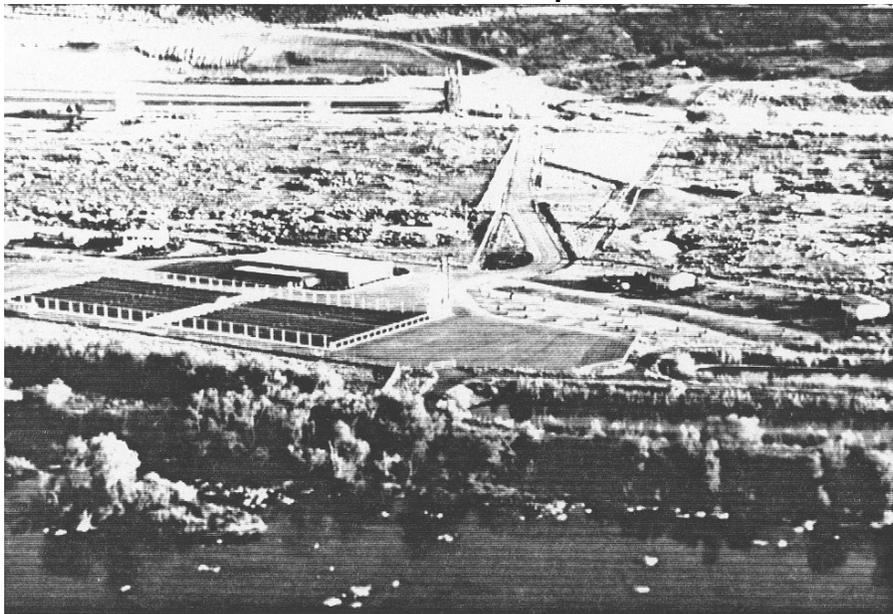




MAGIC VALLEY HATCHERY

1996 Brood Year Report



by

Bob Moore
Fish Hatchery Manager II

Dave May
Assistant Fish Hatchery Manager

Kent Hills
Fish Culturist

Mark Olson
Fish Culturist

IDFG 98-42
May 1998

TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	1
INTRODUCTION	2
OBJECTIVES.....	2
FACILITIES.....	2
WATER SUPPLY	3
STAFFING	3
FISH PRODUCTION.....	4
Egg Shipments and Early Rearing	4
Final Production Rearing.....	4
Length Frequency Data.....	5
FISH HEALTH.....	5
FISH MARKING	5
Adipose Fin-clipping.....	5
Coded-wire Tagging.....	5
PIT Tagging.....	6
PHOSPHORUS LIMITS	6
PRECOCIAL MALE OBSERVATIONS	6
LITERATURE CITED.....	7
APPENDICES	8

LIST OF APPENDIX

Appendix A. Brood Year 1996 Steelhead Survival Rates	9
Appendix B. Brood Year 1996 Production Feed Costs and Utilization	9
Appendix C. Steelhead Smolt Distribution in the Salmon River and Tributaries.....	10

LIST OF APPENDIX (Continued)

	<u>Page</u>
Appendix D. Final Raceway Inventory with Flow and Density Indices for 1996 Brood Year	11
Appendix E. Organosomatic Index Expressed in Percent of Normals.....	12
Appendix F. Brood Year 1996 Coded-Wire Releases	12
Appendix G. Historical Release Data	13
Appendix H. Brood Year 1996 Length Frequency Graph	14
Appendix I. Precocial Males as Percent of Total Population	15

ABSTRACT

The tenth year (May 1, 1996 to May 7, 1997) of steelhead *Oncorhynchus mykiss* production at Magic Valley Hatchery (MVH) was completed with a total of 1,643,210 A-run and B-run steelhead smolts stocked weighing 364,775 lbs. These fish were fed 380,647 lbs of feed for a conversion of 1.04 lbs of feed per pound of gain.

Three different stocks of steelhead were received as eyed eggs including 852,000 A-run Pahsimeroi Fish Hatchery (PFH) steelhead eggs yielding a total of 765,340 smolts. Another 95,796 Sawtooth Fish Hatchery (SFH) A-run eggs netted 84,715 smolts. B-run East Fork Salmon River eggs included 139,400, which resulted in 131,220 smolts to the East Fork Salmon River. In addition 940,391 Dworshak, Clearwater Fish hatcheries B-run eggs were received, contributing 661,935 smolts back to the Salmon River and its tributaries. Further stocking information is located in Appendix C.

Authors:

Bob Moore
Fish Hatchery Manager II

Dave May
Fish Hatchery Assistant Manager

Kent Hills
Fish Culturist

Mark Olson
Fish Culturist

INTRODUCTION

Magic Valley Hatchery (MVH) is part of the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP), compensating for losses of steelhead *Oncorhynchus mykiss* caused by the Lower Snake River Dams. The hatchery was constructed by the Army Corps of Engineers, is administered and funded by the U.S. Fish and Wildlife Service (USFWS), and operated by the Idaho Department of Fish and Game (Department).

The hatchery is located in Twin Falls County, seven miles northwest of Filer in the Snake River Canyon. The hatchery uses a maximum 125 cubic ft per second of 59°F water from Crystal Springs located on the north shore of the Snake River.

All smolts were transported by truck to the Salmon River and tributaries. The brood sources were Dworshak Fish Hatchery (Dworshak) B-run stock, East Fork Salmon River B-run stock, Sawtooth Fish Hatchery (Sawtooth) A-run, and Pahsimeroi Fish Hatchery (Pahsimeroi) A-run stock.

Fish health was good again this year.

OBJECTIVES

1. To hatch and rear 1.78 million A-run and B-run steelhead smolts for stocking in the Salmon River and its tributaries to achieve the mitigation goal of 11,660 adult steelhead back to Idaho waters.
2. Provide smolts and consequently returning adults that could be utilized for harvest, broodstock supplementation, reintroduction, and research purposes.
3. Mark hatchery smolts prior to release to avoid mixed stock harvest and to maximize harvest and natural production management options.

FACILITIES

The hatchery building houses the incubation and early rearing room with 40 upwelling 12 gal capacity incubators. Each is capable of handling and hatching 50,000-75,000 eyed eggs. Two incubators are placed over each raceway. There are 20 concrete tanks (4 ft x 3 ft x 40 ft, 418 cubic ft of rearing space) with a capacity of 115,000-25,000 steelhead to 200 per pound size. The early rearing room also houses two fiberglass troughs (2 ft x 1 ft x 12 ft), and 60 automatic fry feeders. The building also contains an office, laboratory, wet laboratory, shop, dormitory, enclosed storage room, covered vehicle storage area, feed storage room, walk-in freezer, and mechanical room for water pumps, water chiller, and domestic water supply systems.

There are 32 outside rearing raceways (10 ft x 3 ft x 200 ft, with 6,153 cu ft of rearing space). These raceways are divided in the middle by the headrace resulting in 16 East raceways and 16 West raceways. Each raceway has the capacity to raise 60,000-70,000 smolt-size steelhead. The raceways may be further divided to result in a total of 64 individual rearing subunits. A moveable bridge equipped with 16 automatic Neilsen fish feeders spans the outdoor

raceways. Two 30,000 pound bulk feed bins equipped with fish feed fines shakers and a feed conveyor complete the outside feeding system.

There are two tailraces outside located on opposite ends of the facility. Each flows to the north where they join in a common pipe before entering the flow-through settling pond. The hatchery effluent water is treated by opening valves in the bottom of quiescent zone and sweeping wastes into a cleaning waste water pond (approximately 2.5 surface acres). A hatchery flow-through wastewater pond (about 1.5 surface acres in size) cleans the non-cleaning wastewater. All cleaning effluent must pass through both ponds.

The limiting factors in producing more smolts are space and water flows. Our production is about 20% less than the facility was designed for. This is primarily due to production restrictions placed upon us by the National Marine Fisheries Service in an attempt to protect endangered salmon. Density and flow indices may exceed the maximum desired levels of .30 lbs of fish per cubic foot of rearing space per inch of fish length, and 1.25 lbs per gal per minute per inch of fish length at the end of the rearing cycle. Water flows have increased in recent years and have approached the 125 cf/s maximum on several occasions. However, our high flows are in the 110 to 120 cf/s range normally.

WATER SUPPLY

The MVH water supply collection facility is located on the north wall of the Snake River canyon. It collects the 59°F spring water from Crystal Springs in a covered concrete channel system, which consolidates the flow in a metal building. A 42-inch pipeline delivers the 125.47 cf/s of water via gravity flow to a control tank that degasses and distributes the water to the outside raceways through a 42-inch pipeline which supplies the headrace and auxiliary supply waterlines. The auxiliary supply line allows us to add water between raceway sections to improve water quality in the lower sections and to clean upper quiescent zones without dewatering the bottom section. The hatchery building receives water through a 14-inch pipeline, which branches off prior to going through the outside degassing tower. Water going to the hatchery building is degassed in packed columns above each individual raceway.

STAFFING

The MVH is staffed with four permanent employees: Bob Moore, Fish Hatchery Manager II; Dave May, Assistant Hatchery Manager; and Kent Hills and Mark Olson both Fish Culturists. In addition, we sometimes hire temporary Bio-aides or Laborers to assist with fish culture duties during peak production, smolt transportation, and adipose (AD) fin-clipping. Marcus Day was our Bio-aide this year. Personnel from this hatchery continue to oversee adipose marking operations at the three steelhead hatcheries located in southern Idaho.

FISH PRODUCTION

Egg Shipments And Early Rearing

The hatchery received 940,391 B-run (Dworshak) eyed eggs, 139,400 B-run eyed eggs (East Fork Salmon River stock), and 852,000 A-run eyed eggs (Pahsimeroi stock) and 95,796 A-run from (Sawtooth stock). All eggs were received in April, May, and June 1996. The survival of eyed eggs to smolts is found in Appendix A.

All eggs received were treated with Povidone Iodine at 100-ppm for ten minutes, enumerated by displacement and put into the upwelling incubators (50,000-75,000 eggs per incubator, 15 gals/min). The eggs hatched within five days and emerged from the incubators into the hatchery tanks twelve days after hatching. Each of the 20 hatchery tanks (with a flow of 100-250 gals/min) averaged 120,000 feeding fry until they reached 300 per pound or almost two inches long. At that time, fish were moved to the larger outside raceways. The highest mortality rate was during the hatching, swim-up, and early-rearing stages. This year as is traditional survival was lower in the Dworshak stock of eggs and fish than in the Pahsimeroi, Sawtooth, and East Fork stocks.

All of the feeding fry were started on Bio-Diet soft-moist feed until moved from the hatchery building tanks to the larger outside raceways.

Final Production Rearing

Fish in the outdoor raceways were fed more Biodiet soft-moist through the 2.0mm size. They were then fed Rangen 470 extruded salmon diet using Haskell's (1967) feeding rate formula. The feeding rate was calculated using a 10.0 hatchery constant. We start with a one-inch fish (swim-up fry) and end with an 8.4-inch smolt. The fish had a conversion of 1.04 lbs of feed to produce a pound of fish. This is the best conversion we have achieved at this facility yet.

We generally see around an inch of growth per month for the first three months when we are feeding every day. An intermittent schedule of five days on and two days off feed was implemented in October to keep the fish from becoming too large. The steelhead maintained an average .65 to .75-inch per month growth using this system. We used this schedule through the middle of March at which time all fish were put on full ration. See Appendix B for feed and total costs for the year.

Piper's 1970 formulas for density and flow indices were used to calculate the densities and flows for each tank or raceway. The desired density index of .30 or 1.25 flow index was not reached until the end of March in some raceways. The final pond inventories and indices for the individual raceway numbers, densities, and flows are found in Appendix D.

Maximum flows for the year were around 120 cfs from October through March. The majority of the time our flows were around 100-110 cfs. Each of the outside 32 raceways had about 3.4 cfs prior to distribution in April.

Steelhead smolt distribution began on April 9, 1997 and continued five days a week through April. An average of five trucks per day was used for the transportation of 364,775 lbs of fish and involved 78 truckloads (Appendix C). This year we again hauled only 5,000 lbs per load to meet IHOT (Integrated Hatcheries Operation Team) recommendations. In addition, highway load limits to the East Fork Salmon River held us to only 3,000 lbs per truck. On those loads, we only filled three of the five compartments, so density levels within the compartment were the same as the 5,000 pound loads. As in past years, only two loads per day were allowed at Slate Creek. This is due to road concerns and capacity of the receiving pool for fish.

Length Frequency Data

Length frequency data taken from all stocks are shown in Appendix H.

FISH HEALTH

No acute or chronic diseases or mortalities were encountered in these fish. No prophylactic treatments were administered.

Organosomatic index assessments conducted on March 28, 1996 (Appendix E) revealed robust fish with plenty of stored energy. Fat index was 3.95, hematocrit levels were 51.2, and serum protein 5.46. No noteworthy maladies were detected at MVH this year. Furunculosis, coldwater disease, whirling disease, and infectious pancreatic necrosis virus (IPNV) were not isolated this year during routine and preliberation inspections (Munson 1997).

Future plans include fencing and netting to ensure total enclosure from birds. This has become more important due to the continuation of the commercial Hagerman aquaculture industry to completely net off their hatcheries.

FISH MARKING

Adipose Fin-clipping

All of the A-run and B-run hatchery steelhead are required to have an AD fin-clip identifying them from wild steelhead. At MVH the fin-clipping crews (admark and coded-wire taggers) combined to mark 1,665,746 fish during September and October. The coded-wire crew also excised the left ventral fin of all A-run steelhead. Fin-clipping mortality was negligible. No treatment was necessary after handling.

Coded-wire Tagging

Four groups of steelhead were coded-wire tagged this 1996 brood year. There were 402,044 fish marked with the coded-wire tag (CWT) and 397,052 were stocked. None of the Sawtooth A-run fish were coded-wire tagged. Very little loss was encountered from handling and no treatment was necessary. See Appendix F for details on which raceways were tagged with CWTs.

PIT Tagging

All three stocks of steelhead had a total of 2,098 Passive Integrated Transponder (PIT) tags inserted in them. We only found three mortalities leaving 2,095 to be released. None of the Sawtooth fish were PIT tagged.

PHOSPHORUS LIMITS

This year, the Idaho Department of Health and Welfare Division of Environmental Quality (DEQ) was supposed to set maximum phosphorus emissions for each hatchery in the area. This proved to be such a contentious issue that only nine hatcheries received an actual limit the other hundred or so were given To Be Determined (TBD) status. This is probably better than we could have hoped for, but was still a very big disappointment after all of the late night meetings and letter writing campaigns, in which we were involved. A total maximum daily load (TMDL) will be established in accordance with the Mid-Snake River Nutrient Management Plan. The amount of phosphorus the entire aquaculture industry in the Magic Valley can contribute each day will drop 20% to 1,294 lbs in the first year. The target goal then drops another 20% in the fifth year to 970 lbs per day. The proposed allowable discharges for all the hatcheries took baseline data from 1991-92 to establish a mean for the year. Hopefully, our hatchery will be able to meet whatever discharge levels we are eventually given with only modest changes in our system.

PRECOCIAL MALE OBSERVATIONS

In the spring of 1996, it was noted that raceway number 16 West had a very high rate of precocial males. This was noted by the PIT tagging crew and by our own crew while taking length measurements. Although no accurate samples were taken we estimated from length and pound count samples that it was as high as 25% or more of the total population was exhibiting morphological characteristics of precocial males. We were unsure as to what had caused this unusually high rate. Then in the early spring of 1997 it was apparent that the precocial rate was once again high in 16 west. While taking length frequency data records of all obvious precocial males were kept for each raceway sampled. It appeared that the main difference between 16 West and the other raceways was its close proximity to a mercury vapor yard light. We compared the percentage of water surface, which received direct light from various yard lights to the incidence of precocialism. There appears to be a strong correlation (See Appendix I). The light was removed once we suspected it to be the culprit. Next year we will check precocial rates adjacent to the light and at other random areas to see if a reduction occurs.

LITERATURE CITED

Haskell, D.C. 1967. Calculations of amounts to feed trout in hatcheries. *Progressive Fish Culturist* 19 (4) : 194 pp.

Piper, R.G. 1970a. Know the proper carrying capacities of your farm. *American Fishes and U.S. Trout News* 15(1) : 4 pp.

Munson, Doug 1997. Preliberation autopsy report

APPENDICES

Appendix A. Brood Year 1996 Steelhead Survival Rates.

Stock	Dworshak	East Fork	Pahsimeroi	Sawtooth	Total
Number Eggs	940,391	139,400	852,000	95,796	2,027,587
Swimup	846,352	136,612	834,960	94,838	1,912,762
% Swimup	90%	98%	98%	99%	94%
Fingerling	674,958	132,000	774,088	86,600	1,667,646
% Egg To Fingerling	71.7%	94.7%	90.8%	90.4%	82.2%
% Swimup To Fingerling	79.7%	96.6%	92.7%	91.3%	87.1%
Smolts Planted	661,935	131,220	765,340	84,715	1,643,210
Lbs Fish	152,400	27,650	167,175	17,550	364,775
Fingerling To Smolt %	98%	99.4%	98.8%	97.8%	98.5%
% Egg To Smolt	70.3%	94.1%	89.8%	88.4%	81.0%
Lbs Of Food Fed	162,299	30,782	167,701	19,865	380,647
Feed Conversion	1.06	1.11	1.00	1.13	1.04

Appendix B. Brood Year 1996 Production Feed Cost And Utilization.

Number Of Fish	1,643,210
Lbs Of Fish	364,775
Feed Cost	\$137,412.10
Lbs Of Feed	380,647
Conversion	1.04
Total Cost	\$511,350
Cost Per 1000 Fish	\$311.23
Cost Per Pound Fish	\$1.40

Appendix C. Steelhead Smolt Distribution in the Salmon River and Tributaries.

Species	Numbers	Lbs	No./Lb	Receiving Waters	Dates Released
Dworshak B-run	155,770	29,800	5.2	Little Salmon R	4/9-10/97
Dworshak B-run	213,210	50,300	4.2	Slate Creek	4/25-5/1/97
Dworshak B-run	292,955	72,300	4.1	East Fork	4/24-30/97
East Fork B-run	131,220	27,650	4.7	East Fork	4/22-23/97
Sawtooth A-run	84,715	17,550	4.8	Sawtooth Rack	4/11/97
Pahsimeroi A-run	84,760	17,300	4.9	Little Salmon R	4/9-10/97
Pahsimeroi A-run	154,470	31,700	4.9	Salmon R @ McNabb Pt	4/14-15/97
Pahsimeroi A-run	170,540	38,100	4.5	Salmon R @ Bruno	4/15-16/97
Pahsimeroi A-run	221,260	49,550	4.5	Salmon R @ Lemhi	4/16-18/97
Pahsimeroi A-run	134,310	30,525	4.6	Salmon R @ North Fork	4/18-21/97
TOTAL:	1,643,210	364,775	4.5		
AVERAGE:					

Appendix D. Final Raceway Inventory with Flow and Density Indices for 1996 Brood Year.

Raceway	Run	Number	Weight	No/lb	Flow Index	Density
E1	DWOR B	47,740	10,850	4.4	.24	.83
E2	DWOR B	46,870	10,900	4.3	.24	.84
E3	DWOR B	55,720	9,950	5.6	.24	.83
E4	DWOR B	39,250	7,850	5.0	.18	.64
E5	DWOR B	40,800	8,000	5.1	.18	.65
E6	DWOR B	41,600	10,000	4.1	.22	.76
E7	DWOR B	61,200	13,600	4.5	.30	1.06
E8	DWOR B	40,180	9,800	4.1	.21	.75
E9	DWOR B	42,200	10,550	4.0	.22	.79
E10	DWOR B	40,250	11,500	3.5	.23	.83
E11	DWOR B	58,380	13,900	4.2	.30	1.06
E12	DWOR B	39,690	9,450	4.2	.20	.72
E13	DWOR B	52,800	13,200	4.0	.28	.99
E14	DWOR B	55,255	12,850	4.3	.28	.99
E15	EFK B	60,720	12,650	4.8	.29	1.01
E16	EFK B	70,500	15,000	4.7	.33	1.18
W1	PAH A	60,270	12,300	4.9	.28	.98
W2	PAH A	62,000	12,400	5.0	.28	1.00
W3	PAH A	58,880	12,800	4.6	.29	1.01
W4	PAH A	59,220	14,100	4.2	.30	1.07
W5	PAH A	64,390	13,700	4.7	.31	1.08
W6	PAH A	59,400	13,200	4.5	.29	1.03
W7	PAH A	51,120	10,650	4.8	.24	.85
W8	PAH A	44,800	11,200	4.0	.24	.84
W9	PAH A	52,140	11,850	4.4	.26	.91
W10	PAH A	59,570	12,950	4.6	.29	1.02
W11	PAH A	44,346	10,000	4.4	.22	.77
W12	PAH A	41,760	8,700	4.8	.20	.70
W13	PAH A	43,000	8,600	5.0	.20	.70
W14	PAH A	64,444	14,725	4.8	.33	1.18
W15	SAW A	42,640	8,200	5.2	.19	.67
W16	SAW A	42,075	9,350	4.5	.21	.73
Total A-run		850,055	184,725	4.6		
Total B-run		793,155	180,050	4.4		
Grand Total		1,643,210	364,775	4.5		

Appendix E. Organosomatic Index Expressed in Percent of Normals.

Eyes	Gills	Pseudo-Branch	Thymus	Mes. Fat	Spleen	Hind Gut	Kidney	Liver
100	100	100	100	100	100	100	100	100

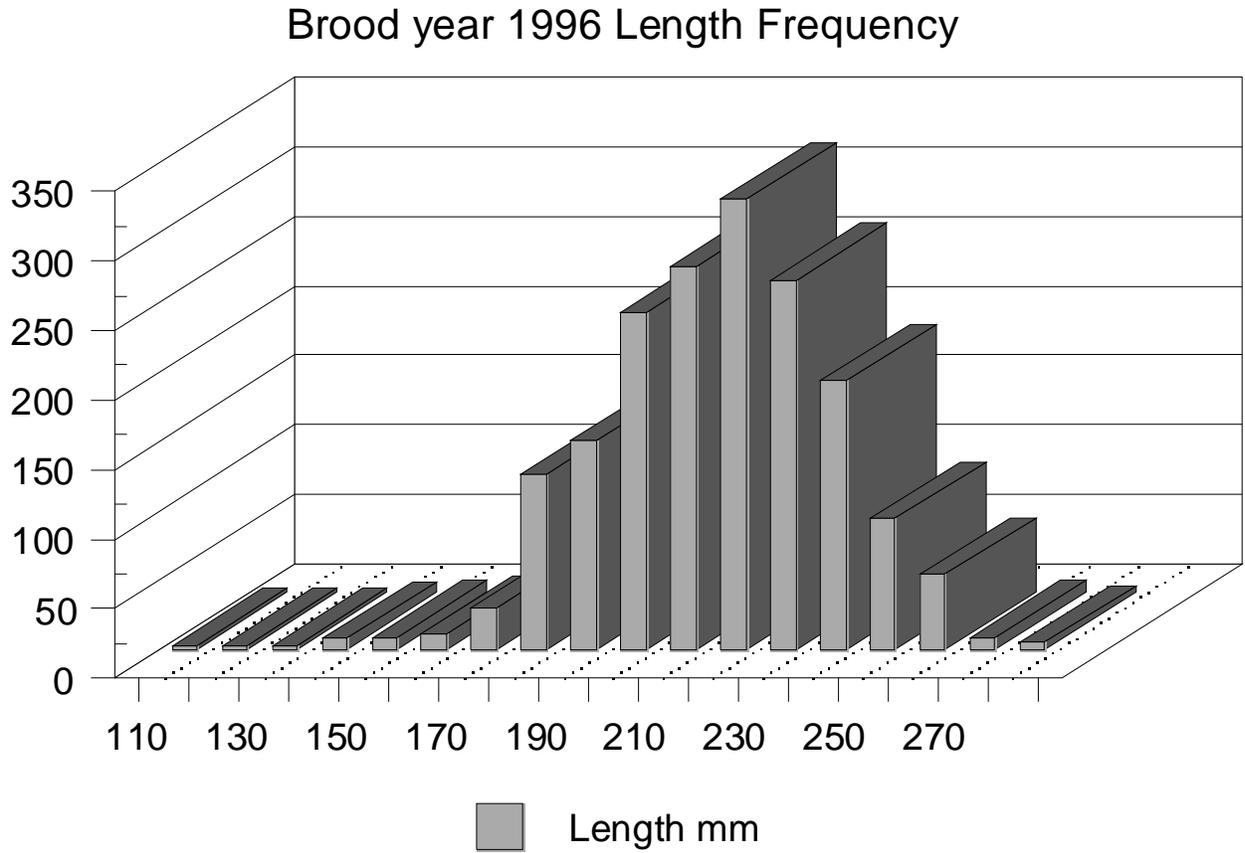
Appendix F. Brood Year 1996 Coded-wire Releases.

CWT Code	Stock	Number Tagged	Number Stocked	PIT Tag	Site & Purpose
10-51-60 10-51-61 10-51-62	Dwor B	61,833	61,200	300	Slate Cr., contrib.
10-52-22 10-52-23 10-52-24	Dwor B	59,367	58,380	300	E FK Salmon, @ Dumpster, contrib.
10-51-06 10-52-06	Dwor B	30,784	30,738	300	Little Salmon, @ Stinky Spr. contr.
10-52-16 10-52-17 10-52-18	Pah A	64,731	64,444	300	N Fk Salmon, contrib.
10-52-10 10-52-11 10-52-12	Pah A	63,245	62,000	300	Salmon R @ McNabb, contr.
10-52-13 10-52-14 10-52-15	Pah A	60,989	59,570	298	Lemhi R, contribution
10-52-19 10-52-20 10-52-21	E Fk B	61,095	60,720	300	E Fk Salmon, @ Trap, contrib.
Subtotals	Dwor B	151,984	150,318	900	
	Pah A	188,965	186,014	898	
	E Fk B	61,095	60,720	300	
Totals		402,044	397,052	2,098	

Appendix G. Historical Release Data.

Year	Pahsimeroi A-run Eggs	East Fork B-run Eggs	Dworshak B-run Eggs	Total Eggs	Spring/ Smolt Releases	Fall/Fry Releases	Total Fish Released	Fish/ Lb	Lbs Released	Lbs Feed	Food Conver
1982-83				145,206	135,361		135,361	4.23	32,000	57,700	2.24
1983-84	238,000		68,000		264,574		264,574	2.77	95,430	154,120	1.62
1984-85				NONE	231,991		231,991	4.37	52,990	REARED	HNFH
1985-86				NONE	NONE				0		
1986-87				NONE	264,415		264,415	4.39	60,215	REARED	HNFH
1987-88	?	FRY		2,109,780	2,064,661		2,064,661	4.54	454,500	554,000	1.32
1988-89	2,047,748	357,506		2,405,254	2,202,800		2,202,800	4.32	509,100	703,373	1.38
1989-90	1,306,674	333,537	1,212,066	2,852,277	2,285,800		2,285,800	4.67	489,430	687,077	1.40
1990-91	1,269,000	463,730	900,000	2,632,730	2,062,000		2,062,000	4.11	501,100	662,326	1.32
1991-92	1,127,928	91,317	1,207,699	2,426,944	2,160,400		2,160,400	4.21	513,000	624,573	1.22
1992-93	1,031,274	133,826	1,322,740	2,487,840	1,925,700		1,925,700	5.75	334,500	529,936	1.58
1993-94	1,081,500	179,080	1,507,033	2,767,613	1,919,250	392,300	2,311,550	4.73	405,450	654,693	1.61
1994-95	800,785	75,395	1,520,160	2,396,340	1,731,355	26,531	1,757,886	4.41	391,825	548,400	1.49
1995-96	803,000	40,000	1,502,200		1,868,085		1,868,085	4.63	402,926	453,662	1.13
1996-97					1,643,210		1,643,210	4.50	364,775	380,647	1.04

Appendix H. Brood Year 1996 Frequency.

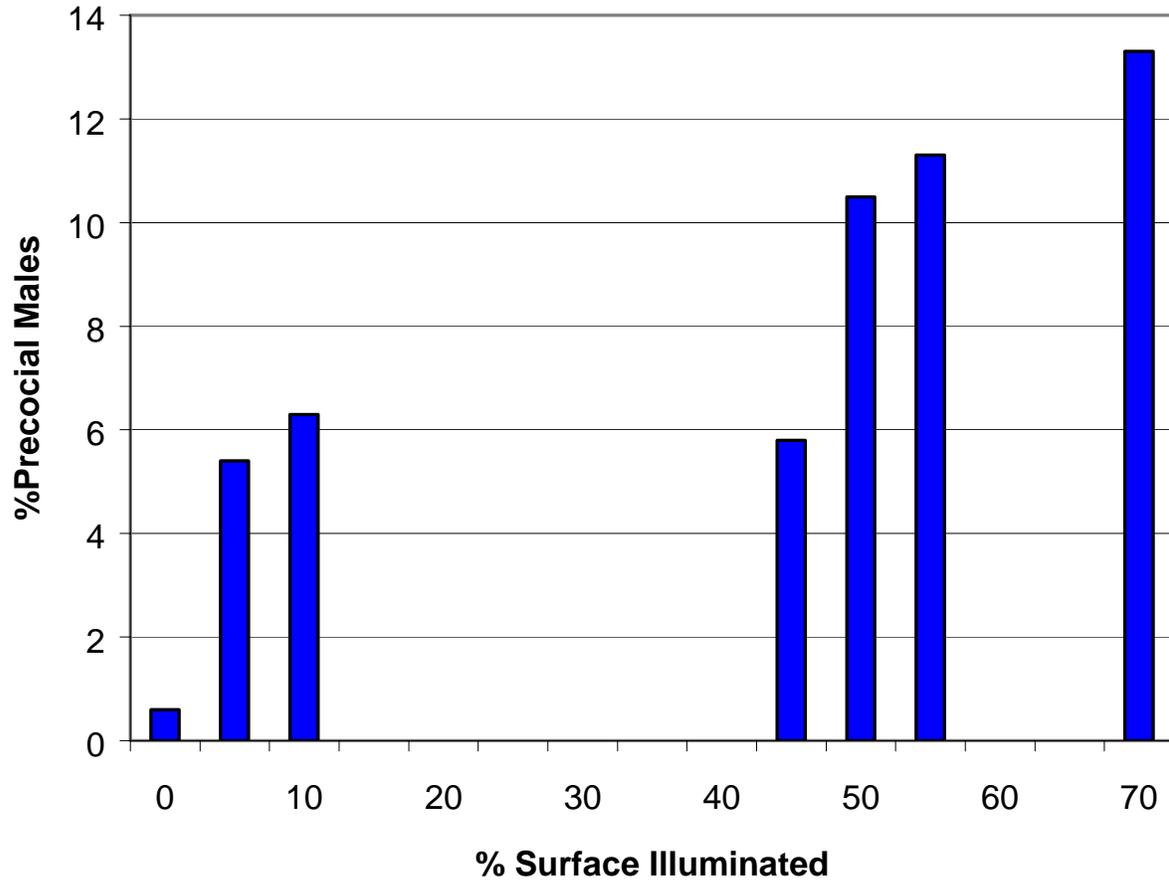


Minimum: 110 mm

Maximum: 280 mm

Mean: 215 mm

Precocials vs. Light



Submitted by:

Bob Moore
Fish Hatchery Manager II

Dave May
Assistant Fish Hatchery Manager

Kent Hills
Fish Culturist

Mark Olson
Fish Culturist

Approved by:

Virgil Moore, Chief
Bureau of Fisheries

Tom Rogers
Fish Hatcheries Supervisor