to the food at the rate of eight grams per 100 pounds of fish. This was fed at intervals of 7 to 10 days, depending upon the appearance of the fish.

These treatment methods controlled the various infestations. Slight modifications of the copper sulphate and acetic acid solutions had to be made when water temperatures varied several degrees.

Columnaris was most prevelant during the summer and fall months and infected all sizes of fish, and generally recurred three or four weeks after the last treatment.

Gill disease, fin rot, and peduncle disease were found mostly on young fingerlings in the spring and early summer months.

Chilodon, Trichodina, and Hexamitus were found while the fish were still in the hatchery (late winter and early spring), but they never became serious.

Ichthyophthirius was prevelant during August and September, and Gyrodactylus and Epistylis from September through late March.

PUBLIC RELATIONS

During the fiscal year, an estimated 94,274 persons visited the hatchery. Of this number, 2,417 were in organized groups consisting of school children, Boy Scouts, Girl Scouts, service clubs, and other interested groups. Most of the groups made prior appointments so that an employee would be available to conduct them through the installation.

During the months of October, November, and December, 51,542 persons, or over one-half of the total yearly number, visited the hatchery.

A public address system was obtained for the months of November and December to explain the need for the hatchery and its functions. A short talk, repeated through the day whenever a large enough group of people was present, was given by one of the hatchery personnel.

MISCELLANEOUS

Housing

The two houses, which were planned by the Bureau of Reclamation during late 1956, were constructed during the spring of 1957 and were occupied by Department of Fish and Game employees in mid-May.

Industrial Safety

Most of the safety items recommended by the California Division of Industrial Safety have been completed, and the remaining items are being completed as rapidly as possible.

SUMMARY

1. The river bed at the weir site was restored to the original grade late in August, and the weir was installed on September 11, 1956.

2. The first salmon arrived September 17, 1956, and the last on January 18, 1957. The peak of the run occurred during the week of November 5. A total of 1,543 salmon entered the holding ponds: 267 were males; 502 were females; 774 were grilse. From 412 females, 2,415,356 eggs were taken, an average of 5,862 eggs per female. The number of eggs hatched was 275,000; of the surviving fry, 210,616 were planted.

3. High water temperature until late November was the major cause of high mortality of eggs and fry. Ninety percent of the females were spawned before November 26, producing 90 percent of the eggs. Of those taken before November 26, only 22 percent reached the eyed stage. Of those eggs taken after November 26, over 88 percent reached the eyed stage.

4. Due to high water releases from Folsom and Nimbus dams, it was necessary to remove the fish weir from the river during most of the steelhead season. Only 115 steelhead were taken. Forty-eight females were spawned and produced 198,029 eggs.

5. It was found that steelhead could be reared on a diet of pelletized dry meals.

6. The many diseases found among the salmon and steelhead were successfully controlled.

APPENDIX

TABLE 1

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
July, 1956

Date	TEMPERATURE AIR Maximum	AIR Minimum	WATER Maximum	WATER Minimum	Weather	American River flow at hatchery (c.f.s.)
1	80	58	54	51	Clear	4,788
2	86	60	59	56	Clear	4,343
3	90	64	58	56	Clear	3,934
4	92	66	59	57	Clear	3,814
5	90	68	59	57	Clear	3,361
6	94	68	60	58	Clear	3,876
7	98	68	60	58	Clear	3,832
8	96	68	59	57	Clear	3,826
9	95	60	58	55	Clear	3,810
10	94	58	59	55	Clear	3,844
11	98	58	59	56	Clear	3,867
12	92	55	59	54	Few clouds & windy	3,850
13	88	58	59	55	Clear	3,448
14	90	64	60	56	Mostly clear	3,814
15	92	62	60	55	Clear	3,807
16	95	64	60	58	Clear	3,825
17	98	66	60	58	Clear	3,867
18	100	67	60	58	Few high clouds	3,909
19	96	70	61	58	Clear	3,896
20	98	62	61	59	Clear	3,910
21	98	60	61	59	Clear	3,949
22	102	64	61	59	Clear	3,950
23	105	68	61	60	Clear	3,939
24	104	66	62	60	Clear	3,810
25	98	66	61	60	Few high clouds	3,380
26	96	64	62	60	Clear	3,509
27	94	60	62	60	Clear	4,060
28	92	56	61	59	Clear	4,081
29	94	54	61	59	Clear	4,124
30	92	54	61	59	Clear	3,706
31	93	52	62	59	Clear	4,181

TABLE 2

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
August, 1956

Date	TEMPERATURE AIR Maximum	AIR Minimum	WATER Maximum	WATER Minimum	Weather	American River flow at hatchery (c.f.s.)
1	90	60	62	59	Clear	4,611
2	89	55	61	59	Clear	4,581
3	90	54	61	59	Clear	4,411
4	88	52	61	59	Clear	4,404
5	89	52	61	59	Clear	4,429
6	93	56	61	59	Clear	4,068
7	95	42	62	60	Clear	3,350
8	95	58	62	60	Clear	4,446
9	95	58	62	60	Clear	4,389
10	101	62	63	61	Clear	4,215
11	86	62	62	61	Clear	4,342
12	79	54	61	60	Clear	4,471
13	92	54	62	60	Clear	4,544
14	90	56	62	60	Clear	4,537
15	88	56	62	60	Clear	4,557
16	96	56	63	61	Clear	3,283
17	92	54	64	61	Clear	3,057
18	92	56	63	61	Clear	3,108
19	94	55	63	61	Clear	3,194
20	88	56	63	61	Clear	3,260
21	90	56	64	62	Clear	3,391
22	90	56	64	62	Clear	3,435
23	92	59	62	62	Clear	3,494
24	94	59	64	63	Clear	3,358
25	90	58	65	62	Clear	3,203
26	88	59	65	63	Clear	3,524
27	90	56	64	62	Clear	3,332
28	90	58	64	62	Clear	3,228
29	86	56	64	62	Clear	3,211
30	84	52	65	63	Clear	3,198
31	89	52	65	63	Clear	3,177

TABLE 3

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
September, 1956

Date	TEMPERATURE AIR Maximum	AIR Minimum	WATER Maximum	WATER Minimum	Weather	American River flow at hatchery (c.f.s.)	King salmon taken
1	92	54	65	63	Clear	2,531	0
2	96	56	66	63	Clear	2,529	0
3	94	56	66	63	Clear	2,511	0
4	93	55	66	64	Clear	2,476	0
5	96	52	66	64	Clear	2,432	0
6	80	56	65	64	Clear	2,527	0
7	78	52	65	63	Clear	2,571	0
8	85	50	66	64	Clear	2,593	0
9	86	58	65	64	Clear	2,516	0
10	86	54	66	64	Clear	2,340	0
11	82	62	67	64	Clear	2,171	0
12	80	64	66	64	Partly cloudy	2,172	0
13	80	62	67	64	Clear	2,173	0
14	82	58	67	64	Clear	2,164	0
15	84	56	67	65	Clear	2,163	0
16	86	56	67	64	Clear	2,165	0
17	92	56	67	64	Clear	2,204	0
18	90	70	67	65	Cloudy - light rain	2,258	7
19	77	63	67	65	Rain	2,252	0
20	78	53	67	65	Clear	2,276	0
21	83	56	67	65	Clear	2,273	0
22	87	63	66	65	Clear	2,247	0
23	87	63	66	64	Clear	2,252	0
24	91	65	67	65	Clear	2,254	0
25	91	58	67	65	Clear	2,254	0
26	84	56	67	65	Partly cloudy	2,174	0
27	86	54	66	65	Partly cloudy	2,285	14
28	83	54	67	65	Clear	2,517	0
29	85	53	67	65	Clear	2,590	0
30	84	52	67	65	Clear	2,686	0

TABLE 4

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
October, 1956

Date	TEMPERATURE AIR Maximum	AIR Minimum	WATER Maximum	WATER Minimum	Weather	American River flow at hatchery (c.f.s.)	King salmon taken
1	86	52	68.5	65	Clear	2,502	0
2	82	52	68	65.5	Showers	1,433	0
3	83	54	67.5	65.5	Clear	1,189	82
4	79	53	67.5	65.5	Partly cloudy	1,251	0
5	80	54	68.5	65.5	Partly cloudy	1,256	0
6	82	54	68	66.5	Clear	1,259	0
7	74	60	66	65.5	Partly cloudy	1,278	0
8	78	60	68	65	Partly cloudy	1,214	0
9	77	50	67.5	65.5	Partly cloudy	1,236	87
10	68	50	66	65.5	Light showers	1,286	0
11	68	47	66	64	Partly cloudy	1,197	9
12	70	43	67	64.5	Clear	1,218	0
13	74	44	67	64.5	Clear	1,215	0
14	74	46	67.5	64	Clear	1,249	0
15	76	46	67.5	64	Clear	1,249	52
16	85	46	67.5	65	Clear	1,201	0
17	76	44	66.5	64.5	Partly cloudy	1,189	0
18	76	47	66.5	64.5	Cloudy	1,251	0
19	78	46	67.5	64.5	Clear	1,231	0
20	77	47	67	64.5	Partly cloudy	1,228	0
21	77	47	67.5	64.5	Clear	1,245	0
22	76	43	65.5	64	Clear	1,249	92
23	70	36	65	63	Rain	1,240	0
24	69	42	63	62	Clear	1,208	66
25	69	40	63	61	Partly cloudy	1,258	0
26	66	48	63	62	Rain	1,390	67
27	60	44	62.5	61.5	Partly cloudy	1,253	0
28	58	45	62.5	61	Partly cloudy	1,244	0
29	64	40	61.5	61	Rain	1,281	73
30	61	48	60.5	59.5	Rain	1,285	45
31	58	44	60	59	Partly cloudy	1,286	145

TABLE 5

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
November, 1956

Date	TEMPERATURE AIR Maximum	AIR Minimum	WATER Maximum	WATER Minimum	Weather	American River flow at hatchery (c.f.s.)	King salmon taken
1	54	43	59	58.5	Light rain	1,253	38
2	63	45	60.5	59	Clear	1,254	140
3	63	41	60	58.5	Clear	1,083	0
4	64	45	60	59	Clear	2,002	0
5	65	40	61	59	Clear	2,064	146
6	68	42	61	59	Clear	2,058	0
7	72	44	60	58	Partly cloudy	2,028	74
8	72	44	60	58	Clear	2,028	36
9	74	45	61	58.5	Clear	2,062	24
10	75	46	60.5	59	Clear	2,095	0
11	72	44	60	58	Clear	2,095	0
12	67	41	61	58	Partly cloudy	2,081	0
13	63	41	59	57.5	Partly cloudy	2,093	146
14	60	40	57.5	56	Clear - north wind	2,092	19
15	60	36	57.5	55.5	Clear	2,148	8
16	62	35	57.5	56.5	Clear	2,121	22
17	65	42	58.5	57	Clear	2,071	0
18	55	40	58	56.5	Clear	2,078	0
19	54	41	55.5	55	Clear - north wind	2,059	30
20	60	32	55.5	54.5	Clear	2,022	0
21	61	34	57	54.5	Clear	2,062	15
22	63	33	57	54.5	Clear	2,041	0
23	64	32	57	55	Clear	2,056	17
24	64	33	56.5	55	Clear	2,077	0
25	63	31	56	55	Clear	2,056	0
26	64	32	56	54.5	Clear	2,017	18
27	64	36	56	54.5	Clear	2,012	0
28	63	35	55.5	54	Clear	2,022	13
29	64	38	55.5	54	Clear	2,009	0
30	62	37	55.5	54	Clear	2,050	8

TABLE 6

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
December, 1956

Date	TEMPERATURE AIR Maximum	AIR Minimum	WATER Maximum	WATER Minimum	Weather	American River flow at hatchery (c.f.s.)	King salmon taken
1	63	36	55.5	54	Clear	2,060	0
2	62	36	55	53.5	Clear	2,044	0
3	60	36	54	53	Partly cloudy	2,002	11
4	56	44	53.5	53	Rain	1,482	0
5	58	45	53	52	Rain	1,530	5
6	58	45	53	52	Rain	1,537	0
7	48	32	52.5	51.5	Clear	1,546	3
8	48	28	51.5	50.5	Clear	1,574	0
9	52	30	51.5	50	Clear	1,554	0
10	58	38	51.5	50	Partly cloudy	1,546	7
11	62	46	52	51	Cloudy	1,548	0
12	60	40	52.5	51	Partly cloudy	1,555	1
13	62	46	52.5	51	Partly cloudy	1,563	0
14	56	40	52	51	Fog	1,563	0
15	58	38	52	51	Partly cloudy	1,565	0
16	58	36	51.5	51	Partly cloudy	1,580	0
17	40	40	50.5	50	Fog	1,570	4
18	50	40	51	50	Fog	1,538	0
19	40	40	50	49	Fog	1,567	3
20	36	33	49	49	Fog	1,568	0
21	50	33	49.5	48.5	Fog	1,586	3
22	42	28	48.5	48	Partly cloudy	1,618	0
23	58	36	49	48	Clear	1,588	0
24	50	40	51	47.5	Clear	1,581	1
25	40	40	51.5	50	Clear	1,574	0
26	40	40	50	49	Clear	1,573	3
27	36	33	49	49	Clear	1,581	0
28	50	33	49.5	48.5	Clear	1,613	0
29	42	28	48.5	48	Clear	1,631	0
30	52	39	49	47.5	Clear	1,627	0
31	58	33	48	47.5	Partly cloudy	1,630	0

TABLE 7

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
January, 1957

Date	TEMPERATURE AIR Maximum	AIR Minimum	WATER Maximum	WATER Minimum	Weather	American River flow at hatchery (c.f.s.)	King salmon taken
1	56	33	48	47.5	Clear	1,612	0
2	52	33	47.5	47	Clear	1,620	1
3	52	35	47.5	47	Clear	1,586	0
4	52	34	47.5	47	Partly cloudy	1,490	0
5	56	35	48	47	Light rain	1,439	0
6	55	35	47.5	46.5	Clear	1,200	0
7	53	33	47.5	46.5	Partly cloudy	1,469	1
8	51	42	47	46.5	Light rain	1,523	0
9	50	30	47	46	Clear	1,521	0
10	51	29	46.5	46	Partly cloudy	1,509	0
11	57	36	46.5	46	Cloudy	820	0
12	60	50	47	46.5	Rain	1,018	0
13	54	50	47	46.5	Light rain	1,028	0
14	56	42	47	46.5	Partly cloudy	1,024	0
15	55	48	48.5	47	Partly cloudy	1,018	0
16	54	36	48	47	Clear - morning fog	1,015	0
17	54	34	48.5	47	Clear	984	0
18	47	34	48	47	Fog	995	3
19	47	41	47	46.5	Rain	980	0
20	51	37	46.5	46	Showers	999	0
21	52	32	47	45	Partly cloudy	1,001	0
22	52	36	46.5	46	Cloudy	992	0
23	53	40	46.5	45.5	Partly cloudy	992	0
24	46	42	46	45.5	Light rain	993	0
25	45	33	46	46	Rain	988	0
26	44	26	46	45.5	Cloudy	983	0
27	44	26	46	45	Partly cloudy	995	0
28	46	32	45.5	45	Clear	1,005	0
29	46	28	45	44	Clear	1,000	0
30	48	27	45	44	Partly cloudy	981	0
31	52	31	45	44	Clear	945	0

TABLE 8

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
February, 1957

Date	TEMPERATURE AIR Maximum	AIR Minimum	WATER Maximum	WATER Minimum	Weather	American River flow at hatchery (c.f.s.)
1	54	33	45.5	44.5	Cloudy	1,004
2	53	26	47	45	Clear	995
3	51	28	45	44	Clear	1,003
4	65	30	47	44	Clear	998
5	55	34	46.5	45	Partly cloudy	1,227
6	57	35	46	45	Cloudy	1,229
7	45	41	45.5	44.5	Rain	1,260
8	67	46	46	45	Light rain	1,261
9	53	35	46	45	Cloudy	1,257
10	65	49	45.5	45	Cloudy	1,260
11	62	46	47.5	45	Partly cloudy	1,255
12	75	52	46.5	46	Light rain	1,257
13	82	47	46.5	45	Cloudy	1,265
14	86	44	49	45	Partly cloudy	1,270
15	80	51	47	46	Partly cloudy	1,270
16	60	52	47	45	Light rain	1,271
17	72	51	46.5	45	Cloudy	1,268
18	70	50	46.5	45	Cloudy	1,275
19	56	52	45.5	44.5	Cloudy	1,270
20	60	48	46	45	Light rain	1,260
21	58	52	46	45	Rain	1,432
22	64	47	47	45	Light rain	1,765
23	64	55	46	45	Rain	1,764
24	60	55	46.5	46	Rain	2,238
25	58	56	47.5	46.5	Partly cloudy	2,528
26	63	55	47.5	46.5	Rain	4,188
27	56	50	48	45.5	Showers	5,279
28	64	52	46.5	45.5	Rain	5,262

TABLE 9

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
March, 1957

Date	TEMPERATURE AIR Maximum	AIR Minimum	WATER Maximum	WATER Minimum	Folsom Reservoir water temperature	Weather	American River flow at hatchery (c.f.s.)
1	60	54	46	45.5	46	Showers	5,268
2	70	52	46.5	46	46	Cloudy	5,287
3	70	52	46	45.5	46	Rain	5,240
4	68	52	46	45	46	Rain	8,018
5	56	55	47	46	46	Rain	22,829
6	86	54	49	47	48	Showers	29,500
7	78	53	48	47	48	Partly cloudy	19,380
8	68	50	48	47	48	Rain	15,355
9	82	50	48	47	48	Partly cloudy	12,645
10	83	40	48	47	48	Partly cloudy	5,536
11	64	52	48	47	48	Cloudy	4,887
12	66	50	48	47	48	Cloudy	5,040
13	70	42	49	47	48	Partly cloudy	5,480
14	86	38	48	47	48	Partly cloudy	5,501
15	70	48	48	47	48	Partly cloudy	5,684
16	77	39	48	47	48	Partly cloudy	7,635
17	84	48	48.5	47.5	48	Partly cloudy	7,576
18	84	44	50	48	48	Partly cloudy	5,955
19	84	46	50	48	48	Clear	4,534
20	80	46	49	48	48	Partly cloudy	4,263
21	70	41	50	48	48	Clear	4,843
22	74	35	50	48	48	Clear	5,128
23	84	36	49	48	48	Clear	4,985
24	82	42	51	48	48	Clear	4,040
25	85	48	50	48	48	Partly cloudy	3,174
26	86	44	50	48.5	48	Clear	2,636
27	86	47	50	48.5	48	Clear	2,500
28	80	48	51	48.5	48	Partly cloudy, rain	2,435
29	70	52	50	49	48	Cloudy, showers	2,516
30	66	42	53	50	48	Partly cloudy	2,515
31	67	48	51.5	49	48	Partly cloudy	2,589

TABLE 10

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
April, 1957

Date	TEMPERATURE AIR Maximum	AIR Minimum	WATER Maximum	WATER Minimum	Folsom Reservoir water temperature*	Weather	American River flow at hatchery (c.f.s.)
1	68	42	52	49	48	Clear	2,579
2	78	45	52.5	49.5	48	Clear	2,585
3	80	55	54	50	48	Clear	2,558
4	80	52	56	50.5	48	Clear	2,627
5	86	50	55	51	48	Partly cloudy	2,533
6	70	48	54	50.5	48	Clear	2,595
7	75	45	51	50.5	48	Clear	2,661
8	78	42	52	51	48	Partly cloudy	2,585
9	76	45	52	49	48	Clear	2,518
10	72	44	52	49	48	Clear	2,509
11	72	43	51	49.5	48	Partly cloudy	2,545
12	68	52	52	50	48	Partly cloudy	2,522
13	78	47	52	50	48	Rain	2,511
14	70	53	57	49.5	48	Partly cloudy	2,489
15	70	53	52	50	48	Clear	2,996
16	70	44	51.5	49	48	Cloudy, rain	4,018
17	68	46	50	49	50	Cloudy, heavy rain	3,934
18	66	50	50.5	49	50	Rain	4,022
19	66	47	50	49.5	50	Clear	4,015
20	68	46	51	49.5	50	Cloudy	3,996
21	68	46	51	50	50	Partly cloudy	3,995
22	70	44	52	50	50	Partly cloudy	4,044
23	74	52	51.5	50	50	Partly cloudy	3,971
24	72	46	53	51.5	50	Clear	3,965
25	74	44	54	51.5	50	Clear	3,982
26	78	46	53	50.5	50	Clear	4,045
27	80	44	53.5	51.5	50	Clear	4,028
28	90	54	53	51.5	50	Clear	4,574
29	74	52	53	50	50	Clear	5,826
30	78	52	52	51	50	Clear	5,233

*Temperature taken at 307 feet elevation.

TABLE 11

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
May, 1957

Date	TEMPERATURE AIR Maximum	AIR Minimum	WATER Maximum	WATER Minimum	Folsom Reservoir water temperature*	Weather	American River flow at hatchery (c.f.s.)	King salmon taken
1	72	51	52.5	51.5	50	Cloudy	2,009	1
2	80	48	53	51.5	50	Partly cloudy	2,004	0
3	88	50	54.5	51.5	50	Clear	2,005	0
4	92	56	55	53	50	Clear	2,011	0
5	78	54	55	53	50	Clear	1,999	0
6	78	55	54.5	51.5	50	Partly cloudy	2,002	0
7	75	62	55	53	50	Partly cloudy	1,988	0
8	78	62	53.5	52.5	50	Showers	1,991	0
9	77	52	55	53	50	Partly cloudy	1,994	0
10	78	56	55	54	50	Partly cloudy	1,999	0
11	76	52	56	53	50	Partly cloudy	1,983	0
12	76	52	54	52.5	50	Partly cloudy	2,010	0
13	75	54	55	53	50	Cloudy	2,556	0
14	70	52	54.5	52.5	50	Heavy showers	4,056	0
15	82	46	54	53	50	Partly cloudy	3,944	0
16	86	52	55	52.5	50	Clear	3,973	0
17	76	54	54.5	53.5	50	Partly cloudy	4,020	0
18	58	58	53	52	50	Rain	4,050	0
19	69	49	53	52	50	Rain	**	0
20	62	50	56	52	50	Rain	5,023	0
21	78	46	58	53.5	50	Clear	12,091	0
22	78	50	56	53.5	50	Partly cloudy	12,126	0
23	80	48	57	53	52	Clear - north wind	11,378	0
24	76	54	55	54	52	Clear	8,821	0
25	86	52	54	52	52	Clear	7,428	0
26	94	56	53.5	52	52	Clear	7,559	0
27	96	58	55	52	52	Clear	7,576	0
28	84	58	54	52.5	52	Clear	8,109	0
29	82	54	54.5	52	52	Clear	8,536	0
30	86	53	55.5	52.5	52	Clear	9,028	0
31	92	54	55.5	53.5	52	Clear	8,531	0

* Temperature taken at 307 feet elevation.

** Information not available.

TABLE 12

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
June, 1957

Date	TEMPERATURE AIR Maximum	AIR Minimum	WATER Maximum	WATER Minimum	Folsom Reservoir water temperature*	Weather	American River flow at hatchery (c.f.s.)
1	94	57	55	54	52	Clear	7,005
2	96	58	54.5	53	52	Clear	7,005
3	99	58	54.5	53	52	Clear	6,935
4	104	60	54.5	53.5	52	Clear	6,389
5	90	57	55	53	52	Clear	5,966
6	104	54	55	53.5	52	Clear	6,035
7	88	58	55.5	54	52	Clear	6,004
8	88	56	55	54	52	Clear	6,018
9	82	60	54	53	52	Light showers	6,014
10	90	53	57.5	53	54	Clear	5,997
11	96	59	56	54.5	54	Partly cloudy	5,974
12	102	62	56	55.5	54	Partly cloudy	5,069
13	98	54	57.5	54.5	54	Partly cloudy	5,011
14	94	54	56.5	54.5	54	Cloudy	4,061
15	82	52	58	55.5	54	Clear	3,994
16	92	54	59	55.5	54	Clear	3,985
17	100	54	57.5	55.5	54	Clear	4,014
18	103	60	57.5	55.5	54	Clear	2,999
19	100	59	58	55.5	54	Clear	2,981
20	93	60	59	56	54	Clear	2,989
21	100	60	62.5	57	54	Clear	2,999
22	106	62	61	58	54	Clear	2,984
23	106	63	59	57	54	Clear	2,962
24	109	66	59	56.5	54	Clear	2,940
25	108	66	58.5	57.5	54	Clear	2,961
26	106	65	58.5	56.5	54	Clear	3,002
27	108	65	58.5	56.5	54	Clear	2,946
28	96	66	58.5	56	54	Clear	2,906
29	90	60	59.5	56.5	54	Clear	3,048
30	90	58	59	57	54	Clear	3,046

*Temperature taken at 307 feet elevation.

Nimbus Salmon and Steelhead Hatchery
Temperature and Flow Data
June, 195[illegible]

Date	Air Max.	Air Min.	Water Maximum	Water Minimum	Nimbus Reservoir water temperature*	Weather	American River Flow at Hatchery (c.f.s.)
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Light showers	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Partly cloudy	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Partly cloudy	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Partly cloudy	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Cloudy	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Clear	[illegible]

*Temperature [illegible]