File
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ANNUAL REPORT
NIMBUS SALMON AND STEELHEAD HATCHERY
FISCAL YEAR OF 1960-61 1/

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SUMMARY

The river bed was leveled on August 30 and 31 prior to installing the racks in the river.

The first salmon arrived on August 31, 1960, and the last on February 2, 1961. The peak of the run occurred during the week of October 30 to November 5. A total of 13,455 males, 6,487 females and 9,331 grilse entered the holding ponds and 3,368 salmon escaped past the weir, bringing the total run to 32,641.

Of the fish entering the holding ponds, 364 males and 3,035 females were transported to the colder water of the Bear River Fish Planting Base in Nevada County for ripening. A total of 12,364,900 eggs was taken at this location.

When the holding capacity of Bear River Base was reached, 48 males and 249 females were transported to Moccasin Creek Hatchery where 1,249,600 eggs were taken.

In all, 4,830 females were spawned during the 1960-61 season and 27,152,200 eggs were taken.

During the salmon season, water temperatures at Nimbus were above 56 degrees until November 20.

Of the 20,579 marked salmon yearlings of the 1955 brood year, 2 males and 2 females returned to the hatchery during the 1960-61 season. This makes a total of 547 fish of this group to return to the hatchery.

Of the 52,657 marked king salmon of the 1957 brood year, 186 males and 160 females returned to the hatchery during the 1960-61 season.

During August, 1960, 191,196 king salmon were planted. Included were 59,070 marked Nimbus fingerlings and 51,590 marked Coleman fingerlings.

From January through June, 1961, 14,893,823 king salmon fingerlings of the 1960 brood year were released.

A total of 99 adult silver salmon entered the holding ponds. Twenty-seven females were spawned, producing 134,000 eggs.

During October, 1960, 11,000 yearling silver salmon of the 1959 brood year were planted.

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(Complete report available upon request)

The steelhead pond was in operation from January 11, 1961, to April 16, 1961, when the last steelhead arrived. During this period, 316 steelhead entered the pond, 150 males and 166 females. A total of 127 females was spawned producing 481,200 eggs for an average of 3,789 eggs per female.

Of the marked 100,281 steelhead of the 1957 brood year, 1 male and 8 females returned to the hatchery during the 1961 season. This makes a total of 155 fish of this group to return to the hatchery.

Starting in July, 1960, and continuing through February, 1961, 595,191 steelhead of the 1960 brood year were released. Included in this release were 100,992 marked fish, which were released in February.

In June, 1961, 14,472 steelhead of the 1961 brood year were planted, leaving 166,000 steelhead on hand at the end of the report period.

INTRODUCTION

This is the sixth 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, 1960, to June 30, 1961, on the numbers of fish trapped and spawned, production of eggs and fish and conditions of water quality and temperature.

KING SALMON MAINTENANCE PROGRAM

History of the 1960 Salmon Run

During the winter of 1959-60, due to relatively low flows released from Lake Natoma, the stream bed at the weir site was in good condition, except for depressions dug by the salmon. A contractor was engaged for two days, August 30 and 31, 1960, to level the river bed at the weir site and to raise the height of the gravel dyke that diverts a substantial amount of the river flow to the lower end of the fish ladder.

The first king salmon (Oncorhynchus tshawytscha) arrived on August 31, 1960, one day before the weir racks were placed in position. A total of 32,641 king salmon migrated to the hatchery, 17,657 more than in 1959. Of these fish, 29,273 entered the holding ponds and 3,368 escaped upstream through the weir and were later removed from the racks as they died and drifted downstream.

The portion of the run entering the holding ponds was composed of 13,455 large males, 6,487 females and 9,331 grilse. Thus, 78 percent were males, including grilse, and 22 percent were females. The run extended over several months with one fish arriving in the holding pond on August 31, 1960, 166 during September, 2,363 in October, 21,448 in November, 4,677 in December, 511 in January and 107 in February. The last fish entered the holding ponds on February 24.

Of the 3,368 dead salmon recovered on the racks, there were 415 males, 150 females and 2,803 grilse.

The total run of 32,641 king salmon consisted of 80 percent males, and 20 percent females.

The Bear River Fish Planting Base in Nevada County was again used for holding adult salmon and incubating salmon eggs during the Nimbus warm water period. This operation has been described by Rice (1960). From September 8 to November 20, 364 male salmon and 3,035 females were transported to Bear River. Of these, 2,090 females were spawned resulting in a production of 12,364,900 eggs.

The first king salmon eggs were taken at Bear River Base on October 24, 1960. When the capacity of the holding ponds at Bear River Base was reached on November 7, 48 males and 249 females were transported to Moccasin Creek Hatchery.

Of the 6,487 females that entered the holding ponds, 4,830 or 74 percent were spawned (including fish spawned at Bear River Base and Moccasin Creek Hatchery) producing 27,152,200 eggs. This is an average of 5,621 eggs per female. The last fish of the season was spawned at Nimbus on February 24, 1961.

Water temperatures at Nimbus were above 56 degrees until November 20, 1960. Fifty percent of the females were spawned prior to this date. A total of 5,668,200 eggs taken at Nimbus during the warm water period was transported to San Joaquin Hatchery.

1955 Brood Year Marked King Salmon

Four fish, two males and two females, of the 20,579 marked yearlings of the 1955 brood year, returned to Nimbus in 1960. This makes a total return to the hatchery and from the fish rack of 517 marked fish, 251 males and 264 females.

1957 Brood Year Marked King Salmon

During the winter of 1958 and 1959, 52,627 yearlings of the 1957 brood year were marked. These fish were from late-running upper Sacramento River parentage. During the 1960 run, 186 males and 160 females returned to the hatchery. Most of the fish are retaining their late-running characteristics as 77 percent of the males and 75 percent of the females arrived after November 20. Eighty-eight of the females were spawned. The first female spawned November 29, 1960, and the last January 18, 1961.

Planting 1959 Brood Year King Salmon

Prior to this report, 20,590,954 Nimbus fingerlings and 959,033 Coleman fingerlings had been released. During August, 1960, the remaining 191,196 fingerlings of the 1959 brood year were planted. This lot weighed 2,901 pounds. This makes a total of 20,699,554 Nimbus king salmon and 1,057,823 Coleman king salmon planted from the 1959 brood year. Of the fish released in August, 59,070 Nimbus fingerlings were marked by removing the right ventral fin and 51,590 Coleman fingerlings marked by removing the left ventral fin.

Planting 1960 Brood Year King Salmon

From January through June, 1961, 14,893,823 king salmon fingerlings were planted in the American River. On June 30, 1961, there were 177,500 fingerlings on hand.

SILVER SALMON

A total of 99 adult silver salmon (Oncorhynchus kisutch) entered the holding ponds. Of these, 47 were males and 52 were females. All of these fish were transported to Bear River Base where 27 females were spawned in November and 20 in December, resulting in 134,000 eggs. Most of the silver salmon were small,

averaging 36 centimeters fork length. The eggs were of poor quality and only 47,000 reached the eyed stage. The resulting fish, however, were of good quality. On June 30, 1961, there were 25,750 silver salmon on hand.

Planting 1959 Brood Year Silver Salmon

On July 1, 1960, there were 11,600 silver salmon of the 1959 brood year on hand. These fish had been received from the U. S. Fish and Wildlife, Coleman Station, in February, 1960. During October, 11,000 silver salmon, averaging 5.1 fish per pound were planted in the American River.

STEELHEAD MAINTENANCE PROGRAM

History of the 1960-61 Steelhead Run

The steelhead holding pond was put into operation on January 11, 1961. Previous to this date, a few steelhead rainbow trout (Salmo gairdnerii gairdnerii) had been taken with the king salmon. These fish were returned to the river since they would not mature for several months. During January, 23 males and 32 females entered the pond; during February, 87 males and 84 females; during March, 40 males and 48 females; and during April, 2 females. The last steelhead was taken April 16.

A total of 127 females was spawned and 481,200 eggs taken between January 25 and April 28. The average number of eggs per female was 3,789.

Returns of 1957 Brood Year Steelhead

Of the 100,281 1957 brood year Eel River steelhead that were marked by the removal of the right ventral fin, 1 male and 8 females returned to the hatchery in 1961. This makes a total return to the hatchery of 155 marked fish, 65 males and 90 females.

Planting 1960 Brood Year Steelhead

On July 1, 1960, there were 808,000 Nimbus steelhead on hand. Starting in July, 1960, and continuing through February, 1961, 595,191 fish, weighing 17,777 pounds were planted in the American River. In January, 1961, 100,992 fish were marked by removing the left ventral and adipose fin and these fish were released in February. The marked fish averaged 12 fish per pound.

Planting 1961 Brood Year Steelhead

Planting of the 1961 brood year steelhead started in June, 1961, when 14,472 fish, weighing 8.4 pounds were released. On June 30, 1961, there were 166,000 steelhead on hand.

DISEASE HISTORY

All of the fish, except the silver salmon, were almost constantly infected with several protozoa and bacteria. The steelhead were especially vulnerable to columnaris and to an unidentified exterior bacteria. The protozoa were controlled by flushing glacial acetic acid through the ponds of infected fish.

Sulpha-methazine was used to control columnaris. This drug is effective when water temperatures are below 65 degrees. For the unidentified exterior bacteria flush treatments of malachite green were quite effective.

PUBLIC RELATIONS

During the period of this report, an estimated 86,600 persons visited the hatchery, 65,600 people came during the salmon season, October, November, and December. On November 20, 1960, over 13,000 people visited the hatchery. Included in the estimated number of visitors were 2,605 people in 75 organized groups which were conducted through the installation by hatchery personnel.

REFERENCES

Hinze, James A.

1962. Annual report Nimbus Salmon and Steelhead Hatchery fiscal year 1959-60. Calif. Dept. of Fish and Game, Inland Fisheries Admin. Rept. No. 62-1, 21 pp. (Mimeo.)

Rice, Geoffrey V.

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

Warner, George H., Donald H. Fry, Jr., and A. Nelson Culver

1961. History of yearling king salmon marked and released at Nimbus Hatchery. Calif. Fish and Game, Vol. 47, No. 4, pp. 343-355.

APPENDIX

APPENDIX

Tables A-1 through A-12 give the daily air and water temperatures, weather conditions, river flow, and numbers of fish of each species entering the hatchery during the report period.

Figure A-1 shows the numbers of fall-run king salmon entering the hatchery during each week of the season.

TABLE A-1
Nimbus Salmon and Steelhead Hatchery
Weather and Water Data Report
July, 1960

Date	Temperature				Weather	American River Flow at Hatchery (c/f/s)
	Air		Water			
	Maximum	Minimum	Maximum	Minimum		
1	96	62	59	56	Clear	3,537
2	99	64	59	57	Clear	3,540
3	104	70	58.5	57	Clear	3,529
4	101	65	59	57	Clear	3,535
5	98	59	59	57	Clear	3,534
6	96	58	59	57	Clear	3,527
7	100	61	59	57	Clear	3,536
8	100	64	59	57.5	Clear	3,512
9	87	58	60	57	Clear	3,532
10	86	52	59	57	Clear	3,488
11	94	62	58	57	Clear	3,260
12	92	60	59.5	56.5	Clear	2,998
13	97	64	60	57.5	Clear	2,607
14	98	66	59.5	57.5	Clear	2,590
15	102	64	61.5	58	Clear	2,612
16	105	62	61.5	59	Clear	2,029
17	109	63	61	59	Clear	3,045
18	106	66	61	58.5	Clear	3,027
19	110	56	61	58.5	Clear	3,001
20	108	66	61	58	Clear	2,971
21	106	66	60	58	Clear	3,238
22	104	72	59.5	58	Clear	3,335
23	104	68	62	58	Clear	4,249
24	102	68	61	58.5	Partly cloudy	4,217
25	103	72	59.5	58	Partly cloudy	4,005
26	102	68	61	58	Clear	3,686
27	104	70	60	58	Clear	3,324
28	102	68	59	57.5	Clear	3,306
29	96	62	59	57	Clear	3,313
30	94	60	61	57.5	Light rain	3,313
31	92	55	60	57.5	Clear	3,318

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

TABLE A-2
Nimbus Salmon and Steelhead Hatchery
Weather and Water Data Report
August, 1960

Date	Temperature				Weather	American River Flow at Hatchery (c.f.s.)	Salmon
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	92	56	60.5	59	Clear	3,348	0
2	90	58	60	58	Clear	2,936	0
3	92	56	60	58	Clear	2,715	0
4	96	59	60.5	58	Clear	2,744	0
5	98	60	61	59	Clear	2,717	0
6	102	62	62	59.5	Clear	2,711	0
7	98	60	61	59.5	Clear	2,738	0
8	98	58	61.5	59	Clear	2,755	0
9	94	58	61.5	58.5	Clear	2,707	0
10	98	58	61	59	Clear	2,599	0
11	102	62	61.5	59.5	Clear	2,483	0
12	105	66	62	60	Clear	2,472	0
13	98	64	63	60	Clear	2,493	0
14	90	58	62.5	61	Clear	2,476	0
15	95	58	62.5	61	Clear	2,501	0
16	97	66	65	60.5	Clear	2,508	0
17	102	62	63	61	Clear	2,525	0
18	104	66	62	60.5	Clear	2,513	0
19	104	64	63	61	Clear	2,476	0
20	98	63	62	61	Clear	2,217	0
21	86	60	62	61	Clear	2,233	0
22	81	56	64	61	Clear	2,259	0
23	87	54	62	60.5	Clear	1,985	0
24	84	56	63	60	Clear	1,990	0
25	90	54	63	61	Clear	1,992	0
26	88	60	63	61.5	Clear	1,973	0
27	86	52	64.5	61	Clear	1,746	0
28	92	54	64	62	Clear	1,755	0
29	93	58	63.5	61	Clear	1,785	0
30	92	58	63.5	61	Clear	1,502	0
31	90	56	63	61	Clear	1,485	1

First salmon received August 31, 1960

TABLE A-3
Nimbus Salmon and Steelhead Hatchery
Weather and Water Data Report
September, 1960

Date	Temperature				Weather	American River Flow at Hatchery (c.f.s.)	Salmon
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	86	58	63	61.5	Clear	1,490	0
2	88	54	64.5	61.5	Rain p.m.	1,506	9
3	79	53	63	61.5	Clear	1,508	0
4	82	53	65.5	61.5	Clear	1,518	0
5	91	54	64.5	62.5	Clear	1,514	0
6	92	52	64.5	62.5	Clear	1,530	0
7	92	63	64	62	Clear	1,507	0
8	96	57	64	62.5	Clear	1,514	30
9	91	61	65	63	Clear	1,519	0
10	98	64	65	63	Clear	1,508	0
11	98	68	65.5	63	Clear	1,504	0
12	94	64	65	64	Clear	1,466	0
13	92	57	65	63.5	Clear	1,026	27
14	88	56	64.5	63	Clear	1,002	0
15	78	52	64.5	61.5	Clear	1,007	0
16	84	52	65.5	63	Cloudy a.m. clear	1,003	0
17	86	52	65	63	Clear	1,007	0
18	92	56	65.5	64	Clear	1,002	0
19	90	56	65	63	Clear	1,008	21
20	86	56	65.5	63	Clear	992	0
21	86	50	65	63	Clear	Not given	0
22	86	50	64	63.5	Clear	1,105	12
23	87	52	66	63.5	Clear	1,103	0
24	92	54	67	64	Clear	1,113	0
25	96	56	65	64	Clear	1,115	0
26	98	58	66.5	64.5	Partly Cloudy	1,120	44
27	88	62	66.5	63	Clear	1,112	24
28	86	54	66	63	Clear	1,111	0
29	80	52	65.5	63	Clear	1,108	0
30	75	56	66	63	Clear	1,111	9

Rack was placed September 1, 1960.

TABLE A-4
Nimbus Salmon and Steelhead Hatchery
Weather and Water Data Report
October, 1960

Date	Temperature				Weather	American River Flow at Hatchery (c.f.s.)	Salmon
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	77	52	65	63.5	Clear	498	0
2	79	53	66	63	Clear	508	0
3	81	54	66.5	64	Clear	509	65
4	80	53	67	65	Clear	516	0
5	88	56	66.5	65	Partly cloudy	514	0
6	87	64	66	64.5	Light showers	515	0
7	76	56	67.5	65	Partly cloudy	515	0
8	73	57	67	65	Clear	514	0
9	69	52	65.5	64	Clear	513	0
10	66	50	64.5	63.5	Cloudy	535	7
11	70	44	64.5	62.5	Clear	513	0
12	70	44	64	61.5	Clear	507	0
13	71	44	64	62	Clear	511	0
14	75	42	65.5	62	Clear	506	0
15	82	51	65	62	Clear, windy	506	0
16	80	48	64.5	62	Clear	505	0
17	78	52	65	62	Clear	509	9
18	75	50	65	63	Clear	503	17
19	76	48	65	62	Clear	504	0
20	79	47	65	62.5	Clear	505	119
21	79	49	65.5	63.5	Clear	499	67
22	81	46	66	63	Clear	497	0
23	79	48	65.5	63.5	Partly cloudy	No report	114
24	71	49	63	60.5	Partly cloudy	509	707
25	70	50	63.5	62	Fog a.m., clear	508	242
26	68	52	64	62	Clear	513	379
27	70	53	63.5	61	Clear	515	560
28	76	55	64	60.5	Clear	510	1,351
29	72	46	63	61	Clear	517	282
30	76	46	63	60.5	Clear	518	356
31	78	48	64.5	62	Clear	521	605

TABLE A-5
Nimbus Salmon and Steelhead Hatchery
Weather and Water Data Report
November, 1960

Date	Temperature				Weather	American River Flow at Hatchery (c.f.s.)	Salmon
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	80	48	65	62	Clear	727	335
2	75	48	64	61	Clear	962	794
3	57	47	61	60.5	Rain	1,025	1,964
4	65	46	63	60.5	Partly cloudy, clear	1,021	1,703
5	60	43	61	60	Rain	1,024	1,953
6	62	48	61	60	Cloudy, light showers	1,031	739
7	64	50	61	60	Cloudy	1,029	760
8	62	44	61	60	Clear, fog a.m.	1,032	881
9	64	41	61	59.5	Clear	1,019	414
10	52	42	61	59.5	Fog a.m., clear	1,023	352
11	59	44	60	60	Rain	1,006	498
12	49	50	60	59	Rain	1,011	521
13	52	46	59	58	Rain	1,015	665
14	52	46	58	58	Rain	1,017	946
15	52	46	58	57.5	Partly cloudy	1,005	1,214
16	57	40	58	57	Clear	1,010	531
17	59	38	58	57	Clear	1,013	847
18	62	42	59	57	Partly cloudy	1,008	1,033
19	59	50	58	57	Clear	1,006	550
20	57	40	57.5	56.5	Clear	1,006	389
21	60	54	58	56.5	Light rain, clear	1,005	391
22	57	40	57	55.5	Cloudy	1,004	524
23	58	39	56	55	Cloudy	1,009	423
24	62	42	56	55	Cloudy	1,013	440
25	63	43	56	55	Rain	1,013	379
26	55	44	55.5	55	Rain	1,019	387
27	53	39	55	54.5	Clear	1,022	440
28	53	35	55	54.5	Clear, fog a.m.	1,022	461
29	52	38	54.5	54	Cloudy, light rain	1,017	422
30	66	36	55	54	Partly cloudy	1,054	456

TABLE A-6
Nimbus Salmon and Steelhead Hatchery
Weather and Water Data Report
December, 1960

Date	Temperature				Weather	American River Flow at Hatchery (c.f.s.)	Salmon
	Air		Water				
	Maximum	Minimum	Maximum	Minimum			
1	60	50	54	53.5	Rain	1,503	320
2	57	45	54.5	53.5	Light rain	1,501	306
3	52	40	55	53.5	Clear	1,517	176
4	54	38	54	53.5	Partly cloudy	1,497	217
5	54	38	54	53	Clear	1,490	235
6	53	38	53	52	Clear	1,483	65
7	48	29	52	51	Clear	1,493	67
8	50	30	51.5	51	Clear	1,505	0
9	51	31	52	50.5	Clear	1,486	83
10	52	34	51.5	51	Rain	1,534	0
11	51	39	52	51	Fog a.m., clear	1,995	140
12	53	39	51.5	51	Cloudy	2,004	0
13	49	41	51.5	51	Cloudy	2,017	225
14	47	39	51	50	Fog	No report	0
15	57	38	51	50	Partly cloudy	2,001	77
16	59	47	51.5	50.5	Light rain	2,000	0
17	62	49	52	51	Partly cloudy	1,999	88
18	57	44	51.5	51	Partly cloudy	1,996	0
19	59	40	53	51.5	Partly cloudy	2,015	82
20	56	43	52	51	Cloudy	1,831	0
21	52	54	51	50.5	Cloudy	2,413	101
22	48	50	50.5	50.5	High fog	2,511	0
23	46	42	50.5	50	Fog	2,466	66
24	42	38	50	50	Fog	2,508	0
25	42	37	50	50	Fog	2,506	0
26	40	38	50	50	Fog	2,499	83
27	58	38	51	50	Partly cloudy	2,501	0
28	58	30	50.5	49	Clear	2,507	45
29	48	30	50	48.5	Clear	2,503	0
30	50	30	50	49	Fog early, clear	2,519	48
31	50	28	50	49	Fog	2,517	0

TABLE A-7
Nimbus Salmon and Steelhead Hatchery
Weather and Water Data Report
January, 1961

Date	Temperature Air Maximum	Temperature Air Minimum	Temperature Water Maximum	Temperature Water Minimum	Weather	American River Flow At Hatchery (c.f.s.)	Salmon	Steelhead
1	49	27	50	49	Fog	2,516	0	0
2	39	27	49	49	Fog	2,498	84	0
3	36	27	49	48.5	Fog	2,484	0	0
4	36	30	48	47.5	Fog	2,503	35	0
5	34	28	47.5	47.5	Fog like snow	2,499	0	0
6	35	30	47.5	47.5	Fog	2,495	17	0
7	46	31	48	47.5	Fog a.m. partly clear	2,505	0	0
8	46	36	48.5	47	Fog a.m. partly clear	2,515	0	0
9	54	42	51	49	Cloudy	2,514	26	0
10	46	44	50	49.5	Fog, cloudy p.m.	2,507	0	0
11	42	36	49	48.5	Fog	2,494	24	12
12	40	40	48.5	48	Fog	2,468	0	0
13	42	36	48.5	48	Fog	2,488	11	8
14	42	42	48.5	48	Fog	2,520	0	0
15	42	42	48	48	Fog	2,507	0	0
16	40	44	48	42	Fog	2,503	19	15
17	40	46	48	48	Fog	2,464	0	0
18	42	38	48	48	Fog	2,494	20	9
19	42	38	48	48	Fog, clearing	2,514	0	0
20	43	30	48	48	Fog, clearing	2,443	7	0
21	45	30	48	48	Fog, clearing	1,482	0	0
22	58	31	48	48	Clear	1,508	0	0
23	50	38	48.5	48	Clear	1,526	14	9
24	52	42	48.5	48	Fog, clearing	1,527	8	0
25	58	43	48.5	48	Rain	1,531	8	2
26	58	50	48.5	48	Rain	1,530	0	0
27	58	40	50	48	Partly cloudy	1,515	14	14
28	55	36	49.5	48.5	Clear	1,514	0	0
29	49	48	48.5	48.5	Rain	1,508	0	0
30	63	48	49.5	48.5	Partly cloudy	1,496	15	22
31	62	52	50	48.5	Rain	1,463	0	0

First steelhead spawned January 11, 1961.

TABLE A-8
Nimbus Salmon and Steelhead Hatchery
Weather and Water Data Report
February, 1961

Date	Temperature Air Maximum	Temperature Air Minimum	Temperature Water Maximum	Temperature Water Minimum	Weather	American River Flow At Hatchery (c.f.s.)	Salmon	Steelhead
1	63	52	50	49	Rain	1,139	0	0
2	58	48	50	48.5	Rain	1,141	16	37
3	60	51	52	49	Partly cloudy	1,136	0	0
4	60	39	51	49	Clear	1,118	0	0
5	62	40	51	49.5	Clear	1,123	0	0
6	62	46	51	49.5	Rain	1,143	19	20
7	58	42	51	50	Fog a.m., partly cloudy p.m.	1,150	0	0
8	62	53	50	50	Rain	1,155	0	0
9	62	50	51	49.5	Rain	1,154	0	0
10	62	49	50.5	49.5	Partly cloudy	1,016	22	23
11	58	49	50	49	Partly cloudy	1,017	0	0
12	58	40	51	49	Partly cloudy	1,023	0	0
13	60	46	51	50	Light rain	1,017	0	0
14	58	42	51	50	Cloudy	1,023	6	31
15	54	46	50	49	Rain	1,017	0	0
16	58	37	51	49	Fog, clear	1,015	0	0
17	56	38	50	49.5	Partly cloudy	1,003	4	8
18	57	34	51	49.5	Clear	849	0	0
19	58	34	51	49	Clear	729	0	0
20	62	36	52	49.5	Clear	726	0	0
21	65	40	52	50	Clear	728	6	16
22	60	42	53	50	Clear	730	0	0
23	63	38	53	50.5	Clear	730	0	0
24	64	38	52	51	Clear	735	5	15
25	60	45	52.5	50	Cloudy	730	0	0
26	58	34	52	50	Clear	709	0	0
27	52	48	52.5	50	Partly cloudy, light rain	701	0	0
28	68	39	53.5	50.5	Partly cloudy	692	0	17

Last salmon spawned February 24, 1961.

TABLE A-9
Nimbus Salmon and Steelhead Hatchery
Weather and Water Data Report
March, 1961

Date	Temperature Air Maximum	Temperature Air Minimum	Temperature Water Maximum	Temperature Water Minimum	Weather	American River Flow At Hatchery (c.f.s.)	Steelhead
1	71	42	52.5	51.5	Partly cloudy	558	0
2	64	50	53	50	Cloudy, light rain	555	0
3	58	38	53.5	51	Cloudy	559	5
4	57	45	53.5	51	Partly cloudy	560	0
5	52	44	51.5	50	Rain	569	0
6	62	38	51.5	50.5	Partly cloudy	555	0
7	60	38	52.5	50.5	Partly cloudy	554	15
8	66	44	52	50	Partly cloudy	561	0
9	66	40	52	50	Clear	569	0
10	64	46	53	50.5	Partly cloudy	579	8
11	64	52	52.5	50	Partly cloudy	684	0
12	66	48	53.5	51.5	Partly cloudy	682	0
13	72	48	54	51	Partly cloudy	684	0
14	68	46	53	51	Partly cloudy - rain	685	12
15	64	44	52.5	50.5	Partly cloudy	693	0
16	59	40	52.5	51	Rain	690	0
17	62	50	54	51	Partly cloudy	683	5
18	64	39	54.5	51.5	Partly cloudy	682	0
19	64	42	53	51.5	Rain	682	0
20	62	40	55	52	Partly cloudy	682	3
21	64	38	55	52	Clear	681	0
22	64	44	54	51.5	Partly cloudy	680	0
23	62	45	54.5	50.5	Partly cloudy	684	8
24	52	48	52.5	51	Rain	682	0
25	62	39	53.5	52	Partly cloudy	903	0
26	54	45	53	52	Showers	985	0
27	58	46	53	52	Rain	998	0
28	64	41	54	52	Clear, north wind	1,012	0
29	72	44	55	52	Clear	1,022	0
30	72	44	53.5	52	Clear	1,006	1
31	72	44	55	52	Clear	1,006	0

TABLE A-10
Nimbus Salmon and Steelhead Hatchery
Weather and Water Data Report
April, 1961

Date	Temperature Air Maximum	Temperature Air Minimum	Temperature Water Maximum	Temperature Water Minimum	Weather	American River Flow At Hatchery (c.f.s.)	Steelhead
1	77	44	56	52.5	Clear	1,002	0
2	80	50	56	52.5	Clear	No report	0
3	86	56	55	54.5	Clear	996	0
4	76	50	59.5	54.5	Partly cloudy	1,001	1
5	70	44	60.5	51.5	Clear	1,001	0
6	74	38	56	52.5	Clear	994	0
7	72	46	59	52.5	Clear	999	0
8	78	43	57	54	Clear	999	0
9	74	48	58	54	Clear	1,000	0
10	75	46	57	53.5	Clear	995	0
11	81	45	55	51	Clear	999	0
12	65	50	51.5	50	Rain	1,013	0
13	72	50	53	51.5	Clear	1,008	0
14	78	44	54	51.5	Clear	997	0
15	82	46	54	52	Clear	996	0
16	88	51	54	51	Clear	995	0
17	76	52	54	51	Clear	1,021	0
18	78	50	53.5	50.5	Partly cloudy	1,070	0
19	74	47	54	50.5	Partly cloudy	1,073	0
20	74	47	54	50.5	Partly cloudy	1,079	0
21	64	47	53	50.5	Cloudy	1,053	0
22	63	45	51	50.5	Rain	1,047	0
23	65	47	52	51	Rain	1,048	0
24	67	40	53	50.5	Partly cloudy	1,053	0
25	70	40	52.5	50.5	Clear	1,050	0
26	69	42	52.5	50.5	Clear	1,050	0
27	72	44	54	51	Clear	No report	0
28	79	44	54.5	52	Clear	1,053	0
29	69	48	53	52	Clear	1,055	0
30	79	52	56	52.5	Clear	1,056	0

Last Steelhead received April 4, 1961

TABLE A-11
Nimbus Salmon and Steelhead Hatchery
Weather and Water Data Report
May, 1961

Date	Temperature				Weather	American River Flow at Hatchery (c.f.s.)
	Air		Water			
	Maximum	Minimum	Maximum	Minimum		
1	68	48	56	54.5	Rain	1,053
2	72	44	56	54	Clear	1,078
3	72	46	56	53	Clear	1,055
4	70	46	58	54	Clear	1,059
5	68	44	56.5	54	Clear	1,054
6	68	52	54	53	Light rain	1,067
7	72	44	57.5	53.5	Partly cloudy	1,067
8	83	48	58	55	Clear	1,069
9	79	52	55	54	Partly cloudy	1,069
10	70	52	55	53.5	Rain	1,068
11	71	50	55	55	Showers	1,071
12	74	42	57.5	55	Clear	1,068
13	84	46	57.5	55	Clear	1,062
14	84	52	59	55	Clear	1,062
15	84	52	59	57	Clear	1,070
16	84	52	57	54.5	Clear	1,061
17	82	50	58	54.5	Clear	1,069
18	84	50	59	56	Clear a.m., rain p.m.	1,068
19	80	52	57	55	Partly cloudy	1,067
20	82	52	58.5	55.5	Clear	1,067
21	84	50	59.5	55.5	Clear	1,062
22	82	48	58	54.5	Clear	1,064
23	81	50	59	55	Clear	1,068
24	84	48	58.5	55	Clear	1,068
25	82	50	55.5	54.5	Clear	1,069
26	84	54	58	54.5	Partly cloudy	1,072
27	84	52	58.5	56	Partly cloudy	1,064
28	83	54	57	54.5	Partly cloudy	1,055
29	68	50	58	55.5	Partly cloudy	1,060
30	72	50	58	55.5	Partly cloudy	1,067
31	74	50	56.5	55.5	Partly cloudy-showers	1,081

TABLE A-12
Nimbus Salmon and Steelhead Hatchery
Weather and Water Data Report
June, 1961

Date	Temperature				Weather	American River Flow at Hatchery (c.f.s.)
	Air		Water			
	Maximum	Minimum	Maximum	Minimum		
1	72	54	56	55	Cloudy	1,518
2	78	56	57	54.5	Partly cloudy	1,531
3	86	56	57	56	Partly cloudy	1,529
4	80	58	57	54.5	Partly cloudy	1,515
5	82	54	57	56	Partly cloudy	1,526
6	85	55	58	55.5	Partly cloudy	1,527
7	84	55	58	56	Clear	1,521
8	81	52	58	55.5	Partly cloudy	1,515
9	84	54	59.5	56	Clear	1,521
10	87	58	58	56.5	Clear	1,514
11	88	60	58	56.5	Cloudy-showers	1,516
12	94	58	54	53.5	Clear	1,522
13	105	60	54	53	Clear	1,535
14	113	66	53.5	52	Clear	1,520
15	113	68	53.5	52	Clear	1,529
16	110	70	53.5	52	Clear	1,529
17	99	68	53.5	52	Clear	1,521
18	97	56	54	52	Clear	1,519
19	106	56	59	58	Clear	1,563
20	109	60	60	57	Clear	2,078
21	112	68	58.5	57.5	Clear	2,559
22	94	56	58	56	Partly cloudy	3,087
23	109	58	59	56.5	Clear	3,526
24	111	66	58	55.5	Clear	3,518
25	108	71	56.5	55.5	Partly cloudy-showers	3,502
26	102	64	58	55	Clear	3,493
27	88	58	56	55	Clear	3,482
28	87	56	57	55	Clear	3,301
29	91	56	56.5	55	Clear	3,296
30	99	54	57	55	Clear	3,302

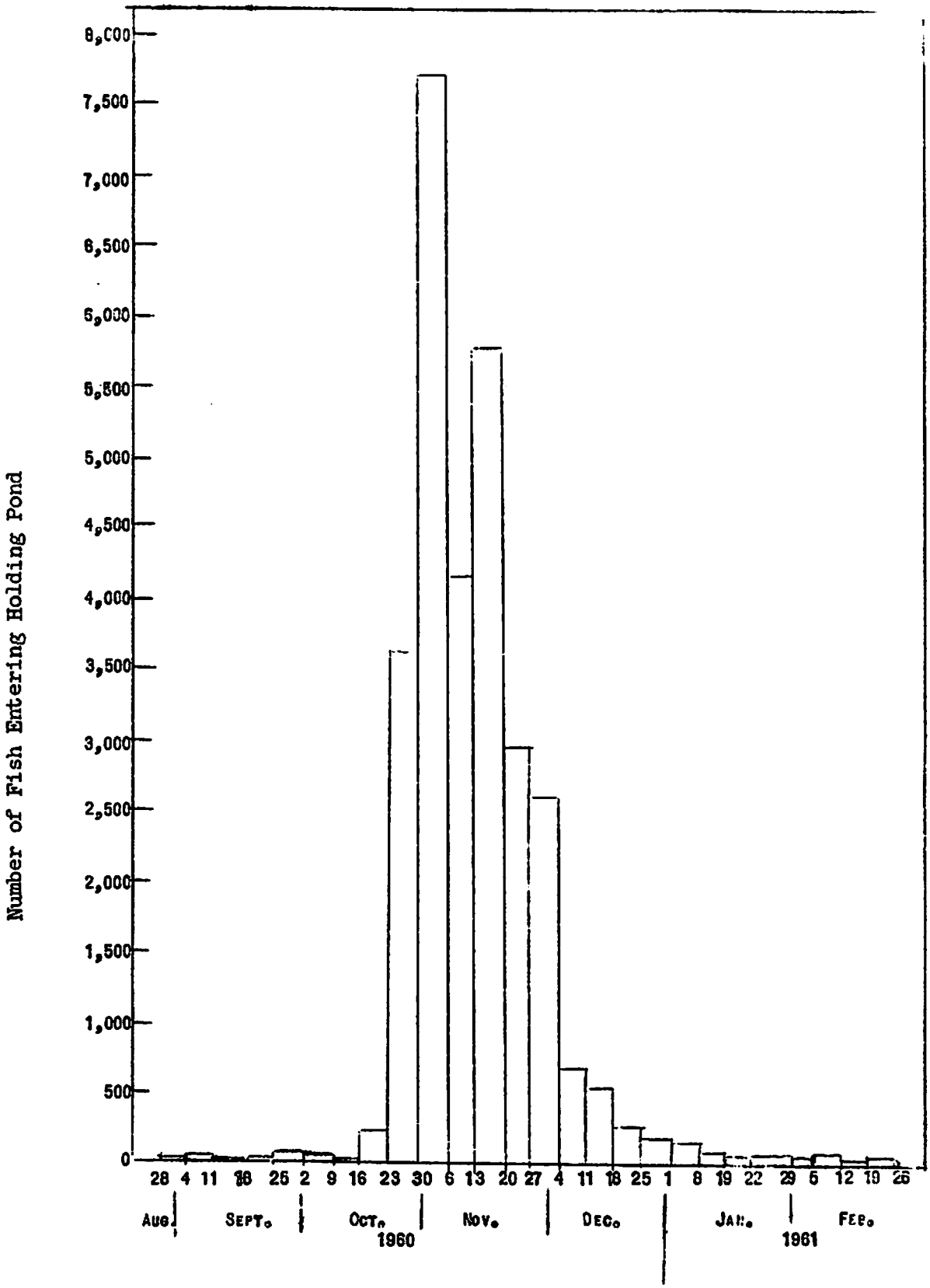

FIGURE A-1. Nimbus Salmon and Steelhead Hatchery fall-run king salmon, 1960-61.