

ANNUAL REPORT NIMBUS SALMON AND STEELHEAD HATCHERY
1975-76 FISCAL YEAR^{1/}

by

Werner H. Jochimsen
Region 2, Inland Fisheries

ABSTRACT

This report describes the operation of Nimbus Salmon and Steelhead Hatchery from July 1, 1975 through June 30, 1976. Tables present numbers of adult fish trapped, eggs taken, fish reared and released, and daily river flow, weather conditions, and water and air temperatures.

There were 7,413 king salmon (Oncorhynchus tshawytscha) trapped, which produced 18,659,860 eggs. The 3,181 winter-run steelhead (Salmo gairdnerii gairdnerii) produced 1,780,480 eggs.

During the year we planted an estimated 5,919,810 fingerling and 214,935 yearling king salmon, 471,610 fingerling and 443,798 yearling winter-run steelhead, and 28,085 fingerling and 95,265 yearling summer-run steelhead.

The summer-run steelhead program was discontinued.

^{1/} Anadromous Fisheries Branch Administrative Report No. 78-10.
Submitted January 1977.

INTRODUCTION

This is the 21st annual report of the Nimbus Salmon and Steelhead Hatchery. The hatchery is operated by the California Department of Fish and Game under contract with the United States Bureau of Reclamation. This report summarizes the activities of the hatchery during the fiscal year 1975-76 with particular reference to numbers of fish trapped, spawned and released, eggs taken and fish produced, and other pertinent information.

PRODUCTION SUMMARY

During 1975-76 we took an estimated 20,440,340 eggs and planted approximately 7,173,503 salmon and steelhead (Table 1).

Table 1. Nimbus Hatchery Production Summary, 1975-76

Species	Number trapped	Eggs taken	Fingerlings planted	Yearlings planted	Total kg planted	On hand 6/30/76
King salmon						
1974 BY	--	--	539,700	214,935	10,381	--
1975 BY	7,413	18,659,860 ^{a/}	5,380,110	--	18,602	174,650
Winter-run steelhead						
1975 BY	--	--	131,150	443,798	31,955	--
1976 BY	3,181	1,780,480 ^{b/}	340,460	--	175	570,800
Summer-run steelhead ^{c/}						
1975 BY	--	--	28,085	95,265	6,754	--

^{a/} Of these, 8,247,125 were shipped to Coleman National Fish Hatchery and 103,680 were shipped to Mokelumne River Fish Installation.

^{b/} The Feather River Hatchery received 40,110; Coleman National Fish Hatchery received 99,990 and the Mokelumne River Fish Installation received 94,640.

^{c/} The summer-run steelhead program has been discontinued.

HATCHERY OPERATIONS

The Weir

Personnel from the Bureau of Reclamation, Folsom Field Division, installed the fish weir on September 3, 1975. Hatchery personnel removed rock and debris from the picket channel and installed pickets and caps on September 5 while the flow in the river was reduced to 42.48 m³/s (1,500 cfs) from the normal 65.13 m³/s (2,300 cfs). The weir was removed on January 20, 1976, because the salmon migration had ended and sufficient steelhead were on hand in the holding ponds to fulfill egg requirements.

Water Temperature Control

On July 31, 1975, the number 9 shutters were raised and on September 2 the number 8 shutters were lifted. As in the past during this phase of shutter manipulation, water temperatures at the hatchery were stabilized. On October 1 the number 7 shutters were raised which resulted in a temperature reduction on October 3. Prior to the last shutter manipulation temperatures ranged from 17.2-18.3 C (63-65 F). After October 3 water temperatures ranged from 13.9-15.0 C (57-59 F) (Appendix Table 1).

On January 8, 1976, the number 7 and 8 shutters were lowered.

Heron Predation Problem

For many years the hatchery has suffered an unknown, but significant, loss of juvenile salmon and steelhead to great blue (Ardea herodias) and green (Butorides virescens) herons. In order to reduce this predation, a cooperative project involving the Bureau of Reclamation, Youth Conservation Corps, and Department of Fish and Game resulted in enclosing the ponds with ground-level plastic netting and overhead wires. Green herons still occasionally gain access to the enclosure, but they have not been a serious problem. Predation by great blue herons has been nearly eliminated.

Disposal of Salmon Carcasses

Edible carcasses were given to State and county institutions, welfare and community action groups and several organizations representing California Indians. Local zoos received carcasses somewhat inferior in quality and a local rendering plant received all inedible carcasses. The total dispensed for each category was 28,917 kg (63,750 lb) edible; 2,132 kg (4,700 lb) animal food and 4,082 kg (9,000 lb) inedible.

Public Relations

Using two methods to determine the number of persons visiting the installation the total for the year was 109,685 or 221,702. The former figure was arrived at by having an employee count or estimate the number of visitors each hour on the hour throughout the day. The latter figure was the result of multiplying the reading on a car counter meter installed at the parking lot exit by 3.00 which was established as the average number of persons per car by sample counts. It is felt the car counter produces a much more accurate record of visitation. In the future we will refine the census a bit further by estimating or counting persons arriving by bus (primarily of concern from late October to early December) and by counting persons riding bicycles. Bicycles do not register on the car counter.

As in past years November was the peak visitation month. The visual estimation was 24,625 and the car counter estimate was 48,498.

Fish Counts

Fish are counted as they are disposed of (spawned, released unspawned, or carcass removed), not as they enter the hatchery. Therefore, the counts presented in Appendix Table 1 do not necessarily reflect the history of the spawning runs. This is particularly true for steelhead, which may accumulate for many weeks before spawning begins.

KING SALMON MAINTENANCE PROGRAM

History of the 1975 Run

King Salmon Counts

The first salmon of the new season was observed in the fish ladder on the same day the rack was installed, September 3. By the time the holding pond was activated on the last day of September, 128 salmon had climbed the ladder and entered a waste channel next to the east holding pond.

A total of 7,413 salmon entered the hatchery ponds. In addition 961 were removed from the weir. Migrants to the holding pond included 2,734 large males, 3,833 large females and 846 grilse^{2/}. Included in the count of grilse were 33 small females. Carcasses counted and removed from the weir included 204 large males, 17 unspawned females, 221 spent females and 519 grilse including 24 small females. Approximately 90% of the carcasses which became lodged on the weir were recovered. This is better than in some years and is a reflection of better water conditions than usual.

Sorting and Spawning

Of the large females counted in the holding pond 3,235 (84.4%) were spawned, 407 (10.6%) died in the pond, 17 were immature when killed, 36 were overripe or were killed accidentally in the sorting mechanism and 138 were returned to the river unspawned.

It appeared that adults entering the holding pond were in much better condition than they had been for many years. Several long term employees commented that they had never seen better looking fish here. What accounts for this phenomenon is unknown.

During the spawning season, October 17, 1975 to January 5, 1976, there were 18,659,860 eggs produced for an average of 5,768 per female. Fertility ranged from 77.9 to 97.1% and averaged 91.8%.

There were 8,247,125 eyed eggs shipped to the Coleman National Fish Hatchery. The Mokelumne River Fish Installation received 103,680 eyed eggs.

^{2/} Fish <60 cm (23.6 in) are considered grilse.

Marked King Salmon Recoveries

All fish were examined for marks after they were killed and processed or were removed dead from the pond. Fork lengths and sex were recorded (Appendix Tables 2 and 3), and heads were removed from any fish with an An-LP or Ad mark for possible recovery of a coded wire tag.

Unusual Salmon Encountered

During the season there were two chum salmon (O. keta), one pink salmon (O. gorbuscha) and four silver salmon (O. kisutch) seen while sorting king salmon.

King Salmon Planting

1974 Brood Year

From the estimated 600,655 1974 broodyear salmon on hand on June 30, 1975, there were 214,935 yearlings and 539,700 smolts planted (Table 2). Obviously there were more fish on hand at the beginning of the fiscal year than the original estimate.

Table 2. Planting Summary, 1974 Broodyear King Salmon,
Nimbus Hatchery

Date	Release site	Size	Number	Kg
Jul. 1975	Sacramento River-Rio Vista	4.2-6.7 g	343,200	1,701
Jul. 1975	Sacramento River-Clarksburg	5.1-6.5 g	72,250	413
Jul. 1975	Sacramento River-Garcia Bend	3.8-4.8 g	124,250	522
Oct. 1975	Sacramento River-Clarksburg	42.4-44.0 g	33,045	1,428
Oct. 1975	Sacramento River-Garcia Bend	32.9-43.6 g	179,210	6,226
Oct. 1975	American River-Nr. Sunrise Boulevard	33.8 g	2,680	91
TOTALS			754,635	10,381 (22,885 lb)

1975 Brood Year

There were 5,380,110 smolts and fingerlings released from the hatchery this season (Table 3). No fish were marked. On June 30, 1976, there were 174,650 fish on hand to be released in the fall as yearlings.

King Salmon Disease Information

1974 Brood Year

Bacterial infections that would not respond fully to standard treatments were the dominant source of losses throughout the summer until the fish were released.

1975 Brood Year

The infectious hematopoietic necrosis (IHN) virus problem remained the dominant factor in the disease picture. While the incidence was not as severe as in the previous two seasons it nevertheless accounted for approximately 93% of the loss. In one lot of fish with the least mortality attributed to IHN, approximately 35,000 fish were lost out of an initial pond population of 270,000. As an example of extreme loss, a lot of fish which initially numbered 1,073,800 was reduced to under 100,000, chiefly from IHN. The estimated total loss of fish from IHN is 3,000,000, or about 34% of the 8,778,000 total population of 1975 broodyear salmon.

Warmer water than usually experienced in late spring and early summer aggravated columnaris disease problems but control measures such as copper sulfate flushes and terramycin in the diet kept losses acceptably low.

Table 3. Planting Summary, 1975 Broodyear King salmon,
Nimbus Hatchery

Date	Release site	Smolts	Fingerlings	Size	Kg
Dec. 1975	Am. River-at hatchery	--	55,760	0.33 g	19
Jan. 1976	Am. River-at hatchery	--	312,840	0.34 g	108
Feb. 1976	Am. River-at hatchery	--	994,400	0.33-0.37 g	345
Mar. 1976	Am. River-at hatchery	--	163,620	0.40-0.79 g	106
Apr. 1976	Am. River-at hatchery	--	301,180	0.46-0.55 g	151
Apr. 1976	Am. River-at hatchery	4,290	--	3.5 g	15
Apr. 1976	Sac. River-Rio Vista	268,550	--	4.4-5.5 g	1,327
May 1976	Sac. River-Rio Vista	1,729,450	--	4.4-6.0 g	9,048
May 1976	Sac. River-Garcia Bend	594,900	--	4.5-6.0 g	3,062
May 1976	Am. River-at hatchery	30,410	17,010	3.7-4.8 g	135
Jun. 1976	Sac. River-Rio Vista	646,475	--	3.3-6.0 g	2,936
Jun. 1976	Sac. River-Garcia Bend	40,500	--	5.6 g	227
Jun. 1976	Sac. River-Clarksburg	220,725	--	4.8-5.7 g	1,123
TOTALS		3,535,300	1,844,810		18,602 (41,011 lb)

Experimental Inoculation of King Salmon

Further attempts to immunize king salmon to IHN with attenuated virus material as described by Jochimsen (1978) were unsuccessful.

WINTER-RUN STEELHEAD MAINTENANCE PROGRAM

History of the 1976 Winter-run Brood Year

Since 1970 we have been attempting to establish an early steelhead run in the American River by selectively spawning adults entering the hatchery in the fall. This year we classified those fish arriving prior to October 29 as early and

those after December 20 as late. Migrants which entered the pond between those dates were either tagged or marked with two small holes in the caudal fin and returned to the river at Howe Avenue or the basin below Nimbus Dam.

Steelhead were seen in the ladder with early arriving salmon on September 3. At the end of September, 85 steelhead were removed from the waste water channel on the east side of the number 1 holding pond where they had been allowed to accumulate, and placed in an enclosure in that pond.

While we maintain a rough estimate of steelhead as they are moved (hatchery log), permanent count records are maintained from the first spawning on December 16, 1975 until the close of the season February 25, 1976 (Table 4, Appendix Table 1). All steelhead were examined for marks as they were spawned or released and a record kept of fork lengths and sex of marked steelhead (Appendix Table 5).

The 301 females spawned (91 early and 210 late) produced 1,780,480 eggs for an average of 5,915 per female. Survival of green eggs to eyed ranged from 75.2-96.7% and averaged 91.3%. The Mokelumne River Fish Installation received 94,640 eyed eggs, the Feather River Hatchery obtained 40,110, and 99,990 were shipped to the Coleman National Fish Hatchery.

Spawned and surplus fish were transported either downriver to the Howe Avenue area or upstream to the basin below Nimbus Dam. Steelhead considered surplus were those not needed for spawning or fish that were <58.4 cm (23 inches) FL. Included in the surplus category were fish that arrived in the holding pond during the period between the early and late runs, October 30 through December 19. Management personnel from Fish and Game Region 2 tagged 396 adult steelhead. Of these fish, 197 were released in the river near Howe Avenue and 199 were released in the Nimbus Basin. This tagging was the initial phase of a program to determine harvest and escapement rates of the fall run.

Marked Adult Steelhead Recovered

We recovered 1,332 marked adult steelhead (Appendix Tables 4 and 5).

Winter-run Steelhead Planted

1975 Brood Year

From August 11, 1975 to March 2, 1976, 574,948 winter-run steelhead were planted including 131,150 fingerlings (Table 5). This was the last season of the three-year marking program. Fish marked RV were planted in January; fish marked LV and LV-RV were released in March. The RV and LV marked fish will be used to evaluate early versus late releases. The LV mark will also identify fish reared on only dry food to compare with fish fed only OMP which are marked LV-RV.

Table 4. Counts of Winter-run Steelhead, Nimbus Hatchery, 1975-76

	Spawned & released		Died in Pond		Released unspawned		Total
	M	F	M	F	M	F	
<u>1975</u>							
10/17	-	-	4	2	-	-	6
10/24	-	-	1	3	-	-	4
10/29	-	-	3	2	-	-	5
11/3 to 12/15	-	-	19	25	453	349	846
12/16	10	13	1	-	49	51	124
12/17	-	-	-	-	150	105	255
12/22	-	-	3	2	102	115	222
12/23	6	12	-	-	-	-	18
12/29	17	24	-	-	-	4	45
12/30	3	5	-	-	22	65	95
<u>1976</u>							
1/5	8	18	3	7	21	5	62
1/6	6	9	-	-	-	-	15
1/14	29	43	6	3	14	22	117
1/16	18	25	1	1	-	-	45
1/21	-	-	-	-	42	60	102
1/23	9	10	-	-	8	-	27
1/28	87	88	2	-	4	4	185
1/30	5	17	-	2	64	-	88
2/4	10	17	3	1	32	94	157
2/6	-	-	-	-	42	22	64
2/11	21	20	2	1	198	268	510
2/20	-	-	-	-	59	128	187
2/25	-	-	-	-	1	1	2
<u>TOTALS</u>	<u>229</u>	<u>301</u>	<u>48</u>	<u>49</u>	<u>1,261</u>	<u>1,293</u>	<u>3,181</u>

Table 5. Planting Data, 1975 Broodyear Winter-run Steelhead, Nimbus Hatchery

Date	Release site	Fingerlings	Yearlings	Size	Mark	kg
8/75	Am. River-Sailor Bar	115,950	-	9.9-8.1 g	-	1,000
10/75	Sac. Riv.-Garcia Bend	15,200	-	23.8 g	-	363
10/75	Am. River-Sailor Bar	-	42,045	37.2-36 g	-	1,531
10/75	Am. River-Nr. Sunrise	-	14,400	50.4 g	-	726
1/76	Sac. River-Garcia Bend	-	185,443	84-30.2 g	-	12,723
1/76	Sac. River-Garcia Bend	-	49,260	75.6-63 g	RV	3,139
2/76	Sac. River-Garcia Bend	-	49,285	82.5-58.4 g	-	3,733
2/76	Sac. River-Garcia Bend	-	46,640	85.6 g	LV-RV	3,992
3/76	Sac. River-Garcia Bend	-	1,345	90.7 g	LV-RV	122
3/76	Sac. River-Garcia Bend	-	46,980	84 g	LV	3,946
3/76	Sac. River-Garcia Bend	-	8,400	80.8 g	-	680
TOTALS		131,150	443,798			31,955 (70,449 lb)

1976 Brood Year

Prior to June 30, 1976, there were 340,460 fingerling steelhead released into the river at the base of the fish ladder (Table 6). There were 570,800 fish on hand of both early and late run groups on June 30.

Table 6. Planting Summary, 1976 Broodyear Winter-run Steelhead, Nimbus Hatchery

Date	Release site	Size	Number	kg
4/76	Am. River-at hatchery	.23-.15 g	94,280	16
5/76	Am. River-at hatchery	.77-.24 g	246,180	159
TOTALS			340,460	175 (386 lb)

SUMMER STEELHEAD PROGRAM

Because of problems encountered with accurately attempting to distinguish between fin clipped adult summer-run steelhead and fish returning which appeared to be marked but were missing pectoral fins due to erosion when they were juveniles, it was decided by management personnel to discontinue the summer steelhead program. Fish of the 1975 brood year which were reared in separate facilities from the fall-run fish were planted as summer runs but were not marked (Table 7).

Table 7. Planting Summary, 1975 Broodyear Summer-run
Steelhead, Nimbus Hatchery

Date	Release site	Fingerlings	Yearlings	Size	Kg
10/75	Am. River-Sailor Bar	20,085		22.1 g	621
2/76	Sac. River-Garcia Bend		95,265	75.6-53.4 g	6,133
TOTALS		20,085	95,265		6,754 (14,890 lb)

STEELHEAD DISEASE INFORMATION

1975 Brood Year

Gill bacteria was a persistent problem though losses were not severe. Copper sulfate flush treatments were employed regularly from mid-June to mid-October. Terramycin was added to feed periodically, especially when copper sulfate treatments did not hold losses down sufficiently. Disease problems disappeared when intake shutters were raised and the water temperature dropped.

1976 Brood Year

No IHN virus related losses occurred this season.

Before fish were ponded there was a considerable loss of young steelhead in the hatchery due to gill bacteria and columnaris. Fish were being treated regularly with copper sulfate and terramycin but this only slowed the rate of loss. Once fish were ponded disease problems were reduced to an insignificant level.

REFERENCE

Jochimsen, Werner H. 1978. Annual report Nimbus Salmon and Steelhead Hatchery, 1974-75 fiscal year. Calif. Dep. Fish and Game, Anad. Fish. Admin. Rep. 78-9. 28 p.

Appendix Table 1

Nimbus Salmon and Steelhead Hatchery Weather, Water, and
Fish Trapping Data July 1, 1975 through June 30, 1976

July	Temperature (C*)				Weather	American River flow at hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	29.4	11.1	15.6	15.0	clear	99.623		
2	31.1	10.6	16.1	14.4	clear	99.594		
3	28.9	11.1	16.1	14.4	clear	99.509		
4	31.1	12.2	16.1	15.0	partly cloudy	99.311		
5	34.4	12.2	16.7	15.0	clear	99.283		
6	36.7	15.0	16.7	15.6	clear	98.773		
7	36.7	15.0	16.7	15.0	clear	99.396		
8	37.8	14.4	17.2	15.0	clear	99.453		
9	40.0	13.3	16.7	15.6	clear	101.265		
10	39.4	16.7	16.7	15.6	clear	99.283		
11	37.8	17.2	16.7	15.6	clear	99.481		
12	37.8	15.6	17.2	15.6	clear	98.971		
13	37.8	14.4	17.2	15.6	clear	99.000		
14	32.2	13.9	16.7	15.6	clear	98.971		
15	25.6	15.6	16.1	15.6	cloudy; rain	99.453		
16	34.4	16.7	16.7	15.0	partly cloudy	100.416		
17	32.2	17.8	16.7	15.6	clear	100.161		
18	30.6	14.4	17.2	16.1	clear	100.246		
19	34.4	15.6	17.8	16.1	clear	100.302		
20	36.1	16.1	17.8	16.1	clear	100.104		
21	36.7	13.9	17.8	16.1	clear	99.821		
22	39.4	15.6	18.3	16.7	clear	99.056		
23	41.1	17.8	17.8	16.7	clear	98.065		
24	42.2	17.8	17.8	16.7	clear	85.662		
25	43.9	21.1	18.3	16.7	clear	86.087		
26	45.0	20.0	18.3	16.7	clear	85.492		
27	37.8	21.1	17.8	17.2	clear	85.039		
28	33.3	15.0	18.3	17.2	clear	85.719		
29	31.1	17.2	17.8	17.2	clear	85.605		
30	33.3	12.2	18.3	17.2	clear	85.011		
31	35.6	14.4	18.3	17.2	clear	84.699		

*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 (continued)

August	Temperature (C*)				Weather	American River flow at hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	39.4	14.4	17.8	17.2	Clear	84.727		
2	41.1	16.1	17.8	16.7	clear	84.473		
3	41.1	16.7	17.8	16.7	clear	84.501		
4	39.4	16.7	17.8	17.8	clear	85.011		
5	37.8	15.6	17.8	16.7	clear	87.616		
6	32.2	15.6	17.2	16.7	clear	85.181		
7	35.6	12.2	18.3	17.2	clear	85.067		
8	38.9	16.7	17.8	13.9	clear	85.152		
9	38.9	18.3	17.8	16.7	clear	85.067		
10	38.9	16.1	17.8	17.2	clear	84.699		
11	37.8	14.4	17.8	16.7	clear	84.897		
12	34.4	13.3	17.8	16.7	clear	85.124		
13	33.3	14.4	17.8	17.2	clear	84.841		
14	33.3	11.7	17.8	16.7	clear	84.926		
15	33.9	13.3	18.3	17.2	clear	84.388		
16	32.2	15.0	18.3	17.2	clear	68.190		
17	32.2	15.0	17.8	17.2	partly cloudy	67.907		
18	22.2	16.1	17.2	17.2	rain	67.935		
19	22.2	15.0	17.8	16.7	rain; partly cloudy	67.425		
20	35.6	13.9	18.3	17.2	partly cloudy	67.397		
21	32.2	18.3	18.3	17.2	clear	67.453		
22	32.2	17.2	18.9	17.2	clear	66.887		
23	35.6	16.7	18.3	17.8	clear	66.746		
24	36.7	17.8	18.9	18.3	clear	66.717		
25	36.7	17.8	18.9	17.8	clear	66.519		
26	26.7	13.3	17.8	17.8	clear	66.887		
27	26.7	13.3	18.3	17.8	clear	67.142		
28	30.0	12.8	18.3	17.2	clear	67.652		
29	31.1	17.8	18.3	14.4	clear	67.878		
30	31.7	15.6	18.9	17.8	clear	67.340		
31	32.2	14.4	18.9	17.8	clear	68.105		

*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 (continued)

September	Temperature (C*)				Weather	American River flow at hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	31.1	12.2	18.9	17.8	clear	67.822		
2	34.4	13.3	18.9	17.8	clear	68.105		
3	35.6	13.3	18.9	18.3	clear	67.397		
4	38.9	15.6	18.3	17.8	clear	66.491		
5	38.9	16.7	17.8	17.2	clear	50.774		
6	38.9	16.1	18.3	17.2	clear	67.255		
7	37.2	16.7	18.3	17.2	clear	67.737		
8	31.7	15.6	17.8	17.2	cloudy; rain	67.935		
9	33.9	16.1	18.3	17.2	clear	67.227		
10	30.0	15.0	17.2	17.2	cloudy; rain	67.425		
11	33.3	13.9	17.8	16.7	partly cloudy	67.340		
12	32.2	14.4	17.8	16.7	clear	65.500		
13	32.2	14.4	17.8	17.8	clear	51.539		
14	31.7	13.3	18.3	16.7	clear	52.530		
15	32.2	13.9	18.3	17.2	clear	68.416		
16	33.9	14.4	18.3	17.2	clear	68.756		
17	35.6	20.0	18.3	17.2	partly cloudy	68.615		
18	33.9	17.2	17.8	17.2	partly cloudy	67.850		
19	30.6	16.7	17.8	17.2	clear	68.813		
20	33.3	13.3	18.3	17.2	cloudy	67.708		
21	34.4	17.8	18.3	17.2	clear	67.085		
22	33.9	14.4	18.3	17.2	partly cloudy	67.595		
23	35.6	13.9	18.3	17.2	clear	67.850		
24	36.7	14.4	18.3	17.2	clear	67.822		
25	35.6	15.6	18.3	17.8	clear	68.161		
26	34.4	15.6	18.3	17.8	clear	67.878		
27	32.2	15.6	18.3	17.2	clear	67.623		
28	30.0	14.4	18.3	17.2	clear	67.085		
29	33.3	11.7	18.3	18.3	clear	67.255		
30	32.2	12.8	18.3	17.2	clear	67.567		

*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 (continued)

October	Temperature (C*)				Weather	American River flow at hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	32.2	13.9	17.8	16.7	clear	84.133		
2	32.2	12.2	17.2	16.7	partly cloudy	84.756		
3	33.3	13.3	15.6	15.0	partly cloudy	84.473		
4	31.7	13.3	15.6	14.4	clear	84.841		
5	32.2	13.3	15.6	14.4	clear	84.699		
6	22.8	13.3	14.4	14.4	clear	84.359		
7	20.6	7.8	15.0	14.4	partly cloudy	84.699		
8	25.6	7.8	14.4	13.9	partly cloudy	84.756		
9	22.2	10.0	14.4	13.9	cloudy; rain	84.303		
10	18.9	13.3	13.9	13.9	cloudy; rain	84.699		
11	21.7	12.2	14.4	13.9	partly cloudy	84.529		
12	22.2	12.2	15.0	14.4	clear; partly cloudy	84.671		
13	21.1	7.8	15.6	15.0	clear; partly cloudy	84.529		
14	23.3	6.7	15.6	14.4	clear	84.614		
15	25.0	8.9	15.6	15.0	clear	85.096		
16	25.6	10.0	15.6	15.0	clear	84.841		
17	26.7	9.4	15.6	15.0	partly cloudy	85.662	138	
18	16.7	11.1	23.3	15.0	clear	85.011		
19	25.0	8.9	15.6	15.0	clear	84.473		
20	27.8	14.4	15.6	15.0	clear	84.869		
21	21.1	12.2	16.1	15.6	partly cloudy	85.152		
22	18.9	8.9	15.6	15.0	clear	84.784		
23	18.9	7.2	15.0	14.4	clear	84.812		
24	18.9	3.3	15.0	13.9	partly cloudy	84.558	319	
25	20.0	6.1	15.0	14.4	cloudy; rain	85.181		
26	18.9	14.4	15.0	14.4	cloudy; rain	85.181		
27	17.2	5.6	15.0	14.4	clear	85.067		
28	18.3	2.8	15.6	14.4	partly cloudy	84.671		
29	18.9	2.8	15.0	14.4	partly cloudy	85.209	375	
30	18.9	9.4	15.0	14.4	partly cloudy	85.917		
31	18.3	6.7	15.0	14.4	clear	87.248		
TOTALS							832	

*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 (continued)

November	Temperature (C*)				Weather	American River flow at hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	20.0	6.1	15.0	14.4	partly cloudy	98.037		
2	21.1	6.1	15.6	14.4	partly cloudy	99.623		
3	22.2	6.7	15.0	14.4	clear	99.509	446	
4	22.8	7.8	15.6	14.4	clear	98.547		
5	18.9	8.3	15.0	14.4	partly cloudy	98.348	211	
6	18.3	9.4	15.0	14.4	partly cloudy	85.719		
7	16.7	9.4	15.0	14.4	cloudy; rain	83.028		
8	15.6	8.3	15.0	14.4	partly cloudy; fog	68.643		
9	15.6	1.7	14.4	13.9	partly cloudy	68.445		
10	16.7	9.4	14.4	13.9	clear	68.161	501	
11	16.7	2.8	14.4	13.9	clear	68.445		
12	18.9	3.8	14.4	13.3	clear	67.567		
13	20.0	3.3	14.4	13.3	partly cloudy	68.105		
14	20.0	6.7	14.4	13.9	partly cloudy	68.360	410	
15	17.2	8.9	14.4	13.9	cloudy; rain	68.133		
16	17.2	11.1	13.9	13.3	partly cloudy	68.133		
17	16.1	1.1	13.3	13.3	clear	68.643	502	
18	12.8	3.9	12.8	12.2	clear	67.907		
19	13.9	-1.1	12.8	12.2	cloudy	67.133	961	
20	14.4	2.8	13.3	12.8	partly cloudy	67.595		
21	12.2	1.1	13.3	12.8	clear	67.737		
22	12.8	1.7	12.8	12.8	partly cloudy	68.275		
23	16.7	1.1	12.8	12.2	partly cloudy	68.643		
24	17.2	2.8	12.8	12.2	partly cloudy	68.756	721	
25	22.8	5.6	13.3	10.6	clear; windy	68.813		
26	16.1	4.4	12.2	12.2	cloudy; rain	84.869		
27	13.3	6.1	12.8	11.7	cloudy; rain	84.246		
28	12.2	1.7	12.2	11.7	partly cloudy	85.520	434	
29	13.3	-3.3	11.7	11.7	partly cloudy	85.407		
30	14.4	2.8	11.7	11.7	partly cloudy	84.897		
TOTALS							4,186	

*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 (continued)

December	Temperature (C*)				Weather	American River flow at hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	15.6	2.8	12.2	11.7	Clear	84.558	301	
2	15.6	4.4	13.3	12.8	clear	84.558		
3	15.6	3.3	11.7	11.7	clear	84.671		
4	16.7	4.4	11.7	11.7	cloudy	85.464		
5	18.9	11.1	12.2	11.7	cloudy	84.274	468	
6	17.8	4.4	12.2	11.7	partly cloudy; fog	84.161		
7	15.6	3.3	11.7	11.7	clear	84.218		
8	15.6	3.9	11.1	11.1	clear; fog	85.435		
9	12.2	5.6	11.7	11.1	fog	85.181		
10	11.1	5.6	11.1	11.1	fog	85.152	380	
11	11.7	5.0	10.6	10.6	fog	85.322		
12	13.3	6.7	11.1	10.6	cloudy	85.577		
13	13.3	0.6	11.1	10.6	partly cloudy	85.407		
14	10.6	0.0	10.6	10.0	partly cloudy	85.067		
15	12.2	-1.1	11.1	10.0	clear	85.265	401	861***
16	13.3	0.0	11.1	10.6	clear	85.379		121
17	13.3	0.0	10.6	10.6	clear	85.379		255
18	13.9	-1.1	10.6	10.0	clear	84.501		
19	15.6	-0.6	11.1	10.0	clear	68.954		
20	15.0	-1.1	10.6	10.0	clear	69.153		
21	15.0	4.4	10.0	10.0	partly cloudy	68.360		
22	15.6	7.8	10.6	10.0	partly cloudy	68.133	300	222
23	11.1	2.2	10.0	10.0	cloudy	68.445		18
24	13.3	2.2	10.0	10.0	clear	67.708		
25	12.2	1.1	10.0	9.4	fog; partly cloudy	66.830		
26	14.4	0.6	10.0	9.4	cloudy	67.114		
27	13.3	6.1	10.0	9.4	fog; partly cloudy	67.142		
28	13.9	2.2	9.4	9.4	fog; partly cloudy	66.746		
29	16.7	2.8	10.0	9.4	partly cloudy	67.425	190	45
30	13.9	3.3	10.0	9.4	clear	67.595		95
31	12.2	0.0	9.4	8.9	clear	67.623		
TOTALS							2,040	1,620

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

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

***There were 802 SH released unspawned and 59 died prior to December 15.

Appendix Table 1 (continued)

January	Temperature (C*)				Weather	American River flow at hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	12.2	-0.6	9.4	8.3	clear	67.935		
2	11.1	-3.9	9.4	8.3	clear	67.312		
3	11.1	-1.7	8.9	8.9	cloudy	68.076		
4	12.2	-3.9	8.9	8.3	partly cloudy	67.878		
5	12.2	8.9	8.9	8.3	cloudy; rain	68.161	298	62
6	13.3	1.1	9.4	8.9	fog; clear	69.181		15
7	15.6	7.8	9.4	8.9	partly cloudy	69.124		
8	15.6	0.0	8.9	8.3	partly cloudy	68.954		
9	13.3	4.4	9.4	8.9	rain	68.303		
10	12.2	0.0	8.9	8.9	partly cloudy	68.558		
11	10.0	1.7	8.9	8.3	cloudy	67.623		
12	11.1	4.4	8.9	8.9	cloudy	68.586		
13	13.3	1.1	10.0	8.9	partly cloudy	68.076		
14	14.4	1.1	10.0	8.9	partly cloudy	68.416	47	117
15	16.7	1.1	9.4	8.9	fog	67.397		
16	16.7	2.2	9.4	8.9	fog	67.623		45
17	14.4	2.2	9.4	8.9	partly cloudy	56.891		
18	18.9	0.6	10.0	8.9	fog; clear	56.891		
19	17.8	1.1	9.4	8.9	clear	56.778		
20	17.8	1.1	10.0	8.9	clear	56.834		
21	17.8	1.1	9.4	8.9	clear	56.834	7	102
22	17.2	1.7	10.0	8.9	clear	57.174		
23	18.9	1.1	8.9	8.9	partly cloudy	56.296		27
24	18.3	1.7	9.4	8.9	partly cloudy	42.788		
25	15.6	-0.6	9.4	8.9	partly cloudy	42.307		
26	17.2	2.2	10.0	8.9	partly cloudy	42.307		
27	18.3	1.1	9.4	8.9	partly cloudy	42.335		
28	18.3	2.2	9.4	8.9	clear	42.364		185
29	16.7	1.1	9.4	8.9	partly cloudy	42.307		
30	18.9	3.3	9.4	8.9	partly cloudy	42.222		88
31	20.6	2.2	9.4	8.9	partly cloudy	41.203		
TOTALS							352	641

*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 (continued)

February	Temperature (C*)				Weather	American River flow at hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	22.2	4.4	9.4	8.9	partly cloudy	40.920		
2	21.1	4.4	10.0	8.9	clear	42.562		
3	18.9	3.3	10.0	8.9	clear	43.072		
4	13.3	6.7	9.4	8.9	cloudy	42.732	3	157
5	10.0	1.1	8.9	8.9	cloudy; rain	42.732		
6	17.8	0.0	8.9	8.9	partly cloudy	42.704		64
7	13.3	1.7	8.3	8.3	partly cloudy	42.619		
8	18.9	7.2	8.9	8.9	partly cloudy; rain	42.335		
9	15.6	5.6	9.4	9.4	partly cloudy	42.505		
10	15.6	3.3	9.4	8.9	clear; fog	42.562		
11	17.8	3.3	10.6	8.9	clear	42.534		510
12	18.9	2.2	9.4	8.9	partly cloudy	42.420		
13	15.6	2.2	9.4	8.9	cloudy; rain	42.250		
14	14.4	6.1	9.4	8.9	cloudy	42.704		
15	15.6	6.1	9.4	8.9	partly cloudy	42.307		
16	12.2	4.4	8.9	8.9	cloudy; rain	42.590		
17	17.8	5.0	9.4	8.9	partly cloudy	42.477		
18	17.8	10.0	8.9	8.9	partly cloudy	42.392		
19	17.2	5.0	9.4	8.9	partly cloudy	42.505		
20	15.6	0.6	9.4	8.9	clear	42.732		187
21	19.4	1.7	9.4	8.9	partly cloudy	42.477		
22	21.7	2.2	9.4	8.9	partly cloudy	42.420		
23	20.6	2.2	10.0	8.9	partly cloudy	42.250		
24	17.2	4.4	10.0	9.4	partly cloudy	42.307		
25	18.9	6.7	10.0	9.4	partly cloudy	42.194		2
26	22.2	7.2	10.0	9.4	partly cloudy	42.392		
27	21.1	5.6	10.6	9.4	partly cloudy	42.420		
28	21.1	10.0	10.0	9.4	partly cloudy	42.619		
29	12.8	8.9	10.0	9.4	cloudy; rain	42.647		
TOTALS							3	920

*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 (continued)

March	Temperature (C*)				Weather	American River flow at hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	13.3	4.4	10.0	9.4	p. cloudy; rain	42.845		
2	6.7	3.9	9.4	9.4	cloudy; rain	43.015		
3	12.2	1.1	9.4	8.9	partly cloudy	43.015		
4	13.9	-1.1	8.9	8.3	clear	43.157		
5	16.1	-0.6	9.4	8.3	clear	42.647		
6	17.2	-1.1	10.0	8.9	clear	42.505		
7	17.2	1.1	10.0	8.9	clear	42.505		
8	18.9	6.7	10.6	9.4	partly cloudy	42.760		
9	21.1	2.8	10.6	10.0	clear	42.590		
10	15.0	5.6	10.0	9.4	partly cloudy	42.307		
11	20.0	9.4	11.1	10.0	clear	42.477		
12	20.0	6.1	10.6	10.0	clear	42.420		
13	21.7	3.9	10.6	10.0	partly cloudy	42.477		
14	22.8	5.0	11.1	10.0	clear	42.307		
15	23.9	3.9	11.1	10.6	partly cloudy	42.081		
16	25.6	9.4	11.1	10.6	cloudy	42.024		
17	25.6	12.2	11.1	10.6	partly cloudy	42.647		
18	18.3	3.9	11.1	10.6	cloudy; rain	42.505		
19	23.9	3.9	11.7	10.6	clear	42.392		
20	21.1	1.1	11.1	10.0	partly cloudy	42.449		
21	24.4	4.4	11.1	10.6	clear	42.590		
22	23.9	6.7	11.1	10.6	partly cloudy	42.392		
23	23.3	4.4	11.7	10.6	partly cloudy	42.449		
24	21.1	10.0	11.1	10.6	partly cloudy	42.420		
25	19.4	2.2	11.7	10.6	partly cloudy	42.194		
26	21.1	1.7	11.7	10.6	partly cloudy	42.166		
27	18.9	0.6	11.7	10.0	partly cloudy	42.364		
28	21.1	5.0	11.7	10.6	partly cloudy	41.967		
29	24.4	5.6	12.2	11.1	clear	41.882		
30	26.7	6.7	12.2	11.1	clear	42.590		
31	21.1	7.2	11.7	11.1	partly cloudy	41.826		

* 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 (continued)

April	Temperature (C*)				Weather	American River flow at hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	18.9	0.6	12.2	11.1	clear	34.236		
2	22.2	1.7	11.7	11.1	clear	34.435		
3	20.0	3.9	11.7	10.6	partly cloudy	33.982		
4	19.4	5.0	11.1	11.1	partly cloudy	33.925		
5	17.2	5.6	11.7	11.1	cloudy; rain	33.953		
6	22.8	4.4	11.7	11.1	cloudy; rain	33.840		
7	22.8	6.7	11.7	11.1	cloudy	33.840		
8	16.7	6.7	11.7	11.1	cloudy; rain	34.067		
9	20.6	4.4	11.7	11.1	clear	34.067		
10	17.8	5.6	11.7	11.1	rain	34.520		
11	18.9	5.6	11.7	11.1	partly cloudy	34.236		
12	20.0	7.2	12.2	11.7	partly cloudy	33.953		
13	21.1	5.6	12.8	11.7	partly cloudy	34.095		
14	23.3	5.6	13.3	11.7	clear	33.868		
15	17.8	10.0	13.3	11.7	partly cloudy	33.783		
16	18.9	4.4	13.3	12.2	clear	33.840		
17	23.3	3.3	12.8	12.2	clear	33.670		
18	23.9	6.7	13.3	11.7	partly cloudy	33.557		
19	28.9	6.1	13.3	12.8	clear	33.812		
20	30.0	10.0	13.9	12.8	clear	33.727		
21	30.0	10.0	13.9	12.8	partly cloudy	33.727		
22	25.6	10.0	13.3	12.8	clear	33.840		
23	30.0	10.0	14.4	12.8	partly cloudy	33.897		
24	30.6	5.0	13.9	12.8	partly cloudy	33.840		
25	22.8	5.1	15.0	13.3	clear	33.925		
26	22.8	11.1	15.0	14.4	clear	33.897		
27	26.1	4.4	14.4	13.9	clear	34.690		
28	25.6	5.6	14.4	13.3	clear	33.670		
29	27.8	6.7	14.4	13.3	clear	34.067		
30	33.3	8.3	15.0	13.9	partly cloudy	33.982		

* 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 (continued)

May	Temperature (C*)				Weather	American River flow at hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	30.0	5.6	14.4	13.3	clear	34.152		
2	30.6	9.4	15.6	14.4	partly cloudy	34.067		
3	31.7	10.0	13.9	12.8	clear	33.982		
4	28.3	8.3	13.9	12.8	partly cloudy	34.067		
5	28.3	10.0	15.0	13.3	partly cloudy	34.067		
6	28.9	11.1	16.1	13.3	partly cloudy	34.010		
7	32.2	12.2	15.6	13.9	clear	33.982		
8	31.1	12.8	14.4	13.9	clear	33.982		
9	32.2	10.6	14.4	13.9	clear	33.953		
10	31.7	10.6	15.0	13.9	clear	33.953		
11	32.8	11.7	17.8	14.4	clear	33.812		
12	38.9	13.3	15.6	16.1	clear	33.868		
13	39.4	16.7	16.1	15.6	clear	33.953		
14	32.8	17.8	18.3	15.6	clear	33.863		
15	36.7	13.9	17.8	16.7	clear	34.180		
16	30.0	13.3	16.7	15.6	clear	34.095		
17	30.0	12.8	16.7	16.1	clear	34.067		
18	28.9	10.6	16.1	15.6	partly cloudy	34.123		
19	30.0	9.4	15.6	15.6	clear	34.038		
20	32.8	10.6	16.1	16.1	clear	34.010		
21	32.8	13.3	16.1	16.1	clear	33.982		
22	33.3	10.0	16.7	15.0	clear	33.925		
23	30.6	5.0	16.7	15.6	clear	33.897		
24	30.6	12.8	16.7	16.1	partly cloudy	33.925		
25	32.2	12.2	17.8	16.1	clear	33.897		
26	37.8	13.3	18.3	16.7	clear	34.038		
27	33.3	15.0	17.2	15.6	partly cloudy	34.095		
28	28.9	9.4	17.8	16.1	partly cloudy	34.038		
29	32.2	9.4	17.2	16.1	partly cloudy	42.307		
30	28.9	12.2	17.2	16.1	partly cloudy	50.633		
31	30.6	13.9	17.8	16.7	partly cloudy	50.972		

*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 (continued)

June	Temperature (C*)				Weather	American River flow at hatchery (m ³ /sec**)	Salmon	Steelhead
	Air		Water					
	Maximum	Minimum	Maximum	Minimum				
1	31.1	10.0	17.8	16.7	clear	43.242		
2	30.0	10.0	17.2	16.1	partly cloudy	42.732		
3	27.8	10.0	17.8	15.6	partly cloudy	42.534		
4	31.1	10.0	17.8	16.1	partly cloudy	42.505		
5	28.9	10.0	17.2	16.1	partly cloudy	42.590		
6	29.4	10.0	17.8	16.1	clear	42.619		
7	24.4	10.0	17.2	16.1	partly cloudy	34.859		
8	30.6	10.0	17.8	16.7	cloudy	33.727		
9	29.4	12.2	17.8	16.1	partly cloudy; rain	34.067		
10	27.8	12.2	17.8	16.1	partly cloudy	34.010		
11	28.9	10.6	17.8	16.1	partly cloudy	34.718		
12	32.8	11.1	18.3	16.7	partly cloudy	33.698		
13	33.3	14.4	18.3	16.7	partly cloudy	34.265		
14	36.7	16.7	19.4	18.3	clear	34.152		
15	40.0	15.6	19.4	18.3	partly cloudy	33.982		
16	37.8	17.8	20.6	17.8	partly cloudy	34.010		
17	40.0	16.1	21.1	18.3	clear	33.925		
18	36.1	14.4	20.6	18.3	clear	34.236		
19	35.6	13.3	20.6	18.3	clear	34.010		
20	28.9	12.2	20.0	17.8	clear	34.123		
21	31.1	12.8	20.0	17.8	partly cloudy	33.953		
22	34.4	12.8	21.1	18.3	clear	33.982		
23	37.8	15.6	21.7	19.4	clear	33.698		
24	39.4	20.0	21.1	20.0	clear	33.585		
25	38.3	17.8	22.2	20.0	partly cloudy	33.897		
26	40.0	17.2	22.2	20.0	partly cloudy	34.067		
27	42.2	15.6	22.8	20.0	clear	34.236		
28	43.3	17.8	22.8	20.0	clear	34.293		
29	34.4	15.6	21.7	20.0	clear	33.727		
30	32.8	12.8	21.1	18.9	clear	33.982		

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

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

Appendix Table 2

Marked King Salmon Recoveries, Nimbus Hatchery, 1975-76

Mark	Brood year	Number recovered	Area released	Average size	Date(s)	Number released	Origin
Ad	1970	99	American River-Nimbus	0.4 g	March 1971	250,900	Nimbus Hatchery
Ad	1973		Sacramento River-Brannon Island		Oct. 74, Feb. 75	42,160	Mokelumne River Fish Installation
Ad-An-LV-RV	?	1					
Ad-RV	1970	4	Sacramento River-Rio Vista	5 g	March, 1971	367,869	Coleman Hatchery
An	?	2					
An-LV	1970	8	American River-Nimbus	5 g	May-June, 1971	258,278	Nimbus Hatchery
An-RV	1970	3	Sacramento River-Rio Vista	5 g	May-June, 1971	257,213	Nimbus Hatchery
An LV-RV	?	1					
An-LP (+CWT)	1969	1	[1/2 at Rio Vista and 1/2 at Feather River Hatchery]	61 g	Feb. 1971	40,000	Feather River Hatchery
An-LP (+CWT)	1970			76 g	Feb. 1972	110,000	Feather River Hatchery
LV	?	1					
LV-RV	?	1					
RV	?	1					
LP	?	2					
Ad-An	?	1					

Fork Lengths (nearest cm) of Marked King Salmon
Recovered at Nimbus Hatchery During the 1975-76 Season

FL(cm)	AD		Ad-AN	An-RV
	Male	Female		
34	1		90 F	90 M
42	2			91 F
3				93 F
4	2		Ad-RV	
5				
6	3		82 F	LP
7	3		90 F	
8	2		90 F	77 M
9	4		106 M	88 M
50	1			
1	3			
2	8		An	LV
3	7			
4	6		63 M	75 F
5	7		72 F	
6	4			
7	6			
8	4		An-LP	LV-RV
9	1			87 F
60	1		88 M	
1	1			
2	2			
3	2		An-LV	RV
4				
5			87 M	78 F
6	1		88 F	
7	1		88 F	
8			91 F	Ad-AN-LV-RV
9	1		93 F	
70	1		96 M	90 F
1			96 F	
2	2		98 M	
3	1			
4		1		
5		1	An-LV-RV	
6		1		
7		2	93 F	
8				
9		2		
50		2		
1		3		
4	2	2		
5	1			
6				
7	1			
44	1	1		
5				
6	1			
00	1			
als by				
sexes	84	15		
als				
sexes				
combined	99			

Appendix Table 4

Marked Steelhead Recoveries, Nimbus Hatchery, 1975-76

Mark	Brood year	Number recovered	Area released	Average size	Date(s)	Number released	Origin
LV	1973 }	411	Sacramento River-Garcia Bend	99 g	March 1974	45,820	Nimbus Hatchery
LV	1974 }		Sacramento River-Garcia Bend	70 g	March 1975	45,370	Nimbus Hatchery
LV-RV	1973 }	330	Sacramento River-Garcia Bend	86 g	March 1974	49,062	Nimbus Hatchery
LV-RV	1974 }		Sacramento River-Garcia Bend	81-91 g	March 1975	46,640	Nimbus Hatchery
LV-LP	?	1					
RV	1973 }	142	Sacramento River-Garcia Bend	80 g	Jan. 1974	50,017	Nimbus Hatchery
RV	1974 }		Sacramento River-Garcia Bend	63 g	Jan. 1975	45,070	Nimbus Hatchery
RV-RP	?	1					
LP	1971 }	424	Sacramento River-Clarksburg	49 g	March 1972	66,115	Nimbus Hatchery
LP	1973 }		Sacramento River-Garcia Bend	50-103 g	Feb. 1974	104,598	Nimbus Hatchery
LP	1974 }		Sacramento River-Garcia Bend	94 g	March 1975	29,923	Nimbus Hatchery
LP-RP	?	12					
RP	?	11					

Fork Lengths (nearest cm) of Marked Steelhead at
Nimbus Hatchery During The 1975-76 Season

FL(cm)	LP		LV		LV-RV		RV		RP	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
43					1					
44			1				1			
45	1	1								
46					1					
47										
48	2		1		2					
49	2									
50	3		1	1				1		
51								1		
52		1		1			1			
53	3	1					1	1		
54	1		1		1					
55	1		1			1		3		
56		2	1	1				1		
57		2		1		1	1			
58		2	1	1			1			
59		1		1		2	1			
60		6						1		
61		2				2		1		
62		9	1	2	1	2	2			
63	2	7		4		1	1	2		
64	1	8		4	1	1		7		
65	3	7		7		4	1	3	1	1
66	6	19		20	4	19	4	3		
67	3	14	3	18	2	13	2	3		
68	5	32	5	28	9	30	3	8	1	
69	3	17	3	20	9	10	3	8		
70	17	39	16	41	21	36	4	15	1	
71	12	13	18	16	15	15	4	6		
72	18	20	18	18	11	12	4	8		
73	17	10	21	11	20	5	4	4	1	
74	24	13	27	8	19	2	4	2	1	2
75	15	6	24	3	15	2	5	1		1
76	15	2	21	5	12		7			1
77	13		12	1	13		2	1		
78	11	1	9		9		2		1	
79	6		7		2		2			
80	1		3	1	1		1			
81	1				1					
82	2		2		1		1			
83										
84			1							
88					1					
Unmeasured		1								
Totals by Sexes	188	236	198	213	172	158	62	80	6	5
Totals Sexes Combined	424		411		330		142		11	

Appendix Table 5 (continued)

FL(cm)	LP-RP		LP-LV	RP-RV
	Male	Female		
60			44 M	74 M
1				
2				
3				
4		1		
5				
6		1		
7		1		
8		2		
9		1		
70	1	1		
1	1			
2	1			
3				
4				
5				
6				
7	1			
8				
9				
	1			
Totals by				
Sexes	5	7		
Totals				
Sexes				
Combined		12		