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ANNUAL REPORT
NIMBUS SALMON AND STEELHEAD HATCHERY 1983-84 FISCAL YEAR

by

Ronald Ducey
Region 2

Anadromous Fisheries Branch
Administrative Report No. 84-08
1984

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ABSTRACT

This report describes the operation of Nimbus Salmon and Steelhead Hatchery from July 1, 1983 through June 30, 1984. Tables present numbers of fish trapped, eggs taken, fish reared and released, daily river flow, weather conditions, and water and air temperatures.

There were 9,081 chinook salmon, Oncorhynchus tshawytscha, trapped, which produced 6,606,980 eggs. There were 5,155 winter-run steelhead, Salmo gairdneri, trapped, from which 2,002,525 eggs were taken.

During the year we planted or transferred a total of 1,722,585 fingerling and 3,108,140 advanced fingerling chinook salmon and 83,420 fingerling and 682,322 yearling steelhead.

^{1/} Anadromous Fisheries Branch Administrative Report No. 84-08.
Submitted August 1984.

INTRODUCTION

This is the 29th annual report for Nimbus Salmon and Steelhead Hatchery. The hatchery is located on the American River near the base of Nimbus Dam and is operated by the California Department of Fish and Game under contract with the United States Bureau of Reclamation. This report summarizes the Hatchery activities from July 1, 1983 through June 30, 1984, with particular reference to numbers of fish trapped, spawned and released, eggs taken and fish produced, and other pertinent information.

PRODUCTION SUMMARY

During 1983-84, we took an estimated 8,609,505 eggs and planted 5,596,467 chinook salmon and steelhead (Table 1).

TABLE 1. Production Summary, Nimbus Salmon and Steelhead Hatchery, 1983-84.

Species	Number of fish trapped	Eggs taken or received	Fingerlings planted	Advanced fingerlings planted	Yearlings planted	Total weight planted (lb)
Chinook salmon						
1982 BY				2,065,490		41,725
1983 BY	9,081	8,031,220 ^{a/}	1,722,585	1,042,650		21,785
Steelhead						
1983 BY					682,322	139,530
1984 BY	5,155	2,002,525	83,420			327

a/ Of this total, 1,424,240 eggs were received from Feather River Hatchery

HATCHERY OPERATION

The Weir

The weir was installed October 5, 1983, by the U. S. Bureau of Reclamation. The pickets were lowered and capped on October 7, 1983.

Water Temperature Control

Shutters #1 - #9 were raised on October 7, 1983. The maximum water temperature dropped to 15.6°C on October 9. The minimum water temperature gradually dropped to a season low of 6.1°C in January 1984 (Appendix Table 1).

Disposal of Salmon Carcasses

Edible carcasses were given to State and County institutions, community action groups and groups or councils representing local Indians. Local zoos received carcasses of questionable quality and all inedible carcasses went to a local rendering plant. The total dispensed was 24,100 lb edible, 4,600 lb animal food and 52,600 lb inedible.

Public Relations

An estimated 319,300 persons visited Nimbus Hatchery this year. This number was arrived at by an automatic car counter installed at the parking lot entrance and an employee count of bus passengers and bicyclists. November was the peak month, with 59,864 visitors.

CHINOOK SALMON MAINTENANCE PROGRAM

Chinook Salmon Counts

The fish ladder was opened October 21, 1983 and the first spawning took place on November 2, 1983.

A total of 9,081 salmon entered the holding pond this season, including 3,081 males, 3,486 females, and 2,514 grilse (Appendix Table 1). Grilse are fish that are less than 60 cm (23.6 in.) FL. A total of 428 carcasses was removed from the weir: 176 males, 85 females and 167 grilse.

Sorting and Spawning

Of the females counted, 1,653 were spawned, and 1,706 either died in the pond or were accidentally killed or were immature. The remaining 127 were released unspawned. The spawning season, which began November 21, 1983, and ended December 12, 1983, produced a total of 6,606,980 eggs, with an average of 3,997 eggs per female. Fertility, as determined by the difference between green eggs taken and the total eggs eyed, ranged from 60.4% to 86.2% with an average of 75.3%.

In addition to the eggs taken at Nimbus Hatchery, a total of 1,424,240 green eggs were received from Feather River Hatchery.

Marked Chinook Salmon Recoveries

All fish were examined for marks as they were processed or removed dead from the pond or weir. Heads were removed from all adipose fin-clipped fish for later removal of coded wire tags (see Appendix Table 2 for tag recovery results).

Chinook Salmon Planting

1982 Brood Year

There was an estimated 2,467,170 chinook salmon on hand July 1, 1983. A total of 2,065,490 advanced fingerlings were planted in July and August of 1983.

1983 Brood Year

We released 1,722,585 Nimbus strain fingerlings and 1,042,650 advanced fingerlings (Table 2). Of these fish, a total of 150,290 was coded wire tagged. On June 30, 1984 there were approximately 3,305,925 chinook salmon on hand to be released in July and August of 1984.

TABLE 2. Planting Data for 1982 and 1983 Brood Year Chinook Salmon.^{1/}

Month	Release site	Fingerlings	Advanced fingerlings	Average size/lb	Weight (lb)
1982 BY (planted in 1983)					
July	Benicia		1,915,200	54	35,625
August	Maritime Academy		49,940	23	2,200
August	Port Chicago		50,350	27	1,900
August	Berkeley Marina		50,000	25	2,000
1983 BY (planted in 1984)					
March	Nimbus Hatch. Ladder	441,000		1,470	300
April	Nimbus Hatch. Ladder	900,335		650	1,385
May	Maritime Academy		180,000	60	3,000
June	Maritime Academy		862,650	60	14,400
June	Nimbus Hatch. Ladder	381,250		141	2,700
Totals		1,722,585	3,108,140		63,510

^{1/} Nimbus and Feather River strains combined.

Chinook Salmon Disease Information

1983 Brood Year

Two minor outbreaks of Columnaris were controlled with flushes using copper sulfate.

WINTER-RUN STEELHEAD MAINTENANCE PROGRAM

History of the 1984 Winter-Run

Steelhead were separated into two groups this spawning season. Fish entering the holding pond from October 21, 1983 through December 12, 1983 were held and spawned as early-run steelhead. All fish entering the holding pond from December 13, 1983 to January 17, 1984 were sexed, counted, marked (hole punched in tail) and released back to the river. All fish entering the hatchery from January 18, 1984 to February 9, 1984 that were unmarked were spawned as late-run steelhead (Table 3). All fish were examined for other marks as they were handled and marked fish were recorded by the district biologist. Heads were removed from all adipose fin-clipped fish for later removal of coded wire tags (see Appendix Table 3 for tag recovery results). Spawned out and surplus fish were returned to the river below the weir.

TABLE 3. Counts of Winter-Run Steelhead, Nimbus Salmon and Steelhead Hatchery, 1983-84.

Date	Spawned and released		Pre-spawning mortality		Released unspawned		Total
	M	F	M	F	M	F	
Nov. 2			11	49	24		84
Dec. 1	19	15			13	1	48
Dec. 19	36	36	13	15	446	403	949
Dec. 27	31	29	28	24	449	512	1,073
Jan. 3	15	28	23	25	400	495	986
Jan. 9	12	17	44	48	216	355	692
Jan. 17	21	21	74	41	221	324	702
Jan. 23	20	47	12	7			86
Jan. 30	19	30	35	30			114
Feb. 6	36	60	48	27		18	189
Feb. 9			39	17	68	108	232
TOTALS	209	283	327	283	1,837	2,216	5,155

Spawning Data 1984 Brood Year

The 283 females spawned produced 2,002,525 eggs (1,151,620 early run and 850,905 late run), for an average of 7,076 eggs per female. Survival of green to eyed eggs ranged from 99.0% to 91.3%, with an average of 94.5%.

Winter-Run Steelhead Planted

1983 Brood Year

From November 9, 1983 to March 21, 1984, a total of 682,322 yearling Nimbus steelhead was planted (Table 4). Of those planted, 322,080 were early-run and 360,242 were late-run. No tagged fish were planted this year.

TABLE 4. Planting Data, 1983 Brood Year Winter-Run Steelhead, Nimbus Salmon and Steelhead Hatchery, 1983-84.

Month	Release site	Fingerlings	Yearlings	Average size/lb	Weight(lb)
November	Benicia		183,290	7.0	26,300
January	Rio Vista		151,320	4.7	32,500
February	Rio Vista		50,117	3.8	13,050
March	Rio Vista		297,595	4.8	62,480
TOTALS			682,322		134,330

1984 Brood Year

A total of 83,420 steelhead fingerlings were released into the American River at the base of the fish ladder (Table 5). On June 30, 1984 there were approximately 595,300 Nimbus fingerlings on hand which will be raised and released as yearlings in 1985.

TABLE 5. Planting Data, 1984 Brood Year Steelhead, Nimbus Salmon and Steelhead Hatchery, 1984.

Month	Release Site	Number of fingerlings	Average size/lb	Weight/lbs
May	Nimbus Hatch. Ladder	60,300	235	257
June	Nimbus Hatch. Ladder	23,120	330	70
Totals		83,420		327

Steelhead Disease Information

1983 Brood Year

Three minor outbreaks of Columnaris were controlled by flushing the steelhead ponds with copper sulfate and adding Terramycin to the feed.

Appendix Table 1

Nimbus Salmon and Steelhead Hatchery Weather, Water and
Fish Trapping Data July 1, 1983 through June 30, 1984

July 1983	Temperature (°C*)				Weather	American River flow at Hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	22.8	15.6	12.8	12.2	Cloudy	357.175		
2	23.9	16.1	13.9	12.8	Clear	287.031		
3	33.9	13.3	14.4	12.8	Clear	283.463		
4	36.7	16.7	13.3	12.8	Clear	297.470		
5	37.2	17.8	13.9	12.8	Clear	282.189		
6	26.7	13.3	13.3	12.2	Clear	281.764		
7	26.7	13.3	13.3	12.2	Cloudy	281.764		
8	27.8	12.2	13.9	12.2	Partly Cloudy	283.180		
9	30.0	12.2	14.4	12.8	Clear	236.002		
10	35.6	16.7	13.3	12.8	Clear	237.658		
11	39.4	17.8	13.3	12.8	Clear	236.512		
12	41.1	17.8	13.3	12.8	Clear	235.323		
13	41.1	17.8	13.3	12.8	Clear	237.050		
14	37.2	24.4	13.9	12.8	Clear	238.268		
15	34.4	23.3	13.9	12.8	Clear	191.260		
16	26.7	20.0	13.9	12.8	Clear	142.751		
17	26.1	18.3	13.9	12.8	Clear	141.760		
18	26.7	13.3	13.3	13.3	Clear	141.618		
19	27.8	13.9	13.3	13.3	Clear	141.901		
20	32.2	14.4	13.3	13.3	Clear	141.505		
21	33.3	14.4	14.4	13.9	Clear	140.740		
22	32.2	14.4	14.4	13.9	Clear	138.815		
23	31.1	13.9	14.4	13.9	Clear	128.139		
24	27.8	13.9	14.4	13.9	Partly Cloudy	128.507		
25	32.2	13.9	14.4	13.9	Partly Cloudy	127.233		
26	32.2	15.0	14.4	13.9	Clear	114.320		
27	33.3	13.3	13.9	13.9	Clear	113.810		
28	34.4	13.9	15.0	14.4	Clear	111.122		
29	35.6	20.6	15.0	14.4	Clear	114.008		
30	36.1	18.9	15.6	13.9	Clear	112.394		
31	37.8	16.7	14.4	14.4	Clear	113.640		

*Temperature measured to nearest whole degree F, and later converted to C.

**Flows measured in cfs, and later converted to m³/sec.

Appendix Table 1 (cont.)

August 1983	Temperature (°C*)				Weather	American River flow at Hatchery (m3/sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	35.0	18.9	15.6	14.4	Clear	113.753		
2	34.4	15.6	14.4	13.9	Clear	113.272		
3	35.6	18.9	15.6	14.4	Clear	114.348		
4	36.7	14.4	15.6	14.4	Clear	113.583		
5	35.0	15.6	15.6	14.4	Clear	113.102		
6	40.0	15.6	15.6	15.0	Clear	112.253		
7	40.6	17.8	15.6	15.0	Partly Cloudy	109.392		
8	36.7	16.7	21.1	15.0	Clear	109.024		
9	33.9	21.1	15.6	15.0	Clear	73.768		
10	31.7	17.2	15.6	14.4	Partly Cloudy	30.329		
11	34.4	21.1	16.7	15.0	Clear	109.591		
12	37.2	17.8	16.7	15.0	Partly Cloudy	125.958		
13	37.8	20.0	15.6	15.0	Partly Cloudy	126.327		
14	33.3	18.9	15.6	15.0	Cloudy	125.789		
15	37.8	24.4	15.6	15.0	Partly Cloudy	125.449		
16	37.8	26.1	16.7	15.0	Clear	124.118		
17	36.1	20.0	15.6	15.0	Clear	124.373		
18	30.0	17.8	15.6	15.0	Partly Cloudy	125.760		
19	31.1	17.8	16.1	20.6	Cloudy	125.958		
20	30.0	17.2	16.1	15.0	Cloudy	125.760		
21	27.2	16.7	15.6	15.6	Cloudy	125.364		
22	28.9	16.1	15.6	15.0	Clear	125.505		
23	31.7	17.8	15.6	15.0	Clear	126.921		
24	31.1	16.7	15.6	15.0	Clear	139.041		
25	28.9	15.6	15.6	15.6	Clear	140.117		
26	28.3	17.8	15.6	15.6	Clear	138.050		
27	28.9	15.6	16.7	15.6	Clear	139.353		
28	32.2	16.7	16.7	15.6	Clear	138.532		
29	31.1	16.7	16.7	15.6	Clear	137.824		
30	29.4	17.8	16.1	15.6	Clear	138.956		
31	27.8	17.8	16.7	16.1	Cloudy	138.588		

*Temperature measured to nearest whole degree F, and later converted to C.

**Flows measured in cfs, and later converted to m³/sec.

Appendix Table 1 (cont.)

September 1983	Temperature (°C*)				Weather	American River flow at Hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	28.9	16.7	16.7	16.7	Clear	127.629		
2	31.1	13.3	16.7	16.1	Clear	122.277		
3	33.9	15.6	16.7	16.1	Clear	102.794		
4	35.6	20.6	16.7	16.1	Clear	126.468		
5	37.8	20.6	16.7	16.1	Clear	126.327		
6	33.9	18.9	16.7	16.7	Clear	123.551		
7	26.7	17.8	16.7	16.7	Clear	121.711		
8	27.8	14.4	16.7	16.1	Clear	120.012		
9	28.9	13.9	16.7	16.1	Clear	120.238		
10	33.9	13.9	16.7	16.1	Clear	112.706		
11	35.0	13.3	16.7	16.1	Clear	110.752		
12	40.0	21.1	16.7	16.1	Clear	137.427		
13	38.9	20.0	16.7	16.1	Clear	116.415		
14	38.3	19.4	16.7	16.1	Clear	116.444		
15	37.8	16.7	17.8	16.1	Clear	112.876		
16	34.4	16.7	17.8	17.2	Clear	97.329		
17	34.4	16.7	17.8	17.2	Clear	97.187		
18	35.6	15.6	17.8	17.2	Clear	97.272		
19	29.4	14.4	17.2	17.2	Clear	97.031		
20	34.4	17.8	17.8	17.2	Clear	97.074		
21	34.4	17.8	17.8	17.2	Cloudy	97.329		
22	34.4	10.0	18.9	18.3	Cloudy-Rain	85.464		
23	26.7	18.3	17.8	17.2	Partly Cloudy	85.407		
24	28.9	15.6	17.8	17.2	Clear	85.662		
25	31.1	15.6	17.8	17.2	Clear	85.067		
26	29.4	15.6	17.8	17.2	Clear	85.237		
27	22.2	15.6	17.2	16.7	Cloudy	85.265		
28	27.8	13.3	17.2	16.7	Clear	84.671		
29	24.4	12.8	17.2	17.2	Cloudy	85.237		
30	23.3	11.1	17.2	17.2	Clear	85.917		

*Temperature measured to nearest whole degree F, and later converted to C.

**Flows measured in cfs, and later converted to m³/sec.

Appendix Table 1 (cont.)

October 1983	Temperature (°C*)				Weather	American River flow at Hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	24.4	15.6	17.2	16.7	Cloudy	86.030		
2	24.4	15.6	17.2	16.7	Clear	83.963		
3	28.9	12.2	17.2	15.6	Clear	56.636		
4	30.0	13.3	17.2	15.6	Clear	14.810		
5	30.0	28.3	17.8	16.7	Clear	97.867		
6	30.0	13.3	17.3	16.7	Clear	97.952		
7	30.0	12.2	17.8	16.7	Clear	59.439		
8	24.4	14.4	16.7	16.1	Partly Cloudy	99.056		
9	24.4	15.0	15.6	15.0	Cloudy	98.632		
10	28.3	13.3	15.0	14.4	Partly Cloudy	98.320		
11	27.8	11.1	15.0	14.4	Clear	97.584		
12	28.3	10.0	15.0	14.4	Partly Cloudy	97.810		
13	30.0	12.2	15.0	14.4	Clear	96.876		
14	28.9	11.7	15.0	14.4	Clear	98.773		
15	24.4	10.0	15.0	14.4	Clear	72.579		
16	23.3	10.0	15.6	14.4	Partly Cloudy	72.239		
17	28.3	10.0	15.6	14.4	Clear	71.673		
18	28.3	11.1	15.0	14.4	Clear	71.503		
19	30.0	10.6	15.0	14.4	Clear	70.399		
20	28.9	10.6	15.6	14.4	Clear	69.011		
21	28.3	11.7	15.6	15.0	Clear	68.926		
22	28.3	11.1	15.6	15.0	Clear	69.804		
23	24.4	16.7	15.6	15.0	Cloudy-Rain	69.662		
24	27.8	11.7	15.6	15.0	Clear	73.060		
25	28.9	12.2	15.6	15.0	Clear	70.597		
26	28.9	10.0	15.6	15.0	Clear	69.634		
27	27.8	11.7	15.6	15.0	Clear	70.342		
28	26.1	11.7	15.6	15.0	Clear	71.191		
29	15.6	15.0	15.0	13.9	Rain	71.163		
30	15.1	15.0	15.0	13.9	Rain	69.861		
31	21.1	12.8	15.0	15.0	Rain	68.161		

*Temperature measured to nearest whole degree F, and later converted to C.

**Flows measured in cfs, and later converted to m³/sec.

Appendix Table 1 (cont.)

November 1983	Temperature (°C*)				Weather	American River flow at Hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	21.1	14.4	15.0	15.0	Partly Cloudy	68.161		
2	22.8	16.1	15.0	15.0	Partly Cloudy	71.701	1,018	84
3	23.3	10.6	15.0	15.0	Clear	72.664		
4	21.1	15.0	15.0	15.0	Cloudy	71.616		
5	21.1	15.0	15.0	15.0	Clear	73.315		
6	21.1	12.2	15.0	14.4	Partly Cloudy	73.627		
7	18.3	8.3	15.0	14.4	Clear	73.485		
8	16.1	2.8	13.9	13.9	Partly Cloudy	74.221	1,575	
9	12.2	10.6	13.9	13.9	Rain	74.675		
10	18.3	11.1	13.9	13.9	Rain	76.175	1,188	
11	17.8	11.1	14.4	13.9	Clear	126.695		
12	17.2	11.1	14.4	13.9	Rain	127.629		
13	12.8	10.0	14.4	13.9	Rain	129.413		
14	15.6	6.7	13.9	13.3	Partly Cloudy	154.446		
15	16.7	6.7	13.9	13.3	Partly Cloudy	416.586	1,883	
16	15.0	10.0	13.9	13.9	Rain	427.828		
17	16.1	13.3	13.9	13.9	Rain	566.360	792	
18	16.1	6.7	13.9	13.3	Partly Cloudy	317.190		
19	12.2	10.6	13.3	12.8	Rain	971.137		
20	11.1	8.9	13.3	12.8	Rain	986.259		
21	15.0	2.2	12.8	12.8	Foggy-Cloudy	1,023.469	672	
22	8.9	3.3	12.8	12.2	Rain	599.266		
23	10.6	6.7	11.7	11.7	Rain	76.855	442	
24	14.4	8.3	11.1	11.1	Rain	142.921		
25	15.6	3.3	11.1	10.6	Clear	140.061		
26	15.6	4.4	11.1	10.0	Clear	188.258		
27	16.1	3.9	11.1	10.0	Clear	699.511		
28	15.6	3.9	11.1	10.6	Clear	711.433	543	
29	15.6	2.2	11.1	10.6	Partly Cloudy	707.667		
30	13.9	6.7	11.1	10.6	Partly Cloudy	467.247		

*Temperature measured to nearest whole degree F, and later converted to C.

**Flows measured in cfs, and later converted to m³/sec.

Total	8,113	84
Cumulative Total	8,113	84

Appendix Table 1 (cont.)

December 1983	Temperature (°C*)				Weather	American River flow at Hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	15.6	3.9	10.6	10.0	Cloudy	237.730		
2	15.6	3.9	10.6	10.0	Cloudy	238.919		
3	13.3	10.0	9.4	8.9	Rain	239.995		
4	13.3	4.4	9.4	8.9	Clear	237.361		
5	13.3	2.2	9.4	8.9	Cloudy-Rain	236.059	516	
6	14.4	7.2	10.0	9.4	Rain	239.259		
7	15.6	5.6	10.0	9.4	Cloudy-Rain	236.540		
8	14.4	10.0	10.0	9.4	Cloudy-Rain	226.624		
9	13.3	4.4	10.0	9.4	Rain	236.965		
10	14.4	11.1	9.4	9.4	Rain	237.277		
11	14.4	10.6	9.4	9.4	Rain	237.701		
12	13.3	4.4	10.0	9.4	Cloudy	338.598	149	48
13	13.3	6.7	10.0	9.4	Cloudy	343.781		
14	15.6	11.1	10.0	9.4	Foggy	339.759		
15	13.3	11.1	10.0	9.4	Foggy	335.144		
16	10.0	15.0	10.0	9.4	Cloudy	334.662		
17	15.6	10.0	10.0	9.4	Partly Cloudy	242.685		
18	11.1	5.6	9.4	8.9	Fog	210.969		
19	11.1	8.9	9.4	8.9	Fog	152.719	42	949
20	12.2	9.4	9.4	8.9	Fog	151.728		
21	10.6	2.8	11.1	8.3	Clear	155.692		
22	6.1	4.4	10.0	10.0	Rain	156.655		
23	7.2	3.3	8.9	8.3	Rain	177.157		
24	10.0	6.7	8.9	8.3	Rain	242.544		
25	10.0	8.9	8.9	8.9	Rain	302.889		
26	11.7	10.0	8.9	8.9	Rain	739.864		
27	11.1	3.3	8.9	8.9	Rain	1,145.973	69	1,073
28	15.0	3.3	9.4	8.9	Partly Cloudy	1,382.315		
29	15.6	8.9	8.9	8.9	Clear	1,367.703		
30	15.0	11.1	8.9	8.9	Fog-Cloudy	1,084.041		
31	13.3	10.0	9.4	8.9	Fog-Cloudy	709.904		

*Temperature measured to nearest whole degree F, and later converted to C.

**Flows measured in cfs, and later converted to m³/sec.

Total 776 2,070

Cumulative Total 8,889 2,154

Appendix Table 1 (cont.)

January 1984	Temperature (°C*)				Weather	American River flow at Hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	15.6	6.7	9.4	8.9	Partly Cloudy	569.900		
2	17.2	6.7	8.9	6.1	Clear	569.985		
3	8.9	3.9	8.9	8.9	Foggy	564.406	11	986
4	9.4	5.6	8.9	8.3	Foggy	431.142		
5	8.9	6.7	8.9	8.3	Foggy	345.678		
6	8.9	6.1	8.9	8.3	Foggy	341.940		
7	7.8	5.6	8.9	8.3	Cloudy	341.572		
8	8.3	6.7	9.4	8.3	Cloudy	339.051		
9	9.4	7.2	8.3	8.3	Cloudy	264.094	47	692
10	9.4	7.2	8.3	7.8	Cloudy-Rain	239.315		
11	16.7	8.9	8.3	7.8	Partly Cloudy	235.436		
12	11.1	5.6	8.9	8.3	Partly Cloudy	234.388		
13	11.1	6.7	8.9	8.3	Foggy	221.390		
14	10.0	3.3	8.9	8.3	Partly Cloudy	143.969		
15	12.2	5.6	8.3	7.8	Cloudy	143.459		
16	13.3	5.6	7.8	7.8	Rain	139.834		
17	11.1	.0	7.8	7.2	Partly Cloudy	140.514	34	702
18	11.1	.0	8.3	8.3	Partly Cloudy	140.344		
19	13.9	1.7	8.9	8.3	Partly Cloudy	123.693		
20	13.3	1.1	8.9	8.3	Cloudy	141.703		
21	14.4	7.8	8.3	7.8	Clear	139.976		
22	13.3	3.3	7.2	6.7	Partly Cloudy	140.061		
23	17.2	4.4	7.8	7.2	Fog-Partly Cloudy	139.098		86
24	20.0	4.4	7.8	7.2	Clear	137.994		
25	17.8	5.6	8.3	7.2	Clear	136.068		
26	19.4	5.6	7.8	7.2	Clear	138.418		
27	17.8	4.4	7.8	7.2	Clear	140.684		
28	18.9	4.4	8.3	7.8	Clear	113.017		
29	17.2	3.3	8.3	7.2	Clear	110.553		
30	21.1	3.3	7.8	7.2	Clear	111.346	60	114
31	17.8	5.6	7.8	7.2	Clear	108.458		

*Temperature measured to nearest whole degree F, and later converted to C.

**Flows measured in cfs, and later converted to m³/sec.

Total	152	2,580
Cumulative Total	9,041	4,734

Appendix Table 1 (cont.)

February 1984	Temperature (°C*)				Weather	American River flow at Hatchery (m ³ /sec#)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	15.6	4.4	7.8	7.2	Partly Cloudy	82.915		
2	17.8	4.4	7.8	7.2	Clear	83.340		
3	17.8	3.3	7.8	7.2	Clear	85.520		
4	20.0	4.4	8.3	7.2	Clear	86.851		
5	20.0	5.6	7.8	7.2	Clear	84.954		
6	20.6	3.9	8.9	7.8	Clear	84.473	40	139
7	17.8	5.6	8.9	7.8	Clear	84.897		232
8	17.8	5.6	7.8	7.2	Partly Cloudy	83.765		
9	16.1	6.7	7.8	7.2	Rain	81.528		
10	14.4	2.2	7.2	7.2	Clear	84.473		
11	11.1	3.3	7.8	7.2	Cloudy	86.795		
12	12.2	8.9	7.8	7.2	Rain	83.935		
13	12.2	8.9	7.2	7.2	Rain	85.775		
14	14.4	2.2	7.8	7.2	Partly Cloudy	140.486		
15	14.1	8.9	7.8	7.8	Rain	233.708		
16	14.4	5.6	7.8	7.2	Partly Cloudy	240.420		
17	14.4	1.1	7.8	7.2	Clear	240.080		
18	16.7	3.3	8.3	7.8	Partly Cloudy	238.466		
19	17.8	3.3	8.3	7.2	Clear	181.660		
20	16.1	7.8	8.3	7.8	Partly Cloudy	181.575		
21	15.6	8.9	7.8	7.8	Partly Cloudy	206.240		
22	15.6	3.3	8.3	7.2	Clear	242.374		
23	8.9	8.9	7.8	7.2	Clear	243.365		
24	16.1	6.1	7.8	7.2	Cloudy-Rain	235.011		
25	15.6	1.1	8.9	7.8	Clear	172.910		
26	16.7	3.3	8.3	7.8	Clear	169.597		
27	16.1	3.9	8.3	7.8	Clear	169.427		
28	18.9	4.4	7.8	7.8	Partly Cloudy	169.512		
29	18.9	3.3	8.3	7.8	Clear	140.344		

*Temperature measured to nearest whole degree F, and later converted to C.

**Flows measured in cfs, and later converted to m³/sec.

Total	40	421
Cumulative Total	9,081	5,155

Appendix Table 1 (cont.)

March 1984	Temperature (°C*)				Weather	American River flow at Hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	21.7	3.9	8.3	7.8	Clear	139.098		
2	22.8	4.4	9.4	8.3	Fog - Clear	138.815		
3	21.1	4.4	8.9	8.3	Clear	113.583		
4	23.3	3.3	9.4	8.3	Clear	112.621		
5	17.8	7.8	8.3	7.8	Clear	112.309		
6	22.2	5.6	8.9	8.3	Partly Cloudy	111.799		
7	22.2	7.8	8.9	8.3	Partly Cloudy	114.376		
8	22.8	6.7	8.9	8.3	Clear	114.291		
9	22.8	8.9	8.9	8.3	Clear	111.771		
10	22.2	10.0	8.9	8.3	Clear	84.246		
11	19.4	8.9	9.4	8.3	Partly Cloudy	81.273		
12	21.7	11.1	9.4	8.3	Partly Cloudy	82.547		
13	16.7	12.2	8.9	8.3	Rain	83.198		
14	16.7	11.1	8.3	7.8	Cloudy-Rain	86.568		
15	16.7	11.1	8.3	8.3	Cloudy-Rain	163.112		
16	16.7	6.7	8.3	8.3	Cloudy	168.945		
17	16.7	8.3	8.3	8.3	Clear	169.257		
18	20.0	3.9	8.3	8.3	Clear	168.860		
19	21.1	7.8	8.9	8.3	Clear	168.266		
20	22.8	11.1	11.1	10.0	Clear	169.653		
21	21.1	12.2	8.9	8.3	Partly Cloudy	170.361		
22	24.4	12.2	10.0	8.9	Clear	170.729		
23	24.4	10.0	10.0	9.4	Clear	168.549		
24	18.3	13.3	10.0	9.4	Partly Cloudy	171.494		
25	22.2	12.8	9.4	8.9	Partly Cloudy	170.163		
26	22.2	11.1	9.4	8.9	Partly Cloudy	168.747		
27	23.3	7.8	9.4	8.9	Clear	168.804		
28	25.0	8.9	10.0	8.9	Clear	170.899		
29	21.1	8.9	10.0	9.4	Clear	169.398		
30	21.1	5.6	9.4	8.9	Clear	169.851		
31	26.1	8.9	14.4	5.6	Partly Cloudy-Rain	171.154		

*Temperature measured to nearest whole degree F, and later converted to C.

**Flows measured in cfs, and later converted to m³/sec.

Appendix Table 1 (cont.)

April 1984	Temperature (°C*)				Weather	American River flow at Hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	18.9	10.6	9.4	8.9	Partly Cloudy	169.965		
2	17.8	5.6	10.0	8.9	Clear	169.483		
3	17.8	6.7	10.0	10.0	Clear	166.736		
4	18.9	6.7	10.0	10.0	Partly Cloudy	122.928		
5	20.0	10.0	9.4	9.4	Cloudy	115.991		
6	22.2	7.8	11.1	9.4	Clear	110.412		
7	21.7	7.2	11.1	9.4	Clear	62.413		
8	20.0	8.3	11.1	9.4	Partly Cloudy	83.850		
9	23.3	4.4	10.0	9.4	Partly Cloudy	111.148		
10	18.9	4.4	10.0	9.4	Rain	111.403		
11	20.0	4.4	10.0	9.4	Partly Cloudy	111.176		
12	24.4	6.7	10.6	9.4	Clear	111.092		
13	27.2	7.8	10.0	9.4	Clear	110.072		
14	30.0	10.0	11.1	10.6	Clear	84.954		
15	27.8	12.2	11.1	10.6	Clear	84.161		
16	22.8	11.1	10.6	10.0	Partly Cloudy	84.076		
17	20.0	9.4	10.6	10.0	Clear	82.915		
18	18.9	8.9	10.6	10.0	Rain	69.096		
19	17.8	6.7	10.0	9.4	Cloudy-Rain	69.294		
20	25.6	7.2	10.6	10.0	Partly Cloudy	68.699		
21	27.8	6.7	11.1	10.6	Clear	68.246		
22	29.4	7.2	11.1	10.6	Clear	68.445		
23	30.6	15.0	11.1	10.6	Clear	67.680		
24	28.9	7.2	10.6	10.0	Clear	67.680		
25	23.9	6.7	10.6	10.0	Clear	67.255		
26	25.6	5.0	10.6	10.0	Clear	67.312		
27	26.7	4.4	11.1	10.0	Clear	67.312		
28	27.8	5.6	11.7	10.6	Clear	67.227		
29	28.9	8.9	11.1	10.6	Partly Cloudy	67.255		
30	21.1	8.9	11.7	11.1	Cloudy	67.369		

*Temperature measured to nearest whole degree F, and later converted to C.

**Flows measured in cfs, and later converted to m³/sec.

Appendix Table 1 (cont.)

May 1984	Temperature (°C*)				Weather	American River flow at Hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	21.1	11.1	10.6	10.6	Rain	67.850		
2	23.3	13.3	10.6	10.0	Partly Cloudy	69.606		
3	24.4	13.3	11.1	10.0	Partly Cloudy	86.143		
4	24.4	11.1	11.7	10.6	Clear	124.967		
5	22.2	7.8	11.1	10.6	Clear	155.636		
6	24.4	7.8	11.7	10.0	Clear	158.439		
7	30.0	13.9	11.1	10.6	Clear	155.636		
8	33.3	11.1	11.1	10.6	Clear	156.060		
9	30.6	13.9	11.7	10.6	Clear	141.165		
10	30.0	11.7	11.7	10.6	Clear	127.771		
11	30.0	13.3	11.7	10.6	Clear	127.318		
12	31.1	4.4	11.7	11.1	Clear	127.346		
13	32.8	4.4	11.7	11.1	Clear	126.921		
14	32.2	6.7	11.1	10.6	Partly Cloudy	127.176		
15	28.3	8.9	11.1	10.6	Partly Cloudy	115.792		
16	26.7	8.9	11.7	10.6	Partly Cloudy	112.592		
17	27.2	8.9	11.7	10.6	Clear	103.304		
18	30.0	12.2	11.7	10.6	Clear	84.331		
19	32.8	13.3	12.2	11.7	Clear	84.359		
20	32.2	13.3	12.8	12.2	Clear	85.152		
21	31.7	14.4	12.2	11.1	Partly Cloudy	85.577		
22	34.4	13.3	12.8	11.1	Clear	85.379		
23	31.1	18.9	12.2	11.7	Clear	85.435		
24	28.9	12.2	12.2	11.1	Clear	85.520		
25	35.0	10.0	12.2	11.1	Clear	85.860		
26	32.2	15.6	13.3	12.8	Clear	85.464		
27	35.6	17.8	11.7	12.2	Clear	85.464		
28	39.4	18.9	12.2	11.7	Clear	85.209		
29	36.1	18.9	12.2	11.7	Clear	85.152		
30	36.7	16.7	11.7	12.2	Clear	85.775		
31	31.7	16.1	15.6	13.9	Clear	112.706		

*Temperature measured to nearest whole degree F, and later converted to C.

**Flows measured in cfs, and later converted to m³/sec.

Appendix Table 1 (cont.)

June 1984	Temperature (°C*)				Weather	American River flow at Hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	35.6	16.7	12.2	11.7	Clear	114.291		
2	32.2	9.4	12.2	11.7	Clear	114.291		
3	29.4	9.4	12.2	11.7	Partly Cloudy	114.225		
4	26.7	13.3	12.2	11.1	Rain	114.461		
5	25.6	12.2	11.7	11.1	Cloudy	114.631		
6	21.1	17.2	11.7	11.7	Cloudy	115.566		
7	30.6	19.4	11.7	10.6	Clear	115.084		
8	31.1	17.8	11.7	10.6	Clear	116.075		
9	32.2	16.7	11.7	10.6	Clear	116.585		
10	32.8	15.6	12.8	11.7	Clear	116.755		
11	31.1	11.7	12.8	11.7	Clear	116.727		
12	28.3	14.4	12.8	11.7	Partly Cloudy	115.226		
13	31.1	14.4	12.8	11.7	Clear	99.963		
14	30.6	12.2	12.8	11.7	Clear	111.545		
15	33.3	14.4	12.8	12.2	Clear	115.962		
16	35.0	15.6	12.8	12.2	Clear	142.949		
17	37.8	12.8	12.8	12.2	Clear	145.724		
18	36.7	14.4	12.8	12.8	Clear	143.940		
19	27.8	14.4	12.8	12.2	Clear	112.961		
20	28.9	14.4	12.8	12.8	Clear	112.621		
21	31.1	12.2	12.8	12.8	Clear	112.762		
22	35.6	6.1	12.8	12.2	Clear	112.989		
23	38.3	5.0	13.3	12.2	Clear	113.329		
24	39.4	5.6	13.3	12.8	Clear	112.196		
25	37.8	12.2	13.9	13.3	Clear	101.322		
26	36.7	17.8	13.3	12.8	Clear	98.348		
27	37.8	16.7	13.3	12.8	Clear	102.398		
28	36.7	17.8	13.9	12.8	Clear	102.511		
29	32.2	15.6	13.3	12.8	Clear	103.814		
30	37.8	17.2	13.3	12.8	Clear	139.466		

*Temperature measured to nearest whole degree F, and later converted to C.

**Flows measured in cfs, and later converted to m³/sec.

Season Total 9,081 5,155

APPENDIX TABLE 2. Coded-Wire-Tagged Chinook Salmon Recovered at Nimbus Salmon and Steelhead Hatchery, 1983-84 Season.

<u>TAG #</u>	<u>Number of Fish</u>
H-6-1-2	1
H-6-7-3	1
6-48-14	2
6-48-17	2
6-58-17	5
6-58-19	1
6-58-21	7
6-58-22	1
6-58-24	11
6-58-25	16
6-58-26	15
6-58-29	3
6-58-30	3
6-58-32	1
6-58-34	2
6-60-21	2
6-62-15	6
6-62-18	4
6-62-19	6
6-62-20	9
6-62-21	2
	<hr/>
Total	100

APPENDIX TABLE 3. Coded-Wire-Tagged Steelhead Recovered at Nimbus Salmon and Steelhead Hatchery, 1983-84 Season.

<u>TAG #</u>	<u>Number of Fish</u>
6-54-43	32
6-54-44	73
6-54-45	113
6-54-46	1
	<hr/>
Total	219