

IDAHO

DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

MACKAY HATCHERY

Annual Report



1 October 1983 - 30 September 1984

by

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MACKAY HATCHERY

Annual Report

ABSTRACT

The Mackay Hatchery has been converted to specialty status with emphasis on fingerling and fry production for statewide distribution.

Production at the Mackay Hatchery for the year October 1, 1983 to September 30, 1984 included:

170,000 (2,330 lbs) rainbow trout fingerlings
166,000 (205 lbs) Henrys Lake cutthroat trout fry
75,000 (1,645 lbs) brown trout fingerling
585,000 (11,003 lbs) fall chinook salmon fry, fingerlings and catchables
255,000 (4,650 lbs) coho salmon fingerlings
760,000 (2,225 lbs) early kokanee salmon fry
210,000 (3,000 lbs) sockeye salmon fry

At the beginning of the fish year, 154,968 fall chinook fingerlings weighing 5,803 pounds and 27,878 brown trout fingerlings weighing 1,131 pounds were on hand. Total Mackay fish planted or transferred numbered 2,219,139 fish weighing 26,008 pounds. A total of 110,620 (2,368 pounds) rainbow trout fry and fingerlings were on hand at the end of the fish year. After subtracting 3,004 pounds of fish transferred in, net production became 2,146,913 fish weighing 18,468 pounds.

A total of 24,616 pounds of feed was utilized, at a cost of \$6,799.22. A conversion of 1.33 was attained, and the feed cost per pound of fish produced was \$0.368. When all hatchery costs were included, each pound of fish produced required an expenditure of \$5.827. This cost includes the costs of redistributing catchables and of planting high mountain lakes with fry from other hatcheries.

In addition to raising fingerlings, Mackay Hatchery is used as a catchable-size rainbow trout redistribution facility. 102,516 fish (31,890 pounds) received from the Hagerman SFH were redistributed to the Lost River Sinks drainages and the upper Salmon River tributaries.

Seventy-eight high mountain lakes were planted with rainbow and cutthroat trout fry transferred here from the Ashton and McCall hatcheries, as the Mackay Hatchery was under construction at that time. Those fish are not included in the production figures, although the cost of planting them is included in the costs.

This year the Mackay Hatchery took on the responsibility of the Kooocanusa rainbow trout spawning operation at the Hayden Creek

Hatchery until the closure of that facility in June. 560,000 eggs were collected and eyed at Mackay, and 350,000 were shipped as eyed eggs to the Mullen Hatchery.

On October 28, 1983, an earthquake measuring 7.2 on the Richter scale hit the Mackay Hatchery, the epicenter being 8 miles away. The spring cover building was destroyed, and raceways were pulled apart and tipped so that the inlets are now at the deep end of the raceways. The major damage, however, was to the spring source. Several new springs opened up, with temperatures and water quality different from the main spring which had supplied the hatchery previously. The "new" water was generally unsuitable for hatchery needs, and was conducive to poor fish health. A major reconstruction project, which had been previously planned, was modified, expanded and started earlier than planned, cutting production short in June, 1984. This, of course, increased production costs for this year but will increase efficiency and lower costs in the future.

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OBJECTIVES

Because of its specialty status, the objectives of the Mackay Hatchery change from year to year, depending on management needs and specialty species egg availability. The objectives of the Mackay Hatchery for 1983-84 were as follows:

1. To stock approximately 75 high mountain lakes in Region 6.
2. To receive approximately 30,000 pounds of catchable rainbow trout and redistribute them to the upper Salmon River drainage and the Sinks drainages of Region 6.
3. To rear various species and numbers of fry and fingerling to be distributed to various locations in all 6 regions of the state.

These include:

550,000 fall chinook salmon
250,000 coho salmon
200,000 sockeye salmon
750,000 early kokanee salmon
170,000 R1 rainbow trout
75,000 brown trout fingerling
160,000 Henrys Lake cutthroat fry

4. To eye and ship approximately 350,000 Koozanusa rainbow trout eggs and 2 million early kokanee eggs.
5. To hold Ashton Hatchery's rainbow trout temporarily during reconstruction at that facility.

INTRODUCTION

The Mackay Hatchery is located 12 miles northwest of the town of Mackay in Custer County, Idaho. It is situated in high desert terrain' at an elevation of nearly 6,300 feet. The hatchery is arranged in a somewhat unique "closed system" in that water rises from springs on the hatchery grounds and after leaving the hatchery, gradually sinks back into the ground as part of the Lost River Sinks.

Historically, the hatchery water supply was a large spring area which provided water at a constant temperature of 52°F, with flows varying seasonally from 15 to 24 cubic feet per second (cfs). However, an earthquake in October of 1983 changed that dramatically. Several new spring vents were opened up, with temperatures ranging from 49°F to 56°F, dissolved oxygen ranging from 1.2 parts per million (ppm) to 3.4 ppm and carbon dioxide levels ranging from 8 to 10 ppm. Ammonia levels in the supply water were at times as high as .65 ppm, and pH changed from 7.6 (recorded in 1969) to 8.0 after the earthquake. These factors combined to produce poor rearing conditions for salmonids.

In June of 1984, the hatchery was depopulated and a major reconstruction project was begun. Water from the less desirable spring vents was channeled to a bypass ditch and water from the better springs was gathered in perforated pipes and a series of three dams. The water was then run through packed columns to aerate and de-gas and then put through the existing supply lines to the various rearing containers. Following reconstruction, the hatchery and small raceways were supplied with water at 52°F and 8 ppm oxygen. The large raceways were supplied with 5 cfs of water at 55°F, 7.6 ppm oxygen and/or 10 cfs of water at 52°F and 5.6 ppm oxygen. The pH is down to 7.7, ammonia is less than .5 ppm and CO₂ is down to 6 ppm. We do not yet know how water flows will fluctuate seasonally.

The physical plant consists of:

A hatchery building containing 13 Heath incubator stacks, providing a total of 195 incubation trays and 30 fiberglass nursery troughs, each 14.5' x 21" x 9.5" deep. The building is supplied with water via a 12-inch pipeline, with a 24-inch packed column aerator on the intake.

Eight fry raceways, each 3' x 100' x 24" deep, supplied via a 14-inch pipeline with a 12-inch packed column aerator on the intake of each raceway.

Eight production raceways, each 8' x 400' x 3' deep, supplied via a 30-inch pipeline and covered headrace. The production raceways can be operated with either of two very different water supplies or a mixture of the two. Five cfs of 55°F water runs through six 48" packed column aerators and arrives at the raceways at 7.6 ppm oxygen. Ten cfs of unaerated water at 52°F arrives at 5.6 ppm oxygen.

A 10' x 44' x 3' deep quarantine raceway was built this year to lessen the chance of infection of Mackay's production fish from catchables transferred here from other hatcheries. Water is supplied from the tailrace after running through large raceways 1 and 2.

An earthen pond, 15' x 80' x 3' deep, was washed out during the earthquake and is now used as a bypass ditch for excess and undesirable water.

FISH PRODUCTION

Seven species of fish were raised at the Mackay Hatchery this year, with percent survivals (live fish at release size, divided by eggs received) ranging from 23.1% to 97.8% (Table 1).

We planted or transferred 2,219,139 fish weighing 26,008 pounds with an additional 110,620 fish weighing 2,368 pounds on hand at the end of the fish year. We started the year with 154,968 fall chinook fingerlings weighing 5,803 pounds and 27,878 brown trout fingerlings

Table 1. Fish production at Mackay Hatchery, 10/1/83 - 9/30/84.^a

Species	Eggs received	% hatch	Fry received	Fish produced	% survival	Pounds produced
Rainbow trout (R1) ^b	158,984	98.7		155,490	97.8	730
			15,594	15,040	96.4	1,600
Cutthroat trout (C3)	176,904	96.0		165,845	93.7	205
Brown trout	194,304	94.7		45,000	23.1	225
Fall chinook salmon	303,120	85.7	422,616	441,275	58.6	3,115
Coho salmon			260,807	222,750	85.4	4,050
Sockeye salmon	259,356	85.8		210,000	80.9	3,000
Kokanee salmon (KE) ^c	76,160	77.3		50,000	65.6	500

^aDoes not include production from fish on hand at beginning of fish year.

^bIn addition, 350,000 Kooacanusa rainbow trout (R3) were shipped as eyed eggs.

^cAn additional 710,000 early kokanee were produced from eggs on hand 10/1/83. 1.75 million were shipped as eyed eggs.

weighing 1,131 pounds on hand. After subtracting 3,004 pounds of fish transferred in, net production became 2,146,913 fish weighing 18,468 pounds.

Egg and fry for our programs are received from various locations in the United States and Canada (Table 2).

FISH HEALTH

Fish health this year was poor in brown trout and fall chinook due to water quality changes from the earthquake of 1983. As dissolved gas concentrations would rise in the supply water, a percentage of the population would drop off of feed and would thereafter refuse feed and gradually die. Electrical mechanical aerators were borrowed from the Nampa SFH but frequent power outages resulted in poor quality brown trout and fall chinook salmon.

Flora in the spring area and raceways bloomed as never before, with blue-green algae, green algae and tremendous numbers of diatoms. The guts of fish apparently starving to death contained tremendous numbers of these organisms and some contained our commercial feed, but no digestion was ongoing.

Enteric bacterial infections were found in some of the fall chinook and brown trout, apparently as a secondary infection to the water chemistry and algae interaction.

Different species reacted differently to the water quality. The sockeye salmon thrived in the poor quality water and were released in very good condition.

FISH RELEASES

Egg and Fingerling Transfers and Plants

A total of 2,219,139 fry and fingerlings weighing 26,008 pounds were transferred to other stations or planted in waters in all 6 regions of the state (Table 3).

High Mountain Lake Program

Seventy-eight high mountain lakes in Region 6 were planted with rainbow and cutthroat fry this year. All were planted by Forest Service contract helicopter. As the Mackay Hatchery was shut down for construction at that time, the fish were transferred in from the McCall and Ashton hatcheries. None of these fish have been included in our production figures, although the cost of planting was absorbed by the Mackay budget.

Table 2. Origin of fish species reared at Mackay Hatchery, 10/1/83
 - 9/30/84.

Species	Received from:
Rainbow trout	Troutlodge, Soap Lake Washington (R1) Hayden Creek Hatchery, Idaho (Kooconusa R3) Hagerman NFH, Idaho (R1, Erwin, Tenn. Strain)
Cutthroat trout	Henrys Lake SFH, Idaho (C3)
Brown trout	Plymouth Rock Trout Company, Plymouth Mass.
Fall chinook salmon	Twin Branch SFH, Indiana Sand Ridge SFH, Illinois
Coho salmon	Sand Ridge SFH, Illinois
Sockeye salmon	Fulton River Salmon Project, Granisle, British Columbia
Kokanee salmon	Eagle SFH, Idaho and South Fork Boise River Trap (KE)

Table 3. Fry and fingerling plants and transfers from Mackay Hatchery production fish, October 1, 1983 to September 30, 1984.

Species	Month/ Year	Receiving waters	Numbers	Pounds	Region
Fall chinook	10/83	Deadwood Reservoir	6,007	225	3
		Coeur d'Alene Lake	30,002	1,402	1
		Ririe Reservoir	7,490	350	6
		Anderson Ranch Reservoir	35,310	1,650	4
		Oakley Reservoir	12,025	561	4
		Salmon Falls Reservoir	17,120	800	4
		Lost Valley Reservoir	2,140	100	3
	11/83	Salmon Falls Reservoir	25,500	1,500	4
	5/84	Ririe Reservoir	21,400	107	6
		Chesterfield Reservoir	4,600	23	5
	6/84	Mullan Hatchery	210,000	2,000	1
		Mullan Hatchery	5,100	1,300	1
		Mormon Reservoir	14,175	135	4
		Anderson Ranch Reservoir	28,350	270	4
		Hagerman Hatchery	35,175	335	4
Salmon Falls Reservoir		115,500	1,100	4	
6/84	Lost Valley Reservoir	7,875	75	3	
	Chesterfield Reservoir	4,200	40	5	
Coho	5/84	Island Park Reservoir	33,000	600	6
	6/84	Cascade Reservoir	154,000	2,800	3
		Ririe Reservoir	68,750	1,250	6
Sockeye	6/84	Stanley Lake	147,000	2,100	6
		Alturas Lake	63,000	900	6 -
Kokanee	6/84	Moose Creek	760,300	2,225	6
Rainbow trout	5/84	Mackay Reservoir	15,040	1,600	6
	6/84	Mackay Reservoir	155,490	730	6
Cutthroat trout	6/84	Subinett Reservoir	165,845	205	4
Brown trout	10/83	Palouse River	29,745	1,400	2
	5/84	Hagerman Hatchery	45,000	225	4
TOTALS			2,219,139	26,008	

Catchable-Size Rainbow Trout Redistribution

The Mackay Hatchery is used for redistribution of catchable-size rainbow trout trucked here from the Hagerman and American Falls hatcheries. During this year, 102,516 fish weighing 31,008 pounds were redistributed.

The catchable planting area included the Lost River Sinks (Birch Creek, Little Lost River drainage and Big Lost River drainage) and the upper Salmon River tributaries from Indianola to Yankee Fork.

SPAWNTAKING OPERATIONS

In addition to other duties, this year the Mackay Hatchery was assigned the spawntaking operation for Kooconusa rainbow trout at the Hayden Creek Hatchery until that facility was closed in June of 1984.

A total of 559,069 eggs were collected. After eyeing at Mackay, 350,000 were shipped to the Hale Fish Hatchery at Mullan for a 62% eye-up.

FISH FEED UTILIZED

A total of 24,616 pounds of feed was used to rear fish at Mackay this year. A feed conversion of 1.33 was attained on the Mackay production fish. Rangen's brand dry feed was used for the entire year. Feed costs totaled \$6,799.22. Feed cost per pound of fish produced was \$0.368. Total production costs per pound of fry and fingerling produced was \$5.827. Cost per fish produced averaged \$.0501. This cost includes all costs for redistributing fish from other hatcheries.

HATCHERY VISITORS

Because of its remote location and severe climate, and because the hatchery was closed for construction during the summer months, the Mackay Hatchery received few visitors other than a few fishermen and hunters who happened here incident to other activities. The total number of visitors in the last year was approximately 200.

HATCHERY IMPROVEMENTS

A completely new water collection system was built for the hatchery during the summer of 1984. A series of three dams was built, each with underground perforated pipe collectors at the intake. Water from each dam was run through newly-assembled pipes to a packed column type of aerator degasser. From the packed columns, water runs from each system

to its designated rearing unit. Water for the small raceways and hatchery building arrives at 52°F and 8 ppm oxygen. The collection aeration system for the large raceways treats 5 cfs at 55°F, producing 7.6 ppm oxygen. In addition, the capability exists of using an additional 10 cfs in the large raceways at 52°F and 5.6 ppm oxygen. The two systems for the large raceways may be used together or separately.

A 10' x 44' quarantine raceway was built in order to reduce the chance of infection from fish transferred in for redistribution. Water for the new raceway is reuse water from the tailrace, coming from the large raceway 1 and/or 2. The intake pipe for the fish-loading pump was poured in the new raceway wall, enabling one-man loading of the fish trucks.

A new office was finished in the old storage room of the hatchery building. The old bachelor's quarters room in the hatchery was turned into a laboratory. A microscope table was built. A microscope and triple-beam balance were procured, enabling us to do periodic necropsy and preliminary disease diagnosis.

The number 2 house, vacant since losing our fish culturist position, was furnished and converted into a bachelor's quarters.

A one-vehicle garage was built at residence #1, using trusses from the old spring house building, which was destroyed in the earthquake.

An additional 15-tray Heath incubator stack was installed, bringing our capacity to 195 trays.

The headrace was covered using materials from the old spring cover as a safety precaution and to eliminate light, reducing photosynthetic activity.

Spalled and cracked areas on raceway walls and floors were broken out and repoured, while we were able to use excess concrete brought in for the other construction. The damage had been caused by the earthquake and by gradual deterioration.

MISCELLANEOUS ACTIVITIES

During construction at the Ashton Hatchery, fish from that facility were held at the Mackay Hatchery. None of these fish have been included in Mackay Hatchery production figures, although production costs were absorbed by the Mackay budget. From October, 1983, to January, 1984, 52,000 rainbow trout were held at Mackay, gaining 4,102 pounds during their stay here. During September of 1984, Ashton's production was again held at Mackay, as construction was ongoing at Ashton.

HATCHERY NEEDS

Three additional raceways, each 5¹ x 75¹x 3¹ deep with aeration devices, need to be built to take advantage of water now being wasted and to maximize production.

A low-water alarm needs to be installed at the intake to the hatchery building. All other intakes are relatively foolproof.

The fish culturist position, which was removed from the Mackay Hatchery during the personnel realignment of June, 1983, needs to be reinstated in order to expand operations to coincide with the production capability of the new water system.

ACKNOWLEDGEMENTS

Hatchery staffing during the 1983-84 fish year included: Bill Doerr, Fish Hatchery Superintendent II; Lynn Watson, Fish Hatchery Superintendent 1 and at different times, Bob Poertner, Laborer; Dan Hughey, Bio-Aide; Scott Patterson, Bio-Aide and Lola Coates, Laborer. During the summer of 1984, Lynn Watson transferred to Henrys Lake Hatchery and we were joined by Doug Anderson, Fish Hatchery Superintendent I.

Me1 Reingold, Regional Fisheries Manager, planted the Salmon River mountain lakes, and Dennis Hardy, Utility Craftsman, helped plant the Copper Basin mountain lakes.