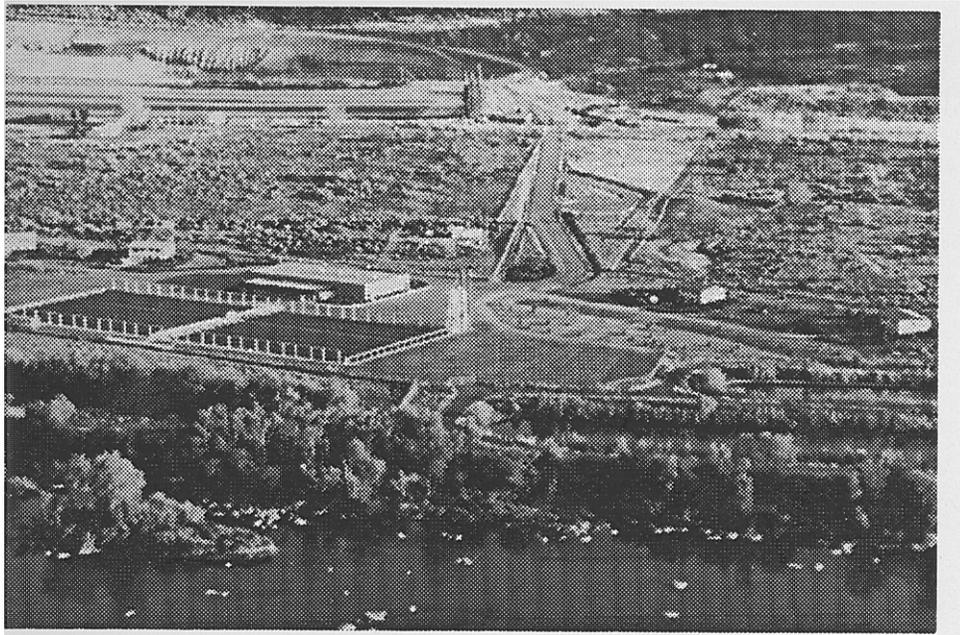




**MAGIC VALLEY FISH HATCHERY
1994 STEELHEAD BROOD YEAR REPORT**



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TABLE OF CONTENTS

ABSTRACT	1
INTRODUCTION	2
OBJECTIVES	2
FACILITIES	2
WATER SUPPLY	3
STAFFING	3
FISH PRODUCTION	3
Egg Shipments and Early Rearing	3
Final Production Rearing	4
Length Frequency Data	4
FISH HEALTH	5
FISH MARKING	5
Adipose Fin Clipping	5
Coded-Wire Tagging	5
Passive Integrated Transponder Tagging	5
LITERATURE CITED	6

APPENDICES

Appendix 1.	Brood Year 1994 Steelhead Survival from Eyed Eggs to Released Smolts	8
Appendix 2.	Brood Year 1994 Production Costs	8
Appendix 3.	Final Raceway Inventory with Flow and Density Indices for Magic Valley Hatchery A- and B-strain Steelhead Trout for 1994 Brood Year	9
Appendix 4.	Steelhead Smolt Distribution in the Salmon River and Tributaries	9
Appendix 5.	Length Frequency Data and Analysis	10
Appendix 6.	Length Frequency of Pahsimeroi A's from Raceways 13W, 10E, 16E on April 12, 1995	11

Appendix 7. Length Frequency of Dworshak B's from Raceways
1W, 3W, 9W on April 12, 1995 12

Appendix 8. Length Frequency of East Fork B's from Raceway 10W 13

Appendix 9. Summary of Fish Autopsy Preliberation Examinations 14

Appendix 10. Brood Year 1994 Coded-Wire Releases 15

ABSTRACT

The eighth year (May 1, 1994 to April 30, 1995) of steelhead *Oncorhynchus mykiss* production at Magic Valley Hatchery was completed with a total of 1,731,355 A-strain and B-strain steelhead smolts stocked weighing 391,825 lbs. These fish were fed 548,400 lbs of feed for a conversion of 1.49. Excess fish (26,531 fry weighing 617 lbs) from the Pahsimeroi A-lot were planted locally on October 19, 1994 at Salmon Falls Reservoir.

Three different stocks of steelhead were received as eyed eggs including 800,785 A-strain (Pahsimeroi stock) steelhead eggs yielding a total of 684,035 smolts. A total of 75,395 B-strain eggs (East Fork Salmon River stock) were received and returned 65,000 smolts to the East Fork Salmon River. In addition 1,520,160 eggs (Dworshak, Clearwater B-stock) were received, contributing a total of 982,320 smolts back to the Salmon River and its tributaries. The East Fork Salmon River got 423,705 Dworshak B-smolts; 342,680 went to Hazard Creek on the Little Salmon River; and Slate Creek received 215,935 Dworshak fish. Further stocking information is located in Appendix 3.

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INTRODUCTION

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

The MVH is located in Twin Falls County, seven miles northwest of Filer in the Snake River canyon. The hatchery uses a maximum 125 cu ft/sec 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 B-stock, East Fork Salmon River B-stock, and Pahsimeroi A-stock.

Furunculosis appeared, for the first time in the history of MVH, and caused elevated mortality in several of our raceways.

OBJECTIVES

1. To hatch and rear 1.78 million A- and B-strain 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 incubators (12 gal). 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 cu ft of rearing space) with a capacity of 115,000 to 125,000 steelhead to 200/lb 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 to 70,000 smolt-sized steelhead. The outdoor raceways are spanned by a moveable bridge equipped with 16 automatic Neilsen fish feeders. Two 30,000 lb 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 a common pipe before entering the flow-through settling pond. The hatchery effluent water is treated by opening valves in the bottom of "quiescent zones" and sweeping wastes into a cleaning waste water pond (approximately 2.5 surface acres). A hatchery flow-through waste water pond (about 1.5 surface acres in size) cleans the non-cleaning waste water. All cleaning effluent must pass through both ponds.

The limiting factors in producing more smolts are space and water flows. Density and flow indices may exceed the maximum desired levels of .3 lbs of fish/cf of rearing space per inch of fish length, and 1.25 lbs/gal/min/inch of fish length at the end of the rearing cycle. Water flows have not reached the 125 cfs maximum water right in several years due at least in part to the drought. Decreases in numbers of fish requested from this facility have improved loading levels even with lower water flows.

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 cfs 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 and to clean upper quiescent zones without dewatering the bottom section. This line has apparently never been used to this date. 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

Magic Valley Hatchery is staffed with four permanent employees: Bob Moore, Fish Hatchery Manager II, who replaced Bud Ainsworth Jr. after his retirement; Dave May, Assistant Fish Hatchery Manager; and two fish culturists, Kent Hills and Mark Olson. Mark Olson replaced Dwight Aplanalp (who lateraled to Clark Fork Hatchery in the Spring of 1995). In addition, we sometimes hire temporary bio-aides, laborers, and Youth Conservation Corp workers to assist with fish culture duties during peak production, smolt transportation, and adipose-fin clipping. Denise Koch and Michael Reed were our bio-aides this year. Personnel from this MVH oversee adipose marking operations at the three steelhead hatcheries located in southern Idaho.

FISH PRODUCTION

Egg Shipments and Early Rearing

The hatchery received 1,520,160 B-strain (Dworshak stock) eyed eggs, 75,395 B-strain eyed eggs (East Fork Salmon River stock), and 800,785 A-strain eyed eggs (Pahsimeroi stock). All eggs were received in April, May, and June 1994. The survival of eyed eggs to smolts is found in Appendix 1.

All eggs received were treated with Argentyne at 100-ppm for ten minutes, enumerated by displacement and put into the upwelling incubators (50,000 to 75,000 eggs/incubator, 15 gal/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 to 250 gal/min) averaged 120,000 feeding fry until they reached 300/lb 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 and East Fork stocks.

All of the feeding fry were started on either BioDiet soft-moist or Rangen soft-moist feed until moved from the hatchery building tanks to the larger outside raceways.

Final Production Rearing

Fish in the outdoor raceways were then fed Rangen salmon diet using Haskell's (1967) feeding rate formula. The feeding rate was calculated using a projected growth of .027 inch/d, starting with 1-inch fish (swim-up fry) and ending with an 8.4 inch smolt.

The steelhead maintained an average .65 to .71 inch/mo growth. The fish had a conversion of 1.49 lbs of feed to produce a pound of fish. Some of the fish were growing faster than desired and were put on an intermittent schedule of feed, 7 days on feed and 7 days off feed for parts of the last two months. See Appendix 2 for feed and total costs.

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 3.

Maximum flows for the year were around 110 cfs from October through March. Each of the outside 32 raceways had about 3.4 cfs prior to distribution in April.

Steelhead smolt distribution began on April 8 and continued six days a week through May 1, 1995. An average of four trucks/d was used for the transportation of 391,825 lbs of fish and involved 81 truckloads (Appendix 4). In the past we have hauled as many as 7,000 lbs of smolts per truckload. In brood year 1993 we tried 6,000 lbs/truck. This year we hauled only 5,000 lbs/load to meet IHOT (Integrated Hatcheries Operation Team) recommendations. Hopefully, lower loading levels will translate into higher survival rates for the smolts.

Length Frequency Data

It appears that sometime in the near future the National Marine Fisheries Service (NMFS) may require us to produce smolts within a very narrow size range (170mm to 220mm). Length frequency data (Appendix 5) from brood year 1994 showed 26% to 45% of smolts planted would have been unacceptable under this plan. See Appendices 6, 7, and 8 for length frequency graphs of all three stocks. It is not surprising so many fish would have been rejected, since it was not our goal to raise smolts in this size range. Next year feeding methods, etc. will be modified to see if that can produce this desired size without major changes in hatchery operation. It is however, doubtful compliance will approach 100% without grading.

FISH HEALTH

Fish Health in general was good for the brood year 1994 fish. We suffered our first encounter, with furunculosis, *Aeromonas salmonicida* at the beginning of 1995. Mortality was generally low grade and chronic. Mortalities rarely exceeded 20/d in the affected (approximately one-fourth) of the total raceways. However, three raceways suffered in excess of 100 mortalities/d sometime prior to stocking. We had to treat with Romet-30 (50mg/kg/day) for five days in January and February. Both treatments seemed to effectively control the disease until the fish were taken off feed for seven days to reduce final fish size. The furunculosis would show up again within two days of the resumption of feeding. When symptomatic fish showed up in March we treated with Terramycin (2.5-3.8 gm/100 lbs. of fish). This drug was used because of the shorter withdrawal time of 21 days versus 42 days for Romet-30. The withdrawal period would not be over before the fish needed to be stocked with the Romet treatment. Unfortunately, Terramycin appeared to have little beneficial effect on mortality rates.

Organosomatic index assessments (Appendix 9) revealed robust fish with plenty of stored energy (fat index of four). No IPNV (infectious pancreatic necrosis virus) was isolated this year. No signs of whirling disease were observed nor the parasite isolated at MVH. This is despite its proximity to Kelly Canyon (Cedar Draw Creek) which is positive for whirling disease. To curtail any chance of horizontal transmission of etiological agents, a stringent program of disinfection should be continued.

FISH MARKING

Adipose Fin Clipping

All of the A- and B-strain hatchery steelhead are required to have an adipose fin clip identifying them from wild steelhead.- At MVH the fin-clipping crews marked 1,789,501 fish during September. Fin-clipping mortality was negligible. Personnel randomly sampled the population of fish prior to stocking and found 98.0% had an acceptable fin clip. Treatment was unnecessary after handling.

Coded-Wire Tagging

Three groups of steelhead were coded-wire tagged (CWT) this 1994 brood year. There were 518,431 fish marked with the coded-wire tag and 483,036 were stocked. Very little loss was encountered from handling and treatment was not necessary. Quality checks done before stocking revealed a 97% retention of CWT.

Passive Integrated Transponder Tagging

All three stocks of steelhead had a total of 2,400 Passive Integrated Transponder (PIT) tags inserted in them; of those 2,378 were released. All CWT and PIT fish data can be found in Appendix 10.

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.

APPENDICES

Appendix 1. Brood Year 1994 Steelhead Survival Rates From Eyed Eggs to Released Smolts.

Eyed egg number	Percent hatched	500/Pound number	Percent survival	Released smolts-fry	Percent survival
<u>Pahsimeroi A-strain</u>					
800,785	97.5%	760,303	4.9%	684,035	85.4%
<u>Dworshak (Clearwater) B-Strain</u>					
1,520,160	96.0%	1,101,555	72.5%	82,320	64.6%
<u>East Fork Salmon B-Strain</u>					
75,395	95.5%	67,352	89.3%	65,000	86.2%
2,396,340	96.3%	1,929,210	80.5%	1,731,355	72.2%

Appendix 2. Brood Year 1994 Production Costs.

Number of fish	Pounds of fish	Pounds of feed	Conversion	Feed cost	Total cost	Cost/1,000	Cost/lb
1,631,355	391,825	584,400	1.49	\$164,629	\$476,700	\$275.34	\$1.21

Appendix 3. Final Raceway Inventory With Flow and Density Indices for Magic Valley Hatchery A- and B-strain Steelhead Trout for 1994 Brood Year.

Raceway	Strain	Number Index	Weight Index	No/lb	Flow	Density
1	B	101,065	24,650	4.1	1.05	0.28
2	B	102,985	23,950	4.3	0.97	0.26
3	B	97,540	24,400	4.0	0.96	0.26
4	B	110,925	24,650	4.5	1.02	0.27
5	B	117,080	24,925	4.7	1.04	0.28
6	B	114,760	23,600	4.9	1.04	0.27
7	B	112,450	25,300	4.4	1.03	0.28
8	B	111,445	25,700	4.3	1.08	0.29
9	B	114,070	25,700	4.5	1.04	0.28
10 West	B	65,000	13,000	5.0	1.11	0.30
10 East	A	63,940	13,900	4.6	1.15	0.31
11	A	102,770	26,050	4.0	1.03	0.28
12	A	98,670	25,300	3.9	0.99	0.27
13	A	97,220	21,400	4.5	0.89	0.24
14	A	106,505	23,850	4.5	0.99	0.27
15	A	106,670	22,250	4.8	0.94	0.25
16	A	108,260	23,800	4.6	0.99	0.27
Total A's		684,035	156,550	4.4	1.03	0.28
Total B's		1,047,320	235,275	4.5	1.00	0.27
Grand Totals		1,731,355	391,825	4.4	1.02	0.28

Appendix 4. Steelhead Smolt Distribution in the Salmon River and Tributaries.

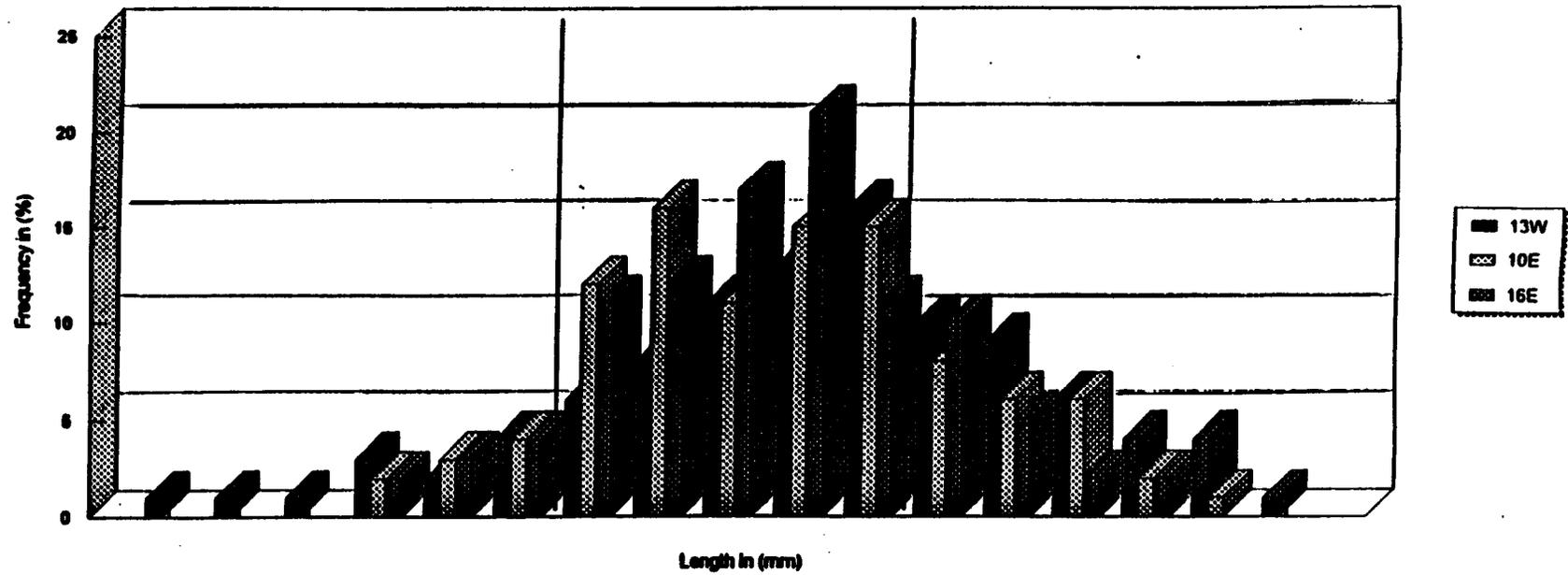
Species	Numbers	Pounds	No./lb.	Receiving Waters	Dates Released
Dworshak B	423,705	99,775	4.4	East Fork	4/19-25/95
East Fork B	65,000	13,000	5.0	East Fork	4/25-26/95
Dworshak B	215,935	46,300	4.4	Slate Creek	4/12-22/95
Dworshak B	342,680	76,200	4.5	Hazard Creek	4/26-5/1/95
Pahsimeroi A	198,270	48,100	4.1	Salmon R @ Lemhi	4/8-17/95
Pahsimeroi A	207,845	47,600	4.4	Salmon R @ McNabb Pt	4/10-12/95
Pahsimeroi A	115,050	27,350	4.2	Salmon R @ North Fork	4/13-14/95
Pahsimeroi A	162,870	33,500	4.9	Salmon R @ Bruno	4/17-19/95

Appendix 5. Length Frequency Data and Analysis.

Pahsimeroi A's		Length				Total release	Percent <175mm	Number <175mm	Percent >225 mm	Number >225 mm	Releasable with size limit		Not releasable with size limit	
Date	Pond fish/lb	Size	Minimum mm	Maximum mm	Mean mm						Percent	Number	Percent	Number
12/3/95	13W	4.40	96	299	209.6	49,280	14%	6,735	32%	15,934	54%	26,611	46%	22,669
12/3/95	10E	5.05	150	270	205.4	63,940	11%	7,228	23%	14,456	66%	42,256	34%	21,684
12/3/95	16E	5.42	140	280	203.3	55,460	12%	6,826	20%	11,092	68%	37,542	32%	17,918
Average: Pahsimeroi A's		4.96	129	283	206.1		12%		25%		63%		37%	
Subtotals						684,035		85,000		170,877		430,942		255,876
Dworshak B's		Length				Total release	Percent <175mm	Number <175mm	Percent >225 mm	Number >225 mm	Releasable with size limit		Not releasable with size limit	
Date	Pond	Size fish/lb	Minimum mm	Maximum mm	Mean mm						Percent	Number	Percent	Number
12/3/95	1W	4.61	160	280	207.9	49,815	7%	3,527	32%	15,870	61%	30,418	39%	19,397
12/3/95	3W	4.41	155	270	213.8	48,790	7%	3,614	31%	14,908	62%	30,268	38%	18,522
12/3/95	9W	5.37	100	260	193.8	56,870	26%	14,538	20%	11,117	55%	31,214	45%	25,656
Average: Dworshak B's		4.80	138	270	205.2		13%		27%		59%		41%	
Subtotals:						982,320		131,143		268,379		582,798		399,522
East Fork B's		Length				Total release	Percent <175mm	Number <176mm	Percent >225 mm	Number >225 mm	Releasable with size limit		Not releasable with size limit	
Date	Pond fish/lb	Size	Minimum mm	Maximum mm	Mean mm						Percent	Number	Percent	Number
12/3/95	10W	4.41	120	235	204.9	65,000	14%	9,057	20%	13,320	66%	42,623	34%	22,377
Magic Valley Hatchery						Total release					Releasable with size limit		Not releasable with size limit	
						1,731,355					1,056,363		674,992	

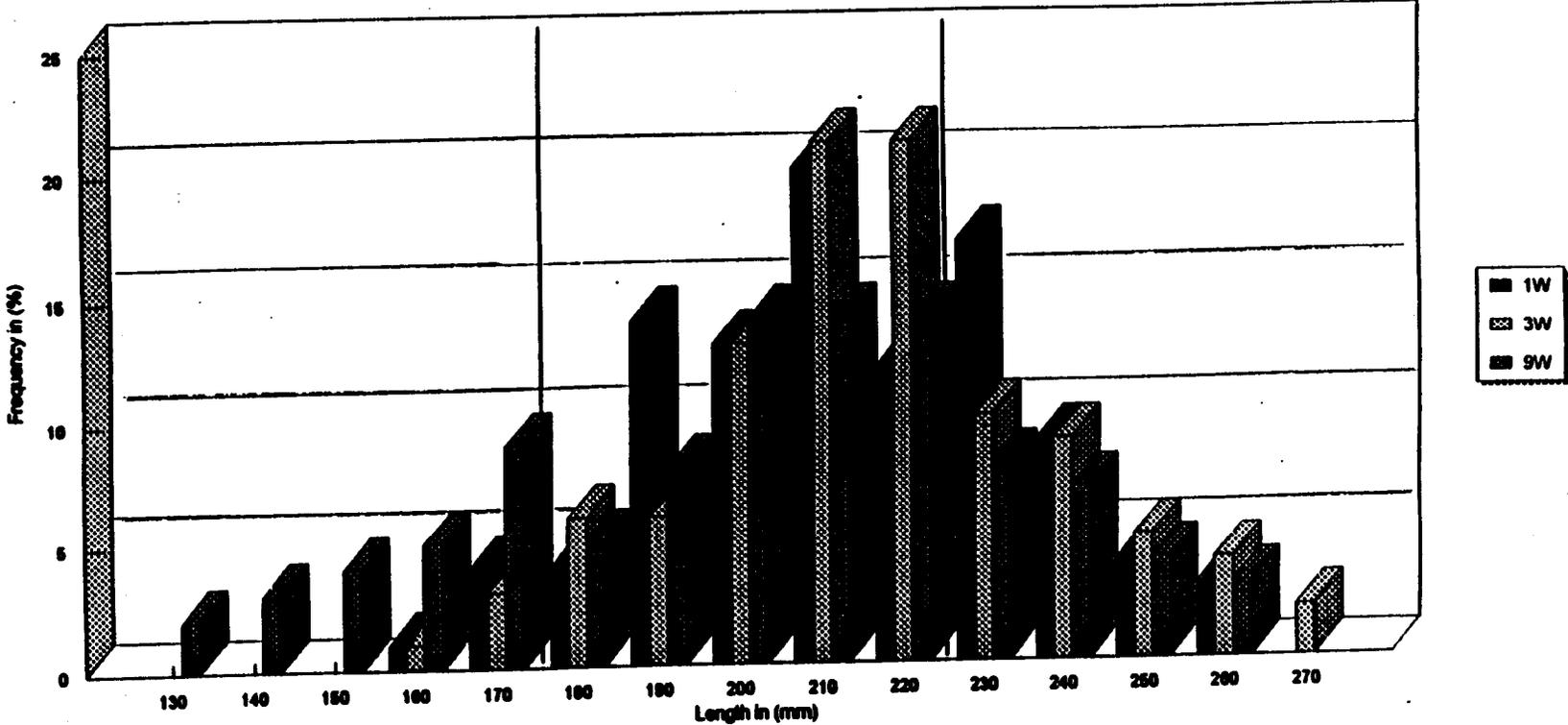
Note: This analysis shows the number and percent of fish that would have been acceptable or unacceptable for release under size guidelines proposed for future years by the National Marine Fisheries Service. All smolts were released this year.

Appendix 6. Length Frequencies of Pahsimeroi A's from Raceways 13W, 10E, 16E on April 12, 1995.



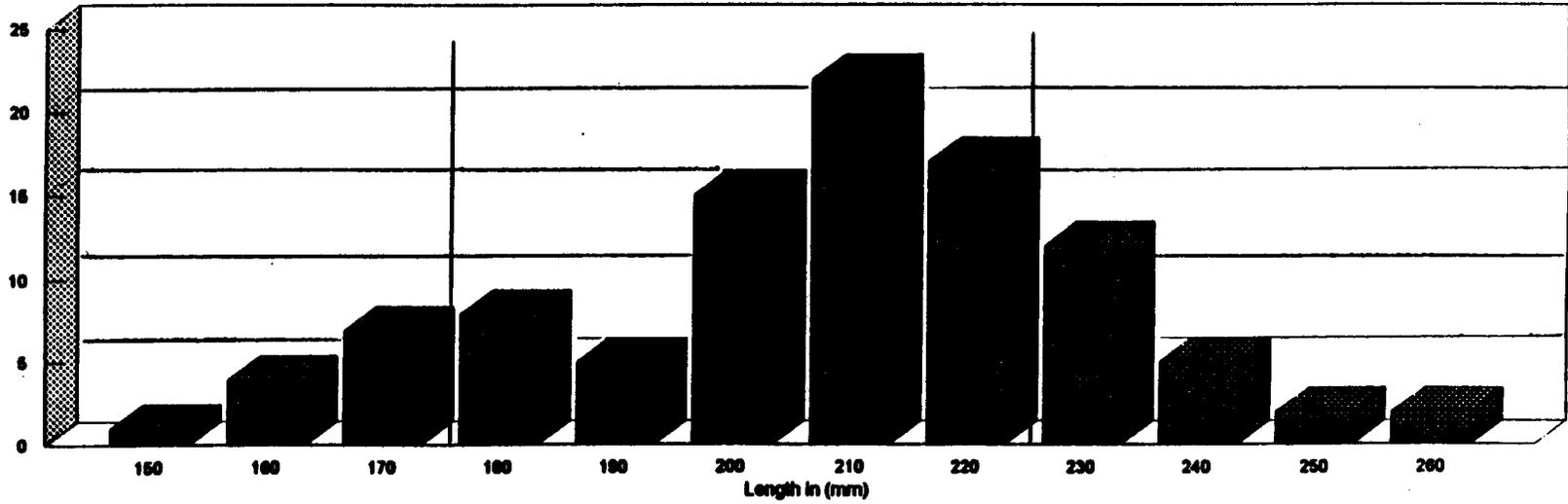
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Appendix 7. Length Frequencies of Dworshak B's from Raceways 1W, 3W, 9W on April 12, 1995.



12

Appendix 8. Length Frequency of East Fork B's from Raceway 10W.



13

Appendix 9. Summary of Fish Autopsy Preliberation Examinations.

Summary of Normals (Percent)										
	Eyes	Gills	Pseudo-branches	Thymus	Mesentary Fat	Spleen	Hind Gut	Kidney	Liver	Bile
Dworshak (B)	100	100	100	100	100	100	100	100	100	100
East Fork (B)	100	100	100	100	100	100	100	100	100	100
Pahsimeroi (A)	100	100	100	100	100	100	100	100	100	100

Appendix 10. Brood Year 1994 Coded-wire Releases.

CWT Code	Stock	Strain Number Tagged	Number Released	Receiving Water	Release Site	Purpose	
10-20-03	Dworshak	B	22,369	21,337	East Fork Salmon River	East Fork Weir	
10-20-12	Dworshak	B	21,797	20,414	East Fork Salmon River	East Fork Weir	Contribution
10-20-04	Dworshak	B	21,597	19,328	East Fork Salmon River	East Fork Weir	Contribution
10-20-13	Dworshak	B	21,791	19,548	Little Salmon River	Hazard Creek	
10-20-14	Dworshak	B	21,687	19,998	Little Salmon River	Hazard Creek	
10-20-06	Dworshak	B	21,104	19,430	Little Salmon River	Hazard Creek	
10-20-01	Dworshak	B	21,717	20,328	Slate Creek	Slate Creek	Contribution
10-20-05	Dworshak	B	21,880	20,391	Slate Creek	Slate Creek	Contribution
10-20-02	Dworshak	B	22,015	20,983	Slate Creek	Slate Creek	Contribution
10-20-24	E F Salmon	B	64,417	61,767	East Fork Salmon River	East Fork Weir	Contribution
10-20-10	Pahsimeroi	A	21,093	17,947	Salmon River	Bruno's	
10-20-11	Pahsimeroi	A	21,789	19,159	Salmon River	Bruno's	
10-20-09	Pahsimeroi	A	21,089	17,501	Salmon River	Bruno's	
10-20-08	Pahsimeroi	A	21,311	19,340	Salmon River	Lemhi	Contribution
10-20-15	Pahsimeroi	A	21,426	20,488	Salmon River	Lemhi	Contribution
10-20-07	Pahsimeroi	A	21,454	20,537	Salmon River	Lemhi	Contribution
10-20-18	Pahsimeroi	A	21,988	21,144	Salmon River	McNabb Point	Contribution
10-20-16	Pahsimeroi	B	21,507	20,625	Salmon River	McNabb Point	Contribution
10-20-17	Pahsimeroi	A	21,730	20,776	Salmon River	McNabb Point	Contribution
10-46-60	Pahsimeroi	A	32,818	31,186	Salmon River	North Fork	Contribution
10-46-61	Pahsimeroi	A	32,052	30,811	Salmon River	North Fork	Contribution
Totals:	Dworshak		195,957	181,755			
	East Fork		64,417	61,767			
	Pahsimeroi		258,057	239,514			
Grand Total:			518,431	483,036			

15

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