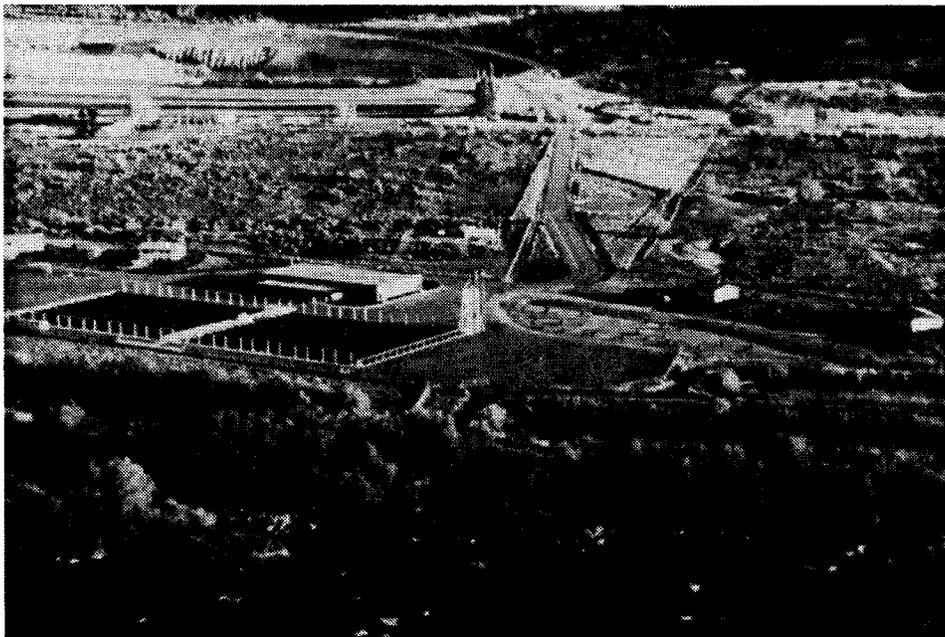




MAGIC VALLEY HATCHERY

1991 Brood Year Report



by

Bud Ainsworth, Fish Hatchery Superintendent III
Mike Graham, Fish Hatchery Superintendent II
Michele Baer, Fish Culturist
Bob Turik, Fish Culturist

December 1992

TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	1
INTRODUCTION	2
OBJECTIVES	2
FACILITIES	2
WATER SUPPLY	3
STAFFING	3
FISH PRODUCTION	3
FISH HEALTH	8
FISH MARKING	8
Adipose Fin Clipping	8
Coded Wire Tagging	9
PIT Tagging	9
LITERATURE CITED	10
APPENDICES	11

LIST OF TABLES

Table 1. Brood year 1991 steelhead survival from eyed eggs to released smolts	4
Table 2. Brood year 1991 mortality	5
Table 3. Final raceway inventory and indices for Magic Valley Hatchery 'A' and 'B' strain steelhead trout for brood year 1991	6
Table 4. Fin erosion study data	7

LIST OF APPENDICES

	<u>Page</u>
Appendix A. Water analysis for Magic Valley Hatchery	12
Appendix B. Steelhead smolt distribution in the Salmon River and tributaries	13
Appendix C. Brood year production cost table	13
Appendix D. Fish health monthly examinations of steelhead	14
Appendix E. Summary of fish autopsy preliberation examinations ..	15
Appendix F. Steelhead marking	16

ABSTRACT

The fifth year (May 1, 1991-April 30, 1992) of steelhead production at Magic Valley Hatchery was completed with 1,127,928 "A" strain (Oxbow Stock) steelhead eggs received, and 1,001,900 smolts stocked in the Little Salmon River. We received 91,317 "B" strain eggs (East Fork Salmon River stock) and returned 84,000 smolts to the East Fork Salmon River. In addition, 1,207,699 eggs (Dworshak and Clearwater stock) were received, and we stocked 956,400 smolts in the East Fork Salmon River. One lot of 119,752 "A" strain eggs (Pahsimeroi stock) were received, and 117,300 smolts were stocked in raceways at Sawtooth Hatchery for an acclimation study prior to release into the Salmon River.

A total of 2,160,400 "A" and "B" strain steelhead smolts were stocked, weighing 513,000 pounds, and were fed 624,573 pounds of feed for a conversion of 1.58

Authors:

Bud Ainsworth
Hatchery Superintendent III

Mike Graham
Hatchery Superintendent II

Michele Baer
Fish Culturist

Bob Turik
Fish Culturist

INTRODUCTION

Magic Valley Hatchery completed its fifth year of production of "A" and "B" strain steelhead production. The hatchery is part of the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP), compensating for losses of steelhead caused by the lower Snake River dams. The hatchery was constructed by the 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 (IDFG).

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

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, Oxbow (Snake River) "A" stock, and Pahsimeroi "A" stock. There were not any disease 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 early rearing room with 40, 12-gallon upwelling incubators capable of handling and hatching 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 capacity of 115,000 to 125,000 steelhead from swim-up to 200 per pound. The early rearing room also houses 2 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 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 steelhead each to smolt size. The outdoor rearing raceways are spanned by a 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.

The limiting factors in producing more smolts would be space and water 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 (Crystal Springs) water supply collection facility is located on the north shore of the Snake River. It collects the 59°F spring water in a concrete channel system and delivers the 125.47 cfs of water (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: Hatchery Superintendent III, Hatchery Superintendent II, Fish Culturist, and Roving Fish Culturist. Several temporary positions of bio-aides, Youth Conservation Corps workers, and laborers are employed at various times of the year to assist with fish culture duties during peak production, transportation, and in the absence of the roving fish culturist.

FISH PRODUCTION

The hatchery received 1,127,928 "A" strain (Oxbow stock) eyed eggs, 1,207,699 "B" strain (Dworshak Stock) eyed eggs, 91,317 eyed eggs (East Fork Salmon River stock), and 119,752 "A" strain eyed eggs (Pahsimeroi stock). All eggs were received the last week of April or during May. The survival of eyed eggs to smolts is found in Table 1.

Table 1. Brood year 1991 steelhead survival from eyed eggs to released smolts.					
Eyed eggs number	Percent hatched	500/pound number	Percent survival	Released smolts	Percent survival
<u>OXBOW (SNAKE RIVER 'A')</u>					
1,127,928	96.7	1,007,565	89.3	1,001,900	88.8
<u>PAHSIMEROI 'A'</u>					
119,752	98.6	117,603	98.2	117,300	98.0.7
<u>DWORSHAK (CLEARWATER 'B')</u>					
1,107,699	96.4	969,357	87.5	956,400	86.3
<u>EAST FORK 'B'</u>					
91,317	98.3	88,059	96.4	84,800	92.9
Totals & Averages:					
2,546,696	96.7	2,182,584	85.7	2,160,400	84.8

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, 15 gpm). The eggs hatched within five days and emerged from the incubators into the hatchery tanks 12 days after hatching. Each of the 20 nursery tanks (418 cubic feet of rearing space each, flow of 100-200 gpm) had a capacity of 150,000 feeding fry until they reached 300 per pound, or 2 inches, and were moved to the larger outside raceways. The highest mortality rate was during hatching, swim-up, and early rearing stages which is traditionally higher in the Dworshak stock of eggs and fish than in the Oxbow, Pahsimeroi, and East Fork stocks. Table 2 indicates the mortality by stock and month from eggs received to stocking.

Table 2. Brood year 1991 mortality.

Month	Oxbow	Pahsimeroi	Dworshak	East Fork
	Eggs Received			
	1,127,928	106,625	1,107,699	91,317
	Mortality			
MAY	59,970	1,445	105,425	1,500
JUN	20,460	610	13,836	2,236
JUL	2,852	469	2,466	561
AUG	1,614	262	1,447	96
SEP	1,990	181	1,427	41
OCT	1,363	64	1,212	91
NOV	533	133	830	46
DEC	358	35	335	9
JAN	432	42	422	24
FEB	1,206	182	776	16
MAR	1,550	76	747	36
APR	1,256	0	204	17

All of the feeding fry were started on Biodiet soft moist feed with oxytetracycline added for 145 days as a prophylactic treatment for cold water disease. After the medicated feed, the fish were fed either Biodiet soft moist or Rangens soft moist feed until moved from the hatchery building tanks to the larger outside raceways. They were fed Rangens salmon diet using Haskell's (1967) feeding rate formula. The feeding rate was calculated using a projected growth of 0.033 inches per day, starting with 1-inch fish (swim-up fry) and ending with an 8.4-inch smolt.

Piper's (1970) formulas for density and flow indexes 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 two months prior to stocking, with the exception of the East Fork and Pahsimeroi stock. These two groups of fish did not exceed the .21 density index. The final indices for the individual raceway numbers, densities, and flows are found in Table 3.

Table 3. Final raceway inventory and indices for Magic Valley Hatchery 'A' and 'B' strain steelhead trout for brood year 1991.

Raceway	Strain	Fish numbers	Weight (lbs)	No./lb	Flow index	Density index
1	A	154,600	38,400	4.03	1.61	0.41
2	A	154,800	40,200	3.85	1.67	0.43
3	A	148,900	37,350	3.99	1.57	0.40
4	A	125,200	32,850	3.81	1.36	0.35
5	A	135,500	34,650	3.91	1.44	0.37
6	A	137,300	34,300	4.00	1.44	0.37
7	A	145,600	33,850	4.30	1.45	0.37
8	B	147,400	35,800	4.12	1.47	0.37
9	B	121,000	27,050	4.47	1.51	0.39
10	B	153,200	34,850	4.40	1.51	0.39
11	B	147,200	31,450	4.68	1.38	0.35
12	B	137,400	32,200	4.27	1.38	0.35
13	B	128,200	29,050	4.41	1.26	0.32
14	B	84,800	20,200	4.20	0.84	0.21
15	B	122,000	27,400	4.45	1.19	0.30
16	A	117,300	23,350	5.02	1.07	0.27
TOTAL A'S		1,119,200	274,950	4.07	1.45	0.37
TOTAL 'B'		1,041,200	238,000	4.37	1.28	0.33
GRAND TOTALS		2,160,400	513,000	4.21	1.37	0.35

Due to reduced water flows of 92 cfs and a full capacity of fish, the dissolved oxygen would drop to 4 ppm after feeding in some of the higher density raceways. Each of the 32 raceways (5,372 cubic feet of rearing space each) had 3 to 4 cfs water flow early in the year and 2.9 cfs at distribution time in April.

The steelhead maintained a .8 to .9 inch per month growth. The fish had a conversion of 1.2 lbs of feed to produce a pound of fish. Some of the fish were growing faster than the desired size and were put on an intermittent schedule of feed; 7 days off feed and 7 days on feed for parts of the last two months. This caused some "soreback," but mortality remained low.

Steelhead smolt distribution began on March 23 for two days (four loads). The remainder of the fish were moved April 6 to April 25. The transportation of 513,000 pounds of fish involved 72 truckloads (Appendix B).

A study of fin erosion from September to April was conducted, with four Heath troughs inside the hatchery building, an additional Heath trough used for show fish inside the hatchery building, and the control or outside raceway 10. The variables studied were feed rates and densities and what affect they would have on the fins. Dorsal and pectoral fins were measured to the nearest millimeter on a monthly basis. The fin index was calculated by dividing the mean fin length by the mean total length and multiplying by 100. Table 4 below indicates the results. A fin index of 10.0 is a perfect fin and the index range covers the beginning (September) and the ending (April).

Table 4. Fin erosion study data.

	Density index	Feed rate (in/day)	Dorsal fin index range	Pectoral fin index range
GROUP 1	0.25	.024	9.0-4.0	10.0-9.2
GROUP 2	0.25	.033	9.0-4.4	10.0-8.8
GROUP 3	0.40	.033	9.0-6.0	10.8-8.1
GROUP 4	0.10	.033	10.0-7.0	10.0-9.0
SHOW	0.10	SATIATION	9.0-7.9	10.0-10.0
RACEWAY 10	0.30	.033	9.3-3.0	10.0-5.4

It was indicated that fish fed to satiation exhibited less fin erosion than fish fed lesser amounts. Fish held at low densities and fed to satiation or at least higher levels, had a fin index higher than those fed less amounts and

held at higher densities. The raceway 10 fin indexes at the end of the study and just prior to stocking were lower, partially because of the necessity to take them off feed attempting to hold them to the desired size of 4.5/lb, Fish in the troughs were never taken off feed, but did exceed the desired size of 4.5/lb. It appears that lower density indexes of 0.10 or 0.15 and feeding levels at or near satiation contribute to acceptable fins.

FISH HEALTH

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

The steelhead stocks, in general, improved in appearance and in fish health. Fin quality remained excellent until the final weeks of rearing. The hatchery changed diets this year compared to past years, implementing the salmon diet instead of the trout diet, and feeding at a higher rate instead of the normal lower rate. Feeding at the higher rate designed to lessen fin erosion.

Infectious Hematopoietic Necrosis Virus (IHN) was isolated in one pool of kidney/spleen/pyloric caeca of the East Fork stock "B" strain fish. No mortality could be attributed to this virus, and the virus was not isolated again.

Monthly and preliberation examinations (Appendix D & E) indicated that all stocks appeared to be void of serious pathogens. Fin quality had improved over previous years, and these fish appeared to be more "robust" than previous years. These improvements in fish quality are probably due to the changes in feeding protocol mentioned at the beginning of this section.

Magic Valley Hatchery received eggs from Oxbow, Pahsimeroi, Dworshak, and Sawtooth (East Fork trap) hatcheries. Currently, stringent sanitation measures are implemented after smolt release for virus control. Prophylactic feeding of oxytetracycline will be discontinued at Magic Valley Hatchery because it was felt that coldwater disease had not been a problem in the past and prophylactic reeding would not be needed.

FISH MARKING

Adipose Fin Clipping

All of the "A" and "B" strain hatchery steelhead are required to have an adipose fin clip to identify them from wild steelhead. At Magic Valley Hatchery, the fin clipping crews marked 2,155,596 fish during October and November. Fin clipping attributed to a .05% mortality rate. Personnel randomly sampled the population of fish prior to stocking and found 99.33% had an acceptable fin clip. Treatment was unnecessary after handling.

Coded Wire Tagging

Three groups of steelhead were coded wire tagged in brood year 1991. There were 129,853 fish marked with the coded wire tags, and 129,220 were stocked. Very little loss was encountered from handling, and treatment was not necessary.

PIT Tagging

All three groups of steelhead had a total of 600 pit tags inserted in them, and all survived to be stocked (Appendix F).

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). 4pp.

Larmoyeux J.D. and Piper, R.G. 1971. Reducing eroded fin condition in hatchery trout. U.S. Trout News 1971 (5):8-9.

Kindschi, Greg A. 1987. Method for quantifying degree of fin erosion. Progressive Fish Culturist 49: 314-315.

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
Steelhead Dworshak B	956,400	217,800	4.4	East Fork Salmon River	4/6-14/92	310
Steelhead East Fork B	84,800	20,200	4.2	East Fork Salmon River	4/6-14/92	20
Steelhead Oxbow A	1,001,900	251,650	4.4	Little Salmon River	4/14-25/92	175
Steelhead Pahsimeroi A	117,300	23,350	5.0	Salmon River at Sawtooth Hatchery	3/23-24/92	20

Appendix C. Brood year production cost table.

Number Of fish	Pounds of feed	Cost of feed	Pounds of fish	Conversion	Total cost	Cost per thousand	Cost per pound
2,160,400	624,573	174,938	513,000	1.22	509,430	235.80	\$0.99

Appendix D. Fish health monthly examinations of steelhead.

Case #	Stock	Date	Data
<u>Juvenile samples</u>			
91-166	91 Pah SA	5/29/91	Viro: 0/10
91-167	91 HC SA	5/29/91	Viro: 0/10
91-168	91 Dwor SB	5/29/91	Viro: 0/10
91-188	91 Saw/HC SA	6/21/91	Viro: 0/10
91-189	91 EF SB	6/21/91	Viro: 0/10
91-190	91 Dwor SB	6/21/91	Viro: 0/10, 1/8 MAS 0/4 BC
91-202	91 Pah SA	7/10/91	Viro: 0/10, Bacty 0/4
91-203	91 DF SB	7/10/91	Viro: ½ pools+ IHNV
91-204	91 HC SA	7/10/91	Viro: 0/10, Bacty 0/4
91-205	91 Dwor SB	7/10/91	Viro: 0/10, Bacty 0/4
91-238	91 Dwor SB	8/21/91	Viro: 0/10, BK 0/10
91-239	91 EF SB	8/21/91	Viro: 0/10, BK 0/10
91-240	91 Pah SA	8/21/91	Viro: 0/10, BK 0/10
91-241	91 HC SA	8/21/91	Viro: 0/10, BK 0/10
91-283	9 Dwor SB	9/23/91	Viro: 0/10, Bacty 0/4
91-284	91 Pah SA	9/23/91	Viro: 0/10, Bacty 0/4
91-285	91 EF SB	9/23/91	Viro: 0/10, Bacty 0/4
91-285	91 HC SA	9/23/91	Viro: 0/10, Bacty 0/4
<u>Alcaligenes,</u>			
<u>Pseudomonas spp.</u>			
<u>Ps. maltophilia</u>			
91-313	91 EF SB	10/17/91	BK(FAT) 0/12
91-314	91 Dwor SB	10/17/91	BK(FAT) 0/12
91-315	91 HC SA	10/17/91	BK(FAT) 0/12
91-316	91 Pah SA	10/17/91	BK(FAT) 0/12
92-09	91 EF SB	1/16/92	Viro: 0/10, Bacty 0/4
92-10	91 Dwor SB	1/16/92	Viro: 0/10, Bacty 0/4
92-11	91 Pah SA	1/16/92	Viro: 0/5, Bacty 0/4
92-12	91 HC SA	3/04/92	Viro: 0/15, BK (ELISA & FAT) 0/15)
92-59	91 HC SA	3/04/92	Viro: 0/15, BK (ELISA & FAT) 0/15)
92-60	91 Pah SA	3/04/92	Viro: 0/15, BK (ELISA & FAT) 0/15)
92-61	91 EF SB	3/04/92	Viro: 0/15, BK (ELISA & FAT) 0/15)
92-62	91 Dwor SB	3/04/92	Viro: 0/15, BK (ELISA & FAT) 0/15)

Note: Pah = Pahsimeroi Stock
 HC = Oxbow stock
 Dwor = Dworshak stock
 EF = East Fork stock

Appendix E. Summary of fish autopsy Preliberation examinations.

Eyes	Gills	Pseudo branches	Thymus	Mesen- tary fat	Spleen	Hind gut	Kidney	Liver	Bile
SUMMARY OF NORMALS (PERCENT)									
OXBOW (SNAKE RIVER A)									
100	93	100	100	0	100	100	100	100	0
PAHSIMEROI (A)									
100	93	100	100	0	100	100	100	100	0
DWORSHAK (B)									
100	60	100	100	0	100	100	100	100	0
EAST FORK (B)									
100	100	100	100	0	100	100	100	100	0

Appendix F. Steelhead marking.

Date marked	No. fish marked	Type of mark	Purpose	No. marked released	Site release
OXBOW SNAKE RIVER A'S					
8/7-30/91	1,016,537	Adipose fin clip	Wild/ Hatchery	1,001,900	Little Salmon River
11/12-14/91	65,384	CWT 10/44/15 10/44/16 10/44/17	Mitigation Research Harvest	64,918	Little Salmon River
3/4/92	300	Pit Tag	Smolts travel time, Adult return	300	Little Salmon River
PAHSIMEROI A'S					
8/28-30/91	112,166	Adipose fin clip	Wild/ Hatchery	117,300	Salmon River & Sawtooth
DWORSHAK, CLEARWATER B'S					
8/7-30/91/	953,124	Adipose fin clip	Wild/ Hatchery	956,400	East Fork Salmon River
11/14-15/91	43,616	CWT 10/44/18 10/44/19	Mitigation Research Harvest	43,481	East Fork Salmon River
3/4/92	200	Pit Tag	Smolts travel time, Adult return	200	East Fork Salmon River
EAST FORK SALMON RIVER 'B'					
8/7-30/91	84,769	Adipose fin clip	Wild/ Hatchery	84,800	East Fork Salmon River
11/16/91	20,853	CWT 10/44/20	Mitigation Research Harvest	20,821	East Fork Salmon River
3/4/92	100	Pit Tag	Smolts travel time, Adult return	100	East Fork Salmon River

Submitted by:

Approved by:

Bud Ainsworth
Fish Hatchery Superintendent III

IDAHO DEPARTMENT OF FISH AND GAME

Michael A. Graham
Fish Hatchery Superintendent II

Michele Baer
Fish Culturist


Steven M. Huffaker, Chief
Bureau of Fisheries


Bill Hutchinson
Fish Hatcheries Manager