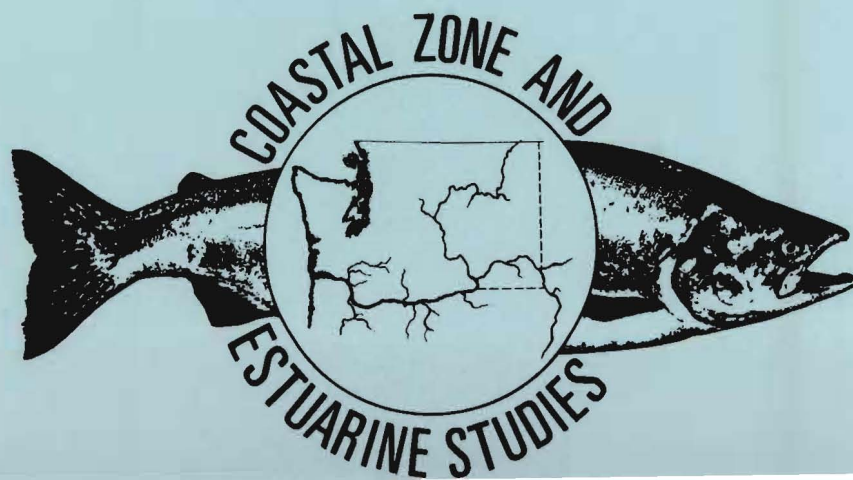


**Use of a Fish Transportation Barge  
for Increasing Returns of Steelhead  
Imprinted for Homing, 1984**

by  
**Jerrel R. Harmon  
and  
Emil Slatick**

**March 1985**



USE OF A FISH TRANSPORTATION BARGE FOR INCREASING  
RETURNS OF STEELHEAD IMPRINTED FOR HOMING, 1984

Annual Report of Research

by  
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## ABSTRACT

In 1982, the National Marine Fisheries Service under contract to the Bonneville Power Administration, began a 5-year study (Project 82-2) to determine if transporting steelhead, Salmo gairdneri, smolts by barge from Dworshak National Fish Hatchery to a release site in the Columbia River below Bonneville Dam would result in increased returns of adults to the various fisheries and to the hatchery homing site.

During 1982 and 1983 over 500,000 juveniles were marked for the study. Adults have returned to in-river sampling sites, to the sport and Indian fisheries, and to the Dworshak National Fish Hatchery homing site from these groups of fish that were serially released as controls from the hatchery or barged as test fish to below Bonneville Dam. During 1983-84, a total of 4,430 adult steelhead recoveries were recorded. Though recoveries so far are numerous, evaluation will not be possible until returns are complete in all sampling areas.

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## INTRODUCTION

The National Marine Fisheries Service (NMFS) began a 5-year study in 1982 under contract to the Bonneville Power Administration to determine if transporting steelhead, Salmo gairdneri, smolts directly from Dworshak National Fish Hatchery (NFH) to a release point below Bonneville Dam on the Columbia River would increase returns of adults to the hatchery and various fisheries. In 1982 and 1983, eight groups of approximately 30,000 juvenile steelhead were marked and released each year for the study (Tables 1 and 2).

The primary objectives of this study are as follows:

1. Determine if steelhead reared and imprinted at Dworshak NFH and transported by truck to a transfer site near Lewiston, Idaho; transferred into a barge; and transported to a release site in the Columbia River below Bonneville Dam and released will return as adults to the hatchery and to the fishery in Idaho in greater numbers than fish released directly into the river at the hatchery.
2. Determine the proportion of fish in each test release that have accepted a homing imprint.
3. Determine the relationship between the physiological condition of steelhead and their ability to imprint.

During 1984, we have been monitoring returning adult steelhead to:

- (1) our adult collection facilities at Bonneville, McNary, and Lower Granite Dams; (2) the sport fishery on the Columbia, Snake, and Clearwater Rivers; (3) the Indian fishery; and (4) the Dworshak NFH homing site. This report summarizes adult recovery efforts in 1984.

Table 1.--Returns of adult steelhead from marked groups of juveniles released in the spring of 1982 from Dworshak National Fish Hatchery. Recoveries were made through December 1984 (preliminary).

Test Number	Date juveniles released	Number juveniles released	Number of adults recaptured													
			Bonneville Dam		McNary Dam		Lower Granite Dam		Sport Fishery		Indian Fishery		Ocean Fishery	Dworshak Hatchery	Total	
			1-ocean age	2-ocean age	1-ocean age	2-ocean age	1-ocean age	2-ocean age	1-ocean age	2-ocean age	1-ocean age	2-ocean age	1-ocean age	1-ocean age	1-ocean age	2-ocean age
Control (C1)	4-19-82	29,838	3	169	0	21	33	344	12	24	2	129	1	10	61	687
Test (T1)	4-19-82	33,012	4	142	1	50	8	44	0	5	3	122	0	8	24	363
Test (T1A)	4-19-82	32,185	3	117	0	24	6	32	4	6	0	118	0	4	17	297
Control (C2)	4-30-82	31,048	6	214	0	9	43	314	6	25	5	129	0	12	72	691
Test (T2)	4-30-82	32,911	6	314	1	47	26	112	5	14	11	262	0	11	60	749
Control (C3)	5-19-82	31,714	5	126	0	13	18	226	3	8	1	100	0	6	33	473
Test (T3)	5-19-82	29,456	8	307	2	32	15	56	0	5	4	173	0	13	42	573
Test (T4)	5-31-82	31,915	2	58	0	17	6	5	0	3	0	51	1	2	11	134
Total		252,079	37	1,447	4	213	155	1,133	30	90	26	1,084	2	66	320	3,967

Because of differences in sampling intensity at each sampling site, these results are not comparable between sites.

Table 2.--Preliminary returns of adult steelhead from marked groups of juveniles released in the spring of 1983 from Dworshak National Fish Hatchery. Recoveries were made through December 1984.

Test Number	Date juveniles released	Number juveniles released	Number of adults recaptured							Total
			Bonneville Dam	McNary Dam	Lower Granite Dam	Sport Fishery	Indian Fishery	Ocean Fishery	Dworshak Hatchery	
Control (C1)	4-20-83	33,178	2	1	10	0	0	0	0	13
Test (T1)	4-20-83	30,341	3	1	2	2	2	0	0	10
Test (T1A)	4-20-83	28,658	7	0	3	0	4	0	0	14
Control (C2)	5-3-83	32,236	9	0	11	0	4	0	0	24
Control (C2A)	5-3-83	31,956	1	0	6	1	1	0	0	9
Test (T2)	5-3-83	32,465	35	2	13	2	17	0	0	69
Control (C3)	5-25-83	30,751	1	0	1	0	0	0	0	2
Test (T3)	5-24-83	31,906	0	2	0	0	0	0	0	2
Total		251,491	58	6	46	5	28	0	0	143

Because of differences in sampling intensity at each sampling site, these results are not comparable between sites.

## METHODS

### Adult Collection Facilities at Dams

Adult trapping facilities at Bonneville and McNary Dams on the Columbia River and Lower Granite Dam on the Snake River were operated in 1984. All facilities were operated during the fall months. The trap at Lower Granite Dam was also monitored during the spring of 1984 since many Dworshak NFH steelhead overwinter in the Snake River below Lower Granite Dam before continuing their migration to the Clearwater River. The operation of all three trapping facilities were similar; however, at Bonneville and McNary Dams, the traps were located in the north fishways only, and hence only a small portion of the Columbia River steelhead population was sampled. At Lower Granite Dam virtually the entire Snake River run was sampled.

These in-river trapping facilities provide separation of tagged fish from the untagged adult population. Fish entering the trapping area pass over a false weir and slide downward through a detection coil into a smooth horizontal trough. If the fish is tagged, the magnetic field is interrupted, and a signal is transmitted to a solenoid that activates an air ram that operates a gate which shunts the tagged fish to a holding area (Durkin et al. 1969; Ebel 1974). Fish that are not tagged are simply diverted back to the main fishway. Tagged fish are removed from the holding area with a dipnet placed in an anesthetic tank, anesthetized, measured, jaw tagged, and identified by brand. By reading the freeze brand, we can tell which group of fish is represented. Fish are then allowed to recover in fresh water before being released. The fish are jaw tagged for identification and recovery in the various fisheries and at hatcheries (Gilbreath et al. 1976; Slatick 1976). Some fish were recovered more than once and recaptured fish are



included in all data summaries. When the data are analyzed, comparisons will be made between treatment (experimental) groups in each recovery area and thus all fish recovered can be used whether recaptured or not. From these recoveries, we are able to identify straying as well as obtain trapping efficiencies for expansion purposes when returns are complete.

#### Sampling in Fisheries and Hatcheries

We have been monitoring the sport fishery since October 1984. The area with the largest concentrations of fishing pressure and fish (Clearwater River and the Snake River near its confluence with the Clearwater River) receives the majority of our sampling effort. Recoveries come from sport fishermen in the form of jaw tags and fish snouts containing coded wire tags.

Most recoveries from the Columbia River Zone 6 fall and winter Indian fishery come from sampling by the Oregon Department of Fish and Wildlife (ODFW) and the Washington Department of Game. We also receive voluntary recoveries from tribal members fishing the Clearwater River in Idaho.

Adult steelhead enter Dworshak NFH through a fish ladder and are held in adult holding ponds until mature enough to spawn. Generally, hatchery personnel check each fish weekly. If the fish is not ripe, it is returned to one of the holding ponds to be checked during spawning the following week. Mature fish are killed, spawned, and checked for a coded wire tag. All snouts of tagged fish are retained for extraction and decoding of the coded wire tag at a later date.

#### RESULTS AND DISCUSSION

A total of 3,099 marked adult steelhead recoveries were observed at our adult collection facilities since August 1983 (Appendix Tables B1-B16). Most

of these returns (2,793) were 2-ocean age fish released in 1982 (Table 1). The relatively large number of marked 2-ocean age fish observed at Bonneville Dam (1,447) resulted from approximately a 30% sample of the steelhead run during the time period when Dworshak NFH fish were in the Columbia River in 1984. Returns of 2-ocean age fish to McNary Dam were substantially lower (213) reflecting a much reduced sampling rate (approximately 4%) at that dam. Returns of 2-ocean age fish to Lower Granite Dam totaled 1,133. Since many Dworshak NFH steelhead overwinter in the Snake River below Lower Granite Dam, we expect a large number of 2-ocean age returns to this facility in the spring of 1985. Because of differences in sampling rates between the collection facilities and because of incomplete returns to Lower Granite Dam, it is too early to predict differences in homing or survival between groups of test and control fish.

Returns of 1-ocean age fish to our adult collectors from 1983 releases total 110 (Table 2). This is slightly lower than the 153 1-ocean age fish collected from 1982 releases in 1983 (Harmon and Slatick 1983). These data suggest that survival of the 1983 fish released may be reduced. Since most Dworshak NFH steelhead return as 2-ocean age fish, however, it is clearly too early to make any assumptions from these early returns.

As of 31 December 1984, we have recovered 90 2-ocean age and 35 1-ocean age steelhead in the sport fishery (Tables 1 and 2). The sport fishing season remains open with liberal daily and season catch limits on the Snake and Clearwater Rivers until 30 April 1985. We expect to receive many more tag returns from this fishery.

We have received a preliminary summary of the 1984 fall Zone 6 Indian fishery returns from ODFW (Appendix Table B17). These preliminary data

indicate a large return of approximately 1,092 steelhead and are included in the Indian fishery catch in Tables 1 and 2. We are now verifying the tag codes from these tags and upon completion they will be added to data summaries in Appendix Tables B1-B16.

Only 1-ocean age fish from 1982 releases have returned to Dworshak NFH. We expect a large return of 2-ocean age fish from the 1982 releases along with a lesser number of 1-ocean age fish from the 1983 releases in the spring of 1985.

#### SUMMARY AND CONCLUSIONS

1. In 1982 and 1983, we marked eight groups of approximately 30,000 juvenile steelhead each year for a total of over 500,000 fish. Adults from these groups of fish that were serially released as controls from the hatchery or barged as test fish to below Bonneville Dam are returning to our adult in-river sampling sites, to the sport and Indian fisheries, and to the Dworshak NFH homing site.

2. Returns to the adult collection facilities at Bonneville, McNary, and Lower Granite Dams total 3,099 fish. Most of these recoveries are from 2-ocean age 1982 released steelhead (2,793). Although returns are still preliminary, it is apparent from the large number of adult returns that survival of juveniles released in 1982 was excellent. Until this season's recoveries at the Lower Granite Dam trapping facility and the Dworshak NFH homing site are complete, we will not be able to evaluate differences between control and test groups of fish.

3. As of 31 December 1984, we have recovered 125 steelhead in the sport fishery and 1,138 steelhead in the Indian fishery. Most of these recoveries

are from 2-ocean age fish released as juveniles in 1982. Although these recoveries are not complete, indications are that returns will be high in both fisheries.

#### ACKNOWLEDGMENT

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APPENDIX A

Expenditure Information

### Expenditure Information

#### A. Summary of expenditures:

1. Labor	\$60.4K
2. Travel of persons	2.1
3. Transportation of things	6.8
4. Rent, communications, and utilities	3.1
5. Printing and reproduction	0.0
6. Contract services	14.3
7. Supplies, materials, and equipment	3.0
8. SLUC	1.5
9. NOAA and DOC overhead	<u>24.8</u>
TOTAL	<u>116.0K</u>

#### B. Major property items:

None



**APPENDIX B**

**Adult Recovery Summaries**

Appendix Table B1.--Preliminary returns of 2-ocean age steelhead from mark release group with  
Wire Code 230606.

1/16/85

1982 DWORSHAK - CONTROL (C1)  
STEELHEAD

MARKS USED LAK 3 230606 NUMBER RELEASED 29838

RECOVERY AREA	1982	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS					
BONNEVILLE TRAP	0	3	169	172	0.576
MCNARY TRAP	0	0	21	21	0.070
LOWER GRANITE TRAP	0	33	344	377	1.263
OCEAN FISHERIES					
OTHER	0	1	0	1	0.003
RIVER SPORT					
COLUMBIA R. BELOW SNAKE R.	0	0	3	3	0.010
COLUMBIA R. ABOVE SNAKE R.	0	1	0	1	0.003
SNAKE RIVER	0	11	18	29	0.097
OTHER	0	0	3	3	0.010
RIVER COMMERCIAL	0	0	0	0	0.000
INDIAN FISHERY	0	2	3	5	0.016
HATCHERIES					
DWORSHAK H.	0	10	0	10	0.033
TOTALS	0	61	561	622	2.084
PERCENT OF RECOVERY	0.0	9.8	90.1		

Appendix Table B2.--Preliminary returns of 2-ocean age steelhead from mark release group with Wire Code 230608.

1/16/85

1982 DWORSHAK - TEST (T1)  
STEELHEAD

MARKS USED	RAL 4	230608	NUMBER RELEASED		33012
RECOVERY AREA	1982	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS					
BONNEVILLE TRAP	0	4	142	146	0.442
MCNARY TRAP	0	1	50	51	0.154
LOWER GRANITE TRAP	0	8	44	52	0.157
OCEAN FISHERIES	0	0	0	0	0.000
RIVER SPORT					
COLUMBIA R. BELOW SNAKE R.	0	0	2	2	0.006
COLUMBIA R. ABOVE SNAKE R.	0	0	0	0	0.000
SNAKE RIVER	0	0	2	2	0.006
OTHER	0	0	1	1	0.003
RIVER COMMERCIAL	0	0	0	0	0.000
INDIAN FISHERY	0	3	2	5	0.015
HATCHERIES					
DWORSHAK H.	0	8	0	8	0.024
TOTALS	0	24	243	267	0.808
PERCENT OF RECOVERY	0.0	8.9	91.0		

Appendix Table B3.--Preliminary returns of 2-ocean age steelhead from mark release group with Wire Code 230607.

1982 DWORSHAK - TEST (T1A)  
STEELHEAD

1/16/85

MARKS USED RAL 3 230607 NUMBER RELEASED 32185

RECOVERY AREA	1982	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS					
BONNEVILLE TRAP	0	3	117	120	0.372
MCNARY TRAP	0	0	24	24	0.074
LOWER GRANITE TRAP	0	6	32	38	0.118
OCEAN FISHERIES	0	0	0	0	0.000
RIVER SPORT					
COLUMBIA R. BELOW SNAKE R.	1	0	2	3	0.009
COLUMBIA R. ABOVE SNAKE R.	0	0	0	0	0.000
SNAKE RIVER	0	3	1	4	0.012
OTHER	0	0	3	3	0.009
RIVER COMMERCIAL	0	0	0	0	0.000
INDIAN FISHERY	0	0	2	2	0.006
HATCHERIES					
DWORSHAK H.	0	4	0	4	0.012
TOTALS	1	16	181	198	0.615
PERCENT OF RECOVERY	0.5	8.0	91.4		

Appendix Table B4.--Preliminary returns of 2-ocean age steelhead from mark release group with  
Wire Code 231604.

1/16/85

1982 DWORSHAK - CONTROL (C2)  
STEELHEAD

MARKS USED LAK 2 231604

NUMBER RELEASED 31048

RECOVERY AREA	1982	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS					
BONNEVILLE TRAP	0	6	214	220	0.708
MCNARY TRAP	0	0	9	9	0.028
LOWER GRANITE TRAP	0	43	314	357	1.149
OCEAN FISHERIES	0	0	0	0	0.000
RIVER SPORT					
COLUMBIA R. BELOW SNAKE R.	0	0	5	5	0.016
COLUMBIA R. ABOVE SNAKE R.	0	0	0	0	0.000
SNAKE RIVER	0	6	19	25	0.080
OTHER	0	0	1	1	0.003
RIVER COMMERCIAL	0	0	0	0	0.000
INDIAN FISHERY	0	5	1	6	0.019
HATCHERIES					
DWORSHAK H.	0	12	0	12	0.038
TOTALS	0	72	563	635	2.045
PERCENT OF RECOVERY	0.0	11.3	88.6		

Appendix Table B5.--Preliminary returns of 2-ocean age steelhead from mark release group with  
Wire Code 231605.

1/16/85

1982 DWORSHAK - TEST (T2)  
STEELHEAD

MARKS USED RAL 2 231605 NUMBER RELEASED 32911

RECOVERY AREA	1982	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS					
BONNEVILLE TRAP	0	6	314	320	0.972
MCNARY TRAP	0	1	47	48	0.145
LOWER GRANITE TRAP	0	26	112	138	0.419
OCEAN FISHERIES	0	0	0	0	0.000
RIVER SPORT					
COLUMBIA R. BELOW SNAKE R.	0	1	9	10	0.030
COLUMBIA R. ABOVE SNAKE R.	0	0	0	0	0.000
SNAKE RIVER	0	4	5	9	0.027
RIVER COMMERCIAL	0	0	0	0	0.000
INDIAN FISHERY	0	11	3	14	0.042
HATCHERIES					
DWORSHAK H.	0	11	0	11	0.033
TOTALS	0	60	490	550	1.671
PERCENT OF RECOVERY	0.0	10.9	89.0		

Appendix Table B6.--Preliminary returns of 2-ocean age steelhead from mark release group with  
Wire Code 231602.

1/16/85

1982 DWORSHAK - CONTROL (C3)  
STEELHEAD

MARKS USED LAK 1 231602 NUMBER RELEASED 31714

RECOVERY AREA	1982	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS					
BONNEVILLE TRAP	0	5	126	131	0.413
MCNARY TRAP	0	0	13	13	0.040
LOWER GRANITE TRAP	0	18	226	244	0.769
OCEAN FISHERIES	0	0	0	0	0.000
RIVER SPORT					
COLUMBIA R. BELOW SNAKE R.	0	0	2	2	0.006
COLUMBIA R. ABOVE SNAKE R.	0	0	0	0	0.000
SNAKE RIVER	0	3	6	9	0.028
RIVER COMMERCIAL	0	0	0	0	0.000
INDIAN FISHERY	0	1	2	3	0.009
HATCHERIES					
DWORSHAK H.	0	6	0	6	0.018
TOTALS	0	33	375	408	1.286
PERCENT OF RECOVERY	0.0	8.0	91.9		

Appendix Table B7.--Preliminary returns of 2-ocean age steelhead from mark release group with Wire Code 231603.

1/16/85

1982 DWORSHAK - TEST (T3)

STEELHEAD

MARKS USED      RAPP1      231603      NUMBER RELEASED      29456

RECOVERY AREA	1982	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS					
BONNEVILLE TRAP	0	8	307	315	1.069
MCNARY TRAP	0	2	32	34	0.115
LOWER GRANITE TRAP	0	15	56	71	0.241
OCEAN FISHERIES	0	0	0	0	0.000
RIVER SPORT					
COLUMBIA R. BELOW SNAKE R.	0	0	2	2	0.006
COLUMBIA R. ABOVE SNAKE R.	0	0	0	0	0.000
SNAKE RIVER	0	0	3	3	0.010
RIVER COMMERCIAL	0	0	0	0	0.000
INDIAN FISHERY	0	4	5	9	0.030
HATCHERIES					
DWORSHAK H.	0	13	0	13	0.044
TOTALS	0	42	405	447	1.517
PERCENT OF RECOVERY	0.0	9.3	90.6		



Appendix Table B8.--Preliminary returns of 2-ocean age steelhead from mark release group with Wire Code 231601.

1/16/85

1982 DWORSHAK - TEST (T4)  
STEELHEAD

MARKS USED RAL 1 231601 NUMBER RELEASED 31915

RECOVERY AREA	1982	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS					
BONNEVILLE TRAP	0	2	58	60	0.187
MENARY TRAP	0	0	17	17	0.053
LOWER GRANITE TRAP	0	6	5	11	0.034
OCEAN FISHERIES					
OTHER	0	1	0	1	0.003
RIVER SPORT					
COLUMBIA R. BELOW SNAKE R.	0	0	2	2	0.006
COLUMBIA R. ABOVE SNAKE R.	0	0	0	0	0.000
SNAKE RIVER	0	0	1	1	0.003
RIVER COMMERCIAL	0	0	0	0	0.000
INDIAN FISHERY	0	0	0	0	0.000
HATCHERIES					
DWORSHAK H.	0	2	0	2	0.006
TOTALS	0	11	83	94	0.294
PERCENT OF RECOVERY	0.0	11.7	88.2		

Appendix Table B9.--Preliminary returns of 1-ocean age steelhead from mark release group with Wire Code 231638.

1/16/85

1983 DWORSHAK - CONTROL (C1)  
STEELHEAD

MARKS USED      LAW 1      231638      NUMBER RELEASED      33178

RECOVERY AREA	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS				
BONNEVILLE TRAP	0	2	2	0.006
MCNARY TRAP	0	1	1	0.003
LOWER GRANITE TRAP	0	10	10	0.030
OCEAN FISHERIES	0	0	0	0.000
RIVER SPORT	0	0	0	0.000
RIVER COMMERCIAL	0	0	0	0.000
INDIAN FISHERY	0	0	0	0.000
HATCHERIES	0	0	0	0.000
TOTALS	0	13	13	0.039
PERCENT OF RECOVERY	0.0	100.0		

Appendix Table B10.--Preliminary returns of 1-ocean age steelhead from mark release group with Wire Code 231640.

1/16/85

1983 DWORSHAK - TEST (T1)  
STEELHEAD

MARKS USED      RAF 1      231640      NUMBER RELEASED      30341

RECOVERY AREA	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS				
BONNEVILLE TRAP	0	3	3	0.009
MCNARY TRAP	0	1	1	0.003
LOWER GRANITE TRAP	0	2	2	0.006
OCEAN FISHERIES	0	0	0	0.000
RIVER SPORT				
COLUMBIA R. BELOW SNAKE R.	0	1	1	0.003
COLUMBIA R. ABOVE SNAKE R.	0	0	0	0.000
SNAKE RIVER	0	1	1	0.003
RIVER COMMERCIAL	0	0	0	0.000
INDIAN FISHERY	0	0	0	0.000
HATCHERIES	0	0	0	0.000
TOTALS	0	8	8	0.026
PERCENT OF RECOVERY	0.0	100.0		

Appendix Table B11.--Preliminary returns of 1-ocean age steelhead from mark release group with  
Wire Code 231639.

1/16/85

1983 DWORSHAK - TEST (T1A)  
STEELHEAD

MARKS USED      RAZ 1      231639      NUMBER RELEASED      28658

RECOVERY AREA	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS				
BONNEVILLE TRAP	0	7	7	0.024
MCNARY TRAP	0	0	0	0.000
LOWER GRANITE TRAP	0	3	3	0.010
OCEAN FISHERIES	0	0	0	0.000
RIVER SPORT	0	0	0	0.000
RIVER COMMERCIAL	0	0	0	0.000
INDIAN FISHERY	0	0	0	0.000
HATCHERIES	0	0	0	0.000
TOTALS	0	10	10	0.034
PERCENT OF RECOVERY	0.0	100.0		

Appendix Table B12.--Preliminary returns of 1-ocean age steelhead from mark release group with Wire Code 231616.

1/16/85

1983 DWORSHAK - CONTROL (C2)

STEELHEAD

MARKS USED      LAW 2      231616      NUMBER RELEASED      32236

RECOVERY AREA	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS				
BONNEVILLE TRAP	0	9	9	0.027
MCNARY TRAP	0	0	0	0.000
LOWER GRANITE TRAP	0	11	11	0.034
OCEAN FISHERIES	0	0	0	0.000
RIVER SPORT	0	0	0	0.000
RIVER COMMERCIAL	0	0	0	0.000
INDIAN FISHERY	0	2	2	0.006
HATCHERIES	0	0	0	0.000
TOTALS	0	22	22	0.068
PERCENT OF RECOVERY	0.0	100.0		

Appendix Table B13.--Preliminary returns of 1-ocean age steelhead from mark release group with Wire Code 231619.

1983 DWORSHAK - CONTROL (C2A)					1/16/85	
STEELHEAD						
MARKS USED	RAF 3	231619			NUMBER RELEASED	31956
RECOVERY AREA	1983	1984			TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS						
BONNEVILLE TRAP	0	1			1	0.003
MCNARY TRAP	0	0			0	0.000
LOWER GRANITE TRAP	0	6			6	0.018
OCEAN FISHERIES	0	0			0	0.000
RIVER SPORT						
COLUMBIA R. BELOW SNAKE R.	0	0			0	0.000
COLUMBIA R. ABOVE SNAKE R.	0	0			0	0.000
SNAKE RIVER	0	1			1	0.003
RIVER COMMERCIAL	0	0			0	0.000
INDIAN FISHERY	0	0			0	0.000
HATCHERIES	0	0			0	0.000
TOTALS	0	8			8	0.025
PERCENT OF RECOVERY	0.0	100.0				

Appendix Table B14.--Preliminary returns of 1-ocean age steelhead from mark release group with Wire Code 231617.

1/16/85

1983 DWORSHAK - TEST (T2)

STEELHEAD

MARKS USED	RAF 2	231617	NUMBER RELEASED	32456
RECOVERY AREA	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS				
BONNEVILLE TRAP	0	35	35	0.107
MCNARY TRAP	0	2	2	0.006
LOWER GRANITE TRAP	0	13	13	0.040
OCEAN FISHERIES	0	0	0	0.000
RIVER SPORT				
COLUMBIA R. BELOW SNAKE R.	0	2	2	0.006
COLUMBIA R. ABOVE SNAKE R.	0	0	0	0.000
SNAKE RIVER	0	0	0	0.000
RIVER COMMERCIAL	0	0	0	0.000
INDIAN FISHERY	0	0	0	0.000
HATCHERIES	0	0	0	0.000
TOTALS	0	52	52	0.160
PERCENT OF RECOVERY	0.0	100.0		

Appendix Table B15.--Preliminary returns of 1-ocean age steelhead from mark release group with Wire Code 231620.

1/16/85

1983 DWORSHAK - CONTROL (C3)  
STEELHEAD

MARKS USED      RAF 4      231620      NUMBER RELEASED      30751

RECOVERY AREA	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS				
BONNEVILLE TRAP	0	1	1	0.003
MCNARY TRAP	0	0	0	0.000
LOWER GRANITE TRAP	0	1	1	0.003
OCEAN FISHERIES	0	0	0	0.000
RIVER SPORT	0	0	0	0.000
RIVER COMMERCIAL	0	0	0	0.000
INDIAN FISHERY	0	0	0	0.000
HATCHERIES	0	0	0	0.000
TOTALS	0	2	2	0.006
PERCENT OF RECOVERY	0.0	100.0		



Appendix Table B16.--Preliminary returns of 1-ocean age steelhead from mark release group with Wire Code 231618.

1/16/85

1983 DWORSHAK - TEST (T3)  
STEELHEAD

MARKS USED LAW 3 231618

NUMBER RELEASED 31906

RECOVERY AREA	1983	1984	TOTALS	PERCENT RETURN
RIVER SYSTEM LIVE TRAPS				
BONNEVILLE TRAP	0	0	0	0.000
MCNARY TRAP	0	2	2	0.006
LOWER GRANITE TRAP	0	0	0	0.000
OCEAN FISHERIES	0	0	0	0.000
RIVER SPORT	0	0	0	0.000
RIVER COMMERCIAL	0	0	0	0.000
INDIAN FISHERY	0	0	0	0.000
HATCHERIES	0	0	0	0.000
TOTALS	0	2	2	0.006
PERCENT OF RECOVERY	0.0	100.0		

Appendix Table B17.--Preliminary returns of coded wire tags recovered from Dworshak National Fish Hatchery steelhead sampled in the Zone 6 Indian Fishery on the Columbia River in 1984 (from a preliminary summary by the Oregon Department of Fish and Wildlife).

Group	Date juveniles released	Number juveniles released	Number of adults recaptured in Indian Fishery
<u>1982 Releases</u>			
Control (C1)	4-19-82	28,838	126
Test (T1)	4-19-82	33,012	120
Test (T1A)	4-19-82	32,185	116
Control (C2)	4-30-82	31,048	128
Test (T2)	4-30-82	32,911	259
Control (C3)	5-19-82	31,714	98
Test (T3)	5-19-82	29,456	168
Test (T4)	5-31-82	31,915	51
		Total	<u>1,066</u>
<u>1983 Releases</u>			
Test (T1)	4-20-83	30,341	2
Test (T1A)	4-20-83	28,658	4
Control (C2)	5-3-83	32,236	2
Control (C2A)	5-3-83	31,956	1
Test (T2)	5-3-83	32,465	17
		Total	<u>26</u>