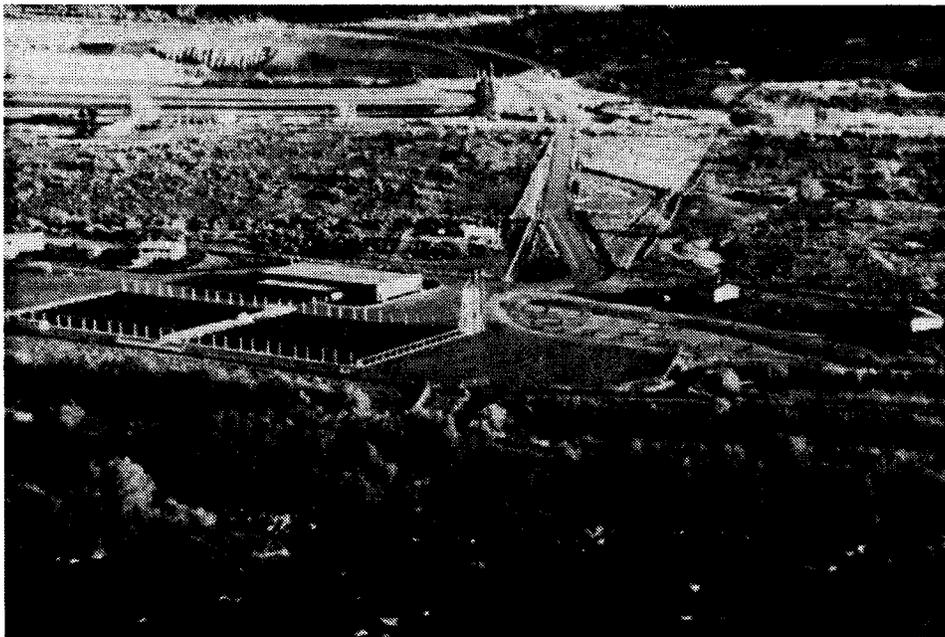




MAGIC VALLEY HATCHERY

1992 Brood Year Report



by

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ABSTRACT

The sixth year (May 1, 1992 to April 30, 1993) of steelhead production at Magic Valley Hatchery was completed with 1,031,274 eyed "A" strain eggs received from Pahsimeroi Hatchery, and 915,900 smolts were released into the Salmon River at Challis, Ellis, Lemhi, and the mouth of the North Fork of the Salmon River. In addition, 1,322,740 eyed "B" strain eggs were received from Dworshak National Fish Hatchery. Smolt totaling 903,400 were stocked in the East Fork of the Salmon River, Slate Creek, and the Little Salmon River. A total of 133,826 eyed "B" strain eggs were received from the East Fork of the Salmon River, and 106,400 were released into the East Fork of the Salmon River.

A total of 1,925,700 "A" and "B" strain smolts were stocked, weighing 334,500 pounds, and were fed 529,936 pounds of feed for a conversion of 1.58

INTRODUCTION

Magic Valley Hatchery completed its sixth year of production of steelhead for the Salmon River and its tributaries. The hatchery is part of the U.S. Fish and Wildlife Service Lower Snake River Compensation Plan (LSRCP), compensating for losses of steelhead caused by the lower Snake River dams. The hatchery was constructed by U.S. Army Corps of Engineers, is funded and administered by the U.S. Fish and Wildlife Service, and operated by the Idaho Department of Fish and Game (IDFG).

The hatchery is located in the Snake River Canyon seven miles northwest of Filer in Twin Falls County. The hatchery's 125 cfs of 59°F water is piped across the river to the south shore from Crystal Springs, which is located the north wall of the canyon.

All smolts were transported by tank truck to the Salmon River and its tributaries. The brood sources were Dworshak and East Fork Salmon River "B" stock and Pahsimeroi. There were no fish health problems encountered during the brood year.

OBJECTIVES

1. To hatch and rear 2 million "A" and "B" strain steelhead smolts for stocking in the Salmon River and its tributaries to achieve the mitigation goal of returning 11,660 adult steelhead back to Idaho waters.
2. Provide smolts and, consequently, return adults that could be used for harvest, supplementation, reintroduction, and natural production.
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 nursery area with 40, 12-gallon upwelling incubators, which handle and hatch 50,000 to 75,000 eyed eggs each. There are 20 concrete tanks (4 ft x 3 ft x 40 ft, 418 cubic feet of rearing space) with a holding capacity of 125,000 steelhead from swim-up fry to fingerling at 200 fish per pound. The nursery area also has 2 fiberglass troughs

and 60 automatic fry feeders. The building also houses an office, laboratory, wet laboratory, shop, dormitory, enclosed storage room, covered vehicle storage area, feed storage room, walk-in freezer, mechanical room for water pumps, water chiller, and domestic water supply system.

There are 32 outdoor rearing raceways (10 ft x 3 ft x 200 ft, 6,153 cubic feet of rearing space) with a capacity of 60,000 to 70,000 smolt size steelhead. The rearing raceways are spanned by an electrically-powered moveable bridge equipped with 16 automatic Neilson fish feeders. There are two 30,000-pound bulk feed bins, two fish feed fines shakers, and a fish food conveyor which comprise the remainder of the feeding system.

The hatchery effluent water is treated using two waste water settling ponds, a cleaning waste water pond, and a hatchery flow-through waste water pond.

Factors that limit the production of additional smolts are space and flows. Density and flow indexes may exceed the desired levels of .3 and 1.25 the last two months of rearing before stocking.

WATER SUPPLY

The Magic Valley Hatchery water supply (Crystal Springs) collection facility is located on the north wall of the Snake River Canyon. It collects the 59°F spring water in a concrete channel system and delivers the 125.47 cfs of water by gravity flow through a 42-inch pipeline to a control tank that distributes the water to the hatchery tanks and raceways.

The water quality analysis is found in Appendix A.

STAFFING

The hatchery is staffed with four permanent employees: one Hatchery Superintendent III, one Hatchery Superintendent II, and two Fish Culturists. Several temporary positions or bio-aides, Youth conservation Corps workers, and laborers are employed at various times of the year to assist with fish cultural duties during peak production, transportation, and in the absence of the Hatchery Superintendent II while he supervises the fish marking operation.

FISH PRODUCTION

The hatchery received eyed steelhead eggs from three sources: 1,031,274 "A" strain eggs from Pahsimeroi stock, 1,322,740 "B" strain eggs from Dworshak stock, and 133,826 "B" strain eggs from East Fork Salmon River stock. All the eggs were received in April, May, and the first week of June. The survival of eyed eggs to smolts is found in Table 1.

Table 1. Brood year 1992 steelhead survival from eyed eggs to released smolts.					
No. eggs received	% hatched	500/lb number	% survival	Released smolts	% survival
PAHSIMEROI 'A'					
1,031,274	99.0	974,450	94.0	915,400	88.8
DWORSHAK 'B'					
1,322,74	98.0	1,042,080	78.8	903,400	68.3
EAST FORK 'B'					
133,826	99.0	124,331	92.9	106,400	79.4
Table A. Totals and averages:					
2,487,840		98.5	85.9	1,819,300	73.1

All eggs received were treated with Argentyne at 100 ppm for ten minutes, enumerate by displacement, and divided into 40 upwelling incubators (50,000 to 75,000 eggs per incubator, at 15 gpm). The eggs hatched within five days, and emerged from the incubators into the fry tanks 12 days after hatching. Each of the 20 nursery tanks (418 cubic feet of rearing space each, with a flow of 100 to 200 gpm) have a capacity of 150,000 fry until they reach 300 fish per pound, or 2 inches, and are moved into the larger outside raceways. The highest mortality rate was during hatching, swim-up, and early rearing stages which is traditionally higher in Dworshak stock than in Pahsimeroi and East Fork stocks. Table 2 indicates the mortality by month and stock from eggs to distribution.

Table 2. Brood year 1992 mortality.				
Month		Pahsimeroi	Dworshak	East Fork
May		4,727	86,898	-----
June		11,123	11,788	3,725
July		7,148	4,603	514
August		1,997	2,216	197
September		961	496	62
October		1,864	736	64
November		1,603	1,480	75
December		738	653	50
January		827	438	39
February		706	502	59
March		699	492	50
April		334	174	25

All feeding fry were started on Rangen's soft moist feed until moved from the hatchery building tanks to the larger outside raceways. Once outside, fry were switched to Rangen salmon diet using Haskell's (1967) feeding rate formula. The feeding rate was calculated using a growth rate of 0.033 inches per day. During the 1992 brood year, it became necessary to slow the growth rate to meet the target size of 4.5 fish per pound. This was accomplished by hold the fish completely off feed for week at a time once a month, then returning the fish to full ration as suggested by Klontz (1992). With this method, the fish were held at a growth rate of 0.022 inches per day, while better preserving their fins from erosion.

Piper's (1970) formulas for density and flow indexes were used to calculate the densities and flows for each raceway and fry tank. The desired maximum density index and flow index of .30 and 1.25 was not reached this year because of the smaller size of smolts at transport time. The highest flow index and density index was .29 and 1.20. The final indexes for the individual raceway numbers, densities, and flows are found in Table 3.

Table 3. Final raceway inventory and indexes for Magic Valley.								
Hatchery "A" and "B" strain steelhead for brood year 1992.								
Race	Strain	Egg Source	Number	Weight	Fork Length	No/ lb	Flow Index	Density Index
1	B	Dwor	112,700	18,400	187	6.1	.91	.25
2	B	Dwor	118,100	20,750	193	5.7	1.00	.24
3	B	Dwor	127,600	19,500	197	6.5	.97	.24
4	B	Dwor	109,900	21,850	200	5.0	1.02	.25
5	B	Dwor	117,500	17,150	194	6.8	.87	.23
6	B	Dwor	126,500	19,350	186	6.5	.97	.24
7	B	Dwor	102,200	17,050	191	6.0	.83	.20
8	B	Dwor	88,900	16,000	194	5.6	.77	.19
9	B	E.Fork	106,400	17,300	184	6.2	.85	.21
10	A	Pah	123,600	25,300	213	4.9	1.17	.28
11	A	Pah	121,000	22,850	196	5.3	1.08	.26
12	A	Pah	139,600	24,500	196	5.7	1.18	.29
13	A	Pah	133,600	23,650	193	5.7	1.14	.28
14	A	Pah	144,000	24,700	196	5.9	1.20	.29
15	A	Pah	131,800	24,100	194	5.5	1.15	.28
16	A	Pah	122,300	22,050	202	5.6	1.06	.26
Total A's			1,009,800	167,350	191	6.0	.91	.22
Total B's			915,900	167,150	194	5.4	1.14	.28
Grand Total			1,925,700	334,600	193	5.7	1.01	.25

Water flows continued to be low this year. Maximum flows were reached in December at 114 cfs, while minimum flows occurred in April at 93 cfs. Oxygen demand did not fall to low levels this year because loading densities and flow indexes stayed at the lower levels of .25 and 1.01, respectively. Each of the 32 raceways (5,372 cubic feet of rearing space) had 3.5 cfs early in the year and 2.9 cfs at distribution time in April.

The steelhead maintained a .58-inch per month growth. The fish were fed \$29,936 pounds of feed and produced 334,500 pounds of fish for a conversion of 1.58. Conversion was higher this year because the fish were held off feed one week per month which reduced the gain to 334,500 pounds.

FISH RELEASES

Steelhead smolt distribution began on April 7 and ended on April 22 after 12 days of transport to 7 sites on the Salmon River and its tributaries (Appendix B). The distribution of 334,500 pounds utilized six LSRCP tank trailers with four contract drivers and two IDFG drivers to carry 52 loads of fish.

SPECIAL STUDIES

For a second year, the hatchery crew studied the factors contributing to fin erosion in steelhead trout. Last year, studies concentrated on densities and feeding levels, while this year the variables were density and substrate.

Fish from a single raceway were divided into six Heath fiberglass troughs at three densities (Table 4). In addition, fish from the original raceway were monitored and studied while the density was held between .2 and .3. Monthly measurements were made on total length, dorsal length, and pectoral fin lengths to the nearest millimeter. A fin index was calculated by using Kindschi's (1987) formula:

$$\text{Fin index} = \text{Mean Fin Length} / \text{Mean Total Length} \times 100.$$

Fish were fed at the growth rate of .033 inches per day. Fish in the fiberglass troughs were fed with demand feeders, while fish in the cement raceway were fed utilizing the moveable feeding bridge.

Table 4. Indexes and parameters for fin erosion experiment .			
Tank	Density	Volume	Flow Index
#1	0.20	9,389	.29
#2	0.20	9,389	.28
#3	0.40	9,389	.61
#4	0.40	9,389	.69
#5	0.10	11,585	.20
#6	0.10	11,585	.19
#7	0.25	10,744	.78

Whenever the outdoor fish were held off feed, all of the indoor fish were also held off feed. Results indicated a significant difference (P <0.05) between density and fin erosion over an eight-month period, with regeneration occurring in pectoral fins after five months.

Comparative studies conducted between indoor fiberglass and outdoor concrete raceways revealed significant differences (P <0.000) in fin erosion. The relationship between substrate and fin erosion is not conclusive; however, due to exogenous variables such as different feeding styles, weather, and predators that may have also contributed to the findings.

FISH HEALTH

Idaho Department of Fish and Game Fish Pathologist Doug Munson conducted all of the examinations of the fish during the year and made the following comments on fish health for the Magic Valley Hatchery (Table 5).

Magic Valley

Diseases Encountered and Treatment.

No diseases, acute or chronic were noticed at Magic Valley during the '92-'93 growing in Magic Valley fish. This was the second year that oxytetracycline medicated feed was not prophylactically fed to these stocks. No negative results were noticed. Renibacterium was found in routine preliberation samples via ELISA (enzyme linked immunosorbent assay). There were no signs of disease from this etiologic agent.

Organosomatic Index

Acute Losses

Acute and chronic losses to etiologic agents were not identified at Magic Valley Steelhead Hatchery.

Other Assessments

Preliberation and organosomatic evaluation of Magic Valley reared steelhead were regarded as normal for this hatchery. The positive results for Renibacterium was most likely a result from cutting the gut or pyloric caeca and a cross reaction in the ELISA process. There were no positive BKD fish via FAT methods from the same fish.

Table 5. Fish Health Examination Report.

Brood year	Stock	Species	Log #	Date	VH	VF	BK	BF	BR	BC	Comments
1992	DWOR	STB	92-338	8-24	-	-					BK 0/10 VIRO 0/10
1992	E.FP	STB	92-339	8-24	-	-	-				BK 0/10 VIRO 0/10
1992	PAH	STA	92-340	8-24	-	-	-				BK 0/10 VIRO 0/10
1992	DWOR	STB	92-414	9-29	-	-	-				BK 0/10 VIRO 0/10
1992	DWOR	STB	92-442	10-19	-	-					BK 0/10 VIRO 0/10
1992	DWOR	STB	92-477	12-4	-	-	-	-	-		BK 0/10 VIRO 0/10
1992	E.FK	STB	92-478	12-4	-	-	-	-	-		BK 0/10 VIRO 0/10
1992	E.FK	STB	92-479	12-4	-	-	-	-	-		BK 0/10 VIRO 0/10
1992	PAH	STA	93-56	3-2	-	-	+				BK 1/3 VIRO 0/20
1992	DWOR	STB	93-57	3-2	-	-	+				BK 1/3 VIRO 0/20
1992	E.FK	STB	93-58	3-2	-	-	-				BL 0/20 VIRO 0/20

FISH MARKING

Adipose Fin Clipping

All hatchery-reared steelhead are required to have an adipose fin clip to identify them from wild steelhead. At Magic Valley Hatchery, adipose clipping began on October 26, 1992 with the coded wire tagging crew. They completed marking 424,102 fish on October 19, 1992. The adipose marking crew marked the remaining 1,517,860 steelhead between November 9 and November 25. Mortality was 0.048%, with 99.62% of the fish having acceptable clips.

Coded Wire Tagging

Both "A" and "B" strain steelhead received coded wire tags this brood year. There were 318,231 fish coded wire tagged and marked with a left ventral and adipose clip in ten raceways (Appendix D).

PIT Tagging

Ten raceways received 100 PIT tags each (Appendix D). Only one mortality occurred among the 1,000 PIT-tagged fish.

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A P P E N D I C E S

Appendix A. Water analysis for Magic Valley Hatchery.

Analysis	Results (mg/l)	Date analyzed
Alkalinity	179.0	6/22/92
Ammonia as N.	<0.05	6/22/92
Arsenic	<0.005	7/02/92
Cadmium Graphite	<0.001	6/26/92
Calcium	59.0	6/26/92
Chloride	50.5	7/07/92
Copper	<0.01	6/26/92
Hardness	243	6/26/92
Iron	<0.01	6/29/92
Lead Graphite	<0.002	6/24/92
Magnesium	24.0	6/26/92
Manganese	<0.01	6/22/92
Nitrate as N	1.86	6/23/92
Mercury	<0.0005	6/24/92
Nitrite as N	<0.01	6/19/92
Phosphate, Total	0.02	6/23/92
Sulfide	<0.05	6/24/92
Sulfate	60.6	7/01/92
Total Diss. Solids	525.0	6/22/92
Total Kjeldahl Nitrogen	<0.01	6/22/92
Zinc	<0.001	6/29/92
pH (SU)	7.95	6/18/92

Appendix B. Steelhead smolt distribution in the Salmon River.						
Species	Numbers	Pounds	No/lb	Receiving waters	Dates Released	Hauling Mortality
Dworshak "B"	391,000	61,900	6.3	East Fork	4/7-9/93	4,535
East Fork "B"	106,400	17,300	5.72	East Fork	4/9/93	10
Dworshak "B"	187,100	30,950	5.72	Slate Creek	4/15/93	8,600
Dworshak "B"	325,300	57,200	5.70	Little Salmon	4/16-21/93	45
Pahsimeroi "A"	266,300	46,750	5.70	Salmon R. (Ellis)	4/12-13/93	25
Pahsimeroi "A"	260,600	47,350	5.50	Salmon R. (Challis)	4/13-14/93	35
Pahsimeroi "A"	198,500	35,800	5.5	Salmon R. (Lemhi)	4/14-16/93	30
Pahsimeroi "A"	190,500	37,250	5.1	Salmon R. (N. Fork)	4/16-22/93	25

Appendix C. Broodyear production cost table.							
Number of fish	Pounds of feed	Cost of feed	Pounds of fish	Conversion	Total cost	Cost per 1,000	Cost per pound
1,925,700	529,936	156,545.79	334,500	1.58	478,831	248.65	1.43

Appendix D. Steelhead marking.

Rwy	Date Marked	No. fish marked	Type mark code	Purpose	No. Marks released	Site released
1W	10/26/92	19,821	CWT 10-50-1	Mitigation, Research,Harvest	19,802	East Fork Salmon
1E	2/23/93	100	PIT	Smolt travel time Adult returns	100	East Fork Salmon
4W	10/29/92	21,051	CWT 10-50-4	Mitigation, Research, Harvest	21,029	Little Salmon
4E	2/23/93	100	PIT	Smolt travel time Adult return	100	Little Salmon
5W	10/30/92	20,656	CWT 10-50-5	Mitigation Research, Harvest	20,639	East Fork Salmon
5E	2/23/93	100	PIT	Smolt travel time Adult return	100	East Fork Salmon
6W	11/2/92	21,058	CWT 10-50-6	Mitigation, Research, Harvest	21,025	Little Salmon
6E	2/23/93	100	PIT	Smolt travel time Adult return	100	Little Salmon
8W	11/4/92	21,100	CWT 10-50-8	Mitigation, Research,Harvest	21,071	Little Salmon
8E	2/23/93	100	PIT	Smolt travel time Adult return	100	Little Salmon
9W	11/5/92	20,639	CWT 10-50-9	Mitigation, Research, Harvest	20,612	East Fork Salmon
9E	2/23/93	100	PIT	Smolt travel time Adult return	100	East Fork Salmon
IOW	11/5/92	66,782	CWT 10-49-24	Mitigation, Research, Harvest	66,671	North Fork
10E	2/23/93	100	PIT	Smolt travel time Adult return	100	North Fork
11W	11/4/92	20,922	CWT 10-50-11	Mitigation, Research, Harvest	20,880	Challis

Appendix D. Steelhead Marking (cont'd.)

RWY	Date Marked	No. Fish Marked	Type mark/Code	Purpose	No. marks Released	Site Released
11E	2/23/93	100	PIT	Smolt travel time Adult return	99	Challis
13W	11/3/92	20,848	CWT 10-50-13	Mitigation, Research, Harvest	20,776	Lemhi
13W	2/23/93	100	PIT	Smolt travel time Adult return	100	Lemhi
14W	10/29/93	20,944	CWT 10-50-14	Mitigation, Research, Harvest	20,878	Ellis
14E	2/23/93	100	PIT	Smolt travel time Adult return	100	Ellis
15W	11/28/93	21,504	CWT 10-50-15	Mitigation, Research, Harvest	21,460	Lemhi
15W	11/28/93	22,225	CWT 10-50-42	Mitigation, Research, Harvest	22,201	Lemhi
15E	2/23/93	100	PIT	Smolt travel time Adult return	100	Lemhi
16W	10/30/92	20,681	CWT 10-50-16	Mitigation, Research, Harvest	20,623	Ellis
16E	2/23/93	100	PIT	Smolt travel time Adult return	100	Ellis
All rwy	11/9-25/93	1,941,99 2	Adipose clips	Hatchery/Wild	1,925,70 0	Salmon drainage

Appendix E. Summary of fish autopsy preliberation examinations.

Eyes	Gills	Pseudo-branches	Thymus	Mesentary Fat	Spleen	Hind gut	Kidney	Liver	Bile
SUMMARY OF NORMALS (PERCENT)									
DWORKSHAK (B)									
95	85	0	0	100	100	100	0	100	100
EAST FORK (B)									
100	100	0	0	100	100	100	100	100	100
PAHSIMEROI (A)									
100	90	100	100	100	100	100	100	100	100

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